



## Disaster Response Handbook

The Disaster Response Handbook is a resource for county Extension agents and other Extension faculty to use to advise the public on coping with disasters. Disasters come in many forms, such as tornadoes, floods, earthquakes, drought, ice storms, disease outbreaks, fire and, more recently, terrorist acts. As you review this Disaster Response Handbook, you should understand that it has been developed as a resource guide and that Extension faculty are not expected to be experts in all the areas listed in the handbook. This book features a number of fact sheets grouped by disaster. It also lists Disaster Assistance Contacts at the local, state and national levels. It is imperative to continue to update this handbook as fact sheets are revised. The handbook is designed so that items can be easily duplicated and distributed to the public as needed.

### Index

#### How to Use This Reference

- Disaster Preparation
- During the Disaster
- After the Disaster

#### Disaster Assistance Contacts

- County Contacts
- State Contacts
- Regional Contacts
- National Contacts
- Religious and Community Service Organizations

#### Disaster Preparedness

- Disasters - What Can Youth Do?
- Basic First Aid
- Emergency CPR

#### Droughts

- University of Arkansas Cooperative Extension Service Fact Sheets Related to Drought Management
- Dry Weather Management for Cattle
- Maintaining Herd Productivity During Drought
- Drought Stricken Forages Often Present Nitrate Toxicity
- When Water and Feed Supplies Become a Concern
- To Keep or to Sell Calves in the Drought?

#### Earthquakes

- Earthquake Survival
- U.S. Earthquake Hazard Map
- Earthquake Preparedness (FSA9600)
- Disaster Response for Volunteers

#### Farm/Home Biosecurity

- Biosecurity Protection for Beef Cattle Operations
- Biosecurity – It's Everybody's Concern
- Cattle Biosecurity
- Biosecurity Guidelines of National Cattlemen's Beef Association
- Rules Veterinarians Practice Under
- Crop Biosecurity and Bioterrorism
- Biosecurity Protection for Fish Operations
- What to Expect in Case of a Foreign Animal Disease Outbreak
- Guidelines for Large Dead Animal Disposal by Burial
- Avian or Asian Bird Flu

#### Financial

- Managing Financial Losses from a Natural Disaster (FSHEC67)
- Replacing Valuable Papers (FSHEC45)
- Steps to Take to Repair Damages
- Recovering the Value of Storm Damaged Timber from Taxes

#### Fires

- How to Reduce Wildfire Risk (Contact The National Arbor Day Foundation and ask for Tree City USA Bulletin #41)
- Arkansas FireWise  
<http://www.arkansasfirewise.com/>
- Arkansas FireWise - Creating a Defensible Space  
<http://www.arkansasfirewise.com/publications/defensiblebrochure.htm>
- Wildfires

#### Floods

- Emergency Procedures for Floods and Flash Floods

- Building Dikes to Prevent Minor Surface Flooding
- Disaster Response for Volunteers
- Electrical Safety During a Flood or Ice Storm
- Feeding Water-Damaged Feeds
- Flooded Private Sewage Systems
- Flooded Vehicles
- Flood-Related Diseases in Poultry and Livestock
- Handling Flood-Damaged Hay/Haylage Fields
- How to Salvage Flood-Damaged Appliances
- How to Save Upholstered Furniture, Carpet and Bedding
- Mold Detection, Prevention and Mitigation
- Septic Systems – What to Do After a Flood
- Well Disinfection
- What to Do During a Power Failure on the Farm
- What to Do With Private Wells and Pumps After a Flood
- What You Should Do if Your Water Well Has Been Flooded

#### Food/Potable Water

- Planning for Food after a Disaster (FSHED81)
- A Quick Consumer Guide to Safe Food Handling (FSHED82)
- Keeping Food Safe During an Emergency
- Seven Food Safety Tips for Successful Community Meals

#### Local Disasters

- Special Note to County Agents

#### Safety

- Disaster Rescue Procedures
- Standby Power Generators
- Using Standby Generators
- Using ATVs Safely During a Disaster
- Chain Saw Safety (FSA1009)
- Agricultural Aviation Security (FSA1038)
- Tree Removal Following a Storm
- Disaster Response for Volunteers
- Electrical Safety During a Flood or Ice Storm
- What to Do During a Power Failure on the Farm
- Basic First Aid
- Emergency CPR
- OSHA's Tips for Keeping Workers Safe in the Cold

#### Stress

- Dealing With Stress
- Children and Stress
- Helping Children Cope With Stress
- Recognizing Stress in Children
- Outreach Materials for Children

#### Tornadoes

- How to Spot a Tornado
- Seek Safety to Escape a Tornado
- Tornado Warnings – What They Mean
- Rules for Tornado Survival
- Tornado Survival for Mobile Home Owners
- Tornado Rescue Procedures
- Clearing a Path for Access After a Tornado
- Tornado Follow-Up
- Insurance for Repairs of Tornado Damage
- Recovery After a Tornado
- When Repairing, Remodeling or Building Your Home
- Managing Storm-Damaged Urban Trees
- Tree Removal Following a Storm
- What to Do During a Power Failure on the Farm

#### Ice, Snow, Cold and Storms

- Alternative Heat Sources
- Frozen Plumbing
- Freezers During Power Outage
- Ice and Snow Accumulations on Roofs
- Farm Practices During Ice and Snow
- Evaluating Ice Damage to Forest Stands
- Managing Storm-Damaged Urban Trees
- What to Do During a Power Failure on the Farm
- Tree Removal Following a Storm
- Electrical Safety During a Flood or Ice Storm
- OSHA's Tips for Keeping Workers Safe in the Cold

#### References

- Internet and Other Sources of Disaster - Related Educational Materials
- FireWise Landscaping for Woodland Homes, U.S. Forest Service  
<http://www.firewise.org/>
- Heating with Wood, MP247

- (Contact your County Extension Agent)
- Improving Home Water Quality, MP292  
(Contact your County Extension Agent)
  - [A Quick Consumer Guide to Safe Food Handling, FSHEd82](#)
  - [Chain Saw Safety, FSA1009](#)
  - [Tornado Safety, FSA1024](#)
  - [Skid-Steer Safety, FSA1025](#)
  - [Beef Cattle Herd Health Vaccination Schedule, FSA3009](#)
  - [Water for Beef Cattle, FSA3021](#)
  - [Nitrate Poisoning in Cattle, FSA3024](#)
  - [Common Arkansas Plants Poisonous to Cattle, FSA3025](#)
  - [Substituting Grain for Hay in Winter Rations for Beef Cows, FSA3036](#)
  - [Heat Stress in Dairy Cattle, FSA3040](#)
  - [Alternative Feeds for Beef Cattle, FSA3047](#)
  - [Replacing Valuable Papers, FSHEC45](#)
  - [Earthquake Preparedness, FSA9600](#)
  - [Managing Financial Losses From a Natural Disaster, FSHEC67](#)
  - [Planning for Food After a Disaster, FSHEd81](#)
  - [Nutritional Disorders in Beef Cattle, FSA3071](#)
  - [Agricultural Aviation Safety, FSA1038](#)

\*To read and access our information you must have [Adobe Acrobat Reader](#) loaded on your computer. To download this free program select the "Get Acrobat Reader" icon. Once you have Acrobat Reader loaded on your computer, just select the file you wish to read.



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Division of Agriculture  
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Privacy • FOI

How To Use  
this Reference



UNIVERSITY OF ARKANSAS  
DIVISION OF AGRICULTURE  
Cooperative Extension Service

University of Arkansas, United States Department of Agriculture, and County Governments Cooperating

## How to Use This Reference

Introduction

Disaster Preparation

During the Disaster

After the Disaster

## Introduction

The Disaster Response Handbook is a resource for county Extension agents and other Extension faculty to use to advise the public on coping with disasters. Disasters come in many forms, such as tornadoes, floods, earthquakes, drought, ice storms, disease outbreaks, fire and, more recently, terrorist acts. As you review this **Disaster Response Handbook**, you should understand that it has been developed as a resource guide and that Extension faculty are not expected to be experts in all the areas listed in the handbook. This book features a number of fact sheets grouped by disaster. It also lists Disaster Assistance Contacts at the local, state and national levels. It is imperative to continue to update this handbook as fact sheets are revised. The handbook is designed so that items can be easily duplicated and distributed to the public as needed.

### Disaster Preparation

County agents should develop a relationship with the local Office of Emergency Management (OEM) director and advise OEM of the resources you have in the CES Disaster Response Handbook. The County Judge can facilitate this relationship. You should plan for a disaster, when possible, so that Extension resources can be used to their fullest extent. Adequate preparation and education can reduce the chaos associated with most disasters. Unfortunately, most Extension educational efforts will be conducted during and after the disaster because of the unpredictability of disasters.

When time permits educational activities prior to an impending disaster, county agents should make the most of the time available. Contact the local Office of Emergency Management director and inform OEM of the types of educational assistance that can be expected from Extension, depending on the disaster. Media will usually be very receptive to placing educational materials in the paper and on the air if an impending disaster, such as an ice storm, is predicted. Issues such as food safety, preserving food

without electricity and the use of generators for supplemental power would be examples of topics that could be exploited prior to a predicted ice storm.

### During the Disaster

With the exception of droughts and floods, most other disasters are short-lived in duration. The Disaster Response Handbook has significant information that should be brought to the attention of the local OEM director for a given disaster. Awareness of problems being experienced by disaster victims can help gear the educational effort much as it does with other Extension educational programs that address a specific problem. Coalitions with agencies at the local level and the Red Cross should be established to help disseminate educational information.

### After the Disaster

Most of the county agent's efforts will likely be focused on education after the disaster. Because so many disasters are associated with power failures, it may be very difficult to reproduce and disseminate educational information. Again, working closely with coalitions of the Red Cross and other emergency personnel may be the best way to disseminate educational information.

There will be much more opportunity for educational assistance to disaster victims after a disaster since it may take weeks or months to clean up the damage. This handbook has many fact sheets that deal with cleanup and helping clientele get back to a normal life. It is also recommended that you evaluate your disaster efforts using input from the local citizens similar to the way you evaluate other Extension educational efforts.

Identification of other possible fact sheets and educational information that need to be developed to address future disasters should be brought to the attention of the appropriate specialist.

Disaster Assistance  
Contacts

## **Disaster Assistance Contacts**

County Contacts

State Contacts

Regional Contacts

National Contacts

Religious and Community Service Organizations

## County Contacts

Name	Phone Number
Emergency Management Coordinator .....	_____
County Sheriff .....	_____
Police .....	_____
Police .....	_____
Police .....	_____
Police .....	_____
Police .....	_____
Fire Chief .....	_____
Fire Chief .....	_____
Fire Chief .....	_____
Fire Chief .....	_____
Fire Chief .....	_____
Electric Utility .....	_____
Electric Utility .....	_____
Electrician or Electrical Supplies .....	_____
Electrician or Electrical Supplies .....	_____
Electrician or Electrical Supplies .....	_____
Gas Utility .....	_____
Gas Utility .....	_____
Church .....	_____
Church .....	_____
Church .....	_____
Church .....	_____
Church .....	_____
Homeless Shelter .....	_____
Radio .....	_____
Newspaper .....	_____
Newspaper .....	_____
Newspaper .....	_____
Television .....	_____

## State Contacts

### Arkansas Department of Emergency Management

P.O. Box 758, Conway, AR 72033

Phone: 501-730-9750 / Fax: 501-730-9754

[www.adem.state.ar.us](http://www.adem.state.ar.us)

The Arkansas Department of Emergency Management provides state-level leadership and coordination in an all-hazards approach to natural and man-caused emergencies and disasters.

### Arkansas National Guard State Headquarters

Camp Robinson Road

North Little Rock, AR 72199

Phone: 501-212-5100

[www.arguard.org](http://www.arguard.org)

### Arkansas State Highway and Transportation Department

10324 Interstate 30

Little Rock, AR 72209

Phone: 501-569-2227 / Fax: 501-569-2400

24-Hour Emergency: 501-569-2000

Email: [info@arkansashighway.com](mailto:info@arkansashighway.com)

[www.ahtd.state.ar.us](http://www.ahtd.state.ar.us)

### Weather-Related Road Conditions

Phone: 501-569-2374

Toll-Free Phone: 1-800-245-1672

### American Red Cross

401 S. Monroe St. (24-hour services)

Little Rock, AR 72205-5410

Phone: 501-748-1030 / Fax: 501-666-5060

[www.redcrosslittlerock.org](http://www.redcrosslittlerock.org)

### Civil Air Patrol

Arkansas Wing Headquarters

2201 Crisp Drive

Little Rock, AR 72202

Phone: 501-376-1729

### Federal Bureau of Investigation

Little Rock Field Office

24 Shackleford West Blvd.

Little Rock, AR 72211

Phone: 501-221-9100 / Fax: 501-221-8509

[www.little.rock.fbi.gov](http://www.little.rock.fbi.gov)

### Poison Control

Little Rock, AR

Phone: 1-800-222-1222

### Liquified Petroleum Gas Board

LP Gas Board Bldg.

3800 Richards Road

North Little Rock, AR 72117

Phone: 501-683-4100

[www.arkansaslpgasboard.com](http://www.arkansaslpgasboard.com)

The Liquid Petroleum Gas Board provides resources to carry out the regulations governing the safe handling of liquified gas.

### Spanish Translation

#### American Red Cross

401 S. Monroe St. (24-hour services)

Little Rock, AR 72205-5410

Phone: 501-614-1021 / Fax: 501-666-5060

[www.redcrosslittlerock.org](http://www.redcrosslittlerock.org)

### State Plant Board

#1 Natural Resources Drive

Little Rock, AR 72205

Phone: 501-225-1598

[www.plantboard.org](http://www.plantboard.org)

The State Plant Board serves the agricultural and business communities by providing information and enforcement of laws and regulations.

### State Veterinarian Office

Arkansas Livestock and Poultry Commission

#1 Natural Resources Drive

P.O. Box 8505

Little Rock, AR 72205

Phone: 501-907-2400

Email: [info@arlpc.org](mailto:info@arlpc.org)

[www.arlpc.org](http://www.arlpc.org)

To safeguard human and animal health, assure food safety and quality and promote Arkansas livestock and poultry industries for our citizens.

### Small Business Administration (SBA)

2120 Riverfront Drive

Little Rock, AR 72202

Phone: 501-324-5871

Aids counseling, assisting and protecting the interests of small businesses by helping families and businesses recover from national disasters.

## **Arkansas Department of Environmental Quality**

8001 National Drive  
Little Rock, AR 72209  
Phone: 501-682-0744 or 501-372-0688  
[www.adeq.state.ar.us](http://www.adeq.state.ar.us)

Protects Arkansas' natural resources from pollution.

### **Emergency Response**

Phone: 800-322-4012 (for emergencies)

Fax: 501-682-0789

[www.adeq.state.ar.us/mgtsvs/erc/default.htm](http://www.adeq.state.ar.us/mgtsvs/erc/default.htm)

Coordinates first response to oil and chemical releases in Arkansas.

### **Regulated Fuel Storage Tanks Division**

Phone: 501-682-0999 or 501-682-0971

[www.adeq.state.ar.us/rst.default.htm](http://www.adeq.state.ar.us/rst.default.htm)

Prevention and remediation of pollution from regulated tank systems through rule making, compliance monitoring/enforcement and corrective action.

## **Arkansas Department of Finance and Administration**

[www.state.ar.us/dfa](http://www.state.ar.us/dfa)

### **Income Tax Administration**

Room 112, Ledbetter Building

7th and Wolfe Streets

P.O. Box 8110

Little Rock, AR 72203

Phone: 501-682-1130 / Fax: 501-682-1691

### **Taxpayer Assistance Office**

Phone: 501-682-7751

### **Tax Credits/Special Refunds**

Phone: 501-682-7106

### **Corporation Income Tax Section**

SBS Building, Suite 400

501 Woodlane Street

Little Rock, AR 72201-1023

Manager: Joe Ellis

E-mail: [joe.ellis@rev.state.ar.us](mailto:joe.ellis@rev.state.ar.us)

Phone: 501-682-4775 / Fax: 501-682-7114

Provides technical assistance to corporate customers, CPAs and other tax preparers.

Processes, examines and audits corporation income tax returns and refund claims.

## **Arkansas Forestry Commission**

Phone: 1-800-468-8834

24-hour dispatch to report a wildfire

[www.forestry.state.ar.us](http://www.forestry.state.ar.us)

## **National Weather Service**

8400 Remount Rd.

North Little Rock, AR 72118

Phone: 501-834-0308

[www.srh.noaa.gov](http://www.srh.noaa.gov)

Provides weather forecasts, current weather, watches and warnings for protection of life and property and enhancing the economy.

## **Division of Agriculture**

University of Arkansas

Springdale Diagnostic Laboratory

3559 N. Thompson Street

Springdale, AR 72764

479-751-4869

## **U.S. Department of Agriculture**

### **Plant Protection and Quarantine**

#### **APHIS-Animal & Plant Health**

Suite 100, 1200 Cherry Brook Drive

Little Rock, AR 72211-3861

Phone: 501-324-5258

### **Veterinary Services**

Suite 300, 1200 Cherry Brook Drive

Little Rock, AR 72211-3861

Phone: 501-224-9515 / Fax: 501-224-5823

### **Farm Service Agency**

Room 3416, 700 West Capitol Avenue

Little Rock, AR 72201-3225

Phone: 501-301-3000

Emergency: 501-749-8103

[www.fsa.usda.gov/ar/ar.htm](http://www.fsa.usda.gov/ar/ar.htm)

### **Natural Resources Conservation Service (NRCS)**

Room 3416, 700 West Capitol Avenue

Little Rock, AR 72201-3225

Phone: 501-301-3100

[www.ar.nrcs.gov](http://www.ar.nrcs.gov)

## **U.S. Army Corps of Engineers**

Public Affairs Office

Little Rock District

P.O. Box 867

Little Rock, AR 72203-0867

Phone: 501-324-5551

Emergency: 501-324-5695

[www.swl.usace.army.mil](http://www.swl.usace.army.mil)

Provides expertise to meet water resources development, military construction, environmental and other engineering needs.

## Regional Contacts

### **FEMA Region VI (AR, LA, NM, OK, TX)**

Federal Regional Center  
800 N. Loop 288, Room 206  
Denton, TX 76209  
Phone: 940-898-5399 or 1-800-260-5110  
[www.fema.gov/religion/vi](http://www.fema.gov/religion/vi)

### **Office of Emergency Preparedness**

Regional Emergency Coordinator - Region VI  
1301 Young Street, Suite 1124  
Dallas, TX 75202  
Phone: 214-767-3843  
E-mail: [mailto:ndms@usa.net](mailto:mailto:ndms@usa.net)

Manages and coordinates recovery from major emergencies and disasters including natural disasters, technological disasters, major transportation accidents and terrorism.

### **FEMA Region IV (AL, FL, GA, KT, MS, NC, SC, TN)**

3003 Chamblee Tucker Rd.  
Atlanta, GA  
Phone: 1-229-225-4756  
[www.fema.gov/religion/iv](http://www.fema.gov/religion/iv)

### **FEMA Region VII (IA, KS, MO, NE)**

2323 Grand Boulevard, Suite 900  
Kansas City, MO 64108-2670  
Phone: 816-283-7060  
[www.fema.gov/religion/vii](http://www.fema.gov/religion/vii)

### **Department of Civil Emergency Management**

Albert Ashwood, Director  
P.O. Box 53365  
Oklahoma City, OK 73152-3365  
Phone: 405-521-2481 / Fax: 405-521-4053  
Emergency: 800-800-2481  
[www.ok.gov/oem/index](http://www.ok.gov/oem/index)  
The Department of Civil Emergency Management (OK) is responsible for managing Oklahoma's response to emergencies and disasters.

### **Mississippi Emergency Management Agency**

P.O. Box 4501, Fondren Station  
Jackson, MS 39296-4501  
Phone: 601-352-9100 (24 hours)  
Fax: 601-352-8314  
Emergency: 1-800-222-6362 (24 hours)  
[www.msema.org](http://www.msema.org)

The Mississippi Emergency Management Agency (MS) is responsible for managing Mississippi's response to emergencies and disasters.

### **Missouri State Emergency Management Agency**

P.O. Box 116, 2302 Militia Drive  
Jefferson City, MO 65102  
Phone: 573-526-9101  
Duty Officer: 573-751-2748  
Fax: 573-526-9261  
Emergency Response Commission: 573-526-9240  
[www.sema.state.mo.us/semapog](http://www.sema.state.mo.us/semapog)

The Missouri State Emergency Management Agency (MO) is responsible for managing Missouri's response to emergencies and disasters.

### **Tennessee Emergency Management Agency**

3041 Sidco Drive  
P.O. Box 41502  
Nashville, TN 37204-1502  
Phone: 1-800-262-3400 (24 hours)  
Fax: 615-242-9635  
[www.tnema.org/](http://www.tnema.org/)

The Tennessee Emergency Management Agency (TEMA) is responsible for managing the Tennessee response to emergencies and disasters.

### **Division of Emergency Management**

#### **Texas Department of Public Safety**

P.O. Box 4087  
Austin, TX 78773-0001  
Phone: 512-424-2208 (24 hours)  
[www.txdps.state.tx.us/dem](http://www.txdps.state.tx.us/dem)

Responsible for managing Texas' response to emergencies and disasters.

**National Weather Service**  
Central Region Headquarters  
7220 NW 101st Terrace  
Kansas City, MO 64153  
Phone: 816-891-8914  
[www.nws.noaa.gov](http://www.nws.noaa.gov)

**Natural Resources Conservation Service**  
Central National Technology Support Center  
501 W. Felix Street, Building 23  
P.O. Box 6567  
Fort Worth, TX 76115  
Phone: 817-509-3328 / Fax: 817-509-3336

**Small Business Administration**  
**Disaster Assistance Loans**  
Disaster Area 3 Office  
14925 Kings Port Road  
Ft. Worth, TX 76155  
Phone: 1-800-366-6303  
[www.sba.gov/disaster](http://www.sba.gov/disaster)

SBA's Disaster Loan Program offers financial assistance to eligible homeowners and businessmen trying to rebuild after a disaster in order to further long-term recovery efforts.

## National Contacts

### **Federal Emergency Management Agency (FEMA)**

National Headquarters, FEMA  
500 C Street S.W.  
Washington, DC 20472  
Phone: 202-646-2500  
Responds to, plans for and aids recovery from  
disaster.  
[www.fema.gov](http://www.fema.gov)

### **National Flood Insurance Program**

NFIP B&S Agents  
15835 Park Ten Place, Suite 108  
Houston, TX 77084  
Phone: 281-829-6880 or 1-800-427-2354  
Fax: 281-829-6879  
[www.fema.gov/nfip](http://www.fema.gov/nfip)  
The NFIP helps ensure protection from financial  
losses caused by flooding.

### **Teleregistration Center**

Disaster Assistance, FEMA  
Phone: 1-800-621-3362  
Apply for disaster assistance if you live in a  
designated federal disaster area.

### **Risk Management Agency**

U.S. Department of Agriculture  
USDA/RMA/Stop 0801  
Room 6092-South  
1400 Independence Avenue  
Washington, DC 20250  
Phone: 202-690-2803 / Fax: 202-690-2818  
[www.rma.usda.gov](http://www.rma.usda.gov)  
RMA promotes, supports and regulates sound risk  
management to preserve and strengthen the  
economic stability of America's farmers.

### **Teleregistration Center for Hearing Impaired, FEMA**

Phone: 1-800-462-7585  
Registration for the hearing impaired.

### **National Emergency Training Center, FEMA**

Admissions Services, Room D006  
16825 South Seton Ave.  
Emmitsburg, MD 21727  
Phone: 1-800-238-3358

### **Centers for Disease Control and Prevention Emergency Preparedness and Response**

1600 Clifton Road  
Atlanta, GA 30333  
24 hrs.  
[www.bt.cdc.gov](http://www.bt.cdc.gov)  
CDC strives to protect people's health and safety by  
providing health information.

### **Chemical Abstract Service, Substance Identification**

P.O. Box 3012  
Columbus, OH 43210  
Phone: 1-800-753-4227  
[www.cas.org](http://www.cas.org)  
CAS provides access to published literature relevant  
to chemistry plus a wealth of information in the  
life sciences and a wide range of scientific  
disciplines.

### **Chemical Transportation Emergency Center**

Phone: 1-800-424-9300  
Provides emergency personnel with information on  
safety measures for handling hazardous  
chemicals involved in accidents on the nation's  
highways, railroads and waterways.

### **EPA – Environmental Protection Agency**

National Headquarters  
401 "M" Street SW  
Washington, DC 20460  
Phone: 202-272-0167  
[www.epa.gov/](http://www.epa.gov/)  
Environmental Protection Agency's mission is to  
protect human health and the environment.

### **Public Liaison Office, EPA**

Phone: 202-260-4454

### **Public Response/Pesticide Safety, EPA**

Phone: 703-305-5805

### **Emergency Response/Superfund Hotline, EPA**

Phone: 1-800-424-9346

### **Oil and Hazardous Materials Hotline, EPA**

Spills Phone: 1-800-424-8802  
Information line: 1-800-467-4922

**EPA – Environmental Protection Agency**  
Public Information Center (PIC)  
401 “M” Street SW 3404  
Washington, DC 20460  
Phone: 202-260-2080 / Fax: 202-260-6257  
Email: [public\\_access@epamail.epa.gov](mailto:public_access@epamail.epa.gov)

**Internal Revenue Service**  
[www.irs.gov](http://www.irs.gov)

**Assistance for the Deaf**  
Phone: 1-800-829-4059

**Casualty Loss Department**  
Phone: 1-800-829-1041

**Disaster Assistance Hotline**  
Phone: 1-800-829-1040

**Federal Tax Forms only**  
Phone: 1-800-829-3676

**Problem Resolution Office**  
Phone: 1-800-829-1040

**Tele-Tax Recorded Tax Information**  
Phone: 1-800-829-4477

**National Fire Protection Association**  
1 Batterymarch Park  
Quincy, MA 02269-9101  
Phone: 617-770-3000 / Fax: 617-770-0700  
[www.nfpa.org](http://www.nfpa.org)

**National Earthquake Information Center –  
United States Geological Survey**  
Box 25046, DFC, MS 966  
Denver, CO 80225-0046  
Phone: 303-273-8500 / Fax: 303-273-8450  
Earthquake Info Line: 303-273-8516  
[www.neic.usgs.gov](http://www.neic.usgs.gov)

**National Weather Service**  
National Headquarters  
1325 East West Highway  
Silver Springs, MD 20910  
[www.nws.noaa.gov/](http://www.nws.noaa.gov/)  
Provides weather forecasts, current weather, watches  
and warnings for the protection of life and  
property and enhancing the economy.

**United State Department of Agriculture**  
1400 Independence Avenue  
Washington, DC 20250  
Phone: 1-800-535-4555  
[www.usda.gov](http://www.usda.gov)

**USDA Natural Resources**  
United States Department of Agriculture  
P.O. Box 2890  
Washington, DC 20013  
Phone: 202-720-3210 / Fax: 202-690-1221  
[www.nrcs.usda.gov](http://www.nrcs.usda.gov)

**United States Fire Administration**  
16825 South Seton Avenue  
Emmetsburg, MD 21727  
Phone: 301-447-1660

## Religious and Community Service Organizations

### State □

#### Arkansas Food Bank

8121 Distribution Drive  
Little Rock, AR 72209  
501-565-8121

[www.arkansasfoodbank.org](http://www.arkansasfoodbank.org)

A nonprofit organization with a mission to eliminate hunger in Arkansas.

#### Arkansas Rice Depot

8400 Asher Avenue  
Little Rock, AR 72204  
501-565-8855

[www.ricedepot.org](http://www.ricedepot.org)

Provides sensible solutions to hunger.

#### Salvation Army Area Command

1111 West Markham Street  
Little Rock, AR 72201  
501-374-9296

Assistance for food, utilities, rent, housing and other needs is provided by local Salvation Army units, based on the availability of resources.

### National □

#### Adventist Community Services

12501 Old Columbia Pike  
Silver Springs, MD 20904  
1-800-381-7171

[www.communityservices.org](http://www.communityservices.org)

Provides social services such as tutoring and mentoring programs, youth volunteer corps, health screening education and assistance, inner city missions and disaster response.

#### American Jewish Joint Distribution Committee

711 Third Avenue, 10th Floor  
New York, NY 10017  
212-650-4975

[www.jdc.org](http://www.jdc.org)

In times of crisis – natural disasters, war, and famine – JDC offers aid to non-Jews.

#### AmeriCares Foundation®

88 Hamilton Avenue  
Stamford, CT 06902  
1-800-486-4357

[www.americares.org](http://www.americares.org)

Mission is to improve primary health care around the world, without physical, cultural or religious boundaries.

#### Catholic Charities, USA

1731 King Street  
Alexandria, VA 22314  
703-549-1656

[www.catholiccharitiesusa.org](http://www.catholiccharitiesusa.org)

This office coordinates the Catholic Church's response to disasters in the United States and disburses relief funds to local Catholic Charities agencies.

#### Catholic Relief Services

209 W. Fayette Street  
Baltimore, MD 21201  
800-736-3467

[www.catholicrelief.org](http://www.catholicrelief.org)

#### Church of the Brethren Emergency Response/Service Ministries

601 Main Street  
New Windsor, MD 21776-0188  
800-451-4407 Ext. 4 / Fax: 410-635-8739

[www.brethren-disaster-response.org](http://www.brethren-disaster-response.org)

Church of the Brethren Disaster Response provides volunteers to clean up debris and to repair or rebuild homes for disaster survivors who lack sufficient resources to hire a contractor.

#### Church World Service

475 Riverside Drive Ste. 700  
New York, NY 10115-0050

[www.cwserp.org](http://www.cwserp.org)

Participate, as a witness to the Gospel of Jesus Christ, in the timely and effective meeting of the physical, psychological and spiritual needs of communities affected by disasters.

#### Episcopal Relief and Development Headquarters

815 Second Avenue  
New York, NY 10017  
Phone: 800-334-7626 / Fax: 212-983-6377

[www.er-d.org](http://www.er-d.org)

Provides emergency assistance and rehabilitative support to people affected by natural disasters, war and civil strife.

#### Friends Disaster Service

241 Keenan Road  
Peninsula, OH 44246  
Phone: 330-650-4975 / Fax: 330-650-2919

[www.disaster-relief.net/mavoad](http://www.disaster-relief.net/mavoad)

Provides cleanup and rebuilding assistance to disaster victims. This free service is provided without

regard to race, creed, gender or religious affiliation. However, particular attention is paid to elderly, handicapped, low income and uninsured persons.

### **Gifts-In-Kind International**

333 N. Fairfax Street  
Alexandria, VA 22314  
Phone: 703-836-2121 / Fax: 703-549-1418  
[www.giftsinkind.org](http://www.giftsinkind.org)

Gifts In Kind International partners with businesses and nonprofit organizations to provide quality products and services that improve lives in communities around the world; provides a conduit for the donation of products, goods and services from the private sector to the charitable sector.

### **Interfaith Disaster Response Network**

3009 David Drive, P.O. Box 733  
Columbia, MO 65205  
Phone: 314-726-6677  
[www.midro.missouri.org](http://www.midro.missouri.org)

### **Kansas Agriculture Mediation Services**

2A Edwards Hall  
Kansas State University  
Manhattan, KS 66506  
800-321-3276  
[www.oznet.ksu.edu/kams](http://www.oznet.ksu.edu/kams)

KAMS specialists provide initial information and guidance at no cost through a toll-free hotline (1-800-321-3276). A network of trained agricultural mediators, K-State Research and Extension financial consultants and Kansas Legal Services (KLS). Provide help to resolve conflicts and disputes using mediation.

### **Lutheran Disaster Response**

8765 West Higgins Road  
Chicago, IL 60631  
Phone: 800-638-3522 / Fax: 773-380-2493  
[www.ldr.org](http://www.ldr.org)

LDR assists families, individuals and congregations in communities to prepare and respond to disasters. Lutheran organizations partner to provide organizations: (1) emotional and spiritual care; (2) volunteer coordination; (3) funding to support disaster response case management; (4) hardship grants to congregations; and (5) supplies to help people rebuild their homes and restore their quality of life.

### **Mennonite Central Committee**

Mennonite Disaster Service  
21 S. 12th Street, P.O. Box 500  
Akron, PA 17501  
Phone 717-859-3889

Toll Free: 888-563-4676 / Fax: 717-859-3875  
[www.mcc.org](http://www.mcc.org)

MCC assists with immigration, refugees, job creation, people with disabilities, offenders and victims of crime and more. Wherever possible, MCC works with local partners, usually local church groups, including Mennonite, Brethren in Christ and other churches.

### **Presbyterian Church USA**

100 Witherspoon Street  
Louisville, KY 40402  
Phone: 502-569-5806  
Toll Free: 800-872-3283 / Fax: 502-569-5018  
[www.pcusa.org/pda/](http://www.pcusa.org/pda/)

Presbyterian Disaster Assistance responds to national and international disasters, aiding refugees and displaced persons and supports development. This is carried out with related church agencies and congregations.

### **Salvation Army, Disaster Services National Headquarters**

15 Slaters Lane  
Alexandria, VA 22313  
Phone: 703-684-5526 / Fax: 703-684-5536  
[www.salvationarmyusa.org](http://www.salvationarmyusa.org)

The Salvation Army provides both immediate emergency assistance and long-term recovery help. Emergency response services are activated on short notice according to an agreed-upon procedure, and long-term recovery is planned in response to the situation working with other community entities.

### **Seventh Day Adventists**

General Conference Headquarters Disaster Services  
12501 Old Columbia Pike  
Silver Springs, MD 20904  
Phone: 301-272-2461 / Fax: 301-680-6370

### **Southern Baptist Disaster Relief**

1548 Poplar Avenue  
Memphis, TN 38014  
Phone: 901-272-2461 / Fax: 901-726-5540  
[www.namb.net](http://www.namb.net)

Southern Baptist Disaster Relief seeks to meet urgent needs of people in community crisis.

### **United Methodist Committee on Relief**

General Board of Global Ministries  
The United Methodist Church  
475 Riverside Drive  
New York, NY 10115  
Phone: 800-862-4246 / Fax: 212-870-3624  
National Hotline: 800-841-1235  
[www.gb-gm-umc.org](http://www.gb-gm-umc.org)

Gary Huitink, Associate Professor - Extension Engineer

3/2006

Disaster Preparedness

## **Disaster Preparedness**

Disasters – What Can Youth Do?

Basic First Aid

Emergency CPR

## Disasters – What Can Youth Do?

Elementary and early middle school students can support the Red Cross and other organizations by raising funds for local, U.S. and international disasters and can take **courses**, such as First Aid for Children Today (FACT), Basic Aid Training (BAT) or Babysitter’s Training. High school and college level students can also raise funds, but they can do even more. Through American Red Cross training programs like **Together We Prepare**, they can provide neighborhood groups, community agencies and businesses with disaster preparedness presentations, materials and workshops.

In addition to providing information on overall preparedness, young people can inform others how to prepare for specific disaster situations such as earthquakes, home fires, wildfires, floods, heat emergencies and terrorism.

### “Together We Prepare” Program

**Now more than ever, you need to be prepared for the unexpected . . .**

#### Make a Plan

**After a disaster, it is vital that you know your family is safe. By making a plan today, you can avoid uncertainty in the future.**

During an emergency, the more you have planned ahead of time, the calmer and more assured you and your family will be. These six steps will help you through the process:

#### 1. Talk

Talk with your family about disasters that can happen where you live. Find out what types of disasters occur in your area.

Talk with your family about why you need to prepare for these events. Calmly explain the potential dangers, and plan to share responsibilities and work together as a team. Make sure every family member knows their particular responsibilities. Designate an alternate in case a person is not there at the time.

#### 2. Plan

Plan where to meet after a disaster. Choose two places:

- Right outside your home, in case of a sudden emergency such as a fire.
- Outside your neighborhood, in case you cannot return home or are asked to evacuate your neighborhood.

After determining your meeting places, you should also:

- Determine the best escape routes from your home. Find two ways out of each room. Also, determine the best two escape routes out of your neighborhood/community.
- Ask an out-of-town friend to be your “family contact.” After a disaster, it’s often easier to call long distance. Other family members should call this person and tell them where they are. Everyone must know your contact’s phone number.
- Find out how to care for your pets. Many shelters do not allow them because of health regulations. For more information on how to care for your pets, see the following information.

#### Animals

The following information has been prepared by the **Humane Society of the United States** in cooperation with the American Red Cross.

Our pets enrich our lives in more ways than we can count. In turn, they depend on us for their safety and well-being. Here’s how you can be prepared to protect your pets when disaster strikes.

#### Be Prepared With a Pet Disaster Plan

The best way to protect your family from the effects of a disaster is to have a disaster plan. If you are a pet owner, that plan must include your pets. Being prepared can save their lives.

Different disasters require different responses. But whether the disaster is a hurricane or a hazardous spill, you may have to evacuate your home.

*In the event of a disaster, if you must evacuate, the most important thing you can do to protect your pets is to evacuate them, too.* Leaving pets behind, even if you try to create a safe place for them, is likely to result in their being injured, lost or worse. So prepare now for the day when you and your pets may have to leave your home.

#### **a. Have a Safe Place to Take Your Pets**

Red Cross disaster shelters **cannot accept pets** because of states' health and safety regulations and other considerations. Service animals who assist people with disabilities are the **only** animals allowed in Red Cross shelters. It may be difficult, if not impossible, to find shelter for your animals in the midst of a disaster, so plan ahead. Do not wait until disaster strikes to do your research.

- Contact hotels and motels outside your immediate area to check policies on accepting pets and restrictions on number, size and species. Ask if "no pet" policies could be waived in an emergency. Keep a list of "pet friendly" places, including phone numbers, with other disaster information and supplies. If you have notice of an impending disaster, call ahead for reservations.
- Ask friends, relatives or others outside the affected area whether they could shelter your animals. If you have more than one pet, they may be more comfortable if kept together, but be prepared to house them separately.
- Prepare a list of boarding facilities and veterinarians who could shelter animals in an emergency; include 24-hour phone numbers.
- Ask local animal shelters if they provide emergency shelter or foster care for pets in a disaster. Animal shelters may be overburdened caring for the animals they already have as well as those displaced by a disaster, so this should be your last resort.

#### **b. Assemble a Portable Pet Disaster Supplies Kit**

Whether you are away from home for a day or a week, you'll need essential supplies. Keep items in an accessible place and store them in sturdy

containers that can be carried easily (duffel bags, covered trash containers, etc.). Your pet disaster supplies kit should include:

- Medications and medical records (stored in a waterproof container) and a first aid kit.
- Sturdy leashes, harnesses and/or carriers to transport pets safely and ensure that your animals can't escape.
- Current photos of your pets in case they get lost.
- Food, potable water, bowls, cat litter/pan and can opener.
- Information on feeding schedules, medical conditions, behavior problems, and the name and number of your veterinarian in case you have to foster or board your pets.
- Pet beds and toys, if easily transportable.

#### **c. Know What to Do AS a Disaster Approaches**

- Often, warnings are issued hours, even days, in advance. At the first hint of disaster, act to protect your pet.
- Call ahead to confirm emergency shelter arrangements for you and your pets.
- Check to be sure your pet disaster supplies are ready to take at a moment's notice.
- Bring all pets into the house so that you won't have to search for them if you have to leave in a hurry.
- Make sure all dogs and cats are wearing collars and securely fastened, up-to-date identification. Attach the phone number and address of your temporary shelter, if you know it, or of a friend or relative outside the disaster area. You can buy temporary tags or put adhesive tape on the back of your pet's ID tag, adding information with an indelible pen.

You may not be home when the evacuation order comes. Find out if a trusted neighbor would be willing to take your pets and meet you at a prearranged location. This person should be comfortable with your pets, know where your animals are likely to be, know where your pet

disaster supplies kit is kept and have a key to your home. If you use a pet sitting service, they may be available to help, but discuss the possibility well in advance.

Planning and preparation will enable you to evacuate with your pets quickly and safely. But bear in mind that animals react differently under stress. Outside your home and in the car, keep dogs securely leashed. Transport cats in carriers. Don't leave animals unattended anywhere they can run off. The most trustworthy pets may panic, hide, try to escape, or even bite or scratch. And, when you return home, give your pets time to settle back into their routines. Consult your veterinarian if any behavior problems persist.

### **Caring for Birds in an Emergency**

Birds should be transported in a secure travel cage or carrier. In cold weather, wrap a blanket over the carrier and warm up the car before placing birds inside. During warm weather, carry a plant mister to mist the birds' feathers periodically. Do not put water inside the carrier during transport. Provide a few slices of fresh fruits and vegetables with high water content. Have a photo for identification and leg bands. If the carrier does not have a perch, line it with paper towels and change them frequently. Try to keep the carrier in a quiet area. Do not let the birds out of the cage or carrier.

### **About Other Pets**

**Reptiles** – Snakes can be transported in a pillowcase, but they must be transferred to more secure housing when they reach the evacuation site. If your snakes require frequent feedings, carry food with you. Take a water bowl large enough for soaking as well as a heating pad. When transporting house lizards, you can follow the same directions as for birds.

**Pocket Pets** – Small mammals (hamsters, gerbils, etc.) should be transported in secure carriers suitable for maintaining the animals while sheltered. Take bedding materials, food bowls and water bottles.

### **A Final Word**

If you must evacuate, do not leave your animals behind. Evacuate them to a prearranged safe location if they cannot stay with you during the evacuation period. (Remember, pets are not allowed in

Red Cross shelters.) If there is a possibility that disaster may strike while you are out of the house, there are precautions you can take to increase your pets' chances of survival, but they are not a substitute for evacuating with your pets. For more information, contact **The Humane Society** of the United States, Disaster Services, 2100 L Street NW, Washington, DC 20037.

In a statement of understanding, The American Red Cross recognizes The Humane Society of the United States as the nation's largest animal protection organization responsible for the safety and well-being of animals, including disaster relief. The American Red Cross is committed to transforming the caring and concern of the American people into immediate action.

For more information about pets, you may wish to contact:

- The Humane Society of the United States.
- The American Veterinary Medical Association.

### **3. Learn**

Each responsible family member should learn **how and when to turn off utilities** such as electricity, water and gas. Ask someone at the fire department to show you how to use the fire extinguisher you store in your home.

- Learn about your community's disaster warning signals: what they sound like and what you should do when you hear them.
- Learn where the safe spots are in your home for each type of disaster.
- Learn about the disaster plans at your business, your child's school or daycare center, or other places where you and your family spend time.

### **4. Check Supplies**

- Review your disaster supplies and replace water and food every six months.
- See the **Build a Kit** information on the next page.
- Check batteries in smoke alarms every year and make sure one is installed on each level of your home.
- Check if you have adequate insurance coverage for each disaster.

## Build a Kit – Disaster Supplies Kit

There are six basics you should stock for your home: water, food, first aid supplies, clothing and bedding, tools and emergency supplies, and special items. Keep the items that you would most likely need during an evacuation in an easy-to-carry container – suggested items are marked with an asterisk (\*). Possible containers include a large, covered trash container, a camping backpack or a duffel bag.

### Water

- Store water in plastic containers such as soft drink bottles. Avoid using containers that will decompose or break, such as milk cartons or glass bottles. A normally active person needs to drink at least two quarts of water each day. Hot environments and intense physical activity can double that amount. Children, nursing mothers and ill people will need more.
- Store one gallon of water per person per day.
- Keep at least a three-day supply of water per person (two quarts for drinking, two quarts for each person in your household for food preparation/sanitation).\*

### Food

- Store at least a three-day supply of non-perishable food. Select foods that require no refrigeration, preparation or cooking, and little or no water. If you must heat food, pack a can of sterno. Select food items that are compact and lightweight. Include a selection of the following foods in your Disaster Supplies Kit:
  - Ready-to-eat canned meats, fruits and vegetables
  - Canned juices
  - Staples (salt, sugar, pepper, spices, etc.)
  - High-energy foods
  - Vitamins
  - Food for infants
  - Comfort/stress foods

### First Aid Kit

Assemble a first aid kit for your home and one for each car.

- Sterile adhesive bandages in assorted sizes
- Assorted sizes of safety pins

- Cleansing agent/soap
- Latex gloves (2 pairs)
- Sunscreen
- 2-inch sterile gauze pads (4-6)
- 4-inch sterile gauze pads (4-6)
- Triangular bandages (3)
- Non-prescription drugs
- 2-inch sterile roller bandages (3 rolls)
- 3-inch sterile roller bandages (3 rolls)
- Scissors
- Tweezers
- Needle
- Moistened towelettes
- Antiseptic
- Thermometer
- Tongue blades (2)
- Tube of petroleum jelly or other lubricant

### Non-Prescription Drugs

- Aspirin or nonaspirin pain reliever
- Anti-diarrhea medication
- Antacid (for stomach upset)
- Syrup of Ipecac (use to induce vomiting if advised by the [Poison Control Center](#))
- Laxative
- Activated charcoal (use if advised by the Poison Control Center)

### Tools and Supplies

- Mess kits, or paper cups, plates and plastic utensils\*
- Emergency preparedness manual\*
- Battery-operated radio and extra batteries\*
- Flashlight and extra batteries\*
- Cash or traveler's checks, change\*
- Non-electric can opener, utility knife\*
- Fire extinguisher: small canister ABC type
- Tube tent
- Pliers
- Tape
- Compass
- Matches in a waterproof container
- Aluminum foil
- Plastic storage containers
- Signal flare
- Paper, pencil
- Needles, thread
- Medicine dropper
- Shut-off wrench, to turn off household gas and water
- Whistle
- Plastic sheeting
- Map of the area (for locating shelters)

## Sanitation

- Toilet paper, towelettes\*
- Soap, liquid detergent\*
- Feminine supplies\*
- Personal hygiene items\*
- Plastic garbage bags, ties (for personal sanitation uses)
- Plastic bucket with tight lid
- Disinfectant
- Household chlorine bleach

## Clothing and Bedding

\*Include at least one complete change of clothing and footwear per person.

- Sturdy shoes or work boots\*
- Rain gear\*
- Blankets or sleeping bags\*
- Hat and gloves
- Thermal underwear
- Sunglasses

## Special Items

Remember family members with special requirements, such as infants and elderly or disabled persons.

- **For Baby\***
  - Formula
  - Diapers
  - Bottles
  - Powdered milk
  - Medications
- **For Adults\***
  - Heart and high blood pressure medication
  - Insulin
  - Prescription drugs
  - Denture needs
  - Contact lenses and supplies
  - Extra eye glasses

## Entertainment

- Games and books

## Important Family Documents

- Keep these records in a waterproof, portable container:
  - Will, insurance policies, contracts, deeds, stocks and bonds
  - Passports, social security cards, immunization records

- Bank account numbers
- Credit card account numbers and companies
- Inventory of valuable household goods, important telephone numbers
- Family records (birth, marriage, death certificates)

- Store your kit in a convenient place known to all family members. Keep a smaller version of the supplies kit in the trunk of your car.
- Keep items in airtight plastic bags. Change your stored water supply every six months so it stays fresh. Replace your stored food every six months. Re-think your kit and family needs at least once a year. Replace batteries, update clothes, etc.
- Ask your physician or pharmacist about storing prescription medications.

## General Disaster Preparedness Materials for Children

- “Disaster Preparedness Coloring Book” (ARC 2200, English, or ARC 2200S, Spanish) Children & Disasters ages 3-10.
- “Adventures of the Disaster Dudes” (ARC 5024) video and presenter’s guide for use by an adult with children in grades 4-6.

Developed by the **Federal Emergency Management Agency** and the **American Red Cross**.

## 5. Tell

Tell everyone in the household where emergency contact information is kept. Make copies for each member of the family to carry with them. Be sure to include an out-of-town contact. It may be easier to call out of the area if local phone lines are overloaded or out of service.

Tell your children how and when to call 911 or your local Emergency Medical Services number for help. Post emergency telephone numbers by phones.

Complete the information on an **Emergency Contact Card** (*see next page*) and make copies for each member of your family to carry with them. Be sure to include an out-of-town contact on your Contact Card. You may be able to reach someone out of town when local phone lines are out of service or overloaded.

# EMERGENCY CONTACT CARD

Call 9-1-1 to request help during an emergency. Please remember that unnecessary calls to 9-1-1 prevent others from getting the help they need.

After a disaster, it is often easier to call long-distance. Ask an out-of-town friend or relative to be your designated family contact. If your family is separated during a disaster, each person should call your family contact to report their location and condition. Be sure each family member carries one of these cards.

OUT-OF-TOWN FAMILY  
CONTACT PERSON: \_\_\_\_\_

Phone: \_\_\_\_\_  
(    ) \_\_\_\_\_ day#    (    ) \_\_\_\_\_ night#

LOCAL EMERGENCY CONTACT NUMBERS:

Spouse, Parent or Guardian Work Phone: \_\_\_\_\_

School Phone(s): \_\_\_\_\_

Day Care Phone: \_\_\_\_\_

Family Cell Phone(s): \_\_\_\_\_

\_\_\_\_\_

*It is important to establish family meeting places in case of disaster. Pick one place to meet right outside of your home and another meeting place outside of your neighborhood.*

Family reunion site(s) during a disaster: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## 6. Practice

Conduct fire drills and practice evacuating your home twice a year. Drive your planned evacuation route and plot alternate routes on a map in case main roads are impassible or gridlocked. Practice earthquake and tornado drills at home, school and work. Commit a weekend to update phone numbers, disaster supplies and review your plan with everyone.

### Chemical or Airborne Hazards

When there is concern about a potential exposure to a chemical or other airborne hazard, local officials will advise you to “shelter-in-place.” This is unrelated to taking shelter on the lowest level of your home in case of a natural disaster like a tornado. To shelter-in-place:

- Close and lock all windows and exterior doors.
- Turn off all fans, heating and air conditioning systems.
- Close the fireplace damper.
- Get your disaster supplies kit and make sure the radio is working.
- Go to an interior room without windows that is above ground level. In the case of a chemical threat, an above-ground location is preferable because some chemicals are heavier than air and may seep into basements even if the windows are closed.
- Using duct tape, seal all cracks around the door and any vents into the room.
- Listen to your radio or television for further instructions. Local officials may call for evacuation in specific areas at greatest risk in your community.

### Build a Kit

**Your household should have a three-day Disaster Supplies Kit to ensure the comfort and safety of your entire family for three full days.**

Disasters can occur quickly and without warning. And when an emergency strikes, it can force you to evacuate your neighborhood or confine you to your

home. If a destructive storm cut off your power, phone and other basic services for several days, or if a chemical spill or other hazard forced you to stay in your home, what would you do? Your family will cope best by preparing for a disaster before it strikes. Assemble a **Disaster Supplies Kit** now – once disaster hits, you won’t have time to shop or search for supplies. Be prepared – build a kit!

### To Prepare Your Kit

You should keep enough supplies in your home to meet your needs for at least three days. Build a Disaster Supplies Kit to take with you in an evacuation.

The basics you should stock in your portable kit include: water, food, first aid supplies, a change of clothing and blanket or sleeping bag, emergency tools (like flashlights, radio, batteries) and special items for infants, elderly or disabled. Keep these items in an easy-to-carry container such as a covered trash container, a large backpack or a duffel bag.

#### Water

- **Keep at least a three-day supply of water per person.**
- **Store one gallon of water per person per day.** (two quarts for drinking, two quarts for each person in your household for food preparation/sanitation)
- **Store water in plastic containers** such as soft drink bottles. Avoid using containers that will decompose or break, such as milk cartons or glass bottles. A normally active person needs to drink at least two quarts of water each day. Hot environments and strenuous activity can double that amount. Children, nursing mothers and ill people will also need more.

#### Food

- **Store at least a three-day supply of non-perishable food.** Select foods that require no refrigeration, preparation or cooking, and little or no water. If you must heat food, pack a can of sterno. Select food items that are compact and lightweight. Include a selection of the following foods in your Disaster Supplies Kit:
  - Ready-to-eat canned meats, fruits and vegetables

- Canned juices
- Staples (salt, sugar, pepper, spices, etc.)
- High-energy foods
- Vitamins
- Food for infants
- Comfort/stress foods

### Medications and Special Items

Remember family members with special requirements, such as infants and elderly or disabled persons.

- **For Baby**
  - Formula
  - Diapers
  - Bottles
  - Powdered milk
  - Medications
- **For Adults**
  - Heart and high blood pressure medication
  - Insulin
  - Prescription drugs
  - Denture needs
  - Contact lenses and supplies
  - Extra eye glasses
- **Non-Prescription Drugs**
  - Aspirin or nonaspirin pain reliever
  - Anti-diarrhea medication
  - Antacid (for stomach upset)
  - Syrup of Ipecac (use to induce vomiting if advised by the Poison Control Center)
  - Laxative
  - Activated charcoal (use if advised by the Poison Control Center)

### Tools and Supplies

*(Recommended items are marked with an asterisk \*)*

- Mess kits, or paper cups, plates and plastic utensils\*
- Emergency preparedness manual\*
- Battery-operated radio and extra batteries\*
- Flashlight and extra batteries\*
- Cash or traveler's checks, change\*
- Non-electric can opener, utility knife\*
- Fire extinguisher: small ABC type stored near where fires are likely to occur such as a kitchen or near a fireplace. It should not be kept in the disaster supplies kit.

- Tube tent
- Pliers
- Tape
- Compass
- Matches in a waterproof container
- Aluminum foil
- Plastic storage containers
- Signal flare
- Paper, pencil
- Needles, thread
- Medicine dropper
- Shut-off wrench, to turn off household gas and water
- Whistle
- Plastic sheeting
- Map of the area (for locating shelters)

### Sanitation

*(Recommended items are marked with an asterisk \*)*

- Toilet paper, towelettes\*
- Soap, liquid detergent\*
- Feminine supplies\*
- Personal hygiene items\*
- Plastic garbage bags, ties (for personal sanitation uses)
- Plastic bucket with tight lid
- Disinfectant
- Household chlorine bleach

### Clothing and Bedding

*(Recommended items are marked with an asterisk \*)*

\*Include at least one complete change of clothing and footwear per person. We suggest long pants and long sleeves for additional protection after a disaster.

- Sturdy shoes or work boots\*
- Rain gear\*
- Blankets or sleeping bags\*
- Hat and gloves
- Thermal underwear
- Sunglasses

### Emergency Kit for Your Car

- Battery powered radio and extra batteries
- Flashlight and extra batteries
- Blanket
- Booster cables
- Fire extinguisher (5 lb., A-B-C type)

- First aid kit and manual
- Bottled water and non-perishable, high-energy foods, such as granola bars, raisins and peanut butter
- Maps
- Shovel
- Tire repair kit and pump
- Flares

### **Important Family Documents**

Keep these records in a waterproof, portable container:

- Will, insurance policies, contracts, deeds, stocks and bonds
- Passports, social security cards, immunization records
- Bank account numbers
- Credit card account numbers and companies
- Inventory of valuable household goods, important telephone numbers
- Family records (birth, marriage, death certificates)

### **First Aid Kit**

Assemble a first aid kit for your home and one for each car.

- Sterile adhesive bandages in assorted sizes
- Assorted sizes of safety pins
- Cleansing agent/soap
- Latex gloves (2 pairs)
- Sunscreen
- 2-inch sterile gauze pads (4-6)
- 4-inch sterile gauze pads (4-6)
- Triangular bandages (3)
- Non-prescription drugs
- 2-inch sterile roller bandages (3 rolls)
- 3-inch sterile roller bandages (3 rolls)
- Scissors
- Tweezers
- Needle
- Moistened towelettes
- Antiseptic
- Thermometer
- Tongue blades (2)
- Tube of petroleum jelly or other lubricant

## **Get Trained**

**Every family should have at least one person trained in First Aid and CPR/AED.**

The American Red Cross offers courses to help you and your family prepare for emergencies. They are aware of the hazards that can happen in the area where you live and work, and can provide you with presentations and information that will help you learn how to keep your family and co-workers safe when disaster strikes. Contact them to find out about disaster preparedness presentations available for your community or workplace.

In the event of a disaster, emergency medical response may be delayed because of the remoteness of your home or by adverse conditions, such as roads blocked by floodwater or debris. While precious minutes slip by, your emergency training could mean the difference between life and death. Properly administered first aid or CPR can help stabilize an injured or ailing family member until help arrives. Make sure at least one family member is trained in first aid and CPR and how to use an automated external defibrillator. It could save a life.

## **Volunteer**

**Red Cross volunteers help people in emergencies, whether it's half a million disaster victims or one sick child who needs blood.**

Their vital work is made possible by people who know how good it can feel to lend a helping hand. Red Cross "everyday heroes" come from all walks of life. Everyone has something special to offer . . . including you.

Last year more than one million Americans helped their communities prevent, prepare for and respond to emergencies as Red Cross volunteers. And the demand for vital American Red Cross services and the committed volunteers to deliver them continues to grow. You can help your community be prepared.

## Donate Blood

**Donating blood on a regular basis ensures a safe and stable supply is available at all times.** America needs a safe and secure blood supply. It is critical to public health. In times of crisis, the American Red Cross can quickly ship blood from one area of the country to another wherever it is needed most. But regular donations of blood are essential to ensure that all needs are met, all of the time.

Every two seconds someone in America needs a blood transfusion from cancer patients, accident

victims, premature infants, to people with chronic diseases. Blood donation means so much to individuals struggling to survive their own personal crisis, and it's something you can do to make a difference.

Giving blood doesn't take much time, and each donation has the power to save as many as three lives. Because whole blood has a shelf life of only 42 days, it is important to be a regular and frequent donor.

The above materials were adapted from the American Red Cross "Together We Prepare" Program.

## Basic First Aid

Accidents happen anywhere and anytime. The first response to an accident is the most important. Oftentimes, first aid given at the scene can improve the victim's chances of survival and a good recovery. The right response is better than an incorrect quick one. Any response, even if it is wrong, is better than none at all.

### Remember Basic First Aid

- The first response to an accident is the most important – know what to do.
- Keep a shock victim covered to reduce heat loss.
- Try to stop bleeding by applying pressure to the wound.
- Do not remove a victim with a spinal injury unless further danger is imminent.

### Unconscious Victims

If the victim is unconscious, perform rescue breathing. (Rescue breathing is explained later.) If the victim's heart has stopped beating, perform cardiopulmonary resuscitation (CPR) if you have been properly trained.

### Shock

Shock usually accompanies severe injury or emotional upset. The signs are cold and clammy skin, pale face, chills, confusion, frequent nausea or vomiting and shallow breathing. Until emergency help arrives, have the victim lie down with the legs elevated. Keep the victim covered to prevent chilling or loss of body heat. Give non-alcoholic fluids if the victim is able to swallow and has not sustained an abdominal injury.

### Bleeding

Until emergency help arrives, try to control any bleeding. If possible, first put on rubber or latex gloves before touching any blood. If these are not available, a clean plastic bag may be used to cover your hands. It is important not to come in contact with blood because of the health risks.

If finger or hand pressure is inadequate to control bleeding, place a thick pad of clean cloth or bandage directly over the wound, and hold it in place with a belt, bandage, neckties or cloth strips. Take care not to stop the circulation to the rest of the limb. For injuries where a tie cannot be used, such as to the groin, back, chest, head and neck, place a thick pad of clean cloth or bandage directly over the wound and control the bleeding with finger or hand pressure. If bones are not broken, raise the bleeding part higher than the rest of the body. If the injury is extensive, the victim may go into shock and should be treated for it.

As a last resort, a tourniquet can be applied to stop bleeding. There is a risk of sacrificing a limb to save a life. A tourniquet is a wide band of cloth or other material tightly placed just above the wound to stop all flow of blood. A tourniquet crushes the tissue and can cause permanent damage to nerves and blood vessels. Once in place, a tourniquet must be left there until a physician removes it. The victim must be taken to medical help as soon as possible.

### Burns and Scalds

Until medical help arrives, immerse the burned area immediately in tap or cool water or apply clean, cool, moist towels. Do not use ice because it may cause further damage to the burned area. Maintain this treatment until the pain or burning stops. Avoid breaking any blisters that may appear. Do not use ointments, greases or powders.

For more severe burns or chemical burns, keep the victim quiet and treat them for shock. Remove any clothing. If the clothing sticks to the burned area, leave it there. For exposure to chemicals, flush the skin with plenty of water, but only cover the exposed area with a clean bandage if the chemical has caused a burn. If the burn victim is conscious, can swallow and does not have severe mouth burns, give plenty of water or other non-alcoholic liquids to drink. Get the victim to a physician or hospital as soon as possible.

### Broken Bones

For fractured limbs, take the following precautions until emergency help arrives. Place the injured part in as natural a position as possible

without causing discomfort to the patient. If the patient must be moved to a medical facility, protect the injured part from further injury by applying splints long enough to extend well beyond the joints above and below the fracture. Use firm material, such as a board, pole or metal rod, as a splint. Pad the splints with clothing or other soft material to prevent skin injury. Fasten splints with a bandage or cloth at the break and at points along the splint above and below the break.

Use a pressure bandage to control any bleeding.

For very serious fractures involving injuries to the body, neck or back, observe the following: Do not move the victim without medical supervision, unless absolutely necessary, and then only if the proper splints have been applied. If a victim with a suspected neck or back injury must be moved, keep the back, head and neck in a straight line, preventing them from being twisted or bent during movement. Use a board or stretcher to support the victim, if available.

## Spinal Injuries

Take special care when helping a spinal injury victim. All damage to the spinal cord is permanent, because nerve tissue cannot heal itself. The result of nerve damage is paralysis or death.

Do not move the limbs or body of a victim with a suspected spinal injury unless the accident scene is such that there is imminent danger of further injury or unless it is necessary to establish breathing. The victim's body should be stabilized to prevent any movement of the head, neck or body. Be aware that any movement of a victim with spinal injury may result in paralysis or death.

If the victim must be moved, keep the neck and torso of the body as straight as possible and pull in a direction that keeps the victim's spine in a straight line. Pull the body from the feet or shoulders (using both feet, both shoulders, or both arms pulled over the shoulders). It is also possible to pull the victim by the clothing. Grab the victim by the collar of the shirt and support the victim's head with your forearms while pulling. The clothes drag is preferred because the victim's head is supported while being moved. Do not pull the body sideways.

When providing patient care, it may be necessary to roll the victim over on his or her back to clear an airway or evaluate breathing. When rolling the victim over, the head, neck and torso should be moved together so that no twisting occurs.

## Rescue Breathing for an Adult

When breathing movement stops or when their lips, tongue and fingernails become blue, a person needs immediate help. When in doubt, apply rescue breathing until medical help arrives. Delay of rescue breathing may cost the victim's life. Start immediately. Seconds can count.

The American Red Cross teaches the following 10 steps to assist an adult who has stopped breathing.

1. Does the person respond? Tap or gently shake the victim. Shout, "Are you OK?"
2. Shout, "Help!" Call people who can phone for help.
3. Roll the person onto their back by pulling them slowly toward you. Slowly pull towards you until the victim is face up.
4. Open the airway by tilting the head back and lift the chin. Clear the mouth and throat of any obstructions with your fingers.
5. Check for breathing. Look, listen and feel for breathing for three to five seconds.
6. Give two full breaths. Keep the head tilted back. Pinch the nose shut and seal your lips tight around the victim's mouth. Give two full breaths for one to one and a half seconds each.
7. Check for pulse at the side of the neck. Feel for pulse for five to 10 seconds.
8. Phone emergency staff for help. Send someone to call for an ambulance.
9. Continue rescue breathing. Keep the head tilted back, lift the chin and pinch the nose shut. Give one full breath every five seconds. Look, listen and feel for breathing between breaths.
10. Recheck the pulse every minute. Keep the head tilted back and feel for the pulse for five to 10 seconds. If the victim has a pulse, but is not breathing, continue rescue breathing.

For infants and small children, follow the first five steps listed above. On the sixth step cover the child's mouth and nose in a tight seal and give two small breaths. Check for pulse and call for help. Begin rescue breathing, giving one small breath every three seconds for an infant and one every four seconds for a child.

## Choking

Choking occurs when food or a foreign object obstructs the throat and interferes with normal breathing. The following steps are advised if the choking victim is unable to speak or cough forcefully.

### For adults and children over one year of age:

1. Ask, "Are you choking?"
2. Shout, "Help!" Call for help if the victim cannot cough, speak or breathe, is coughing weakly or is making high-pitched noises.
3. Phone emergency staff for help. Send someone to call an ambulance.
4. Do abdominal thrusts. Wrap your arms around the victim's waist. Make a fist. Place the thumb side of the fist on the middle of the victim's abdomen just above the navel and well below the lower tip of the breastbone. Grasp the fist with the other hand. Press the fist into abdomen with a quick upward thrust.
5. Repeat abdominal thrusts until the object is coughed up or the victim starts to breathe or cough. If the victim becomes unconscious, lower the victim to the floor.
6. Do a finger sweep. Grasp the tongue and lower jaw and lift jaw. Slide the finger down inside of the cheek to base of tongue. Sweep the object out.
7. Open the airway. Tilt the head back and lift the chin.

8. Give two full breaths. Keep the head tilted back, pinch the nose shut and seal your lips tight around the victim's mouth. Give two full breaths for one to one and a half seconds.
9. Give six to 10 abdominal thrusts. If the air will not go in, place the heel of one hand against the middle of the victim's abdomen. Place the other hand on top of the first hand. Press into the abdomen with quick upward thrusts.
10. Repeat steps six through nine until the airway is cleared or the ambulance arrives.

### For infants less than one year old:

1. Place the victim's head in a downward position on the rescuer's forearm with the head and neck stabilized.
2. With the heel of the rescuer's hand, administer five rapid back blows between the victim's shoulder blades.
3. If the obstruction remains, turn the victim face up and rest on a firm surface.
4. Deliver five rapid thrusts over the breastbone using two fingers.
5. If the victim is still not breathing normally, administer mouth-to-mouth resuscitation as specified for an infant.
6. Repeat the above steps as necessary. If the obstruction cannot be removed, call for medical help immediately.



Adapted for use from the University of Maine Cooperative Extension Farm Safety Program by Dr. Russ Kennedy.

## Emergency CPR

### 1. CALL



Check the victim for unresponsiveness. If there is no response, call 911 and return to the victim. In most locations the emergency dispatcher can assist you with CPR instructions.

During cardiac arrest, the heart stops pumping blood, the blood pressure falls to zero and the pulse disappears. Within 10 seconds of cardiac arrest the person loses consciousness and becomes unresponsive. If you shake or shout at the victim, there will be no response. Sometimes a person in cardiac arrest may make grunting, gasping or snoring type breathing sounds for a couple of minutes. **Do not** be confused by this abnormal type of breathing. If a person is unresponsive (doesn't respond to shouts or shakes) and is not breathing (or is breathing abnormally), then call 911 and begin CPR.

### 2. BLOW



Tilt the head back and listen for breathing. If not breathing normally, pinch nose and cover the mouth with yours and blow until you see the chest rise. Give 2 breaths. Each breath should take 1 second.

Remember, a person in cardiac arrest may have abnormal breathing for a couple of minutes. This abnormal breathing is called "*agonal respiration*" and is the result of the brain's breathing center sending out signals even though circulation has ceased. The key point is that the abnormal breathing may sound like grunting, gasping or snoring. It disappears in 2 to 3 minutes. If you see this type of breathing, **do not** delay CPR. The person desperately needs air, and only you can provide it.

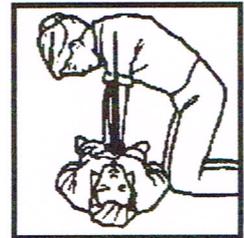
If the victim is still not breathing normally, coughing or moving, begin chest compressions. Push down on the chest 1 1/2 to 2 inches 30 times right between the nipples. Pump at the rate of 100/minute, faster than once per second.



In general, the chest should be pushed down 1 1/2 to 2 inches. Sometimes you may hear a cracking sound. Do not be alarmed. The sound is caused by cartilage or ribs cracking. Even if this occurs, the damage is not serious. The risk of delaying CPR or not doing CPR is far greater than the risk of a broken rib.

CONTINUE WITH  
2 BREATHS AND 30 PUMPS  
UNTIL HELP ARRIVES.

NOTE: This ratio is the same for one-person and two-person CPR. In two-person CPR the person pumping the chest stops while the other gives mouth-to-mouth breathing.



### Complications of CPR

Vomiting is the most frequently encountered complication of CPR. If the victim starts to vomit, turn the head to the side and try to sweep out or wipe off the vomit. Continue with CPR.

The spread of infection from the victim to the rescuer is exceedingly rare. Most cardiac arrests occur in people's homes – relatives or friends will be the ones needing to do CPR. Even CPR performed on strangers has an exceedingly rare risk of infection. There is NO documentation of HIV or AIDS ever being transmitted via CPR.

Adapted for use from United States Department of Agriculture Food Safety and Inspection Services by Dr. Russ Kennedy.

Draughts

## Droughts

University of Arkansas Cooperative Extension Service Fact Sheets Related to  
Drought Management

Dry Weather Management for Cattle

Maintaining Herd Productivity During Drought

Drought Stricken Forages Often Present Nitrate Toxicity

When Water and Feed Supplies Become a Concern

To Keep or to Sell Calves in the Drought?



## University of Arkansas Cooperative Extension Service Fact Sheets Related to Drought Management

FSA 3009	Beef Cattle Herd Health Vaccination Schedule
FSA 3021	Water for Beef Cattle
FSA 3024	Nitrate Poisoning in Cattle
FSA 3025	Common Arkansas Plants Poisonous to Cattle
FSA 3036	Substituting Grain for Hay in Winter Rations for Beef Cows
FSA 3040	Heat Stress in Dairy Cattle
FSA 3047	Alternative Feeds for Beef Cattle
FSA 3071	Nutritional Disorders in Beef Cattle

## Dry Weather Management for Cattle

It is not uncommon for Arkansas summers to be very hot and dry. As summer begins, cattle usually are in good body condition, but the pastures can dry up very quickly. Hot weather stress is particularly hazardous to closely confined cattle such as show cattle. High relative humidity when the temperature is at or above 80°F adds to the likelihood of profit-stealing losses. Temperatures above 100°F are always dangerous and if the humidity is above 25 percent, the situation is “Emergency.” When conditions are at the emergency level, all handling of cattle should be kept at a minimum. Provide shade if possible and plenty of fresh water.

Listed below are some beef cattle management suggestions for dry weather conditions.

1. **Provide a Good Water Supply.** Cattle require greater amounts of water during hot weather.
2. **Check the Herd Routinely.** Check for good health, body condition and soundness – eyes, feet, teeth, udder, etc.
3. **Inventory Feed Resources.** Estimate as accurately as possible the amount of hay available. Include crop residues or other sources of roughage. Check on the cost and availability of crop byproduct feeds such as soybean hulls, corn gluten feed, whole cottonseed, rice bran, cottonseed hulls, etc. If feed supplies are inadequate, consider alternative feeding and management options to most efficiently maintain the herd.
4. **Cull the Herd.** Sell open cows, old cows, unsound cows (injured, diseased, pendulous udder, short or missing teeth, etc.), cows which produce lightweight calves and late calving cows. Keep young, productive cows and the best replacement heifers and bulls.
5. **Wean Calves Early.** Cows nursing calves have about double the energy and protein needs of dry cows. Calves can be weaned as young as six to eight weeks of age and started on a complete ration. Young calves require a good quality feed with adequate levels of protein, TDN, minerals and vitamins. After calves are weaned, cows can be maintained on a minimum amount of forage. Cows should be maintained in a moderate body condition. It’s generally cheaper to feed the cow and calf separately than it is to feed the cow, which feeds the calf.
6. **Creep Feeding or Creep Grazing.** If milk production declines, nursing calves receive inadequate nutrition to grow properly. Creep feeding or preferably creep grazing (which probably won’t be available during droughts) may be used to maintain adequate calf gains. Calves usually prefer milk to grass so they will first take whatever milk is available and, therefore, creep feeding or creep grazing doesn’t reduce nutrient needs of the cow.
7. **Provide Cattle on Pasture Supplemental Feedstuffs.** Hay is often the least expensive supplement to feed cattle on pasture. However, during periods of drought, other feeds (grains, protein supplements, range cubes, etc.) may provide a cheaper source of nutrients.
8. **Have Forage Tested and Feed Balanced Rations.** Efficiently use available forage by having it tested and balance rations to avoid overfeeding or underfeeding mistakes.
9. **Use Appropriate Feed Additives.** Monensin (Rumensin®) fed to beef cows, replacement heifers or stockers at the recommended levels will reduce hay or pasture requirements by about 10 percent. Lasalocid (Bovatec®) will improve feed efficiency in calves, replacement heifers and stockers.
10. **Supply Adequate Minerals and Vitamins.** Nutrient needs for phosphorus and other minerals and vitamins should be met, especially during periods of drought.

- Provide a good free-choice mineral-vitamin supplement year-round.
11. **Consider Poultry Litter and Other Alternative Feeds.** Identify the cheapest sources of protein, energy and roughage for a given situation and then use those feeds to balance a ration for the cattle that must be fed. Broiler litter is usually preferred to turkey litter but either may be used as a cheap source of protein and minerals for beef cattle if they are good quality and adequately processed.
  12. **Group Cattle for Feeding.** Don't feed all cattle together in one group. Separate the herd into groups based on nutrient needs. Dry cows need less than cows nursing calves. Replacement heifers and first-calf heifers have higher requirements than mature cows. Distinct management groups of cattle in most beef herds are (1) dry cows, (2) cows nursing calves, (3) first-calf heifers, (4) weanling replacement heifers, (5) bred yearling heifers and (6) bulls.
  13. **Avoid Nitrate and Prussic Acid Poisoning.** Environmental conditions which retard plant growth often cause excessive accumulation of nitrate and prussic acid in plants. If forage is suspect, have it tested for these poisons. Most common accumulators of nitrates ranked from highest to lowest are weeds, corn, sorghums, sudangrass, cereal grains, tame forage grasses and legumes. Nitrate accumulates primarily in lower stems. Prussic acid accumulates primarily in the leaves.
  14. **Maintain Herd Health.** Continue to follow recommended guidelines for vaccinating cattle and controlling flies and other external and internal parasites.
  15. **Avoid Feed Waste.** Plan feeding to avoid waste. Unroll large round bales or use ring feeders to prevent wastage of hay. May limit-feed hay to make cattle eat all of it, especially if grain or other feeds will be supplied.

## Maintaining Herd Productivity During Drought

Drought always presents unique and difficult management situations. Most farmers are caught somewhat by surprise by the size, scope and severity of drought. Getting off to a late start in managing through any drought would completely alter the normal approach to forage and nutritional management.

- Feeding through drought usually is not an economically viable option. For hay feeding to make economic sense, cattle prices would have to be high. In most situations, the most economical option is to reduce herd size so supplemental forage will not have to be purchased or fed.
- Reduce your herd size to what your resources will support. Critically evaluate the physical attributes of the individual cows. Consider culling those cows with bad physical attributes – udders, legs, eyes, etc. Cull the cows on their reproduction efficiency. Palpate the herd and cull the open cows. Look at your records and cull those cows who have not calved every 12 months or are extremes (too early or too late) in your breeding and calving season.
- Critically evaluate replacement heifers. Decide what is the minimum number of heifers needed next year and sell the rest.
- Evaluate the bulls. If they are getting old and need to be replaced, sell them now and plan on purchasing a better bull before next breeding season.

### Environmental/Stress Management

Managing through a drought requires implementing practices that help reduce stress. This includes nutritional and environmental factors, which lead to increased energy requirements of cows and calves.

- Fencing off watering areas that become boggy will reduce energy required to maintain production. This only works when there are other sources of water available.
- Hauling water is an expense that cannot be supported for long. There is also the risk of

having weaker cows bog down and die before they are discovered. When water supplies are depleted it is time to liquidate. Minimize exposure to increased health risks by reducing access to stagnant watering areas.

- Allow cattle access to shade, normally a problem only on operations with a high percentage of “improved” pastures.
- Heifers and calves are not able to compete with mature cattle for pasture or supplemental feed. Drought feed is costly and it is important to feed only those animals that really need it. Segregating animals gives each group a better chance of getting needed feed supplies.
- Manage cows to maintain a body condition score (BCS) of 4 or above on mature cows and 5 on two- and three-year-old cows. Cull early and allow cows to maintain condition on standing forage. Thin cows are more susceptible to parasites.

### Health Management

- Continue to protect cows and calves against clostridial diseases (blackleg). As cattle graze on shorter and shorter forage the chance of picking up soil-borne pathogens increases. Blackleg, leptospirosis and anthrax are just a few of the diseases that occur with greater frequency during drought.
- Check with veterinarians in the local area to get a history on diseases of concern.
- Chances of leptospirosis increases as watering areas dry up. Cattle and wildlife are forced into more concentrated areas and the chance of spread between species increases.
- Protect against the reproductive diseases – campylobacter fetus (vibrio), brucellosis, haemophilus somnus, trichomoniasis, IBR and BVD to name a few.

- Cattle at all ages are affected by a diversity of internal and external parasites. Parasites, both internal and external, need to be monitored and controlled as needed.
  - Sell replacement heifers and any other cow that will not wean a calf in this production year. If a place can be found to hold these cattle economically there may be justification for retaining ownership.
- ### Nutritional Management Strategies
- The key to successful forage management during drought is to cull and reduce the number of animals early enough and go deep enough to provide adequate forage for the remaining cow herd.
  - Cull first-calf heifers next. There are two primary reasons. These two groups of cattle are normally the most expensive to develop and maintain and have the lowest production potential. When feed is expensive and cattle are cheap, cost can be reduced dramatically by moving these cattle.
  - Keep cows that are least susceptible to nutritional stress caused by poor forage conditions. This will be mid-aged cows between 4 and 10 years of age. At lower body condition scores (BCS 3 and 4) cows of this age will average 35 percent and 20 percent higher conception rates than first and second calf cows, respectively, as shown in Table 1.
  - Always manage the forage base to allow adequate consumption and efficient use of marginal precipitation. Cows need to consume forage at the rate of 2 to 3 percent of their body weight to have a chance of maintaining acceptable production and reproductive performance. This will be a constant battle until the drought breaks, requiring constant monitoring and periodic adjusting to prevent decline in range condition and cow performance.
  - Decreased milking ability and lighter calves at weaning are reasons older cows have higher conception rates at any given BCS. If condition can be maintained on second-calf cows they can also be kept in the herd.
  - Minerals will need to be provided to cattle during periods of drought. Do not stop supplementing phosphorus! Phosphorus has a major impact on reproductive performance.

**Table 1. Body Condition Score at Palpation by Age Group (Parity)**

Parity	BCS 3	BCS 4	BCS 5	BCS 6	BCS 7	All
1	40%	50%	70%	82%	83%	63%
2	43%	79%	89%	100%	100%	77%
3-10	71%	86%	92%	97%	95%	91%
> 10	100%	92%	97%	100%	100%	97%
All	54%	76%	89%	94%	94%	84%

(Wiske, Herd, 1995)

This information was adapted from a fact sheet written by Diego M. Gimenez, Jr., Extension Animal Scientist.

## Drought Stricken Forages Often Present Nitrate Toxicity

Under normal weather conditions, nitrogen application to soils is taken up as nitrate by plants and metabolized into plant protein. Under drought conditions, this metabolism is decreased and nitrate content of the plant is increased. Forages such as corn, sorghums, pearl millet, soybeans, sudangrass and sorghum-sudan hybrids may accumulate toxic levels of nitrates. Several weeds (e.g., pigweeds, Canadian thistle, ragweed's goldenrod, nightshades) may also accumulate nitrates, so weedy hay may create a problem. Whenever nitrate accumulations are suspected, take extreme precautions in feeding the forage.

- When cattle or other ruminants consume forages with nitrates, the rumen bacteria convert the nitrates to nitrite. Bacteria may utilize nitrite, but the bacteria are overloaded when nitrate concentrations are too high. In this case, nitrite is readily absorbed into the blood system and changes the blood into a form (methemoglobin) that cannot transport oxygen in the body.
- When acute toxicity occurs, cattle have difficulty breathing, have paralysis, go down and may die within an hour unless treated. Accurate diagnosis and prompt treatment of acute cases are essential in the prevention of deaths and abortions.
- The prime diagnostic criterion for nitrate toxicity is chocolate-brown blood. Another symptom is the darkening of normally white membrane (e.g., eyes) to a bluish color.
- Animals are often drowsy, develop a chronic cough, are unthrifty with a reduced appetite and have a drop in production. Abortions and decreased conception may occur.

### Nitrate in forages CANNOT be estimated.

- It is absolutely essential that forages be analyzed. Taking a representative sample prior to grazing the suspected forage is important. Sampling prior to harvest can help determine whether it is worthwhile to harvest the crop.
- Nitrate content of forage MAY decrease by 15 to 20 percent if ensiled, but this cannot be counted upon.
- Nitrate content normally does not decrease in hay. If the nitrate in the forage is excessive, the cost of harvesting and storage should be avoided.
- If preliminary analysis indicates that harvesting is feasible, nitrates may change by the time of harvest, so a second analysis should be made on the forage prior to feeding.
- Nitrate content of drought-stricken forage often increases for two to four days following a rain, so harvesting or grazing should be postponed if rain occurs. Leaf and grain portions of forages are normally lower in nitrate content than lower stalks, so get a representative sample of what will be harvested or grazed.
- The minimum toxic level of nitrates is difficult to define even though there are guidelines. Labs normally list either nitrate (NO<sub>2</sub>) or nitrate nitrogen (NO<sub>2</sub>-N) values (other values occasionally reported) and the numbers are very different.
- Nitrate values can be converted to nitrate nitrogen by multiplying the nitrate value by 0.23; nitrate nitrogen can be converted to nitrate by multiplying the nitrate nitrogen by 4.40.
- The following guidelines for nitrate nitrogen were compiled from several sources and the categories may differ slightly from those you obtain from your laboratory reports.
  - 0-575 PPM: Generally considered safe.
  - 575-1150 PPM: Use caution when feeding young or pregnant animals. Prevent over consumption.
  - 1150-3450 PPM: Potentially fatal.
- Susceptibility of animals to toxicity will depend not only on the concentration of nitrate in the forage but also on the total amount of nitrate consumed, the speed of intake of the toxic forage and the adaptation to the feed.

- If the nitrate content is not excessively high, the danger can be reduced by hand-feeding or mixing the forage with other nitrate-free feeds. For lactating dairy cattle on total mix rations, varying the ingredients can alter the final concentration of nitrates in the total feed mix.
- For beef cattle, dry dairy cattle or heifers, blending nitrate containing forages is difficult. Feeding the animals with nitrate-free forages before grazing may be adequate, but any such grazing management must be done with care.
- Adapting the cows to the feed over time allows the bacteria to adjust to the forage. Introduce such forages into the ration gradually over a period of 7 to 10 days.
- Don't allow hungry animals access to the suspected forages. Under practical conditions, injury is much greater when an animal consumes the forage rapidly than when it is consumed slowly.
- Thus, providing small amounts over a long period of time, even when the cows are accustomed to the feed, is less apt to create problems than if the cows have free access to nitrate-containing hay.
- The inability to control total intake creates problems when cows are allowed free-choice access to grazing (e.g., drought-stricken corn) or hay in large round bale feeders. Providing other nitrate-free feeds before or with grazing or large round bales helps limit "slugging" the cow's system with nitrates.
- Addition of vitamin A (~22,000IU/head/day) is considered beneficial. Access to iodized salt is also considered of value as the iodine metabolism may be compromised with nitrates.
- Animals exhibiting symptoms of nitrate toxicity maybe saved if immediate action is taken. Animals should be removed from the nitrate containing forages and placed on nitrate-free forages.
- Animals should be handled and moved slowly and with a minimum of stress. The oxygen-carrying capacity of the blood is quite low, so stressing the cows or running them with dogs, horses or pickups enhances the problem.
- Methylene blue is the specific treatment for animals exhibiting systems of nitrate toxicity, and survival of affected animals may be improved if a veterinarian administers methylene blue immediately.

In summary, drought-stricken forages may contain toxic amounts of nitrates for cattle, and prevention of problems is essentially the only valid approach to avoiding economic loss. Suspected forages should be tested and results used in the feed management of cattle. Nitrate-containing forages may be used with proper precautions. Limiting forage intake, adapting cows to forages, mixing problem forages and nitrate-free feeds and preventing animals from eating nitrate-containing forages free choice, especially when hungry, are important in avoiding cattle losses.

This information was adapted from a fact sheet written by B. R. (Pete) Moss, Professor in Dairy Science, Don Ball, Alumni Professor in Agronomy, Darrell Rankins, Associate Professor in Animal Nutrition and Gatz Riddell, Professor, Large Animal Surgery and Medicine.

## When Water and Feed Supplies Become a Concern

Drought usually gets its reputation from its impact on crops. But its impact on livestock can be equally dramatic. Hot, dry weather increases the water needs of livestock but often decreases water supplies. Crops may not yield as planned, causing a feed shortage. Consequently, farmers may face special challenges, including decisions about whether to buy feed or sell livestock.

### Provide Adequate Water

Ample drinking water is vital to animals during hot and humid conditions. Animals cool themselves by panting (water loss from the lungs) and through water evaporation from the skin. Increased respiration during hot weather is especially important for pigs and other animals that do not sweat. Animals must replace the water loss to cool themselves.

- Maintain access to water.
- Keep water containers clean.
- Adjust the drinking space for the size and number of animals in the pen or group.
- Excessive volumes of water grow warm and stale throughout the day.
- Check the water delivery systems periodically for plugs or other problems.

### Water Requirements

Water requirements may increase to double the normal intake for animals during hot weather. Clean, fresh water is important. If animals do not meet their water needs, they may refuse to eat, experience lowered production, become sick or die.

Water supplies also may become a problem as the drought wears on. Wells and piping may be inadequate if water demand increases dramatically; shallow wells and streams may dry up. You may need to transport water. Contact your local emergency government office or your county Extension office for information on water supply assistance.

Some general water estimates for various conditions and animals are as follows.

### Daily water intake for beef cattle at 88°F:

- Cows: 16.5 gallons for nursing calves; 14 gallons for bred dry cows and heifers.
- Bulls: 18 gallons.
- Growing cattle: 9 gallons for 400 pound animal; 12 gallons for 600 pound animal; 14 gallons for 800 pound animal.
- Finishing cattle: 14 gallons for 600 pound animal; 17 gallons for 800 pound animal; 20 gallons for 1,000 pound animal; 22.5 gallons for 1,200 pound animal.

### Daily water intake for dairy cattle at 80°F:

- Dry cows (for maintenance and pregnancy): 16.2 gallons for 1,400 pound animal; 17.3 gallons for 1,700 pound animal.
- Lactating, 1,400 pound cows (for maintenance and milk production): 17.9 gallons for 20 pounds milk production; 24.7 gallons for 60 pounds milk production; 38.7 gallons for 80 pounds milk production; 45.7 gallons for 100 pounds milk production.
- Heifers: 3.3 gallons for 200 pound animal; 6.1 gallons for 400 pound animal; 10.6 gallons for 800 pound animal; 14.5 gallons for 1,200 pound animal (for maintenance and pregnancy).

### Average daily water intake for swine:

- Breeding herd: 2 to 3 gallons for gestating sows and boars; 4 to 5 gallons for lactating sows.
- Young pigs: 0.5 to 1 gallon for weaned pigs (15 to 50 pounds); 1 gallon for growing pigs (50 to 120 pounds); 1.5 to 2 gallons for finishing pigs (120 pounds to market).

### **Average daily water intake for small ruminants:**

- Sheep and goats: 0.75 to 1.5 gallons for mature females and males.

Increase amounts for hot, dry conditions.

### **When Feed Becomes an Emergency**

Feed supplies may run low if crops are compromised or lost because of dry weather. Farmers unable to afford additional feed may face an emergency situation. Some considerations include:

**Develop an inventory of livestock numbers and feed supplies.** An inventory will help you plan for current and long-term feed needs.

**Get advice and assistance.** When a feed shortage is imminent, contact a nutritionist or your county Extension office for guidance and your lender for early discussion of potential problems or needs.

Two major options when facing a feed shortage are to:

- Buy or obtain additional feed. Feed assistance may be available from relief groups. Volunteer organizations typically offer hay lifts during drought years. Contact your county Extension office for more information.
- Sell nonessential animals. The money received can help buy additional feed for remaining animals.

This information was adapted from a fact sheet written by Diego M. Gimenez, Jr., Extension Animal Scientist.

## To Keep or to Sell Calves in the Drought?

During drought there is very little grass in pastures either for animals to eat or to cut as hay. Many are already feeding surplus hay from last winter and some of you are already buying hay and other feeds for your livestock. The question many of you are trying to answer is, "Do I keep feeding or do I sell my calves now?" It's a tough question to answer generally because each operation is different.

- If you have adequate foodstuffs to hold onto your calves until fall, you need to do so. Prices are expected to go up because of a smaller calf crop this year and secondly, improved demand for beef may also help market prices.
- Look for alternative feeds that are readily available and low-cost. Producers have got to consider using other feedstuffs than just hay. Options could include broiler litter, whole cotton seed, peanut hay and soybean hulls among many other possibilities. The key is to locate a nutritious alternative feed that you can buy at a reasonable cost. Bulky feedstuffs are not a good choice if they have to be transported long distances (due to handling and freight charges).
- Consider getting together with other producers to buy feeds in large bulk quantities. You may not need or have storage space for a trailer load of cottonseed, but it could be more affordable if two or three producers bought a truckload together. Also, buying in bulk will allow you to avoid the cost of bagging the feed.
- Make sure you have the storage facilities for bulk alternative feeds. Open front sheds give protection to the feeds while still giving you easy access to the feeds. Storing some bulk feedstuffs on thick grass sod with a tarp or plastic cover is possible, but you must consider the cost and waste of the feedstuff.
- Summer creep feeding offers another option. The decision to creep feed calves hinges on whether the cost of the creep feeding is less than the value added to the calf at sale time. You can feed a variety of rations to calves. Grain and a combination of byproducts can be fed in most cases.
- Early weaning of calves is another option. By four months, a calf is only getting between 20 and 40 percent of its energy requirement from its mother. Early weaned calves fed in a dry lot or supplemented on pasture may gain a half-pound to a pound faster than nursing calves. Early weaning reduces the nutritional needs for the nursing cows by one-third to one-half. You can now move these animals to low quality forages. You can also cull and sell older or open cows.
- A final option you may want to consider is retained ownership. Retained ownership through the stocker and feedlot phase offers you some flexibility.

This information was adapted from a fact sheet written by Dr. Walt Prevatt, Extension Agricultural Economist.

Earthquakes

## Earthquakes

Earthquake Survival

U.S. Earthquake Hazard Map

Earthquake Preparedness (FSA9600)

Disaster Response for Volunteers



## Earthquake Survival

### Before the Earthquake Strikes

How well you, your family and your home survive an earthquake often depends upon how well you prepare beforehand. The following checklist will help you get started:

1. Know the safe spots in each room – under sturdy tables, desks or against interior walls. Pick a spot away from windows, fireplaces, bookcases or tall furniture that could fall on you.
2. Conduct practice drills so you and your family know the safe locations in your home. Remember to “Drop, Cover, and Hold-on” during an earthquake.
3. Decide how and where your family will reunite if separated during an earthquake.
4. Learn how to shut off gas, water and electricity in case the lines are damaged. Do not attempt to relight the gas pilot. Call the utility company.
5. Learn first-aid and CPR (cardiopulmonary resuscitation) from your local Red Cross chapter or other community organizations.
6. You may want to secure your water heater and major appliances, as well as tall, heavy furniture, hanging plants, picture frames and mirrors.
7. Keep breakables, heavy objects and flammable or hazardous liquids (paints, pesticide sprays and cleaning products) in secured cabinets or on lower shelves.
8. Choose an out-of-state friend or relative that separated family members can call after the quake to report their whereabouts and conditions.

### During the Earthquake

1. **Drop, cover, and hold-on!** Move only a few steps to a nearby safe place. It is dangerous to try to leave a building during an earthquake because

objects can fall on you. Many fatalities occur when people run outside of buildings, only to be killed by falling objects or collapsing walls. In U.S. buildings, you are usually safer to stay where you are.

2. If you’re outside in an earthquake, stay outside. Move away from buildings, streetlights and power lines. Crouch down and cover your head.
3. If in a highrise building, stay away from windows and outside walls. Get under a table. Do not use elevators.
4. If driving, pull over to the side of the road and stop. Avoid overpasses and power lines. Stay inside your car until the shaking stops.
5. If in a crowded place, do not rush for the doors. Crouch and cover your head with your hands and arms.

### After the Earthquake

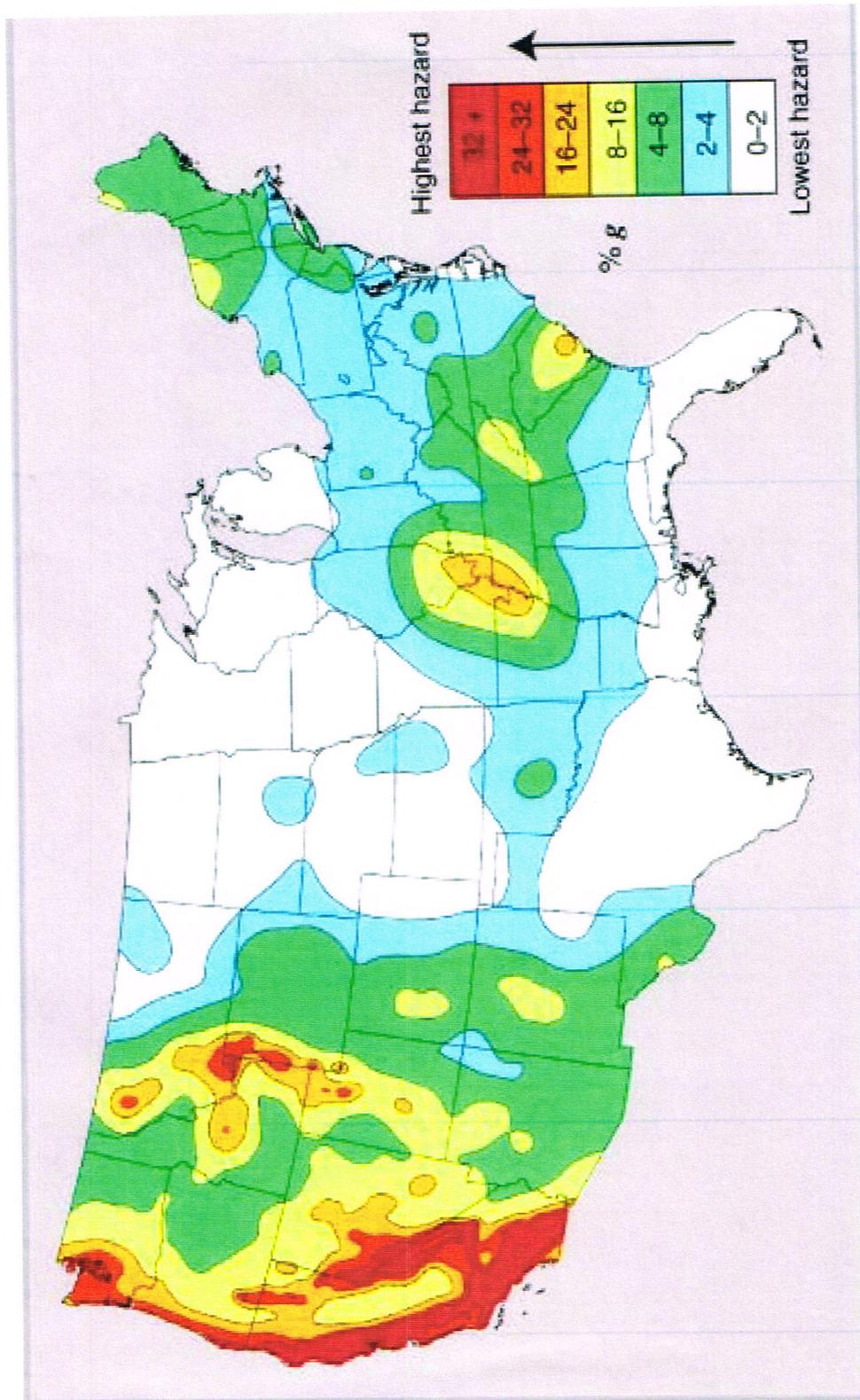
Unless there is an immediate, life-threatening emergency, do not attempt to use the telephone. After an earthquake, be sure to:

1. Check yourself for injuries. Often people tend to others without first checking themselves for injuries. You will be better able to care for others if you are not injured or if you have received treatment for your injuries.
2. Expect aftershocks. Each time you feel one, drop, cover and hold on. Aftershocks frequently occur minutes, days, weeks and even months following an earthquake.
3. Prepare to be self-sufficient for at least three days if it was a major earthquake.
4. Look for and extinguish small fires. Eliminate fire hazards. Fire is the most common problem following earthquakes.

5. Check for gas and water leaks, broken electrical wiring or sewage lines. If there is damage, turn off the utility at the source. Immediately report gas leaks to your utility company. Check for downed power lines; warn others to stay away.
6. Inspect your home for damage. Use battery powered lanterns or flashlights to inspect your home. Kerosene lanterns, candles, and matches may tip over or ignite flammables inside. Get everyone out if your home is unsafe because aftershocks can cause additional damage. Stay out of damaged buildings.
7. Turn on your portable radio for instructions and news reports. Local radio and local officials provide the most appropriate advice for a particular situation.
8. Stay calm and lend a hand to others, especially to the elderly or those that require special assistance.



## U.S. Earthquake Hazard Map



Ples Spradley, Pesticide Assessment Specialist

12/4/02

# Earthquake Preparedness

Ples Spradley  
Associate Professor -  
Pesticide Education

This fact sheet will help you plan for and survive a major earthquake. It tells you what to do before, during and after the quake to lessen the impact on your family and your home.

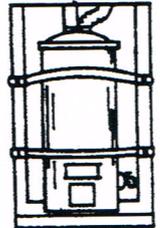
One of the worst earthquakes in recent history occurred along the New Madrid Fault in the winter of 1811-1812. This fault zone is of great concern to Arkansans because of the amount of damage that will result should another quake occur. Geologists predict that the chances of another major earthquake in the area are quite high. Being prepared can lessen the impact.

Be prepared to be self-sufficient for at least three days after the quake. Following are precautions to be taken before, during and after the earthquake.

## Before the Quake

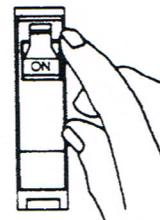
1. Conduct a hazard hunt. Some possible hazards include:
  - Tall, heavy furniture which could topple, such as bookcases, china cabinets or modular wall units.
  - Appliances which could move enough to rupture gas or electrical lines.
  - Hanging plants in heavy pots that could swing free of hooks.
  - Heavy picture frames or mirrors over the bed.
  - Latches on kitchen or other cabinets which will not hold the door closed during shaking.
  - Breakables or heavy objects that are kept on high or open shelves.
  - A masonry chimney that could crumble and fall through an unsupported roof.

- Flammable liquids like painting or cleaning products that would be safer in a garage or outside shed.
- Hot water heaters which can be pulled away from pipes and rupture. To avoid damage, secure your water heater by strapping it to the wall.
- Anything that can move, break or fall when your house starts to shake.

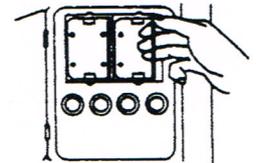


Take steps to correct these hazards. Secure or relocate heavy items.

2. Teach responsible members of your family how to turn off electricity, gas and water at main switch and valves. **Caution:** Do not shut off gas unless an emergency exists. If gas is ever turned off, remember that all pilot lights must be relit. Call your utility company.



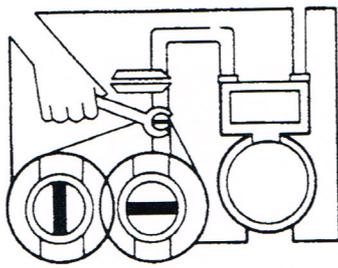
**Circuit Breaker**



**Pull-Out Cartridge Fuses**

*Arkansas Is  
Our Campus*

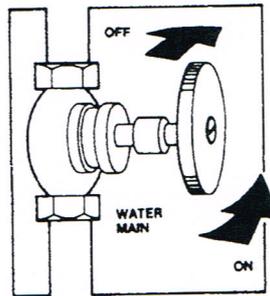
Visit our web site at:  
<http://www.uaex.edu>



**Gas Valve**

ON OFF

Label water shutoff valve, found where water enters the house. Also label main water shutoff valve, found with meter in a concrete box away from the house.



3. Family Earthquake Drill – It's important to know where you should go for protection when your house starts to shake. By planning and practicing what to do before an earthquake occurs, you can condition yourself and your family to react correctly and spontaneously when the first jolt or shaking is felt. An

earthquake drill can teach your family what to do in an earthquake.

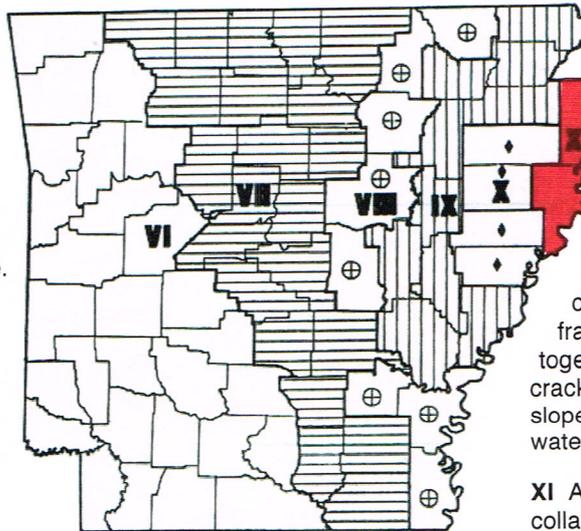
- Each family member should know the safest and most dangerous spots in each room.
  - Safe spots: The best places are under supported archways, against inside walls and under heavy pieces of furniture like a desk or sturdy table.
  - Danger spots: Stay away from windows, hanging objects, mirrors, fireplaces and tall, unsecured furniture.
  - Reinforce this knowledge by physically placing yourself in the safe location. This is especially important for children.
  - In the days or weeks after this exercise, hold surprise earthquake drills. Call out "earthquake" and have each family member respond by moving to the safest place.
  - Be prepared to deal with what you may experience after an earthquake – both physically and emotionally.
  - Establish a point of contact for separated family members.
4. Make sure you have emergency supplies on hand.
    - Flashlights with spare batteries. Secure a flashlight to your bed. Do not use matches or

The map predicts damage corresponding to Roman numerals on the Modified Mercalli Scale in an 8.6 earthquake. If an earthquake is around 7.16 on the Richter scale, reduce the zone Roman numerals by one. For example, substitute X for XI in Mississippi and Crittenden counties and read the damage on the Modified Mercalli Scale under X. If the earthquake is a 6.6, then reduce the zone numeral by two. For example, Mississippi and Crittenden counties would experience damage listed under IX on the Modified Mercalli Scale.

**Modified Mercalli Intensity Scale**

- VI** People are frightened and run outdoors. Heavy furniture may be moved; some instances of fallen plaster and toppling of chimneys. Slight damage.
- VII** Everybody runs outdoors. Damage is negligible in buildings of good design and construction, slight to moderate in ordinary structures and considerable in poorly built or

- badly designed structures. Chimneys broken. Felt in moving automobiles.
- VIII** Some damage even in buildings of good design and construction. Considerable damage in ordinary buildings, with some collapsing.



Great damage in poorly constructed buildings. Panel walls thrown out of frame structures. Falling of houses and factory chimneys, columns,

monuments and walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Hinders driving of automobiles.

**IX** Damage considerable in buildings of good design and construction. Structures thrown out of alignment with foundations. Ground cracked conspicuously. Underground pipes damaged.

**X** Wooden houses of good design and construction collapse. Most masonry and frame structures destroyed together with foundations. Ground cracked causing damage, rails bent, slopes and embankments slide, water surface rises.

**XI** Almost all masonry structures collapse, bridges destroyed, fissures over entire surface of ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent prominently.

candles after an earthquake until you are certain no gas leaks exist.

- Portable radio with spare batteries. Most telephones will be out of order or used for emergency purposes, so radios will be your best source of information.
- First aid kit; first aid skills – Have a first aid book such as *Standard First Aid and Personal Safety* by the American National Red Cross. Take basic Red Cross first aid and CPR courses.
- Fire extinguishers. Keep a Class ABC fire extinguisher handy for small fires.
- Food. It's always a practical idea to keep a supply of nonperishable food on hand which can be rotated into your diet and replenished on a regular basis. Have a sufficient supply of canned or dehydrated food, powdered milk and canned juices for at least two weeks. Dried cereals and fruits and non-salted nuts are a good source of nutrition.
- Water should be stored in airtight containers approved for food contact and replaced every six months. Store at least enough water per person for a two-week period. Also have purification tablets such as Halazone and Globaline, but read the label on the bottle before using tablets. Liquid household bleach can also be used to purify water. Use 5.25 percent sodium hypochlorite (liquid household bleach, not fresh or lemon scent) in the following amounts for cloudy water: 1 teaspoon per 5 gallons of water, 16 drops per gallon of water or 4 drops per quart. The amounts can be reduced by one-half for clear water. Water from an undamaged water heater could be a good source of water.
- Special items. Have at least a two-week supply of medications and special foods needed for infants or those on limited diets. Be sure to check with your physician or pharmacist about how long these medications can be stored and still remain effective.
- Tools. Pipe wrench and crescent wrench for turning off gas and water mains.

## During the Earthquake

1. Stay as calm as possible. Remaining calm will help you control your situation, and others that are with you will be less likely to panic. They will draw courage from you and lessen the chances of injury.
2. Ride out the earthquake. During a major earthquake, you may hear a roaring or rumbling sound that gradually grows louder and feel a rolling sensation that starts out to be gentle and within a second or two grows violent and knocks you off your feet OR you may be jarred first by a

violent jolt – as though your house was hit by a truck. A second or two later you'll feel the shaking and you'll find it very difficult to stand up or move from one room to another.

The rumbling and rolling may frighten you, but the whole tremor will only take a minute or two.

Remember, the myths about the earth opening up and swallowing you are NOT true. Injuries are not caused by the earthquake itself, but by falling objects. Try TALKING yourself through the earthquake to relieve the stress and provide a calming effect for other members of your household.

- If you are indoors, stay there. Get under a desk or table or in a corner like you practiced in your drills. Remember, stay clear of windows, bookcases, china cabinets, mirrors and fireplaces until the shaking stops.
- If in a high-rise building, get under a desk, stay away from windows and outside walls. Stay in the building on the same floor. Don't be surprised if the electricity goes out, or if elevator, fire alarm or sprinkler systems go on. **DO NOT USE ELEVATORS!**
- If you happen to be in the kitchen, turn off the stove at the first sign of shaking and quickly take cover under a counter or table.
- If in a crowded public place, do not rush for the doorway since other people are going to have the same idea. Move away from display shelves containing objects that may fall.
- If you are outside, get into the open away from buildings, trees, walls and power lines.
- If you are in your car, pull to the side of the road and stop the car. Do not park under overpasses or power lines. Stay in your car until the earthquake is over. If the earthquake has been severe, do not attempt to cross bridges or overpasses. They may have been damaged.

**PROCEED WITH CAUTION WHEREVER YOU ARE.** The possibility of encountering **FALLEN POWER LINES** is great. If you are in your car, you will most likely be protected from the live wires, unless you touch grounded metal. If you are on foot, make a wide path around the wires. **NEVER** assume downed power lines are dead – or **YOU** may be! People, metal and damp objects are good electrical conductors. To avoid shock and serious burns, **STAY WELL AWAY!** A wrong move trying to rescue someone else **COULD KILL YOU!**

## After the Quake

1. Check for injuries.
- If anyone has stopped breathing, give mouth-to-mouth resuscitation. Stop any bleeding injury by applying direct pressure to the wound. **Do not**

move seriously injured people unless they are in immediate danger of further injury. Cover injured persons with blankets to keep them warm.

- Do not use the telephone unless there is a severe injury. For more detailed emergency procedures, consult your first aid manual found in your standard first aid kit.
- Wear shoes in areas near fallen debris and broken glass.

2. Check for hazards.

- Put out small fires, if possible. If not, get out immediately. Alert your neighbors.
- Check gas, water and electrical lines and appliances for damages. If you smell gas or see a broken line, shut off all utilities. Do not switch on the gas or electricity again until the power company has first checked your home. Do not search for gas leaks with a lighted match.

## Three Day Survival Pack

### Top of the Barrel



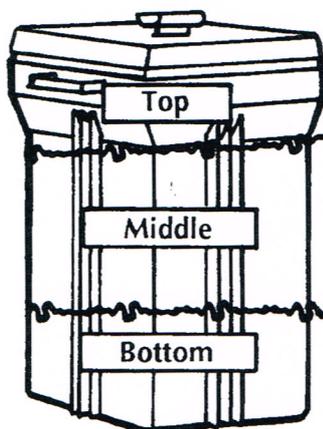
#### Standard First Aid Kit

First aid manual  
Aspirin or pain relievers  
Laxatives  
Rubbing alcohol  
Diarrhea medicine  
Petroleum jelly  
Soap  
Salt  
Gauze  
Band-aids

Matches  
Needles  
Tweezers

Heavy string  
Syrup of ipecac  
Elastic bandage  
Individual medical needs  
Small splints, popsicle sticks  
Triangular bandage (36" x 36" x 52")  
Sanitary napkins (pressure dressing)  
Disposable diapers (dressing/splint/padding)  
Micropore adhesive, paper tape  
Baking soda (1/2 teaspoon soda +  
1 teaspoon salt + 1 quart water for shock)

Cotton balls  
Cotton swabs  
Safety pins  
Scissors  
Thermometer



### Middle of the Barrel

#### Food

Can opener  
Three-day supply of food requiring no refrigeration.  
Date all food items. Write out a menu for each day.

#### Examples

Commercially canned meat and food (1/2 lb/person)  
Nonfat dry milk (1/2 lb/person)  
Graham crackers (1/2 lb/person)  
Dried apricots (1/2 lb/person)  
Canned orange or tomato juice  
Peanut butter (1/2 lb/person)  
(Supplies daily 2,100 calories and essential nutrients.)  
Water (1/2 to 1 gal/person per day). Store separately.



#### Bedding

Sleeping bag/blankets  
Plastic sheets/tarp

#### Clothing

One change/person

#### Personal Supplies

Toiletries  
Towel  
Good book  
Paper/pencil

**Infant/Children's Needs**  
if applicable

#### Fuel and Light

Matches  
Candle  
Signal flare  
Sterno canned heat

#### Equipment

Can opener  
Dishpan  
Dishes (disposable)  
Utensils (disposable)  
Axe  
Shovel  
Bucket (plastic bag liners)

### Bottom of the Barrel



#### Money

#### Other

Water purification tablets  
Liquid chlorine/bleach  
Eyedropper  
Soap

- Do not use electrical switches or appliances if gas leaks are suspected because sparks can ignite gas from broken lines.
- Do not touch downed lines or broken appliances.
- Clean up spilled medicines, bleaches, gasoline and other flammable liquids.
- Check to see that sewage lines are intact before using the toilet. Plug bathtub and sink drains to prevent sewage backup.
- Check food and water supplies. If water is cut off, use emergency water supplies found in water heaters and melted ice cubes.
- Check the building for cracks and damage, particularly the chimneys or masonry walls. Do not use fireplaces unless the chimney is undamaged and without cracks.
- Check closets and cupboards. Open doors cautiously. Beware of objects tumbling off shelves.
- Use charcoal broilers for emergency cooking, **ONLY OUT OF DOORS.**
- Be prepared for aftershocks. These are usually smaller than the main quake, but some may be large enough to do additional damage to structures weakened during the main shock.
- Do not use your vehicle unless there is an emergency. Do not go sightseeing through badly damaged areas. You will only hamper the relief effort. Keep streets clear for the passage of emergency vehicles.

For more information on earthquake hazards and ways to reduce risk, contact the **Arkansas Department of Emergency Management**, P. O. Box 758, Conway, Arkansas 72033-0758. Phone: 501-730-9750.

The original publication (Fact Sheet S107) was compiled and adapted for Arkansas by members of the Earthquake Preparedness Committee.

**Earthquake Preparedness Committee – Bringle Jennings, Chairman**, Wallace Cummings, Jimmie Lee Edwards, Mike Hedges, James Peachey, Mark Peterson, Carol Reiner, Glenda Rushing, and Eleanor Walls

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## Disaster Response for Volunteers

Your neighbors and community need volunteers to assist, and you are prepared to help. Whether you are going into a disaster area to help rescue victims or restore vital needs, observe several precautions. In a situation so full of emotions, do what you can to help victims without hampering other volunteers or disaster workers. There are a few key items to observe.

Where possible, coordinate your efforts to contribute to the community effort. It is essential that volunteers support and contribute to recovery, not burden the strained resources.

Many volunteers are not trained rescue personnel, but all emergency workers follow a vital rescue principle: Your personal safety is your most important concern. Don't put yourself in a dangerous position where you could become a victim because medical personnel and facilities are already taxed to the limit. Precious efforts to locate missing persons or care for disaster victims will be diluted if you become injured. An injured person can't be of assistance to others, including caring for his or her family. Also, any injury will take you and others away from your tasks.

Here are pointers to enhance your effectiveness as a volunteer:

- Downed power lines should be given a wide berth. You can be electrocuted as the result of voltage transmitted by water or soil. Dangerous voltages may be encountered more than 10 yards from downed "hot" power lines. Allow electric utility company workers and trained electricians to handle all electrical-related hazards.
- Be alert to identify natural gas or LP gas leaks. If you smell mercaptan and know how to close the valve to the natural gas supply, do so immediately. Close the LP gas valve at the supply tank, unless heat may potentially cause an LP gas tank rupture that could endanger you. Make sure everyone stays a safe distance upwind and immediately contact the gas supplier if it isn't wise or obvious how to stop the gas leak.
- Respect all areas that are cordoned off.
- Don't park where traffic will be blocked.
- Buildings in areas with damaged structures shouldn't be entered until they have been thoroughly inspected by experienced construction personnel. Cleanup and repair can proceed in buildings that are determined safe for entry.
- Debris may be in unstable piles. Avoid them to prevent nasty falls, cuts and injury from nails, broken glass, etc.
- Experienced chain saw operators should clear downed trees. All those working in the area moving brush should understand the dangers of chain saws and falling trees. Alert people around you to respect chain saw operators, because they cannot hear and may not see an approaching individual.
- Providing clean water and food, as well as ice during warm weather, is critical. If you can bring enough to share with victims and disaster workers until power and potable water are restored, you have given vital aid. It is wise to take available first aid supplies with you so you can provide an initial antiseptic treatment, if it is needed.
- Where traffic lights aren't working, you should drive with courtesy and caution. Heavy construction equipment, military equipment, ATVs and four-wheel-drive vehicles may be in use. Be alert and respect them. All kinds of equipment may be moving to clear the way and rebuild vital infrastructure.
- Be alert around habitat for, and avoid, poisonous snakes and other displaced vermin seeking food and water after the disaster.

Assistance providing shelter and clothing to victims will give comfort during ice storms, flash floods or other disasters. A friendly, neighborly response during the first few days meets an essential need until other help, donations, etc., arrive.

Farm/Home Biosecurity

## **Farm/Home Biosecurity**

Biosecurity Protection for Beef Cattle Operations

Biosecurity – It's Everybody's Concern

Cattle Biosecurity

Biosecurity Guidelines of National Cattlemen's Beef Association

Rules Veterinarians Practice Under

Crop Biosecurity and Bioterrorism

Biosecurity Protection for Fish Operations

What to Expect in Case of a Foreign Animal Disease Outbreak

Guidelines for Large Dead Animal Disposal by Burial

Avian or Asian Bird Flu

## Biosecurity Protection for Beef Cattle Operations

Dr. Tom Troxel, Beef Cattle Specialist, Section Leader - Animal Science

Biosecurity management practices are designed to reduce/prevent the spread and movement of infectious diseases onto the operation. Infectious diseases introduced onto an operation can have a devastating effect on cash flow and equity. The goal of a biosecurity plan is to minimize the movement of biologic organisms and their vectors (dogs, cats, rodents, biting flies, birds, etc.) onto and within your cattle operation. Biosecurity can be very difficult to maintain because the interrelationship between management, biologic organism and biosecurity is very complex. While developing and implementing biosecurity is difficult, it is the cheapest, most effective means of disease control available, and no disease prevention program will work without it.

Infectious diseases can be spread between operations by:

- The introduction of diseased cattle or apparently healthy cattle incubating disease.
- Introduction of healthy cattle who have recovered from disease but are now carriers.
- Vehicles, equipment, clothing and shoes of visitors or employees who move between herds.
- Contact with inanimate objects that are contaminated with disease organisms.
- Carcasses of dead cattle that have not been disposed of properly.
- Feedstuffs, especially high risk feedstuff, which could be contaminated with feces.
- Impure water (surface drainage water, etc.).
- Manure handling and aerosolized manure and dust.
- Exposure to horses, dogs, cats, wildlife, rodents, birds and insects.

### Biosecurity Plan

A biosecurity plan has three major components. They are **isolation**, **traffic control** and **sanitation**. When effectively managed, these components meet the principal biosecurity objectives of preventing or minimizing cross-contamination of body fluids (feces, urine, etc.) between animals, animals to feed and animals to equipment.

**Isolation** prevents contact between animals within a controlled environment. The most important step in disease control is to minimize commingling and movement of cattle. This includes isolation of new purchases for at least two weeks as well as not commingling established groups of cattle. Always isolate sick cattle and return them to their original group when they've recovered. Long-acting therapies have improved our ability to minimize movement of infectious organisms between groups. An important biosecurity action on beef operations is to separate cattle by age and/or production groups. Facilities should be cleaned and disinfected appropriately between groups.

**Traffic control** includes traffic and visitors onto your operation and traffic patterns within your operation. It is important to understand that traffic includes more than vehicles. All animals, including dogs, cats, horses, wildlife, rodents and birds, and people must be considered. Without good traffic control, disease can sneak in on anything from coveralls to tractor tires. People spread contaminated material directly by boots, shoes, hands, and clothing. Indirectly, shared hoof trimmers, truck tires, farm machinery and other equipment passing between farms can transmit disease.

Limit visitors' access to barns and lots. Post a warning sign asking visitors to keep out and giving instructions or a telephone number to call instead of entering the operation. Demand that visitors wear clean boots and coveralls or wear disposable boots and coveralls. Have calves and other sale animals picked up without dealers or transporters entering the barn. Keep a record of visitors. Ideally, the inside of truck, trailer and wagon beds, the bottom surfaces of a vehicle and tires should be washed and disinfected prior to entering the operation. An alternative method to minimize contact is to locate a set of holding pens away from the main housing areas and use them as a transfer station to keep outside vehicles off the main operation.

Traffic control within the operation should be designed to stop or minimize contamination of cattle, feed, feed handling equipment and equipment used

on cattle. A dead animal should be placed in a location that allows rendering trucks access without cross-contaminating healthy cattle. Vehicles and employees should not leave an area with dead cattle without cleaning and disinfecting. Composting of dead animals may be an option for many producers.

**Sanitation** is the third component to a biosecurity plan. Beware of using instruments and equipment on healthy animals following their use on sick or infected animals. Avoid using common syringes and needles for vaccination, blood testing or administering animal health products. Isolate sick animals, especially animals with unfamiliar symptoms or those that don't get better with the usual treatment. Be aware when working sick animals and try to move only from healthy to sick animals during the day, not vice-versa.

Rodents and other wildlife are capable of carrying diseases within a herd. Rodents can spread or accelerate the spread of established diseases from contaminated areas to uncontaminated areas via their droppings, feet, fur, urine, saliva or blood. Clean up, mow, seal openings in buildings and bait to hold down their population. Deer-proof fences might be necessary in certain situations.

Following is a list of signs that could be symptoms of different, serious diseases:

- Sudden, unexplained death loss in the herd.
- Severe illness affecting a high percentage of animals.
- Blistering around an animal's mouth, nose, teats or hooves.
- Unusual ticks or maggots.
- Large numbers of animals suddenly going off feed.
- Central nervous system disorder that causes an animal to stagger or fall.

### **Minimum Biosecurity Measures**

- Visitors should avoid livestock areas, pens and barns unless it is necessary.
- Park vehicles on paved or concrete areas that are away from production sites on farm to avoid contact with dirt, mud or manure. If this is not possible, be certain that tires are free of dirt and debris by hosing the tires and wheel wells before leaving the premises. If this does not clean the tires adequately; take the vehicle to a pressure car wash.
- Wash hands with soap and water or an antibacterial gel before entering and after leaving the premises to avoid transmitting disease agents from person to person.

11/15/02

## **Biosecurity – It's Everybody's Concern**

**Dr. Tom Troxel, Beef Cattle Specialist, Section Leader - Animal Science**

### **Why Be Concerned?**

- Since September 11, 2001, biosecurity has taken on a different meaning.
- Disease can have a devastating effect.
- Prevent the introduction and spread of diseases.
- Prevent people from introducing infectious diseases.
- Biosecurity should be a very high priority in day-to-day management.

### **Critical Control Points**

- New additions to the herd.
  - Apparently healthy animals could be incubating diseases.
  - Apparently healthy animals could be carriers.
  - Physically inspect all new animals.
  - Test for diseases of concern.
  - Try to vaccinate before the stress of transport.
  - Quarantine for three weeks.
- Feed and water supplies.
- Minimize contact between different age groups.
- Treat returning animals as if they are new additions.
- Minimize fence-line contact.
- Wildlife (rodents, birds, deer, coyotes, dogs, cats, etc.).
- Use appropriate vaccine handling and administration techniques.
  - Blood-borne diseases.
  - Disposable equipment.
  - Disinfect reusable equipment.
- Use your veterinarian.
- Mechanically transport infectious organisms (shoes, clothing, feeding equipment, trailers, etc.).
  - Wash livestock trailers.
  - Restrict access of people.
  - Provide boot and hand washing facilities.
  - Remove manure contamination.
- Read and follow pesticide labels.
- Vandalism.
- Buy only the amount you need.
- Keep an inventory list (product name, date of purchase, quantity, etc.).

- Inspect storage areas regularly (including feed room).
- Keep storage areas locked.

### **Farm Security**

- Keep equipment locked up (pesticide application equipment, trucks, tractors, etc.).
- Be aware of potential for siphoning or stealing from bulk tanks.
- Watch for unusual or suspicious behavior – people unfamiliar with details of using agricultural equipment; acting nervous, uneasy, or avoiding eye contact; demanding immediate possession of purchased materials and paying in cash. Be aware who is around the farm (roads, driving by, etc.).

**Promptly report any thefts of pesticides or equipment and any suspicious behavior to your local law enforcement agency.**

**Pay attention to what you are doing and to what is going on around you!**

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11/15/02

## Cattle Biosecurity

The purpose of “biosecurity” is to establish a prevention barrier to disease. Essentially it is like being a bodyguard to prevent disease from entering/crossing the fence. The only reason for establishing increasing levels of biosecurity is to control disease. Each increase in biosecurity level requires an equivalent increase in management decisions and activities.

If you already have a disease that you want to eliminate from your herd, you will have to go to a greater level of biosecurity for a longer period of time. Once you have achieved that level of biosecurity, then you would have to undergo a testing and eradication scheme within your herd.

If you want to keep a disease out, you have to go to the level of biosecurity that will prevent the disease from gaining possible entry into/onto your farm.

Example 1: Shipping fever	Should be at least level 1
Example 2: Johnes	Should be at least level 2C
Example 3: Salmonella/Mycoplasma	Should be at least level 4
Example 4: Foot and Mouth	Should be at least level 5

In general, to achieve a higher level of biosecurity, you will have to adopt the restrictions and precautions of the lesser (preceding) levels as you progress to the next level, even if it is for a temporary time period.

### Levels of Biosecurity

- 0) No precautions or restrictions. Animals and people free to move and have contact with other livestock.
- A) Vaccination program instituted (for Brucellosis, Black Leg, Lepto, etc.).
- B) Establish a sick isolation pen physically separate from rest of herd.
  - 1) Separation barrier with quarantine facilities. Complete identification of each animal on farm. Establish a quarantine facility where any purchases, additions, animals returning from livestock shows are kept for two to three weeks before adding to rest of herd. Retesting for unwanted/undesirable diseases. Quarantine facility should be physically separated from the rest of the livestock and the sick pen by a fenced barrier strip so that there is no physical contact with drainage of water or waste. An individual that either does not have access to the rest of the livestock or as the last activity before retiring for the day should provide care in the quarantine facility. No equipment used on quarantine animals should have contact with other animals without cleaning and disinfecting. Necropsy all unknown causes of death. Bury dead animals so that there is no physical contact with fluids or excretions. Clean and disinfect equipment used for burial prior to other use.
  - 2) Semi-closed herd established with all replacements added only from herds of equal or preferably higher health status into a quarantine facility for two to three weeks (or longer) before contact with the herd. Institute testing for any specific diseases to be excluded/eliminated. All livestock transportation vehicles cleaned and disinfected prior to and after each use. Identification and record system of health status that identifies offspring to at least the mother. Double fence property to prevent contact with neighbors.
- 2A) Additions by whole herd purchasing of animal of equal or greater health status.

- 2B) Only bulls purchased from herds of equal or greater health status.
- 2C) Manure/litter disposal should follow a management plan to prevent contact with pregnant animals and babies. Management restrictions to control contact of animals of different ages and reproductive status. Restrictions on usage and source of colostrums. Maintain same minimum health requirements for all embryo donors/recipients. Remove all known infected animals. Institute fly/insect control.
- 3) Closed herd maintained, with replacements raised on the farm. Only allow semen for artificial insemination from reputable sources with equivalent of higher health status.
  - 3A) Address wildlife access issues by appropriate fencing.
- 4) Strict access control to farm. No one on the farm without disinfected rubber boots or disposable boots, clean coveralls (provided by farm) or disposable coveralls. All instruments, or other material brought on to farm, must be washed or disinfected. Recommend a logbook to record every entry and visitor to farm with date, time on, time off and purpose of visit. Strict control of feed sources and delivery. All incoming vehicles should be restricted from areas where they might have contact with livestock. No contact/access of meter readers and postal/parcel deliveries with herd. Feed bins covered. Bird, rodent and pest controls implemented.
- 5) Total restriction of farm access. Restrict the number of family and employees with access to animals to the minimum required to feed and care for animals; only those individuals can have access to the animals at any time. No outside visits by owner, employees or members of their families to any other farms or areas where livestock might be. Total control of feed sources.

## Biosecurity Guidelines of National Cattlemen's Beef Association

### Controlling Disease within the Herd

- Vaccinate the herd against all endemic diseases (BVD, Clostridia disease, etc.).
- Decrease stress by using low stress management for movement and processing. Provide ample feed, water and shade.
- Isolate all sick animals.
- Minimize fence line contact with neighboring animals.
- Do not place cattle of different ages in the same pen.
- Keep records of all disease occurrences.
- Maintain a closed herd, if possible.

### Purchasing Replacement Animals

- Quarantine all new animals for 30 to 63 days.
- Test new animals for disease (BVD, Johne's, Salmonella, etc.).
- Purchase animals from healthy and reputable herds.
- Purchase feeds from reputable sources.

### Environmental and Pest Control

- Provide footbaths at entrances and exits of confinement facilities.
- Provide timely manure and dead animal removal.
- Keep grounds and feed bunks as dry as possible.
- Have an insect control program in practice. (Insects can be vectors for diseases such as anaplasmosis and bluetongue.)
- Have a rodent control program in practice.

### Disinfection

- Clean and remove as much organic material as possible, before disinfecting.
- Choose a disinfectant that will work against the pathogen you are trying to control.
- Be aware of any toxic, harmful or corrosive effects of the disinfectant.
- Follow the label on the disinfectant package.

### Visitors

- Minimize the number of visitors to the facility.
- Be sure all visitors have clean clothing/coveralls, boots and hands.
- Minimize visitors' contact with animals.
- Be sure all equipment brought onto the farm is disinfected or that disposable equipment is used.
- Be sure all vehicles brought to the farm are clean and have disinfected tires.
- Do not allow foreign visitors on the farm until they have been in the country for five days.
- Do not allow foreign visitors to bring any clothing, food or accessories they have had in another country onto the farm.

### Employees

- Be sure all employees understand and follow the biosecurity protocol.
- Realize that employee-owned animals can be a possible source of contamination to your facility.

## **Rules Veterinarians Practice Under** **F. Dustan Clark, Extension Poultry Health Veterinarian**

A veterinarian, like any other person involved in a profession, has rules to obey and a certain level of expected conduct and competency to maintain. Any veterinarian in any state is subject to the same rules that apply to any citizen of the United States and any state resident. However, there are also additional rules that apply to the practice of veterinary medicine.

The practice of veterinary medicine in a state of the United States is governed by a set of rules and laws usually known as the Veterinary Practice Act. The rules are usually set forth by the legislative body of the state and are established to define the practice of veterinary medicine in the state, establish a veterinary board and establish penalties for the illegal practice of veterinary medicine. The veterinary profession is also regulated in each state by a state Veterinary Medical Board. The exact name of the Board may vary from state to state or the overseeing agency may be different; but the rules, regulations and policies are similar.

In the State of Arkansas, the office of the Arkansas Veterinary Medical Examining Board is headquartered in Little Rock, Arkansas. The Board consists of five members appointed by the governor of the state. There are four veterinarians on the Board and one public member.

The purpose of the veterinary board is multiple. Some of the duties include examining and determining the qualifications of applicants to practice in the state, issuing veterinary licenses, investigating complaints against veterinarians and enforcing the provisions of the veterinary practice act. These rules and regulations are designed to protect the general public and their animals by ensuring that licensed qualified veterinarians are engaged in the practice of veterinary medicine.

The practice act and/or veterinary board also outlines a code of professional conduct for veterinarians

to follow. This code lists activities which are considered as unprofessional conduct, such as the "guarantee of a cure." A veterinarian that violates the rules of the practice act and/or veterinary board is investigated by the veterinary board and may be issued a citation, temporary suspension of their license or a revocation of their license to practice. Unprofessional conduct, conviction of a felony of moral turpitude, negligence, animal cruelty, dishonesty, etc., are all grounds for investigation and punishment.

The diagnosis of disease in an animal by a veterinarian is also somewhat regulated by the provisions adopted in a state by the agency with the responsibility to control animal diseases in the state. This is usually the domain of the state veterinarian or state department of agriculture. The agency charged with this responsibility usually issues a list of diseases that are considered reportable.

A "reportable disease" is one that is to be reported to the agency in charge of animal disease control. These diseases are those that have the potential to be communicable to people, are easily spread or are a foreign animal disease (i.e., one not endemic to the United States). A few examples are rabies, Brucellosis, Tuberculosis, Avian Influenza, Exotic Newcastle, Anthrax and Hog Cholera. In most states a veterinarian is legally obligated to report any disease listed as reportable in that state or the United States if the disease is only suspected in an affected animal. In other words the veterinarian does not need to definitively diagnose the disease, only suspect it.

The reasons for these rules and regulations are to protect the health of the public, protect the health of animals, protect the food supply and prevent deadly and costly disease outbreaks. They also ensure that a veterinarian is practicing with a certain level of knowledge and professional conduct and obeys the laws of the state and nation.

## Crop Biosecurity and Bioterrorism

**Dr Charles E. Wilson, Extension Agronomist - Rice, Ples Spradley, Pesticide Assessment Specialist  
and Dr Richard Cartwright, Plant Pathologist**

Events surrounding September 11, 2001, have focused attention on security and terrorism in all aspects of American life, but the agricultural community in the U.S. and elsewhere has been concerned about the security of our food supply for some time. Over the past few years, the introduction of exotic pests into the U.S., such as karnal bunt of wheat or the Russian grain aphid, and the recent outbreak of foot and mouth and mad cow diseases in Britain have all resulted in huge economic losses to agriculture and resulted in increased concern about crop and livestock biosecurity.

Events surrounding September 11 have also alerted us to another aspect of biosecurity and bioterrorism. During the investigation of these events, it was discovered that at least one of the World Trade Center terrorists had investigated the use of a “crop-dusting” plane for still unknown purposes. However, many felt that he could have been interested in more than just crashing a small plane into a building. Perhaps the intent was to use it to spray people, crops or livestock with a biological or chemical agent smuggled into the U.S. or even to disperse one of our many restricted-use pesticides in an illegal or dangerous manner. Although this would have seemed far-fetched just a few years ago, the sad circumstances of last fall illustrate that there are rogue groups around the world bent on wanton destruction and terrorism in other countries, including our own. Therefore, many persons feel that the time has come for at least a heightened awareness of crop and livestock security.

The basic need for that security is the protection of a stable, safe and inexpensive food supply. Our food supply in the U.S. consists of several components including large-scale commercial grain, oil and fiber crops and commercial fruit, vegetable and nut production.

In Arkansas, commercial grain, oil and fiber production are extremely important in the eastern half of the state, the Arkansas River Valley and southwestern Arkansas. Large row-crop farms are generally family owned and operated but may

involve several family members with a limited hired labor force. They are highly mechanized and capable of immense production in a very short time.

To operate efficiently, large-scale crop production is not very diverse and requires very few farmers. In other words, only a few crops are grown on enormous acreage within a fairly small area and only a few varieties are grown within each crop. Most of our population relies on very few people to produce the basis of the food supply.

This lack of diversity in crops and the reliance on such a small part of our population as producers increases the risk of economic sabotage through the purposeful introduction of exotic and destructive pests or by other means. However, Arkansas row-crop production is more diverse than certain places, growing rice, cotton, soybeans, wheat, corn and grain sorghum on significant acreage. In the Midwest, often only corn and soybeans occupy large areas. So the introduction, whether intentionally or by accident, of a new pest into our country poses a more significant threat than it might in other places. For example, a new disease or insect pest of rice could rapidly establish itself and damage large areas of the crop in eastern Arkansas because 1.5 million acres of rice in the state are near each other and our seed, production and grain handling systems are intertwined. While no one believes such pest introduction would wipe out production, even a 10 or 20 percent loss in one year would have a substantial impact on not only the Arkansas economy but on the United States, since we grow more than 45 percent of the nation’s rice.

What are the threats to crop production? These include:

- **Accidental introduction of new pests or diseases.**

There are many examples of this threat. New pests and diseases are introduced into the U.S. each year by people traveling to and from other countries or through our crop importing system. APHIS, the Agricultural Plant Health Inspection Service, is

responsible for preventing these introductions or containing them if accidentally introduced. A recent example of an introduction was karnal bunt of wheat which is a rather mild disease biologically. But because of various quarantine laws in different countries karnal bunt poses, a very important economic and political problem for wheat exports. Its introduction and discovery in Arizona, followed by discoveries in California, New Mexico and Texas, created and has continued widespread economic problems among U.S. wheat producers and grain buying companies.

- **Willful introduction of new pests or diseases.**

This threat is simply a purposeful application of the first. A malicious introduction of a new pest or disease would entail both intent and specialized knowledge. As far as we know, this has not occurred in crop production in the U.S. but remains a possibility. Many countries, including ours, have conducted research on the development of certain plant diseases as biological weapons for the use of damaging another country's crops. This is not as easy as it looks, however, and over time the unreliability of plant pathogens to produce disease led to an abandonment of this idea. Both of these threats are monitored, not only by APHIS, but also by the Extension Service in each state, and by agricultural field personnel and growers themselves. How so? Anything new and different attacking a crop in the U.S. is rapidly brought to the attention of county Extension agents, Extension specialists and university researchers. These professionals understand how to put in motion a response and who to notify to quickly address such a development.

- **Accidental contamination of crops or food products with chemical or biological agents.**
- **Willful contamination of crops or food products with chemical or biological agents.**

These threats have occurred on a limited basis in the U.S. and elsewhere but constant monitoring by the food/feed industry and FDA and rapid response by law enforcement and the medical profession has largely prevented widespread problems.

- **Accidental destruction of crops with chemical agents.**
- **Willful destruction of crops with chemical or biological agents.**

Accidental injury or even destruction of fields sometimes occurs when a pesticide applicator sprays the wrong herbicide by mistake. Accidental pesticide applications of this nature are quickly noted and Extension personnel can alert the Arkansas State Plant Board if necessary. The purposeful use of herbicides to destroy crops is unknown in the U.S. and would certainly be recognized immediately.

So, what can farmers and others in commercial agriculture do with respect to crop biosecurity? Common sense things, mostly.

- **Be more vigilant.**
- **Report unusual crop problems to the local county agent.**
- **Buy only the amount of pesticides needed for the season and avoid carryover.**
- **Keep pesticides locked up and control access to them.**
- **Keep a pesticide inventory.**
- **Don't import problems by bringing in seed or plants from other countries illegally. Go through proper channels to import crop products.**
- **Read and follow pesticide labels and make sure the applicator does as well.**
- **Lock and control access to pesticide application equipment, including airplanes.**

A safe, stable and inexpensive food supply is the foundation of any civilization. It makes sense to protect it from both accidental and willful injury. An increased awareness of crop biosecurity could help in the short and long term.

11/15/02

## Biosecurity Protection for Fish Operations

Dr. Andy Goodwin, Associate Professor-Fish Health/Pathology  
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Producers of trout and salmon have long followed rigorous biosecurity protocols designed to prevent the spread of fish diseases from one farm to another, between farmed fish and wild fish and from pond to pond within a farm. The bacterial and viral diseases of trout are easily spread and research has shown that the incidence of diseases is significantly higher on farms that employ workers that work at more than one production facility. Trout and salmon are subjected to rigorous health inspections before any fish transfer takes place. These inspections may involve individual lots of fish, but more commonly focus on certifying production facilities and their water supplies as free from specific fish diseases. State and federal law mandate the protocols for these inspections and frequently involve highly sensitive DNA techniques (PCR).

There are no such organized regulations governing the movement of the warmwater fish. Each state and foreign country may have its own import regulations but there is no system for routine inspection of warmwater fish farms. The difference in handling of coldwater and warmwater fish diseases developed because of a historic emphasis by the U.S. Fish and Wildlife Service on the management of trout and salmon. Since then, warmwater fish have remained out of the inspection spotlight because of a widespread perception by farmers and regulators that disease risks associated with the transport of warmwater fish are not significant. This widely held assumption might not be valid. A careful examination of the history of some warmwater fish diseases provides ample evidence of disease spread.

Enteric septicemia of catfish (ESC) is the most important disease in the catfish industry. The disease occurred on an Arkansas fish farm in 1969, but was not correctly diagnosed until 1978 when three cases were reported. By 1985, the disease was so widespread that diagnostic laboratories reported almost 4,000 cases. Another example is Koi Herpes Virus (KHV). This disease was exported to the U.S. along with shipments of koi. It spread slowly at first because water temperatures were not optimal. When spring came and koi ponds warmed, valuable collections of koi were wiped out all over the U.S. Clearly

there are warmwater fish diseases with the potential to be just as devastating as those that affect trout.

### Preventing the Introduction of New Diseases

The greatest disease risk facing Arkansas fish producers is the introduction of new diseases into established farms. Possible mechanisms for disease introduction vary depending on the fish species involved, but those below probably present the biggest hazard.

- Bringing infected fish onto the farm from another fish farm or from the wild.
- Transfer of equipment (seines, aerators and trucks) between farms.
- Animal vectors, especially birds.
- Using contaminated water.

Farmers can avoid introducing new diseases by following procedures aimed at blocking these modes of disease transfer. A comprehensive biosecurity plan should include the following.

**When introducing new fish:** Wild fish, fish from other farms or fish returned to the farm by a distributor should all be considered potential sources of disease. New fish should be inspected for known diseases before they are brought onto the farm. While not practical with current catfish production practices, producers of other fish species should quarantine new fish in ponds or facilities separated from the rest of the farm by the greatest practical distance and as far away from existing broodfish stocks as possible. The duration of the quarantine should be at least several weeks and involve the full range of spring or fall temperature fluctuations (quarantining fish in the winter for a disease that only occurs in warm water is not useful). Minnows returned to producers from dealers should be kept separate from established fish stocks.

**When moving equipment:** Drying kills many fish pathogens. When practical, trucks, seines and other equipment that has been used for fish from another facility or from the wild should be rinsed

(warm soapy water is even better) and allowed to dry before reuse. This is especially critical for seines and trucks that have been used to harvest or transport sick fish. As a mechanism to transfer disease from farm to farm, a wet mucus-laden seine is almost as dangerous as the transfer of infected fish.

**Animal vectors:** The most important animal vectors for fish diseases are birds. Several species of fish-eating birds carry life stages of parasites (“grubs”) that infest fish. A bird control program that uses the most effective legal means to discourage birds from visiting farm ponds can reduce this risk (see your Extension agent or the animal control specialists from USDA-APHIS). The same parasites that travel in birds also have snails in their life cycles so chemical or biological control of snail populations is beneficial in species where grubs are a problem. There is also some evidence that birds may be able to transmit bacteria or viruses through their droppings. Birds may also drop fish that they have removed from one body of water into another.

**Contaminated water:** The safest water for fish production is water pumped straight from a well to the pond. However, concerns about declining water tables and pumping costs have raised interest in

reusing water and in the use of water pumped from rivers. Water recirculated within a farm from pond to pond is not likely to be the source of new pathogens but may enable existing pathogens to build up larger populations. River water may contain new pathogens not present on the farm and is the least desirable source of water for fish production. If river water must be used, it should be pumped through the finest filter practical and aged in fish-free ponds before use.

## **Preventing the Establishment and Spread of Disease**

When populations of fish quit feeding, behave strangely or suffer significant mortality, samples should be submitted to one of the four UAPB Fish Disease Diagnostic Laboratories. This is especially critical if the disease appears different than those previously experienced on the farm. Until a diagnosis is determined, sick fish should be quarantined and any movement of fish, water or equipment from the pond should be prevented. If an exotic disease is diagnosed, the infected fish should be treated or eradicated to prevent the spread of the disease. Careful adherence to this policy has prevented the establishment in Arkansas of several potentially devastating exotic diseases.

11/15/02

## What to Expect in Case of a Foreign Animal Disease Outbreak

### Notification of Outbreak in the United States in Another State

- Suspicion:
  - Governor's Alert
  
- Confirmation:
  - Governor's Proclamation closing border
    - Mandatory
    - Stop entry of all livestock and poultry
    - Stop movement within the state
      - 7 days
      - Close sale barns/livestock markets
      - No fairs, exhibitions, rodeos, shows, etc.
      - All livestock and poultry restricted to farm premises
  - Surveillance
  - Industry Notification
  - Voluntary Increase in Biosecurity
  - Farms encouraged to restricting access and limit off farm visiting
  - Publicize through media and livestock organizations
  - Livestock or Poultry in Transit
    - If Arkansas livestock or poultry – return to farm or maintain on premises of market/fair grounds, etc.
    - If not Arkansas livestock or poultry:
      - Seal trailer and record movements
      - Return to state of origin (if close to border)
      - Allow to exit state (if receiving state will accept, if intermediary state will allow, etc.)
      - Request state of destination to report on disease status
  - Surveillance within state on farm
    - Companies contacting growers with livestock or poultry on farms
    - Commodity groups contacting producers
    - Extension Service contacting producers
    - Other field employees of state or federal
  - Contact other states about possible movements to and through Arkansas
  - Exceptions to movement restrictions
    - If nonsusceptible species
    - If susceptible species move with increased biosecurity
    - Poultry permits with C & D certificate
    - Commuter flock agreements
    - Company/Complex agreements
    - Swine permits with C & D certificate
    - Commuter Herd agreements
    - Company/Complex agreements

### If No Diagnosis Within the State Within Seven Days

- Reopen livestock markets to Arkansas livestock
- Allow movement of animals to feedlot/slaughter out of Arkansas (if surrounding states cooperate to allow movement)

- Continue to allow commuter flock and commuter herd movement
- No entry into Arkansas without health certificate, C & D certificate prior to entry and that Arkansas is not the state of destination
- Designated Dirty Corridors for Interstate Transit: I-40, I-30, and I-55

### **Response to Instate Outbreak**

- Mandatory
- Stop entry of all livestock and poultry
- Stop movement within the state
- Lab specimen collected and sent to Foreign Animal Disease Diagnostic Laboratory, herd quarantine and state veterinarian notified
- Survey area for animal population (livestock, poultry and wildlife)
- Determine potential quarantine zones and emergency services and timeline

### **Receive Lab Confirmation**

- The “infected zone” around the infected farm would be determined. This is the geographical area extending 5 miles beyond all known affected farms.
- Surveillance zone is the geographical area extending 10 miles out beyond the periphery of the Infected Zone.
- Determine the Quarantine Zone around the infected farms
- Post guards at the quarantine zone borders, infected premises and at-risk premises
- Animal Surveillance
  - Susceptible animals
  - Nonsusceptible animals
  - Wildlife
- Establish field operation center
- Epidemiological activities
- Vaccinations (if any)
- Vector control
- Eradication activities (appraisals, disposal, depopulation, burial, cleaning and disinfection, etc.)
- Post-Outbreak monitoring and surveillance
- Quarantine release
- Indemnity payments
- Follow up, evaluation and debriefing

## Guidelines for Large Dead Animal Disposal by Burial

Dead animal disposal can be performed by various methods. Burial, incineration and composting are all acceptable and legal methods of disposing of dead animals. This plan specifically addresses burial, as it is the most common method used.

Incineration should be performed in accordance with the equipment manufacturer's recommendations.

Composting shall be performed in accordance with the University of Arkansas Division of Agriculture, Cooperative Extension Service guidelines for composting swine.

The Arkansas Livestock and Poultry Commission regulates the disposal of dead animals, and they shall be contacted for proper procedures to dispose of dead animals in the case of a mass die off.

Dead animals shall be buried in pits or trenches, or by mounding. The burial should be performed in accordance with the following guidelines:

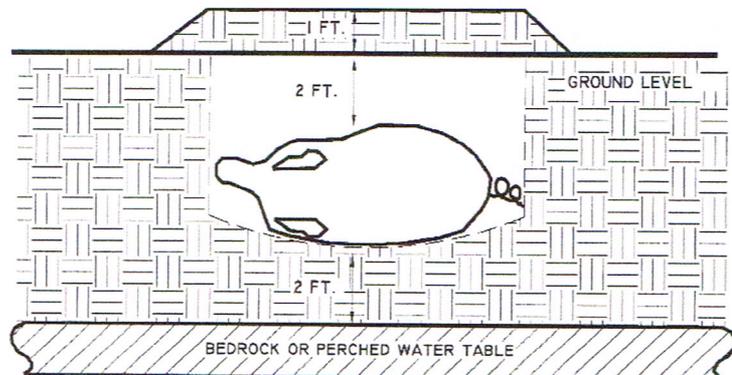
1. Burial shall be performed in the most remote area possible. Burial areas shall be located a minimum of 300 feet down gradient from wells, springs and other water sources. Burial shall not be made within 300 feet of streams or ponds, or in soils identified in the county soil survey as being frequently flooded.
2. The bottom of the pit or trench should not be closer than 2 feet to a perched water table or cavernous bedrock. A soil investigation of the burial area should be performed to ensure that the soils are adequate for dead animal disposal.
3. Pits or trenches shall be approximately 4 feet to a maximum of 6 feet deep. They should have stable slopes not steeper than 1 foot vertical to 1 foot

horizontal. Vertical side slopes will be acceptable on pits dug to meet a one-time burial provided that it is not necessary to have people work in the pit.

4. Dead animals shall be uniformly placed in the pit or trench so that the carcasses do not exceed a maximum thickness of 2 feet. All dead animals shall be covered the same day they are placed in the pit or trench. The cover over and surrounding the buried animals shall be a minimum of 3 feet. The finished cover shall be shaped so drainage and runoff will be away from the pit or trench.
5. The bottom of trenches left open shall be sloped to drain and shall have an outlet. All surface runoff shall be diverted from entering the trench.
6. Burial areas shall be inspected regularly and any subsidence or cavities filled.

Burial by mounding should be performed in areas where soil conditions described above cannot be met. The animal shall be placed flat on the ground and covered with a minimum of 3 feet of material. The surrounding area shall be graded and sloped to prevent water from ponding adjacent to the burial mound.

### Burial of Large Dead Animals



These guidelines are from USDA Natural Resource Conservation Service standards and are enforced by the Arkansas Livestock and Poultry Commission.

## Avian or Asian Bird Flu

Recently, there has been a tremendous concern about a strain of Avian Influenza (AI) referred to in the news media as the “Bird Flu,” “Asian Bird Flu” or “Avian Flu.” This strain of Avian Influenza has caused serious problems in poultry and humans in Southeast Asia.

Avian Influenza is a viral disease caused by a virus (Orthomyxovirus). The virus has two glycoproteins known as Hemagglutinin (H) and Neuraminidase (N) that protect the virus and allow it to adhere to surfaces such as respiratory cell membranes. There are 15 types of H glycoproteins and 9 types of N glycoproteins. The two glycoproteins are used by poultry health professionals to differentiate between strains of AI such as H5N2 or H7N1. In addition, AI is designated as low pathogenic or high pathogenic depending upon the genetic makeup and mortality levels it causes in poultry. The type of Avian Influenza currently in Southeast Asian nations is a “highly pathogenic” strain of H5N1. This strain has caused extremely high mortality in poultry and has infected 100+ humans, causing approximately 65 deaths. It is these features that have caused the great concern over the disease.

Normally, Avian Influenza was not considered to spread from birds to people without first going through an intermediary such as pigs. However, in 1997 in an outbreak in Hong Kong poultry, the virus did spread directly to people. Yet, it should be noted that many people have been associated with the eradication efforts and have not fallen ill with the disease. Unfortunately, a small number of people have developed an infection from the virus. Virtually all of these people have been in direct close contact with infected birds.

Most of the poultry raised in Southeast Asian nations are raised as “free-range or free-running poultry” (often referred to as village poultry) where they commingle with other animal and bird species as well as have frequent contact with people. It is thought that this practice of allowing poultry to commingle with other species in free-range situations has led to Avian Influenza outbreaks. In the United States, commercial poultry are kept confined in controlled housing and have contact with only limited numbers of people.

The transmission of Avian Influenza to people has been the very rare exception. However, the concern is that, if the virus mutates and acquires human influenza genes, it could be transmitted efficiently from person to person, thus setting the stage for a possible pandemic (worldwide epidemic). It is this concern over the possible change in the virus to one that could cause a pandemic that has health officials worldwide anxious.

There have been limited outbreaks of Avian Influenza in poultry in the United States in the past. These infected flocks were humanely depopulated and disposed of. The poultry houses were cleaned, disinfected and checked for the virus. Currently, there is a ban on the importation of live poultry or poultry products from AI-affected areas. Also, it is important to note that almost all of the poultry sold in the United States is produced in the United States. Avian Influenza monitoring and surveillance efforts are constantly being conducted in the poultry industry as an additional safeguard. Because of these practices and the U.S. food inspection protocols, there is virtually no chance that a person will come in contact with poultry meat or products that are infected with the Avian Influenza virus. Normal hygiene practices such as washing of hands after handling raw poultry meat and properly cooking poultry reduce the chances further since the Avian Influenza virus is easily destroyed by normal cooking temperatures.

Currently, there is no vaccine available commercially for protection of people against H5N1 “Bird Flu.” However, research efforts to develop a vaccine are continuing, and clinical vaccine test trials were conducted in April of 2005. The United States Center for Disease Control (CDC) has provided U.S. health departments with recommendations for enhanced surveillance and detection of H5N1 and has issued advisories to travelers visiting countries with outbreaks of H5N1. Numerous training programs and workshops have been conducted with state and local health departments to increase awareness of the disease and enhance the agencies’ ability to detect H5N. The CDC is also working with the National Institute of Health and the World Health Organization to develop vaccine seedstock candidates and safety test vaccines. These preparations are being done to be ready in case the virus changes and develops the ability to spread from person to person, thus causing a pandemic. Hopefully, the changes in the virus will not occur, but the efforts to be prepared if the virus

changes could prevent numerous illnesses or deaths. There is currently no H5N1 Avian Influenza in the United States. The current safeguards in place make an outbreak highly unlikely. However, prevention and surveillance are always prudent.

Poultry producers can help protect their flocks against AI and other diseases by utilizing biosecurity practices such as those listed below:

1. Keep **“No Visitors”** and/or **“Restricted”** signs posted at the road entrance of the farm.
2. **Do not allow** visitors on the farm or in the poultry houses.
3. **All farm personnel should wear separate clothing** (including shoes, boots, hats, gloves, etc.) on the farm. Clothes used on the farm should **stay** on the farm.
4. **Completely change all clothing** after caring for the flock, and wash hands and arms thoroughly before leaving the premises.
5. **Do not visit** other poultry farms or flocks or have contact with any other species of birds.
6. Keep all poultry houses securely locked. Lock all houses from the inside while working inside.
7. All equipment, crates, coops, etc., should be **thoroughly cleaned and disinfected** before and after use.
8. **All essential visitors** (owners, feed delivery personnel, poultry catchers and haulers, service men, etc.) are to wear protective outer clothing (coveralls), boots and headgear prior to being allowed near the poultry flock or farm.
9. **Monitor all vehicles** (service, feed delivery, poultry delivery or removal, etc.) entering the premises to determine if they have been **properly cleaned and disinfected. This includes disinfection of the tires and vehicle undercarriage.**
10. Sick and dying birds should be submitted to a diagnostic laboratory for proper diagnosis of the problem. All commercial growers should contact their flock supervisor and follow their instructions.
11. **Dead birds** are to be **properly disposed of** by burial, incineration or other approved method.
12. Any person handling wild game (especially waterfowl) **must** completely change clothing and shower or bathe before entering the premises.
13. **Do not** borrow equipment, vehicles, etc., from another poultry farm.
14. **Do not visit** areas where Avian Influenza is a problem.

*Financial*

## Financial

Managing Financial Losses from a Natural Disaster (FSHEC67)

Replacing Valuable Papers (FSHEC45)

Steps to Take to Repair Damages

Recovering the Value of Storm Damaged Timber from Taxes

# Managing Financial Losses from a Natural Disaster

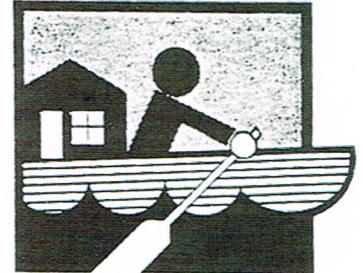
Laura Connerly  
Family and Consumer  
Sciences Associate



**Earthquake**



**Tornado**



**Flood**

Managing financial losses after a natural disaster – flooding, earthquake, tornado or other windstorms – is difficult. Preparing for possible financial losses now will ease your post disaster recovery.

## **Plan Ahead Before Disaster Strikes**

Are you prepared? An emergency fund, adequate insurance and being organized are keys to any pre-disaster financial plan.

### **Establish an emergency fund.**

\$ You will need funds to cover deductibles and co-payment clauses in your homeowners, flood, automobile or health insurance policies. Earthquake insurance riders also have deductible clauses.

\$ You may need funds for small, uninsured losses.

### **Review your Insurance policies now to avoid misunderstandings later.**

\$ Know what is covered and what is not. Read your policies and ask questions. Do you have adequate coverage? Purchase needed insurance now.

\$ Separate policy protection is required for losses due to an earthquake or flooding.

### **Practice damage control.**

\$ Keep up your property. Perform needed repairs. For example, secure shingles, fix door hinges, strap-down your water heater and install earthquake resistant cupboard latches to prevent unnecessary destruction.

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<http://www.uaex.edu>

## Update your records.

- \$ Inventory your personal property. Keep records in a safe place to help with any insurance settlement.

## Insure Your Risks

### Homeowners Insurance

Homeowners insurance protects your home and/or your personal possessions against certain risks. Check your policy for the list of risks which are included. If you rent, live in a condominium or mobile home, you can purchase a homeowners-type policy.

Coverage includes damages to the dwelling, other structures and your personal property (check for exemptions and reimbursement limits on specific items such as jewelry and guns). Coverage also includes additional living expenses and/or reimbursements for some or all of your costs for temporary housing while your damaged home is repaired or replaced.

Your homeowners policy may protect against perils such as fire and lightning or have extended coverage for damages from windstorm or hail, explosions, riot, other aircraft or vehicles, glass breakage or smoke. If you have Broad Form coverage, 17 perils are covered. Most home insurance policies do not cover losses and damages due to earthquakes or floods.

**Policies, premiums and services provided by different insurance companies will vary. When shopping for homeowner's insurance, consider the following.**

- \$ Protect yourself against catastrophic rather than small losses.
- \$ Cut premiums by increasing your deductibles.
- \$ Compare coverage with at least three different insurance companies.
- \$ Choose a carrier with a good reputation for claims service.
- \$ Ask about discounts and special rates. Nonsmokers, homes with smoke alarms, use

of dead bolt locks and fire extinguishers often qualify for lower rates.

- \$ If you buy homeowners and automobile insurance from the same company, you may receive a discount.

### Earthquake Insurance

Most insurance policies do not cover any loss resulting from any form of earth movement. However, coverage against loss resulting from any earthquake activity may be added to your homeowners insurance by an earthquake damage rider. Earthquake activity includes earthquake and volcanic eruptions, explosions or effusions (from earthquakes or volcanoes) that begin during the policy period.

The premium for an earthquake rider will depend on the location, structure and value of the home. In most cases, reimbursement for losses is subject to a deductible. Earthquake deductibles can be either a percentage of your total coverage or a dollar amount. Often there are separate deductibles – one for structural damages and another for damage to contents. If earthquake tremors occur at distinctly different times, reimbursements for damage from the second, third, etc., tremors may be subject to new deductibles. Check your policy.

Ask if the earthquake rider will cover the structure and the contents or just the contents. If you have a homeowners-type policy for your rental unit, check to see if you can purchase an earthquake rider on your possessions. Since each company is different, ask questions so that you understand the terms of your own policy.

### Flood Insurance

Standard homeowners policies do not cover flood losses. If your house is located in a flood-prone community which has a flood plain management program in compliance with the National Flood Insurance Program (NFIP), you may be eligible to purchase low-cost flood insurance. If so, you can purchase a separate flood insurance policy for your home, condominium, mobile home, farm or rental unit and also the contents. Flood insurance will be subject to a deductible, a standard \$500 on buildings and an additional \$500 deductible on contents of building.

Don't delay. There is a 30-day waiting period for the policy to become effective. Note, if your home is not in a flood-prone area, you cannot purchase flood insurance. For additional information, contact your insurance agent.

### **You May Need Both Earthquake and Flood Insurance**

Regions in Arkansas close to the New Madrid fault may also be subject to flooding in the event of strong earthquake activity. For example, levees could be disturbed or drains could be broken and water released. Too late, you may learn you needed both flood and earthquake insurance to cover losses. Ask your insurance agent how you may be affected.

### **Automobile Insurance**

Car damage is covered for windstorm, earthquakes, falling objects, missiles, explosions, hail, water and flooding if you have comprehensive coverage in your personal automobile policy. Check with your insurance agent.

## **What to Do After a Disaster**

### **Insurance Settlements**

The insurance industry plays an important role after a catastrophe. Insurance representatives will be on the scene immediately following a major disaster to speed up the handling of claims. Notify your insurance representative of any losses. Leave word of where you can be contacted. Hardship cases are a first priority – with service promised to all policyholders as soon as possible. And finally, don't assume your settlement will be the same as your neighbor's.

Some policy owners may find the insurance company will complete a follow-up visit to your home. The company wants to know if you used your claims check to complete your repairs.

## **Property Losses and Income Taxes**

Casualty write-offs from an earthquake or flood are equal to the amount of your losses not covered by insurance minus both a \$100 deductible and 10 percent of your adjusted gross income (AGI). Suppose your AGI is \$20,000 and your loss is \$10,000. You could deduct a loss of \$7,900 ( $\$20,000 \times 10\% = \$2,000 + \$100 = \$2,100$ ;  $\$10,000 - \$2,100 = \$7,900$ ).

### **Government Assistance**

In Arkansas, disaster relief begins at the city and county level. Depending on the severity of the disaster, local officials may request state assistance from the Governor, through the Arkansas Office of Emergency Services. The Governor may also request a presidential disaster declaration to secure federal assistance.

Individuals and families must apply for available governmental disaster assistance programs to determine eligibility. Before a disaster, store records in a safe place so you will have the information you need to complete the required paperwork. With today's coordinated efforts after a natural disaster, representatives from local, state, federal and volunteer relief programs will operate from a central location in your community to process applications and prevent duplication of effort.

At the state level, Temporary Housing Assistance Grants are available for one to three months for families whose homes were destroyed or uninhabitable after a disaster. Persons with additional living expenses coverage from a homeowners policy are not eligible. Individual and family grants to assist disaster victims with uninsured losses from a disaster are available. Grants can be used for medical expenses, limited home repair, repair/replacement of furniture, appliances, transportation, insurance deductibles and food.

If your damaged community receives a presidential disaster declaration, the federal Individual and Family Grant (IFG) Program may authorize funds for such needs as housing,

personal property, medical/dental, funeral and transportation. Each application is reviewed to determine specific needs and eligibility.

### Assistance By Volunteer Agencies

Churches, American Red Cross, Salvation Army and Mennonite Disaster Service provide food, clothing, shelter, workers, medicines and medical supplies and other emergency services and funds for immediate needs of disaster victims. These volunteer agencies have formed the National Voluntary Organizations Active in Disaster (NVOAD), [www.nvoad.org](http://www.nvoad.org), to coordinate resources with each other and government agencies.

**For more information on organizing your financial affairs, the following publications are available at your county Extension office.**

- |         |  |
|---------|--|
| FSHEC75 | A Sample Filing System                             |
| FSHEC52 | Family Advisors                                    |
| FSHEC15 | Important Family Records<br>What to Keep and Where |
| FSHEC45 | Replacing Valuable Papers                          |
| FSHEC51 | Safe Deposit Box Inventory                         |

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**LAURA CONNERLY** is family and consumer sciences associate, University of Arkansas Division of Agriculture, Cooperative Extension Service, Little Rock.

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FSHEC67-PD-1-06RV

# Replacing Valuable Papers

Laura Connerly  
Family and Consumer  
Sciences Associate

Valuable papers, although not used very often, may be needed quickly or unexpectedly. No one ever plans to lose family papers, but due to fire, natural disasters, moves or family changes, papers may be lost or destroyed.

It may take weeks or months to replace valuable papers, so begin the replacement process as soon as possible. Prompt replacement will prevent delays when the papers are actually needed.

<b>Valuable Papers</b>	<b>Source of Replacement Information</b>
Adoption Papers Birth Certificate Death Certificate Marriage License Divorce Certificate	Arkansas Department of Health Division of Vital Records 4815 West Markham, Slot 44 Little Rock, AR 72205-3866 Phone: (501) 661-2174 Web site: <a href="http://www.healthylarkansas.com/certificates/certificates.html">http://www.healthylarkansas.com/certificates/certificates.html</a>
Driver's License	Contact your local Revenue Office For more information or a list of county locations: Arkansas Department of Finance and Administration Office of Driver Services Web site: <a href="http://www.arkansas.gov/dfa/driver_services/ds_index.html">http://www.arkansas.gov/dfa/driver_services/ds_index.html</a>
Educational Records	School or schools attended
Health Records	Personal physician's office
Insurance Policies	Contact the agency providing coverage. For additional assistance in locating the company, contact: Department of Insurance 1200 West Third Street Little Rock, AR 72201-1904 Phone: (501) 371-2600 Fax: (501) 371-2618 Web site: <a href="http://www.state.ar.us/insurance">http://www.state.ar.us/insurance</a>
Military Service Papers	NPRC mailing address: National Personnel Records Center Military Personnel Records 9700 Page Avenue St. Louis, MO 63132-5100 Phone: (314) 801-0800 Fax: (314) 801-9195 Web site: <a href="http://www.archives.gov/research">http://www.archives.gov/research</a>

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**Valuable Papers**

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**Source of Replacement Information**

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Passports	Local Postal Service office
Property Deeds	Local Circuit Clerk's office
Social Security	Phone toll free: 1-800-772-1213 Web site: <a href="http://www.ssa.gov">http://www.ssa.gov</a>
Stock Certificates	Contact any brokerage firm (fees may be involved)
U.S. Savings Bonds	Contact the Bureau of Public Debt for Form 1048, Claim for Lost, Stolen or Destroyed United States Savings Bonds: Department of the Treasury, Bureau of Public Debt HH/H (paper) Savings Bonds P. O. Box 2186, Parkersburg, WV 26106-2186 E/EE/I (paper) Savings Bonds P. O. Box 7012, Parkersburg, WV 26106-7012 E-mail: <a href="mailto:SavBonds@bpd.treas.gov">SavBonds@bpd.treas.gov</a> Phone: (304) 480-7537 Fax: (304) 480-6010 Web site: <a href="http://www.treasurydirect.gov">http://www.treasurydirect.gov</a>

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**Taxes****Federal Income Tax Returns**

Complete IRS Form 4506 to request a copy of a previous return.  
Contact the IRS Service Center if filed in Arkansas:  
RAIVS Team  
3651 South  
Interregional Highway  
Stop 6716 AUSC  
Austin, TX 78741  
Web site: <http://www.irs.gov>

**Property and Personal Taxes**

Contact county Tax Collector's office.  
A comprehensive list of tax assessors, collectors and other county officials is available from:  
Assessment Coordination Department  
1614 West Third Street  
Little Rock, AR 72201-1815  
Phone: (501) 324-9240

**State Income Taxes**

Send a letter to the Income Tax Section with your name as it appeared on the tax return and your spouse's name, if you filed as a married couple, social security number(s), the tax year or years for which you want copies. You must sign your request.  
Individual Income Tax  
Research Section  
P. O. Box 3628  
Little Rock, AR 72203-3628  
Web address: <http://www.arkansas.gov/dfa>

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**Vehicle Titles**

Contact your local Revenue Office.  
For more information or a list of county locations:  
Web address: [http://www.arkansas.gov/dfa/dfa\\_vehicles.html](http://www.arkansas.gov/dfa/dfa_vehicles.html)

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Dr. Judith R. Urich and Wanda W. Shelby, former Extension specialists, University of Arkansas Division of Agriculture, Cooperative Extension Service, Little Rock, prepared original manuscript.

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## Steps to Take to Repair Damages

### Step 1. Make family safety your first priority.

If your home suffered structural damage from the disaster (for example: you have a partially collapsed roof), you may need to relocate until repairs are made.

If temporary living costs are partially covered by your insurance policy, work out these arrangements with the agent or claims adjuster. If you don't have insurance, contact the Office of Emergency Management while they are in the area working the disaster to see if you qualify for state assistance. (Currently, Emergency Management personnel are located at \_\_\_\_\_.)

### Step 2. Report damage to your insurance company.

Call your insurance agent as soon as possible. Leave word where you can be contacted. The sooner you talk to your agent, the sooner your claim will be filed and an adjuster can be scheduled to inspect your damage. In times of total disaster, help the adjuster find your home by spray painting the house number where the agent can see it. Hardship cases are a first priority, so if your damages are slight, you may have to wait.

The amount and type of coverage you have will affect how much of the loss will be covered by insurance. Don't assume your settlement will be the same as your neighbor's.

### Step 3. Make needed repairs.

Get your agent's advice about your policy's coverage and how best to get reimbursed for the repairs.

If you must make temporary repairs before an insurance adjuster's visit, talk with your agent about how to get reimbursement. If possible, take your own photographs or make a videotape of the damage. If there are disputes later, the pictures will serve as evidence.

Don't be in a hurry to settle your insurance claim. Instead, keep your agent current on repair estimates, repair progress and repair costs. Additional damage may be discovered after the repairs are underway. Be sure that you have all water damage, foundation and structural damage covered on the repair estimates. If the work has been completed to your satisfaction, use the final billing to get the insurance repayment, if possible.

If the claims adjuster works directly with the contractor, make sure you understand what repairs are being done before signing an agreement.

Keep copies of insurance adjustments, claims, receipts and photographs in a safety deposit box or other secure place until all claims are settled. If you have out-of-pocket expenses for deductibles or costs not covered by insurance, you may be eligible for a casualty write-off on your income tax return. If so, the records used to justify your tax deductions should be kept for at least three years after you file your return.

## Recovering the Value of Storm Damaged Timber from Taxes

Dr. Tamara Walkingstick, Extension Specialist - Forestry

Dr. Frank Roth, retired Extension Forester

One of the crucial questions facing forest landowners after a disaster is how do I recover my losses to my timber from a tax point of view. Timber is considered a long-term investment and losses usually fall under the casualty loss classification.

To be allowed as a casualty loss deduction on your federal income tax return, a loss must be caused by natural or other external factors acting in a sudden, unexpected and unusual manner. A sudden event is one that is swift, not gradual or progressive. An unexpected event is one that is ordinarily unanticipated and one that you do not intend. An unusual event is one that is not a day-to-day occurrence and one that is not typical for the activity in which you were engaged when the damage or destruction occurred.

The language in Section 165(c)(3) of the Internal Revenue Code indicates that fires, storms and shipwrecks are casualty losses. The term has been limited by the courts and IRS to these and similar occurrences such as windstorm, sleet and hail. (**Note:** Losses from insect attacks such as southern pine beetle and drought losses to planted seedlings are not normally considered casualty losses because they do not meet the suddenness test.) Casualty losses also include destruction or damage from plane crashes, automobile accidents or similar events.

### **Determining the Amount of Deductible Loss –**

If your timber is destroyed by a fire, ice storm or other casualty, your deductible loss is the allowable basis (value invested) in the timber destroyed minus any insurance or other compensation received. Timber damaged but not made unmerchantable should be salvaged if possible. If a gain results from the salvage activity, there is no casualty loss with respect to the salvaged timber. Determine your gain or loss from the salvage cutting, sale or other disposal as you would for timber sales in general. If you are not able to salvage the timber after making a bona fide attempt to do so and claim a loss deduction, you should keep a record of your efforts in order to show that the timber was not salvageable.

### **Determining Volume of Timber Destroyed –**

To claim a loss deduction, the single identifiable object damaged or destroyed must be identified. For timber, this is expressed in terms of the specific units destroyed. The units of measurement used should be those utilized to maintain your timber accounts, such as board feet, cords, cubic feet or tons. The number of units of timber destroyed must be established by fair and reasonable measurement to justify a deduction. You may wish to employ a consulting forester to cruise the timber if the area is extensive and much work is involved. In some cases the county forester or other representative of the Arkansas Forestry Commission may be able to furnish you with an estimate of the quantity destroyed.

### **Determining Basis of Timber Destroyed –**

Determine the basis (value invested) in timber destroyed as you would for a timber sale. First, determine the depletion unit by dividing the adjusted basis for depletion as shown in your timber account by the quantity of merchantable timber in the account. Then, multiply the depletion unit by the number of units destroyed to find the amount allowable as a loss. The volume used to calculate the depletion unit for the loss should include adjustments for growth for the year of the casualty but is not reduced by the volume of timber destroyed. If your timber has no basis, you will not have a deductible loss.

**Year of Deduction –** A loss arising from a casualty generally is deducted in the year in which the casualty occurs. This is true even if you have not yet settled a reimbursement claim or have not received an agreed-upon insurance settlement or other compensation. If a claim for reimbursement has been made, and you think you will recover all or part of the loss even though you have not yet received payment by the time the tax return for the year of the casualty is due, reduce the reported loss by the amount you expect to recover. If you later recover less than the amount you estimated, you may deduct the difference for the year in which you become certain that no more reimbursement or recovery can be expected.

11/15/02

Fires

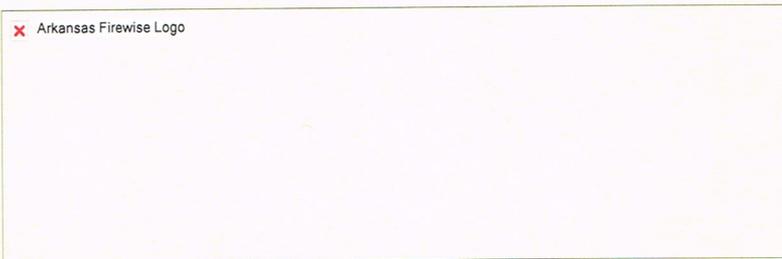
## **Fires**

How to Reduce Wildfire Risk

Arkansas Firewise

Arkansas Firewise – Creating a Defensible Space

Wildfires




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Arkansas leads the nation in Firewise Communities!

There were 115 active communities in 2012. Was your community one of them?

Contact us to discuss how your community can qualify as a recognized Firewise community.

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**Click here for a blank Community Wildfire Preparedness Plan template.**

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The Arkansas Firewise program is a multi-agency wildfire preparedness effort sponsored by the Arkansas Forestry Commission - and part of the National Firewise Communities USA organization. Firewise works with fire departments and civic organizations to make communities safer from wildfire through mitigation projects and community education initiatives.

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Join us in partnering with the national Firewise office to create 1,000 safer places in 2013. Use Firewise mitigation projects to help communities prepare for a dry, hot summer ahead and let us help where we can!

---

Contact us:

Kevin Kilcrease, Firewise Coordinator  
(501) 296-1940  
[Jerry.Kilcrease@arkansas.gov](mailto:Jerry.Kilcrease@arkansas.gov)

3821 West Roosevelt Road  
Little Rock, AR 72204  
Phone: (501) 296-1940  
Fax: (501) 296-1949

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**What can Firewise do for your community or fire department?**

**Wildfire Education Programs**

The Arkansas Firewise Team educates the state of Arkansas about the causes and prevention of wildfire. Any meeting, safety fair, civic function, luncheon, youth rally, volunteer event, church gathering or otherwise is an excellent opportunity to discuss how homeowners can very easily prepare homes and landscapes to resist wildfire. We can prepare presentations to address area-specific wildfire hazards and complete on-site wildfire risk assessment surveys. All visits are at no cost to communities. The Arkansas Forestry Commission makes wildfire prevention education a priority by offering the Firewise safety principles to any group interested. A community or group does not have to be affiliated with any fire department to receive a Firewise presentation and/or newsletter.

**Wildfire Prevention Training and Seminars**

Host a how-to training seminar at the next town hall meeting or property owner's association meeting to better inform residents in your area about wildfire safety. The Firewise program is a hands-on initiative that enables residents across Arkansas to make their property more resistant to one of our state's most naturally occurring events – wildfire.

**Recognition as an Arkansas Firewise Community**

**Mitigation Project Ideas Newsletter, 2012**

Need some fresh ideas about community projects? See below!

Send an e-mail to [firewise@arkansas.gov](mailto:firewise@arkansas.gov) to begin receiving Firewise newsletters

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**Arkansas Forestry Commission**

The Arkansas Forestry Commission sponsors Firewise efforts for Arkansas. The main Firewise office is located at AFC headquarters in Little Rock.

For information about fire danger, burn bans, wildland fire, forest management or trees in the urban forest, visit the **Arkansas Forestry Commission website.**

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**Resources and Literature**

Arkansas Homeowner's Guide

**Our homeowner's guide has wildfire statistics, helpful information for homeowners concerning defensible space, landscaping and construction guidelines, as well as a take-home risk assessment. Feel free to print or use these in your**

Through funding from the US Forest Service, the Arkansas Forestry Commission does provide grants through fire departments that complete community certification requirements to become an Arkansas Firewise community. Contact your local AFC office, or the Firewise Team for a presentation during a regularly scheduled fire training meeting. We can come to your area at your convenience to discuss certification requirements. [A checklist of renewal requirements can be viewed here.](#) Call 501-296-1940 with questions.

communities however you need to, or call the Firewise team and we can deliver some to you. You do not have to be a recognized Firewise community to receive these resources.

[Mini Brochure](#)



[What can Firewise do for your community?](#)

[Arkansas New Community Checklist](#)

[Arkansas Renewal Community Checklist](#)

[Resources for Active Communities](#)

[Approved Mitigation Equipment List](#)

[Volunteer Tracking Sheet](#)

[Community Renewal Form](#)

[How to Guide for Ordering Free Supplies](#)

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## The webpage cannot be found

HTTP 404

Most likely causes:

- There might be a typing error in the address.
- If you clicked on a link, it may be out of date.

What you can try:

- Retype the address.
- Go back to the previous page.
- Go to and look for the information you want.

### More information

This error (HTTP 404 Not Found) means that Internet Explorer was able to connect to the website, but the page you wanted was not found. It's possible that the webpage is temporarily unavailable. Alternatively, the website might have changed or removed the webpage.

For more information about HTTP errors, see Help.

*Arkansas Firewise -  
Creating a Defensible Space*

## Wildfires

Arkansas has a long history of wildfires in its forests. Each year thousands of acres of Arkansas wildland and many homes are threatened or destroyed by fire during the fire season that lasts from February to October. Wildfires occur in every month of the year, but are most prevalent in the spring and late summer. Severe wildfire outbreaks can occur in winter after long-term droughts and drying winds. Fire indices are used to give a general measure of forest fire potential. One index is the Cumulative Severity Index (CSI) that combines temperature and rainfall and equates it to forest fire potential. Under average conditions, the CSI averages around 350 and 400. Every few years, however, the CSI has reached over 750 relating to extreme fire danger.

Wildfires are not limited to forests, however. As Arkansas' population has grown, more and more people are moving into the zone termed the urban wildland interface; the area adjacent to forests or wildland. Although homeowners cannot control the weather, they can design their homes and landscapes to maximize the best chance of survival. Federal and state governments have developed several excellent guides called "FireWise" for homeowners that, if followed, might just save someone's home or even someone's life. The following recommendations are based on the Arkansas Forestry Commission's publication entitled "Living with Wildlife: A Guide for Arkansas Homeowners."

There are things that homeowners can do right now to increase the chance that their home might survive a wildfire:

- Don't burn anything under the current burn ban. That means your trash, brush, leaves, etc. Most fires in Arkansas are caused through carelessness or arson. Use some common sense.
- Ask yourself: "Is there at least a 30-foot buffer surrounding my home that is "lean, clean and green"? Follow this checklist.
  - Use low-growing herbaceous plants that are kept green during the fire season.
  - Use mulches, rock and other non-combustible hard surfaces.
  - Have a bonded contractor remove tree limbs within 15 feet of a chimney or within 150 feet vertical clearance from power lines or any limbs that touch the house.
  - Remove all dead vegetation from around the house. This means removing leaves in the gutter, under the porch or within 30 feet of your house. You can also water any vegetation next to the house.
  - Remove "ladder" fuels which are low-hanging branches, tall weeds, grasses and shrubs at least 30 feet away from your home. If you have an Eastern Red Cedar next to your house, either remove it or prune it up at least 10 feet: cedars are basically little incinerators waiting for a spark.
  - Plant vegetation that is "fire smart" or that is less likely to ignite from a wildfire.
  - Create fuel breaks such as an open lawn and wide walkways.
  - Make sure that your fireplace chimney is free of creosote. Don't stack your firewood next to the house.

The most important thing that a person can do is practice common sense. Don't throw your cigarettes out the window. If you see someone throw a cigarette from their vehicle, call the State Police at 1-866-811-1222 to report littering and report these thoughtless acts.

If you see flames, get away from the danger. Don't stay and fight. Let firemen or trained volunteers do that. You can assure that you have adequate access for fire fighting trucks by not blocking your drive and by making fence openings. If there is adequate time, you might leave your hose connected to the spigot. Close all exterior and interior doors and windows. Close all exterior vents. Prop a ladder against the house so that firefighters

have easy access to the roof. Shut off propane at the tank. But the bottom line is to get out fast when you see flames.

Information on wildfires and how to reduce wildfire risk can be found on several web sites. One is the Arkansas FireWise site:

- <http://www.arkansasfirewise.com/>  
The Arkansas Forestry Commission is responsible for the protection of 19,727,978 acres of non-federal or private forestland in Arkansas. They can assist communities, homeowners and forest landowners in protecting their property

through proper landscaping for homes and building fire lanes for landowners.

- The National FireWise site is <http://www.firewise.org/>.  
At least ten different chapters on being FireWise can be found at the national web site. This site includes audio and video tracts, publications and other materials.
- If you are interested in the latest fire statistics, go to <http://www.nifc.gov/>.

Wildfires occur frequently in Arkansas. Take steps to ensure that you are FireWise.

Floods

## **Floods**

Emergency Procedures for Floods and Flash Floods

Building Dikes to Prevent Minor Surface Flooding

Disaster Response for Volunteers

Electrical Safety During a Flood or Ice Storm

Feeding Water-Damaged Feeds

Flooded Private Sewage Systems

Flooded Vehicles

Flood-Related Diseases in Poultry and Livestock

Handling Flood-Damaged Hay/Haylage Fields

How to Salvage Flood-Damaged Appliances

How to Save Upholstered Furniture, Carpet and Bedding

Mold Detection, Prevention and Mitigation

Septic Systems – What to Do After a Flood

Well Disinfection

What to Do During a Power Failure on the Farm

What to Do With Private Wells and Pumps After a Flood

What You Should Do if Your Water Well Has Been Flooded

## Emergency Procedures for Floods and Flash Floods

Dr. Keith Bramwell, Poultry Specialist, Dr. Frank T. Jones, Poultry Section Leader, University of Arkansas, Fayetteville, and Phil Tacker, Extension Engineer

### Home Preparation for Floods

If you live near water or in an area that is prone to flooding, some simple advance preparation will help you to be ready.

1. Have an emergency plan for your family to quickly and safely exit your home or farm. This plan should include:
  - a. Shutting off utilities (electricity, gas, water)
  - b. Locking houses
  - c. Providing for the survival of livestock
  - d. Keeping current on the latest emergency procedures
  - e. Methods to secure outside items such as trash cans, lawn mowers, tools, buckets, etc., to prevent them from washing away and causing hazards
  - f. Methods to ensure that the family gets the emergency supplies
2. Store emergency supplies in sealed plastic boxes or bags in an easily accessible location. Supplies should include:
  - a. A battery-powered radio with extra batteries
  - b. Basic first aid supplies for all family members
  - c. A sufficient supply of nonperishable foods and water (1 gallon per person) to keep the family and pet(s) fed for 3 or 4 days
  - d. Can opener
  - e. Candles, dry matches and flashlights with extra batteries
  - f. Chlorine bleach, 2% iodine or chlorine tablets for purifying water
  - g. Protective water-repellent clothing and footwear
  - h. Blankets for each family member
  - i. Mosquito repellent
  - j. Personal hygiene items
  - k. Infant supplies
  - l. Prescription drugs or medicines
3. These materials should be on hand if you intend to build a temporary sand bag dike:
  - a. Sand
  - b. Sand bags
  - c. Shovels
  - d. Plastic sheeting
  - e. Lumber
4. Fire hazards increase during floods and fire departments may be unable to respond to fires. Address any hazards that could result in a fire. This includes:
  - a. Turning off gas, electricity and water
  - b. Securing gasoline and other flammable material containers to prevent leakage

### Farm Preparation for Floods

If a flood is eminent, move to higher ground IMMEDIATELY. If limited time is available, take care of animal needs, then equipment concerns and then supplies, in that order. BE CERTAIN that you have enough time to accomplish tasks and safely reach higher ground.

1. Move livestock to open areas relatively free of obstacles.
2. If there is inadequate time to move livestock, open gates and barn doors so animals can escape.
3. Leave building doors and windows open at least 2 inches to equalize water pressure and prevent buildings from shifting.
4. Disconnect electrical power.
5. Move motors and portable electric equipment to high, dry locations.

6. Move machinery, fuel, pesticides, herbicides, feed and grains to high, dry locations.
7. Tie down lumber, logs, irrigation pipes, fuel tanks and other loose equipment or supplies.

### **Emergency Procedures During a Flood Threat**

1. Be especially alert for floods if you live in a flash flood area such as a mountain valley. If you suspect a flash flood, **IMMEDIATELY GO** to higher ground. Do not wait until you are instructed to move.
2. If you are advised to evacuate, do so immediately. **NEVER** disregard a flood warning or official evacuation advisory. Family safety is more important than protection of property or possessions. Evacuation in ordinary vehicles is much simpler and safer before flood waters become deep. Listen to radio broadcasts for evacuation directions and routes.
3. If you are the first to know about a flood, report the situation to authorities. However, report only what you know to be true. Do not pass along rumors.
4. Be ready to help with rescue operations if called upon.

### **Evacuation Safety Rules**

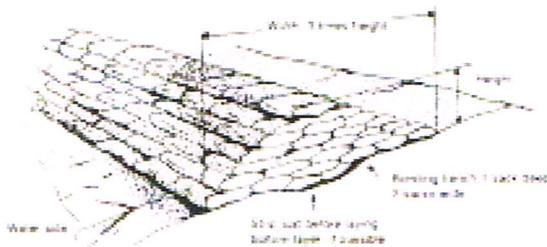
1. If advised to evacuate, do so **IMMEDIATELY**. Do not make last minute preparations unless you are absolutely certain you have time.
2. Move quickly and calmly. Don't take chances. Safely getting out of the storm area and to higher ground is your first priority. Automobiles may **NOT** be the safest and quickest form of transportation during a flash flood. If you live near a hill, walking up the hill might be the fastest way to safety.
3. If rising water suddenly traps you in a building or the house, move to the second floor and, if necessary, to the roof. Wear warm clothing and take a portable radio and flashlight with you. Do not try to swim to safety – wait for help.
4. When leaving the house or farm, avoid flooded areas if possible. Don't try to walk through flood water that is more than knee deep.
5. Know where you are going before you leave. Listen to radio broadcasts for evacuation instructions and use suggested evacuation routes. Other roads or potential short cuts could be blocked, washed out or have downed power lines.
6. If you have limited time for evacuation preparations, get the emergency supplies and **GO**.

## Building Dikes to Prevent Minor Surface Flooding

Dr. Keith Bramwell, Poultry Specialist, Dr. Frank T. Jones, Poultry Section Leader, University of Arkansas, Fayetteville, and Phil Taker, Extension Engineer

Water from melting snow or heavy rains can flood houses, equipment and supplies. A 1- to 3-foot high sandbag or earth dike can offer protection from shallow flooding. HOWEVER, it should be clearly understood that such dikes offer NO protection from flash floods.

### STACKING SANDBAGS



A sandbag dike can be constructed as follows:

1. Select a site that uses natural land features to keep the dike as short and low as possible. Avoid trees and other obstructions that would weaken the structure. Do not build the dike against a basement wall. Leave about 8 feet of space to maneuver between the dike and the building.
2. Remove ice, snow and sod down to bare soil from a strip of land about 8 feet wide, if possible. Dig a bonding trench in the center that is 2 bags wide and 1 bag deep.
3. Fill and lap sand bags as described in the directions and figure below.

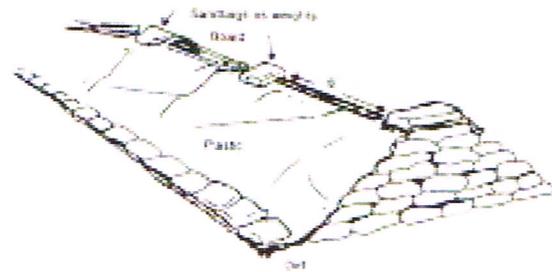
### HOW TO FILL AND LAP SANDBAGS



- a. Fill about half full of clay, silt or sand, but do not tie them.
- b. Start the bottom layer lengthwise to the dike and alternate direction of bags so cracks are staggered. Lap the bags' unfilled portion under the next bag.

- c. Tamp thoroughly in place with a flat board.
- d. Build the dike three times as wide as high.

### SEALING THE DIKE



4. Instructions are below and a figure on how to seal the dike is above.
  - a. On the water side, spread a layer of soil or sand 1 inch deep and about a foot wide along the bottom of the dike.
  - b. Lay polyethylene plastic sheeting over the loose soil so that its edge extends 1 foot from the bottom of the dike. Extend the upper edge of the sheeting over the top of the dike. The plastic sheeting should be a minimum of 6 mils thick.
  - c. Lay the plastic sheeting down very loosely so the force of the water will easily conform it to the sand surface. The force of the water could puncture the plastic if it is stretched too tight.
  - d. On the water side, place a row of tightly fitted sandbags on the bottom edge of the plastic. Lap the bags together and tap them in place as described in direction 3.
  - e. Put sandbags down the top edge of the plastic at about 6 foot intervals. Place boards or soil between these sandbags to prevent wind from disturbing the plastic. Avoid walking on the plastic or avoid puncturing it with sharp objects.

Bags required for 100 linear feet of dike	
Height of dike	Bags required
1 foot	800
2 feet	2000
3 feet	3400

4/3/03

## Disaster Response for Volunteers

Your neighbors and community need volunteers to assist, and you are prepared to help. Whether you are going into a disaster area to help rescue victims or restore vital needs, observe several precautions. In a situation so full of emotions, do what you can to help victims without hampering other volunteers or disaster workers. There are a few key items to observe.

Where possible, coordinate your efforts to contribute to the community effort. It is essential that volunteers support and contribute to recovery, not burden the strained resources.

Many volunteers are not trained rescue personnel, but all emergency workers follow a vital rescue principle: Your personal safety is your most important concern. Don't put yourself in a dangerous position where you could become a victim because medical personnel and facilities are already taxed to the limit. Precious efforts to locate missing persons or care for disaster victims will be diluted if you become injured. An injured person can't be of assistance to others, including caring for his or her family. Also, any injury will take you and others away from your tasks.

Here are pointers to enhance your effectiveness as a volunteer:

- Downed power lines should be given a wide berth. You can be electrocuted as the result of voltage transmitted by water or soil. Dangerous voltages may be encountered more than 10 yards from downed "hot" power lines. Allow electric utility company workers and trained electricians to handle all electrical-related hazards.
- Be alert to identify natural gas or LP gas leaks. If you smell mercaptan and know how to close the valve to the natural gas supply, do so immediately. Close the LP gas valve at the supply tank, unless heat may potentially cause an LP gas tank rupture that could endanger you. Make sure everyone stays a safe distance upwind and immediately contact the gas supplier if it isn't wise or obvious how to stop the gas leak.
- Respect all areas that are cordoned off.
- Don't park where traffic will be blocked.
- Buildings in areas with damaged structures shouldn't be entered until they have been thoroughly inspected by experienced construction personnel. Cleanup and repair can proceed in buildings that are determined safe for entry.
- Debris may be in unstable piles. Avoid them to prevent nasty falls, cuts and injury from nails, broken glass, etc.
- Experienced chain saw operators should clear downed trees. All those working in the area moving brush should understand the dangers of chain saws and falling trees. Alert people around you to respect chain saw operators, because they cannot hear and may not see an approaching individual.
- Providing clean water and food, as well as ice during warm weather, is critical. If you can bring enough to share with victims and disaster workers until power and potable water are restored, you have given vital aid. It is wise to take available first aid supplies with you so you can provide an initial antiseptic treatment, if it is needed.
- Where traffic lights aren't working, you should drive with courtesy and caution. Heavy construction equipment, military equipment, ATVs and four-wheel-drive vehicles may be in use. Be alert and respect them. All kinds of equipment may be moving to clear the way and rebuild vital infrastructure.
- Be alert around habitat for, and avoid, poisonous snakes and other displaced vermin seeking food and water after the disaster.

Assistance providing shelter and clothing to victims will give comfort during ice storms, flash floods or other disasters. A friendly, neighborly response during the first few days meets an essential need until other help, donations, etc., arrive.

## Electrical Safety During a Flood or Ice Storm

During or after storms or other disasters it is vital to avoid damaged electrical wiring. Initially, power substations may be disconnected, rendering distribution services both useless and harmless. However, never consider a circuit harmless until a qualified electrician repairs the damage, or at least disconnects all circuits that are potential hazards.

Water in the proximity of electricity may pose a lethal hazard. To protect yourself, your family and neighbors in the aftermath of an ice storm or flood or similar disaster, the University of Arkansas Cooperative Extensions Service offers this advice:

- Avoid stepping into a wet or flooded area. If there are submerged power distribution wires, they may energize the standing water and more than 10 yards around the perimeter. Within damaged or flooded buildings, electrical outlets, wiring or electrical cords may energize the water, posing a potential lethal danger.
- Portable electric generators are often put into use for temporary power. However, they can become deadly if improperly installed or operated. After a tornado in Little Rock, a utility worker was electrocuted by current flowing back into the power distribution, making a “downed” power line hot in contact with the worker.
- Every standby generator needs to be grounded properly. To avoid “shorts” and potential electrocution, keep the generator dry.
- Do not connect generators directly to household wiring. A qualified, licensed electrician should install your generator to ensure that it meets local electrical codes.
- Do not operate the generator in an enclosed or partially enclosed space. Gasoline or diesel engines may produce deadly levels of carbon dioxide. Engine exhaust should be vented where it is diluted into outside air.
- Take special care not to overload the generator. Assure that any extension cords connected to the generator are rated for the current load. It should have a grounded, three-pronged plug and be free of cuts and worn insulation.
- If it is possible, use ground fault circuit interrupters (GFCI) around any water hazard. This will help prevent electrocutions and electrical shock injuries. Portable GFCIs for electrical outlets that don’t require tools for installation are available in most electrical and hardware supply stores at prices ranging from \$12 to \$30.
- Don’t use electrical appliances that have been wet until they are sound. Water may damage electrical motors in furnaces and appliances, such as freezers, refrigerators, washing machines and dryers. If certain appliances have been under water, a qualified service repairman can recondition them.

Additional electrical safety information can be found on the Electrical Safety Foundation International website, [www.electrical-safety.org](http://www.electrical-safety.org).

## Feeding Water-Damaged Feeds

Wet feeds may produce mold spores, some of which are toxic to certain livestock. If you must feed wet or flood-damaged feed, proceed very cautiously. Watch animals carefully for any signs of illness. Mixed feeds, grains and roughages which have heated or spoiled will have little nutritive value for livestock, depending on the extent of the damage.

- Do not feed heated, badly molded or sour feeds, deteriorated cottonseed or moldy legume hays (such as alfalfa or clover) to any livestock. Any feed that is moldy-smelling is generally not good for feeding.
- Spread wet feeds out to dry as soon as possible. Dried feeds can be fed in limited amounts to beef cattle and non-lactating dairy stock.
- Use extreme caution when feeding moldy protein concentrates.
- Mix moldy feed with 90 to 95 percent sound feeds at first. Watch cattle carefully.
  - Beef cattle on full feed may go off feed.
  - Some animals may exhibit poor gains or reduced energy; young animals are more susceptible to mycotoxins than mature animals of the species.
- Some animals may develop respiratory or nervous disorders from inhaling mold spores.
- Do not feed moldy feed to horses, sheep, swine or pregnant cattle; the animals may die. Do not feed moldy feed to lactating dairy cows.
- Some diseases are spread by water.
  - Any flooded feed could be contaminated, even when dried.
  - Watch animals for signs of nervousness, listlessness, going off feed and general unthriftiness.
  - Temporarily discontinue feeding questionable ration components until a veterinarian can confirm that the feed ration isn't related to the animal's malady.
  - Contact a veterinarian if you observe any undesirable symptoms in the animals being fed salvaged feed.

Adapted from The Disaster Handbook, 1998 National Edition, Institute of Food and Agricultural Sciences, University of Florida

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Dr. Frank Jones, Extension Poultry Specialist and Associate Center Director for Extension

Dr. Tom Troxel, Beef Cattle Specialist and Section Leader - Animal Science

3/2006

## Flooded Private Sewage Systems

### Sanitation and Clean-Up Concerns

A flooded private sewage system can be hazardous. Sewage may back up into the home, contaminate drinking water and prevent proper sanitation until the system is fixed. You can't control rainfall or flooding in your area, but you can prepare for high water problems and respond appropriately to emergency flooding.

### How Problems Occur

When flooding or saturated soil conditions persist, a private sewage system cannot function properly. Soil treatment systems for wastewater rely on aerobic (with oxygen) regions to reduce the amounts of chemicals and living organisms (viruses, bacteria and protozoa). When the soil is saturated or flooded, those hazardous materials can enter the groundwater and your drinking water supply.

### Preparing for Flooding

If you are prepared when flooding occurs, your family can be safe and your system should survive. To prepare for a flood:

- Make sure all septic tanks are full of liquid. The high-water season is not the time to have tanks pumped; empty tanks are buoyant and may "pop" out of the ground during flooding.
- Plug floor drains, if necessary, to keep sewage from backing up into the basement. Floodwaters may still enter the basement through cracks and seams, however.

### During a Flood

- Stop using your private sewage system. Use portable toilets, if possible, or use any large container with a tight-fitting lid for a temporary

toilet. Line the container with a plastic bag. After each use, add chlorine bleach or disinfectant to stop odor and kill germs. If necessary, bury wastes on high ground far away from your well.

Remember that a well may become contaminated during a flood. Therefore, **DO NOT DRINK THE WATER**. Drink bottled water, or disinfect water before drinking. Contact your local health department for the proper way to disinfect your water.

- Do not bathe or swim in floodwater. It may contain harmful organisms.
- Shut off power to a sewage lift pump if you have one in the house or in a pump chamber (mound, in-ground pressure, at-grade systems).

### After the Flood

- Do not use the sewage system until water in the disposal field is lower than the water level around the house.
- If you suspect damage to your septic tank, have it professionally inspected and serviced. Signs of damage include settling or inability to accept water. Since most septic tanks are below ground and completely covered, they are not likely to be damaged. However, sometimes septic tanks or pump chambers become filled with silt and debris and must be professionally cleaned. If tile lines in the disposal field are filled with silt, a new system may have to be installed in new trenches. Because septic tanks may contain dangerous gases, state codes may require homeowners to obtain a permit from the Health Department before cleaning or repairing the tank. Although the Health Department will probably provide the homeowner with guidelines for

cleaning and repairing septic tanks, it is recommended that the job be left to a licensed plumber.

- Discard any items that are damaged by contaminated water and cannot be steam cleaned or adequately cleaned and disinfected.
- Do not pump water out of basements too quickly. Exterior water pressure could collapse the walls.
- If sewage has backed up into the basement, clean the area and disinfect the floor with a

chlorine solution of one-half cup of chlorine bleach to 1 gallon of water.

- Contact the county health department or County Extension Office to obtain a drinking water test kit. Do not drink the water until it has been tested and is safe.

### **Additional Resources**

- Your County Extension Agent
- Your county code administrator
- Your local health department

Adapted from The Disaster Handbook - 1998 National Edition, University of Florida/Institute of Food and Agricultural Sciences, Publication SP 431.

## Flooded Vehicles

If a flood has engulfed your vehicle, contact your auto insurance company immediately. The insurance office should tell you whether they can assess the damage immediately or if they want you to evaluate or possibly restore your transportation. Recent model vehicles can be costly to restore if they have been immersed in muddy water. The height and duration of flooding are indications of how costly reconditioning may become.

If water has risen more than halfway up the tires, do not start the car, as that may cause more damage to the engine. Get your car towed to your mechanic to have him inspect the engine and transmission before anyone attempts to start it.

Vehicles submerged by floodwater will sustain permanent damage if they are not reconditioned right away. Most vulnerable are the engine, electrical system, transmission and other components of the drive train. Flood water and contaminants will cause premature wear and additional vehicle maintenance.

If water has risen no higher than the vehicle axles, silt and rust can damage your brakes. Contamination of wheel bearings, constant velocity joints, the engine crankcase and transmission fluid can be remedied, but progressive damage is likely to occur after the flood recedes and corrosion begins.

Water and oxidation damage to the electrical system may become evident after several months. If water covers the electronic components controlling engine settings, power door locks, power windows or the air bag systems, the cost of remediation may be greater than accepting an insurance "total loss" settlement.

If water seeps into the vehicle interior, you may note a "wet dog" smell. Flushing the interior with plenty of clean water soon may prevent stains and musty odors later. However, the seats and carpet may stay soggy for weeks, so removal from the vehicle may be the best way to recondition upholstery. Drying the seats once they've been submerged is very difficult but essential. Conventional "detailing" may briefly mask an odor, but mold or bacteria can cause nauseous odors that persist.

Shallow floods may only cause a minor inconvenience if brakes and wheel bearings are checked and serviced properly. However, for someone who isn't a trained technician, flood damage is difficult to assess. Don't take any "short-cuts" that may hamper you from stopping your vehicle or, in any way, endanger you or your passengers.

## Flood-Related Diseases in Poultry and Livestock

If your fields or farm buildings have been flooded, take special precautions against flood-related diseases in poultry and livestock. If possible, move the poultry or livestock to a dry, clean environment. Give animals extra care, particularly if they have been stranded by floodwater and have been off regular feeding schedules (see Table 1 for minimal survival requirements for livestock). Be cautious about allowing livestock access to wet or contaminated feed. Feed only a few animals initially, watching them for several days before allowing other livestock access to questionable feed, hay or silage. In addition, watch for signs of flood-related diseases.

### Blackleg and Anthrax

Blackleg, caused by microorganisms spread over fields by standing water, is a potentially serious post-flood disease. It most commonly affects cattle 6 to 24 months old, but it also affects sheep, goats and infrequently occurs in swine.

Symptoms include acute lameness, depression, fever and swelling in the hip, shoulder, chest, back, neck or throat muscles. If untreated, blackleg is usually fatal within 24 hours after onset, and death may often be the first indication of disease. Treatment may be effective in the early disease stages. The best prevention against blackleg is inoculation of all unvaccinated young cattle before they are put out on pastures that have been flooded. Vaccines are available which also protect against malignant edema (gas edema) and other water-borne diseases.

Anthrax is another disease that may break out following flooding. All animals that die suddenly following flooding should be necropsied by a veterinarian.

### Malignant Edema

Hot, painful swelling at point of infection, high fever, loss of appetite, decreased milk production,

difficult breathing and convulsions followed by death are signs of malignant edema. This disease kills animals one or two days after symptoms appear. Treatment for blackleg and malignant edema is rarely effective. If massive doses of penicillin are given early in the course of disease, treatment may be successful. However, clinical signs are seldom detected early enough to allow effective treatment. The key to controlling these diseases is initiating a good immunization program. Both specific and combination vaccines are available.

### Tetanus (Lockjaw)

Tetanus is a problem whenever animals have puncture wounds. Symptoms include generalized stiffness caused by muscle contractions. Legs and tail are extended; the third eyelid hovers over the eye when its head is raised. Animals can be vaccinated for prevention, and the disease is treatable in its early stages.

### Foot Rot

Constant exposure to mud and water softens tissues around the hooves of cows and sheep, greatly increasing their susceptibility to foot rot. Lameness, a painful swelling of the hoof and foul-smelling dead tissue in the space between the claws are common symptoms of the disease.

To prevent foot rot and other foot infections, walk cows through a solution of copper sulfate (2 pounds of ordinary commercial bluestone in 5 gallons of water) as they leave the milking parlor or stable after they have been thoroughly milked. Put the solution in a 4- to 6-inch deep container, placed in an alleyway or doorway. As long as cows' feet are stained with the copper sulfate solution, they are reasonably protected against foot rot. A vaccine is now available to help producers control this disease.

**Table 1. Minimal Survival Requirements for Livestock**

Animals	Feed per day	Water per day	Space required per head*
Dairy cow in production	Large breeds: 20 lb hay Small breeds: 15 lb hay	7 1/2 gal in winter, preferably 15 gal or more 9 gal in summer, preferably 20 gal or more	20 cows or less – 30 sq ft 21 cows or more – 50 sq ft
Dairy cow, dry	Large breeds: 15 lb hay	7 1/2 gal in summer	5 dry cows or less – 20 sq ft
Beef cow, dry	12 lb hay or 8 lb ground ear corn, oats or barley	5 gal in winter 7 1/2 gal in summer	30 sq ft
Beef cow with calf	14 lb hay or 10 lb ground calf ear corn, oats or barley	7 1/2 gal in winter 9 gal in summer	150 sq ft
Weaning calves	8 – 12 lb hay or 5 lb ground ear corn, oats or barley	3 gal in winter 6 gal in summer	30 sq ft
Brood sow with litter	3 – 4 lb grain	3 – 4 gal	40 sq ft
Brood sow, dry	1 – 2 lb grain	1 gal	20 sq ft
Weaning pigs to market weight	1 – 4 lb grain	1 qt – 1 gal	4 – 12 sq ft
Hens in production	1/4 lb feed	5 gal for each 100 hens	1 1/4 sq ft
Broilers	0.1 – 0.2 lb per bird	5 gal for each 100 hens	1 sq ft
Ewe with lamb	4 lb hay or 3 lb grain	3 qts	32 sq ft
Ewe, dry	2 lb hay or 1 1/2 lb grain	2 qts	16 sq ft
Weaning lamb	1 1/2 – 2 lb grain	1 qt	16 sq ft
* Close quarters increase water and ventilation requirements.			

## Mastitis

Organisms in mud and muddy water can cause severe mastitis. Coliform organisms may be involved. They cause acute intoxication (septicemia) in the udder and death of udder tissue (gangrene).

To protect cows against mastitis, clean their teats thoroughly before milking. Wash teats and udders with a cleansing agent before applying the sanitizing solution. Dry teat ends carefully with clean paper towels before applying the milking machine. Milk the cows carefully; do not overmilk and be careful to avoid injury of teat ends. If possible, allow cows to lie down in a relatively dry, clean place. Cows are probably better off outside in a wet, muddy pasture than they are in wet, foul barns or confinement.

## Botulism

Botulism, the most common post-flood chicken ailment, is caused by toxins from organisms in spoiled vegetables or decaying animal carcasses. Botulism toxins form in spoiled or decaying materials, and birds are affected when they eat these materials. Paralysis, difficulty eating and swallowing and general weakness are symptoms. The best way to prevent this disease is to confine chickens well away from spoiled or decaying matter.

Horses are also very susceptible to botulism from drinking stagnant water and eating spoiled food.

## Brooder Pneumonia

This disease affects chickens and turkeys of all ages. It can affect poultry when they breathe in mold

spores from wet, moldy feed or from wet litter. Symptoms include fast breathing, coughing and gasping. To prevent brooder pneumonia, keep brooders sanitary, give the birds clean litter, clean all utensils and do not use moldy feed.

## **Erysipelas**

This disease commonly affects turkeys and swine following flooding. In swine the disease may be either acute (causing high fever and rapid death) or chronic (with development of characteristic skin lesions). Swine that have not been vaccinated against erysipelas should be vaccinated before they are allowed into flooded buildings or released onto flooded pastures. Prompt antibiotic treatment is effective against erysipelas in swine and turkeys. In turkeys, the disease frequently affects the snood of toms after even a slight injury.

## **Protecting Yourself and Your Family From Disease**

Since certain animal diseases can infect humans, protection is important. Puncture wounds can result in diseases such as tetanus or other serious diseases. Cuts, scrapes or other skin injuries can lead to local infections or more serious diseases such as dermal anthrax or erysipelas. Since floods and standing water can promote the growth of anaerobic pathogens, avoid contact. Very young, very old or persons with impaired immune function (e.g., AIDS patients or cancer patients) are likely most susceptible.

Adapted from The Disaster Handbook, 1998 National Edition, Institute of Food and Agricultural Sciences, University of Florida

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## Handling Flood-Damaged Hay/Haylage Fields

### Salvaging Wet Legumes or Wet Grass Hay

After flooding, some overly-mature alfalfa or clover-grass hay meadows can be partially salvaged by cutting and mixing with quality silage. It is critical to minimize any contaminants from the hay and to ensure that all legumes are free of mold that might affect animals that are fed the green chop. Legumes that get wet will mold; they should not be ensiled.

Often there is not a sufficient amount of forage available for mixing wet grass hays to achieve an economical hay/haylage mix. However, grass is less likely to mold than legumes, and there may be situations when the grass can be harvested and ensiled if mixed with quality ensilage. By ensiling two or more loads of quality hay silage before adding a load cut from wet hay, this forage may be salvaged. However, the nutritional value should be sampled to guide one on how best to utilize this ensilage. If nutritional content is low, this mix is not desirable forage for lactating dairy cows.

The advantage to this approach is that the damaged crop can be removed quickly in order to reduce the detrimental effect on the next cutting.

### Ensiling

Ensile perennials in a conventional upright, horizontal bunker or temporary trench silo. To make a trench silo:

- Locate the trench where drainage is good.
- Design the trench for efficient feeding. A longer, fairly narrow, deep trench results in less silage deterioration and feeding loss than a wide, shallow trench.

To make the silage:

- Direct cut or wilt to 65 to 70 percent moisture.
- Chop finely.
- Pack thoroughly.
- If available, add 100 to 200 pounds of corn and cob chop to each ton of ensile nutrients. This will improve fermentation, quality and palatability.

### Legume or Hay Meadows

To minimize damage to hay/hayfields which were flooded:

- Remove existing "old" growth soon from fields that have not been harvested. This will allow a good crop after the flood.
- Utilize the grass as either hay or silage.
- If hay crop is silt-damaged, use a flail harvester or similar machine to spread the foliage somewhat uniformly back onto the field. Then immediately top-dress the cut over hay meadow with fertilizer. You may also want to apply nitrogen to stimulate grasses. Check with your county Extension agent for recommended application rates.
- On fields harvested just prior to the flood, make crop into hay or silage. Then top-dress with fertilizer. Check with your county Extension agent for specific recommendations.
- If post-flood growth is short or yellow, top-dress immediately.

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## How to Salvage Flood-Damaged Appliances

### Cleaning Appliances

Water, especially dirty flood water, causes many problems if it gets into an appliance. If it gets into an electric motor, the windings, electrical contacts and switches may corrode or short out. If it gets into insulation, the usefulness of the insulation in keeping heat in (ranges) or out (refrigerator/freezers) may be less than it should be, and odors may exist for years. You should also consider the fact that new federal energy savings laws have forced the manufacturers to produce a much more efficient product. A new appliance may pay for itself in savings on your electric bill, especially if the manufacturer chooses to help you out on the initial cost.

#### First...

Before entering a home after a flood, be sure that the electricity to the dwelling has been completely shut off. If you are not certain how this is done, get a licensed electrician or authorized service man to do this for you. If there is still water surrounding the appliance, don't go near it until you are certain that the electricity to that appliance is off. Many flood-damaged appliances can be salvaged, but they must be thoroughly dried out first and should be checked out by an authorized service technician before being plugged into an electrical outlet. Cleaning and sanitizing should probably await the electrical check; it may not be worth the time to clean up the unit. Move the appliance to a location where air can get to it and prop the doors open. You may want to set a fan inside or nearby to increase the air flow. Make certain that a small child can't get inside and close the door. The drying process may take a week or longer.

### Don't Hose Them Down

Because your appliance may be mud- and water-filled, it may be tempting to hose it down. Don't do it! Water may get into places that the flood didn't reach, and you will only increase the damage. Instead, wash the appliance with a wet cloth and common household cleaners like Formula 409 or Fantastik. Rinse with a disinfectant solution (one teaspoon of chlorine bleach for each gallon of water) to sanitize and discourage mildew. Dry with a towel.

K-State Flood Survival and Recovery Fact Sheet MF-1131, Kansas State University Agricultural Experiment Station and Cooperative Extension Service.

Trade names are used to provide specific information; no endorsement is intended, nor is criticism of similar products implied.

Rachel Lipsey, Program Associate, Biological and Agricultural Engineering

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### Getting Rid of Odors

If an odor persists, wash with a solution made by adding one teaspoon of baking soda to a quart of water or one cup of vinegar or household ammonia per gallon of water. Activated charcoal (carbon), usually available where swimming pool or aquarium maintenance supplies are sold, will gradually soak up persistent odors. Place a thin layer in a large cookie pan and leave it there for 6 to 8 hours. It will then need to be reactivated by placing the pan in an oven, set at 350°, and leaving it there for approximately 1 hour. This procedure may be repeated indefinitely, as the charcoal never wears out. Refrigerators and freezers with wet insulation probably can't be salvaged. While older models with fiberglass cabinet insulation and metal liners can be saved by replacing the insulation, this is a high-cost repair, and the money might better be spent on a new, higher efficiency model. Cabinets with polyurethane foam insulation and seamless plastic liners resist water better, but, once soaked, are not repairable.

### Built-In Appliances

Built-in ranges, ovens and dishwashers (not portable or free-standing) generally have a batt of fiberglass insulation wrapped around the inner cabinet, with no outer cabinet. This insulation can easily be removed and replaced if it has become dampened with flood water.

### "800" Numbers for Appliance Manufacturers

Even though an appliance warranty does not cover flood damage, most appliance manufacturers have disaster programs and offer discounts on parts of a new product if an appliance is involved in a major flood.

Your county extension agent has a list of "800" numbers for all major appliance manufacturers. Call the manufacturer if you have an appliance which was in flood water and see what they can offer you in the way of advice or financial help before you attempt to plug in the appliance.

## How to Save Upholstered Furniture, Carpet and Bedding

Articles that have been heavily contaminated with toxic chemicals such as concentrated pesticides or embedded fiberglass or asbestos should be thrown away. Many products labeled “dryclean only” and severely damaged textiles are already ruined. Due to sewage, pesticides and other unknown toxic materials in floodwaters, many clothing and interior textile (carpet, upholstered furniture, drapery) products should be thrown away.

Some household textiles can be saved. It’s important to use a disinfectant to destroy harmful bacteria that can remain alive on fabrics for a long time.

### Upholstered Furniture

Remove padding. Plan to reupholster. Throw away all cotton stuffing and any other stuffing that is badly damaged, contaminated with sewage or other chemicals, or generally impossible to dry, clean or sanitize. Dry thoroughly using a fan and indirect heat. On some days the out-of-doors may be a good place for drying. To protect exposed wood, dry in the sun a short time only.

### Carpet and Rugs

Throw away carpet and pad that is heavily contaminated with floodwater and residue. You may be able to save carpet soaked with cleaner groundwater.

Most wall-to-wall carpet that can be saved is best cleaned by a professional rug cleaner or restorer. If you try to restore carpet yourself, rugs and carpet that can be removed and the pad discarded will provide the greatest success (it holds large quantities of floodwater and residue). If possible, dry small rugs out-of-doors in sunlight. Carpets that are glued to the floor without pad can be cleaned in place. Use shop water vacuums as well as dry blankets and towels to blot up excess moisture.

Apply rug shampoo with a carpet shampooer according to manufacturer’s directions. Be sure to remove all detergent used in cleaning. Anytime detergent is left in the product, you will have real problems with accelerated soiling, and you need to be very careful to thoroughly remove any suds or detergent that you have added to the product.

Sanitize by sponging a weak chlorine solution (1/4 teaspoon chlorine bleach to 1 cup of water) or other sanitizing product applied according to label directions and rinsing several times with clear water sponged onto carpet. Do not replace carpet or rug until all subfloors are dry.

After shampooing, dry rugs or carpets quickly. Hang rugs on line if possible, or lay them out flat in a warm, dry place. Electric fans will speed up drying. Carpets and rugs should be thoroughly dried.

### Bedding

**Mattresses** – It probably is best to throw out these products. A good innerspring mattress could be sent to a commercial renovating company; however, many communities will not have such a facility. If you do find such a service, check the cost and expected outcome. Odor may remain, and it may be less expensive to replace the mattress.

**Pillows** – Many pillows are relatively low cost. Best advice is to throw them away as they are very difficult to sanitize. You may want to try saving feather or down pillows. Contact your county Extension agent for additional information.

**Sheets, Pillowcases, Towels and Other Linens** – Use the “Directions for Cleaning Soiled Fabrics” on appropriate household cleaners. Refer to care label to determine if chlorine bleach can be used and the hottest water temperature that is safe.

**Blankets, Quilts, Comforters** – Use the directions on “Cleaning and Disinfecting Textiles” on appropriate household cleaners. Refer to the care label to determine if chlorine bleach can be used and the hottest water temperature that is safe. Wash only one blanket, quilt or comforter at a time. Some comforters will require an extra large commercial washer for best results. Following final washing procedure, heavy items should be rinsed at least three times in clear, warm water. Spin off water or gently squeeze out as much water as possible. When satisfied with results, you may dry in an automatic dryer at moderate heat setting, or dry in a warm room with a fan, or across two or three clotheslines. Put several bath towels in dryer with blanket, quilt or comforter to speed up drying.

## Mold Detection, Prevention and Mitigation

### What Is Mold?

Molds are fungi. Fungus is the general overall term used for mold, mildew, mushrooms, woodrot, rust and yeasts. The fungi are a distinct group of organisms with over 1,000 different types found in the U.S. The most common are *Alternaria*, *Aspergillus*, *Cladosporium*, *Fusarium*, *Penicillium*, *Rhizopus* and *Stachybotrys*. These fungi produce microscopic cells called spores that burst and spread easily through the air, settle on surfaces and, if the conditions are right, grow into thriving colonies. Fungi contain no chlorophyll and so are unable to make their own food. They survive by releasing enzymes that help them absorb and digest nutrients (cellulose, protein and fats) from their host materials, which is any living or dead organic matter. Mold can range in color from white to green and orange to brown and black. Early development of mold will have a fine web-like appearance of filaments (hyphae) on the surface or in the structure of its substrate. As it matures, it develops a bushy appearance with fruiting bodies that contain the spores.

### The Health Effects of Mold

Exposure to mold is common both inside and outside the home. Some people are more sensitive to mold than others, especially those with allergies and asthma. Some may be strongly affected when exposed to larger quantities of mold.

Mold exposure may cause:

- Cold-like symptoms
- Watery eyes
- Sore throat
- Wheezing
- Dizziness, and
- May trigger asthma attacks

Because mold spores are very small and can be easily inhaled, it is not safe to live in houses with high mold levels. Exposure to prolonged high spore levels may cause the development of an allergy to mold.

Types of people who are most severely affected by indoor mold growth include:

- Infants and children
- Elderly people
- Individuals with respiratory conditions or sensitivities such as allergies and asthma
- Persons having weakened immune systems (people with HIV infection, chemotherapy patients, organ transplant recipients)

### Detection of Mold

Molds can usually be detected by a musty odor, and discoloration of surfaces is common with mold growth. The mold may be found in shades of whites, greens, browns, blacks or oranges.

If you see or smell mold, you have a problem. Reliable sampling for mold can be expensive since it requires special equipment and training. Testing is not generally recommended as a first step. Usually it is not necessary to determine what type of mold you have. All molds should be treated the same and regarded as potential health risks.

### Causes of Mold Growth

Mold can grow in a home for various reasons including:

- Flooding
- Condensation – on windows or walls caused by indoor humidity that is high or surfaces that are cold (such as north-facing walls and moist summer air contacting air-conditioned surfaces)
- Poor ventilation in attics and closets
- Overflow from tubs, sinks or toilets
- Excessive moisture from firewood stored indoors
- Excessive humidifier use – increases relative humidity
- Inadequate venting of kitchen and bath humidity
- Improper venting of combustion appliances (such as kerosene and gas heaters)
- Failure to vent clothes dryer exhaust outdoors (including electric dryers) or using indoor clothes line
- House plants – water from a large number of plants can generate large amounts of moisture
- Excessive moisture from inadequate dehumidification during air conditioning (oversized system)
- Standing water found in condensate drain pans (refrigerator, air conditioner) and in crawl spaces

- Leaky basement
- Dripping pipes
- Roofs in need of repair or faulty gutters

## Conditions for Mold Growth

Molds grow on organic materials such as paper, leather, dirt and soap scum. They grow best at warm temperatures, but they can grow over a large temperature range.

## Ways to Prevent Mold

Cleaning and drying surfaces prevents mold growth. Mold will grow on damp surfaces within a couple days at normal temperatures.

Reduce moisture levels in the bathroom by running an exhaust fan during and after showers.

Fix plumbing leaks and seepage to prevent the buildup of moisture and prevent the growth of molds.

Store clothing dry and clean to prevent the growth of mold on clothes.

Reduce humidity levels by discontinuing use of a humidifier if the relative humidity is more than 40 percent, and use dehumidifiers and air conditioners when levels of humidity are high. Also, ventilate with outside air during the winter when outside temperatures are colder than indoor temperatures. Ventilating with warm summer air typically increases the air's relative humidity in a basement.

Increase the flow of air within your home. Moving furniture away from walls and opening closet doors to permit air circulation limits the growth of molds.

Prevent condensation. Insulating walls and installing storm or thermal pane windows keeps surfaces warm and limits condensation. In areas with high relative humidity, additional precautions may be necessary to ensure that your home stays mold free. For example, the use of vinyl wallpaper on exterior walls can cause vapor to be trapped inside your walls, thus creating excellent conditions for mold growth.

## Cleanup of Mold

### Cleanup and Removal of Mold

People can experience health effects when exposed to mold even if it is dead, so it must be removed. Killing active mold by applying a biocide such as chlorine bleach does not minimize health risks. Anyone spending more than a brief time

cleaning in a moldy environment should use a HEPA filter or N95 rated mask; typically it will have two straps. Also, use gloves.

Porous materials should be thrown out or completely decontaminated if they are moldy. Materials such as hard plastic, glass and metal can be cleaned. Remove the mold from non-porous materials using a soap or detergent. Never mix bleach and ammonia. Disinfect structural members that have been cleaned by applying a solution of 1 cup chlorine bleach per 1 gallon water or follow manufacturer's recommendations. The surface should be thoroughly wetted with the solution. Keep the surface wet with the bleach solution for 10 to 15 minutes to kill the mold. Allow the solution to dry naturally 6 to 8 hours. The area must be well ventilated since bleach fumes may cause lung irritation. Remember that chlorine deactivates termite treatments. After cleanup, termite treatments should be reapplied.

Other products that kill mold are biocides. These biocides have Environmental Protection Agency (EPA) registration numbers on the bottle and instructions for the intended application.

## Methods to Remove Mold from Various Products

Always clean surfaces, removing the mold, before using a chlorine bleach solution. Bleach changes the surface color.

For places where termites pose a problem, remember that chlorine deactivates termite treatments. After cleanup, termite treatments should be reapplied.

**Painted Surfaces Inside the Home** – Scrub moldy surfaces with a detergent. Do not mix bleach with cleaners containing ammonia. After the mold has been removed, discoloration can be removed using a solution of 1 cup chlorine bleach to 1 gallon water. Rinse with clean water and allow to dry thoroughly before painting or papering.

**Painted Exterior Surfaces** – Scrub mold on paint with a solution of 1/3 cup detergent that does not contain ammonia, 1 cup chlorine bleach and 1 gallon of water.

**Bathrooms** – Scrub surfaces with a solution of 1 cup chlorine bleach, 1 tablespoon detergent that does not contain ammonia and 1 gallon water. Keep the surface wet for about 10 minutes, then rinse well with water and dry.

**Roofs with Asphalt Shingles and Fiberglass Panels** – Use a mixture of 1 quart chlorine bleach, 1 ounce of detergent and 1 gallon water at the rate of

1 gallon per about 40 square feet. This solution will damage metal rain gutters and plants, so control runoff and rinse surfaces contacted by the solution.

**Wood Shingles, Decks and Other Untreated Wood** – Scrub surfaces with a solution of 1 quart chlorine bleach and 1 ounce detergent in 1 gallon water. Rinse thoroughly. If stains remain, increase the concentration of bleach to water and re-treat. Allow wood to dry thoroughly before painting or enclosing.

**Clothing and Other Textiles** – Brush, shake, sun and air mildewed textiles outdoors. Launder washable items with detergent and chlorine bleach when appropriate.

**Leathers** – Dyes used on leathers are very sensitive to numerous substances. Moisten a cloth with a solution of 1 cup denatured alcohol to 1 cup water, wipe away visible mold and dry in circulating air.

**Carpet and Rugs** – Discard pads containing mold. It is nearly impossible to remove all the mold in a pad. Carpet should also be discarded except for minor mold infestations. It is best to hire a professional carpet cleaner or restorer to clean wall-to-wall carpet. If you try to save the carpet yourself, apply rug shampoo with a carpet shampooer according to manufacturer's directions. Expose mold growing on the back of carpet to the direct rays of the sun. Scrub the back of the carpet using a detergent. Paint the carpet backing with a solution of 1/4 teaspoon chlorine bleach to 1 cup of water or another sanitizing product applied according to the label directions. Rinse several times. After shampooing and sanitizing, dry the carpet or rugs quickly by laying them outdoors in the sun and wind or use fans to speed dry.

**Upholstered Furniture and Mattresses** – If occupants are not sensitized to mold, very minor mold infestations may be tolerated in upholstered furniture and mattresses. Brush surface mold away with a broom outdoors. Vacuum outdoors, or use a vacuum with a HEPA filter bag. Discard the disposable vacuum cleaner bag. Use the services of a professional upholstery cleaner, or sponge the item with detergent suds and wipe with a clean cloth. Avoid getting the stuffing wet. Wipe the furniture with a cloth moistened with a solution of 1 cup denatured or rubbing alcohol to 1 cup water and dry thoroughly. Place the item in the sun for a few hours and air it thoroughly, or use a fan and indirect heat to dry. If mold is growing into the fabric or in the padding of an upholstered piece, nothing will eliminate the mold or odor except renovation or replacement.

**Books** – Stand books on end. Spread out pages to dry. Wipe off mold with a clean, dry cloth. After a few hours, stack and press to avoid wrinkling. Alternate opening and stacking until completely dry. Sprinkle talcum powder or cornstarch on pages to absorb moisture. Books may be frozen until you have time to work with them.

**Wood Furniture** – It is essential to differentiate between a little surface mold on the finish and mold that has grown through the finish and into the wood. If there is extensive mold growth, the wood should be sanded to remove the entire area of mold using appropriate personal respiratory protection or another method used to remove the mold. Caution should always be used when refinishing wood furniture that has been exposed to mold; whenever possible these items should be replaced rather than repaired.

## Drying Out Before Rebuilding

The problem: Wood submerged in water will absorb a large amount of water. Rebuilding too quickly after a flood can cause continuing problems such as mold growth, insect infestations and deterioration of the wood and wall coverings.

How long until it's dry? It may take weeks for the wood to be adequately dry to close a wall. The drying time will vary depending on the initial moisture content and the drying conditions.

How can I tell if it's dry enough? Test it with a wood moisture meter. Wood should have a moisture content of less than 15 percent before drywall, paneling or other coverings are placed on the wood. Do-it-yourselfers may be able to purchase, borrow or rent a meter from a hardware store or lumberyard. If a contractor is doing the work, homeowners should have the contractor verify with a meter that the wood is dry.

## How Can I Dry Things Out?

It is important to remember that each of these procedures works best in certain situations; these depend very much on your climate. During times with higher humidity, using central air systems and dehumidifiers will most likely be the most effective method to dry out your belongings and home.

- **Ventilation** – Ventilation is usually the best way to dry things out; several gallons of water can be removed per day. Provide an entrance and exhaust opening for air to promote cross-ventilation. Place a fan in a window or door with the fan facing to the outdoors. Seal the rest of the opening with cardboard, plywood or blankets so

the fan can create a vacuum. Use fans to circulate air over wet surfaces. Face fans into corners or other secluded areas.

- **Heat** – Heat increases the moisture-holding ability of the air. Use your furnace or large heaters to heat the air. Small space heaters will have little effect. As wood gets drier it may be helpful to heat the house for a few hours then ventilate to exchange moist air with dry air.
- **Dehumidifiers** – A dehumidifier can be used if outside air is humid. Dehumidifiers function most efficiently at warm temperatures. At 80 degrees and 60 percent relative humidity, most residential dehumidifiers will remove 1 to 2 pints of water per hour from the air.

## Mold Information in Foreign Languages

### What Is Mold?

Available in Laotian/English, Spanish/English, Cambodian/English and Hmong/English.  
<http://www.extension.umn.edu/distribution/housingandclothing/DK6944.html>

### Household Mold

English:  
<http://extension.oregonstate.edu/washington/resources/documents/HouseholdMold.pdf>

Russian:  
[http://extension.oregonstate.edu/washington/resources/documents/Mold\\_%20Russian.pdf](http://extension.oregonstate.edu/washington/resources/documents/Mold_%20Russian.pdf)

Spanish:  
<http://extension.oregonstate.edu/washington/resources/documents/Mohodelacasa.pdf>

Acknowledgment for this information is given to Dr. Kenneth Hellevang, North Dakota State University Extension Service, Fargo, ND.

Vietnamese:  
[http://extension.oregonstate.edu/washington/resources/documents/Mold\\_Vietnamese.pdf](http://extension.oregonstate.edu/washington/resources/documents/Mold_Vietnamese.pdf)

## Mold Resource Web Links

### EPA Mold Resources

[www.epa.gov/iaq/molds/moldresources.html](http://www.epa.gov/iaq/molds/moldresources.html)

### Mold Allergy (National Institute of Health)

<http://www.niaid.nih.gov/publications/allergens/mold.htm>

### Home Moisture

<http://www.homemoisture.org>

## Lessons

### Controlling Home Moisture for Indoor Air Quality Presentation

<http://www.homemoisture.org/presentations.htm>

### Mold in Your Home Presentation

<http://www.homemoisture.org/presentations.htm>

### Keep Your Home Healthy Presentation

<http://www.homemoisture.org/presentations.htm>

### What's the Matter with Mold?

<http://cecp-online.org>

## Septic Systems – What to Do After a Flood

### Where can I find information on my septic system?

Please contact your local health department for additional advice and assistance. For more information on onsite/decentralized wastewater systems, call the National Environmental Services Center at (800) 624-8301 or visit their website at [www.nesc.wvu.edu](http://www.nesc.wvu.edu).

### Do I pump my tank during flooded or saturated drain field conditions?

No! At best, pumping the tank is only a temporary solution. Under worst conditions, pumping it out could cause the tank to try to float out of the ground and may damage the inlet and outlet pipes. The best solution is to plug all drains in the basement and drastically reduce water use in the house.

### What if my septic system has been used to dispose wastewater from my business (either a home-based or small business)?

In addition to raw sewage, small businesses may use their septic system to dispose of wastewater-containing chemicals. If your septic system that receives chemicals backs up into a basement or drain field, take extra precautions to prevent skin, eye and inhalation contact. The proper clean-up depends on what chemicals are found in the wastewater. Contact the health department or EPA for specific clean-up information.

### What do I do with my septic system after a flood?

Once floodwaters have receded, there are several things homeowners should remember:

- Do not drink the well water until it is tested. Contact your local health department.
- Do not use the sewage system until water in the soil absorption field is lower than the water level around the house.
- Have your septic tank professionally inspected and serviced if you suspect damage. Signs of damage include settling or an inability to accept water. Flooding doesn't damage most septic

tanks since they are below ground, i.e., completely covered. However, septic tanks and pump chambers can fill with silt and debris and must be professionally cleaned. If the soil absorption field is clogged with silt, a new system may have to be installed.

- Only trained specialists should clean or repair septic tanks because tanks may contain dangerous gases. Contact your health department for a list of septic system contractors who work in your area.
- If sewage has backed up into the basement, clean the area and disinfect the floor. Use a chlorine solution of a half cup of chlorine bleach to each gallon of water to disinfect the area thoroughly.
- Pump the septic system as soon as possible after the flood. Be sure to pump the tank, the distribution box and the lift station if present. This will remove silt and debris that may have washed into the system. Do not pump the tank during flooded or saturated drain field conditions. At best, pumping the tank is only a temporary solution.
- Do not compact the soil over the soil absorption field by driving or operating equipment in the area. Saturated soil is especially susceptible to compaction, which can reduce the soil absorption field's ability to treat wastewater and lead to system failure.
- Examine all electrical connections for damage before restoring electricity.
- Be sure the septic tank's access cover is secure and that inspection ports have not been blocked or damaged.
- Check the vegetation over your septic tank and soil absorption field. Repair erosion damage and sod or reseed areas as necessary to provide turfgrass cover.

**Remember: Whenever the water table is high or your sewage system is threatened by flooding, there is a risk that sewage will back up into your home. The only way to prevent this backup is to relieve pressure on the system by using it less.**

## What are some suggestions offered by experts for homeowners with flooded septic systems?

- Use common sense. If possible, don't use the system if the soil is saturated and flooded. The wastewater will not be treated and will become a source of pollution. Conserve water as much as possible while the system restores itself and the water table falls.
  - Prevent silt from entering septic systems that have pump chambers. When the pump chambers are flooded, silt has a tendency to settle in the chambers and will clog the drain field if it is not removed.
  - Do not open the septic tank for pumping while the soil is still saturated. Mud and silt may enter the tank and end up in the drain field. Furthermore, pumping out a tank that is in saturated soil may cause it to "pop out" of the ground. (Likewise, recently installed systems may "pop out" of the ground more readily than older systems because the soil has not had enough time to settle and compact.)
  - Do not dig into the tank or drain field area while the soil is still wet or flooded. Try to avoid any
- work on or around the disposal field with heavy machinery while the soil is still wet. These activities will ruin the soil conductivity.
  - Flooding of the septic tank will have lifted the floating crust of fats and grease in the septic tank. Some of this scum may have floated and/or partially plugged the outlet tee. If the septic system backs up into the house, check the tank first for outlet blockage. Clean up any floodwater in the house without dumping it into the sink or toilet and allow enough time for the water to recede. Floodwaters from the house that are passed through or pumped through the septic tank will cause higher flows through the system. This may cause solids to transfer from the septic tank to the drain field and will cause clogging.
  - Locate any electrical or mechanical devices the system may have that could be flooded to avoid contact with them until they are dry and clean.
  - Aerobic plants, upflow filters, trickling filters and other media filters have a tendency to clog due to mud and sediment. These systems will need to be washed and raked.

Source: The Environmental Protection Agency, publication EPA 816-F-05-029, September 2005, Office of Water (4606 M), [www.epa.gov/safewater](http://www.epa.gov/safewater)

## Well Disinfection

### Why Disinfect?

Well disinfection can eliminate or reduce many different kinds of harmful bacteria and viruses as well as harmless bacteria which can cause unpleasant taste and odors. However, disinfection will **not** correct water problems caused by chemical contamination from nitrate, fuels, pesticides or other substances. Well disinfection should be performed under the following circumstances:

- When coliform bacteria are present in the water;
- After flooding of the well;
- After plumbing installation, e.g., softeners, sinks, filters;
- After casing or pump repairs – submersible types or other;
- When water taste or odor changes, e.g., from iron or sulfur reducing bacteria;
- As part of annual maintenance; or
- During startup of seasonal wells.

### Safety Precautions

#### ELECTRICAL

**EXTREME CAUTION** is advised as you will be working with electricity and water. Potentially lethal voltages exist – if you are not acquainted with working with electricity, seek professional advice. Your safety precautions should include:



- Turn off all power to the pump before removing the well cap.
- While the power is off, examine for chaffed wire insulation or missing wire nuts and repair as necessary.
- Wear rubber-soled shoes or boots, preferably waterproof.

#### CHEMICAL

**Severe eye damage may result from contact with chlorine, including bleach and highly chlorinated household water.**

- Warn users of the water to not drink or bathe in the water while chlorine is still present in the system.
- Do not leave bleach jugs within reach of children – ingestion of bleach is the most common toxic exposure for children in the United States.
- Wear protective goggles or a face shield when working with the bleach.

#### RESPIRATORY

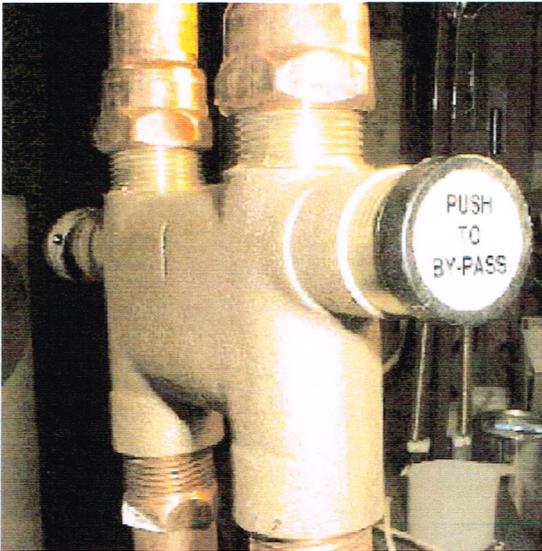
**Well pits pose an extreme hazard as they frequently contain a build-up of toxic gases or simply lack sufficient oxygen to sustain life.**

- **DO NOT ENTER WELL PITS.** Death can occur in even a shallow well pit – refer disinfection of wells in pits to licensed well or pump contractors.

## Procedure

### STEP 1 – Isolate critical areas

Bypass devices such as softeners, bait tanks and livestock to prevent damage to the device or animals. This would also be a good time to install a new filter element if the water system has one. Since softeners themselves may be a source of contamination, it is good to disinfect the softener at the same time the well is being disinfected. See the end of this document for a softener disinfection procedure.



### STEP 2 – Electrical safety

Turn off electrical power to the pump.

If the breaker box has a “lockout” hasp to prevent someone from accidentally turning on the water pump circuit breaker, use it.



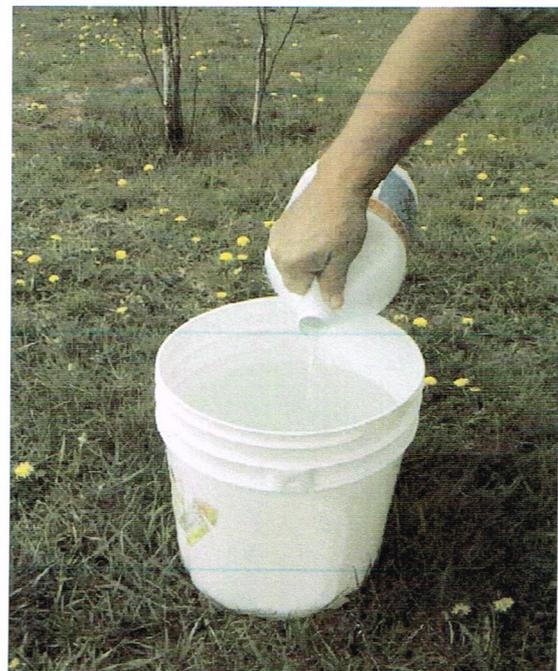
### STEP 3 – Remove well seal/cap

With electrical power off, remove the well cap and lift the wires/wire nuts aside.



### STEP 4 – Mixing a chlorine solution

Add 1/2 gallon of bleach to a clean pail with about 3 gallons of water. This is generally sufficient to disinfect a 4-inch diameter well 100 feet deep or less. For wells greater than 100 feet, increase the amount of bleach proportionately. Or, to determine the amount of water in the well, multiply the gallons of water per feet by the number of feet of water in the well using the following table:



**Diameter of well (X) Gallons per foot**

4 inches	.65
5 inches	1.00
6 inches	1.50
8 inches	2.60
10 inches	4.10
12 inches	6.00

For each 100 gallons of water in the well use the amount of compound listed below.

<b><u>Laundry Bleach</u></b>	<b><u>Hypochlorite Granules</u></b>
5.25% Chlorine	70% Chlorine
3 cups	2 ounces (2 tablespoons)
(24) ounces	

**STEP 5 – Adding chlorine to the well**

Pour the mixture into the well.



**STEP 6 – Recirculating chlorinated water**

Recirculation of chlorinated water helps to wash down the sidewalls of the well casing, mix the water column thoroughly and distribute the chlorine.

- Place garden hose into well casing.
- Turn on pump power.
- Run garden hose from the water system and put it back into the casing to recirculate water.



Recirculate for about 2 hours from the time you smell chlorine from the garden hose.

- You may notice that the water coming from the garden hose turns reddish for a brief period. This is due to the chlorine precipitating iron in the water. If the water appears excessively red and cloudy from this reaction, discharge the hose outside of the casing until the water runs clear.

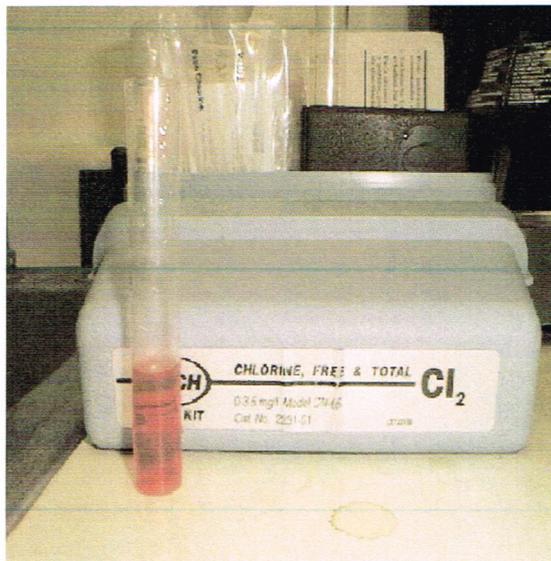
**STEP 7 – Bringing chlorine to each faucet**

While water is circulating, turn on each faucet\* one at a time until you smell bleach (or use chlorine test papers), then close the faucet. Do this for each faucet, including:

- Hot water taps;
- Toilets and shower/bath fixtures; and
- Any outside faucets or yard hydrants

\*Faucet aerators may need to be removed if clogging occurs from precipitated iron.

(Chlorine test papers, such as those commonly used in restaurants to check chemical sanitizing dishwashers, are not necessary but provide a visual indication that chlorine is present.)



dissipated before submitting a water sample for coliform analysis. This will ensure a valid test result.

## STEP 8 – Removing the chlorinated water

Let system set overnight with chlorine in the water lines. In the morning, run a garden hose to flush out the system.

- Since chlorine will kill vegetation, direct the water to an area where it won't matter if plants are harmed.
- Do not run the water into your septic system as the amount of water required to flush the system may hydraulically overload the septic system.
- TOTAL chlorine must be absent prior to taking water samples for coliform analysis. While this test isn't necessary for the homeowner, be aware that any amount of chlorine left in the system may erroneously result in a negative coliform test.
- When a chlorine test kit is unavailable, wait a few days after the last trace of chlorine odor has

## Disinfection Issues

### Expectations and Concerns

It may take as little as 1/2 hour or as much as 4 days to completely remove the chlorine odor from the water system. This is dependent upon many factors including the height of the water column in the casing, well drawdown and pump capacity. To facilitate faster removal of the chlorine in stubborn cases, a hose splitter may be attached and one hose run back into the casing and the other hose pumped to remove waste.

Water heaters take a long time to flush out once chlorine has been introduced into them. **Do not shower/bathe with water containing high levels of chlorine due to the possibility of damaging your eyes.** If you elect to drain down the water heater to remove the chlorine, be sure to turn off the electricity or gas to the heater, otherwise the heater will be damaged when the water recedes from the heating elements or burner.

It is not unusual to require 2, 3, 4 or more disinfections to clear water systems of coliform bacteria that have been growing in the system for a period of time. If the well refuses to clear, a licensed well driller should be enlisted to utilize special techniques and equipment to flush the well. It is essential that any water system defects that could allow surface water to enter the well be corrected.

Plumbing grit and precipitated minerals may form when the chlorine is added to the system. This grit can cause clogging with faucet aerators, flush valves, water solenoids and equipment using filters.

### Softener Disinfection

Water softeners may be damaged by excessive amounts of chlorine, but the softener itself should be chlorinated when there are bacteria problems. Follow the manufacturers instructions for disinfecting the particular unit you have or use this procedure:

- During the disinfection process, turn softener to “Bypass” once chlorine is first smelled in a softened water tap.

- Keep unit on bypass until chlorine is flushed out of the system.
- To disinfect the softener, add 1/2 cup bleach to the brine tank and regenerate the unit.



### Follow-Up

Frequently, coliform bacteria will regrow in the water system after about a month. For this reason, it is important to retest approximately 30 days after disinfection. If coliform is again detected, disinfect the well using the same procedure.

Source: Well Disinfection, Disinfection Handout, Indiana Department of Environmental Management, August 4, 1999.

## What to Do During a Power Failure on the Farm

A power failure or fuel shortage can cause problems on poultry and livestock farms, but being prepared can minimize the seriousness of these problems.

There are four areas of concern:

- Poultry
- Livestock
- Milk
- Equipment

### Poultry and Livestock

To protect poultry and livestock during a power failure, you should provide four essentials: ventilation, water, heat and feed.

#### *Ventilation*

- Most commercial poultry facilities should already be equipped with standby power generation for emergency ventilation.
- Ventilate shelter with standby power generators rather than natural ventilation.
- Do not close buildings tight to conserve heat, since animals could suffocate from lack of oxygen.
- Because oxygen will eventually be used up in mechanically ventilated production facilities, clear debris from all vents. Then open vents to facilitate natural airflow.
- In dairy facilities, open doors or turn cows outside, unless weather conditions prohibit (e.g., ice storm, tornado, etc.).

#### *Water*

- Provide all animals, especially cattle, with plenty of water.
- Your water pump might be adapted to be driven with a small gasoline engine and a belt. In some cases, a tractor may provide power for a standby

power generator. Otherwise you will need to haul water.

- If you have an outside source of water (pond or a stream), cattle can be turned out.
- Whatever the source of water, make sure it remains clean so animals can drink it.
- If no water is available, dairymen can feed cows their own milk as a last resort.

#### *Heat*

- Provide essential heat during cold weather. Use portable camp stoves and heaters as emergency heat sources for brooders. However, remember that stoves or heaters use oxygen and, if improperly managed, can present a fire hazard. Have qualified personnel inspect your standby heaters routinely in order to enhance fuel combustion and heat production; recondition or discard equipment that has potential to ignite a fire.
- Plan ahead to have this equipment ready when needed.

#### *Feed*

- Provide feed. Animals need extra energy for body heat during prolonged severe weather, especially if they are unsheltered. The best sources of energy are corn and other grains.
- If mechanical feeders are not connected to emergency power generation equipment, they will be inoperable during a power failure and emergency feeding procedures must be employed.
- Use pelleted cake or cake concentrate for emergency feed.

### Storing Milk

- Request that the marketing cooperative or processor pick up milk as soon as possible.

- A standby power generator can handle vital electrical equipment on the dairy during emergencies. Although such equipment can represent a sizable financial investment, one major power failure can pay for the equipment. While generation equipment can be borrowed during emergencies, be aware that travel may not be possible in ice storms, severe rain or wind storms and such equipment may already be in use.
- The intake manifold on a gasoline tractor engine may be used as a vacuum to operate select milking machines that do not have magnetic pulsators, but the vacuum levels may vary and increase the incidence of mastitis. If cows are not milked within 24 hours, the level of mastitis is likely to increase greatly.
- Even if you are short of extra milk storage facilities, do not store milk in stock tanks or other containers such as bathtubs. Dairy plants are not likely to accept milk that has been stored in anything other than regular milk storage containers.
- Check with your local marketing cooperative or processor about the policy from the Arkansas Department of Health regarding emergency storage of milk.
- If you are unable to cool your milk or have it picked up, check your tank for souring each time you add milk to it by looking for clumping or smelling for odors. This check could mean the difference between losing all or only part of your milk supply.

## Standby Power Generators

Emergency power generation is strongly recommended for commercial facilities caring for large numbers of animals. However, emergency power generation equipment must be properly sized, installed, maintained and routinely tested to be effective.

- Remember when sizing generators to account for both operating and start-up wattage needs.
- Mount generators securely in a location that protects the equipment from the weather, but permits the exhaust of gases and heat during the operation.
- Keep wiring runs as short as possible and size the wire for the maximum current load.
- Test generation equipment under full load for at least 30 minutes weekly and ensure that all equipment operates properly under generated power.
- Ensure that adequate fuel is available.

## Equipment

- Unplug or turn off all electric equipment to prevent damage when power is restored.

Gary Huitink, Associate Professor - Extension Engineer

Dr. Tom Troxel, Extension Beef Cattle Specialist and Section Leader - Animal Science

Dr. Jodie Pennington, Extension Dairy Specialist

Dr. Frank T. Jones, Extension Poultry Specialist and Associate Center Director for Extension

3/2006

## What to Do With Private Wells and Pumps After a Flood

**WARNING!**  
**DO NOT TURN ON THE PUMP.**  
There is danger of electrical shock and damage to your well or pump if it has been flooded

**WARNING!**  
**DO NOT WASH WITH WELL WATER.**  
People drinking or washing with water from a private well that has been flooded will risk getting sick.

Drilled, driven or bored wells are best disinfected by a well or pump contractor, because it is difficult for the private owner to thoroughly disinfect these wells.

If you suspect that your well may be contaminated, contact your local or state health department or county Extension agent for specific advice on disinfecting your well. The suggestions below are intended to supplement flood precautions issued by state and local health authorities.

### Well and Pump Inspection

**Flood Conditions at the Well** – Swiftly moving floodwater can carry large debris that could loosen well hardware, dislodge well construction materials or distort casing. Coarse sediment in the floodwaters could erode pump components. If the well is not tightly capped, sediment and floodwater could enter the well and contaminate it. Wells that are more than 10 years old or less than 50 feet deep are likely to be contaminated, even if there is no apparent damage. Floods may cause some wells to collapse.

**Electrical System** – After floodwaters have receded and the pump and electrical system have dried, do not turn on the equipment until the wiring system has been checked by a qualified electrician, well contractor or pump contractor. If the pump's control box was submerged during the flood, all

electrical components must be dry before electrical service can be restored. Get assistance in turning the pump on from a well or pump contractor.

**Pump Operation** – All pumps and their electrical components can be damaged by sediment and floodwater. The pump including the valves and gears will need to be cleaned of silt and sand. If pumps are not cleaned and properly lubricated they can burn out. Get assistance from a well or pump contractor who will be able to clean, repair or maintain different types of pumps.

### Emergency Disinfection of Wells That Have Been Flooded

**Before Disinfection:**  
*Check the condition of your well. Make sure there is no exposed or damaged wiring. If you notice any damage, call a professional before the disinfection process.*

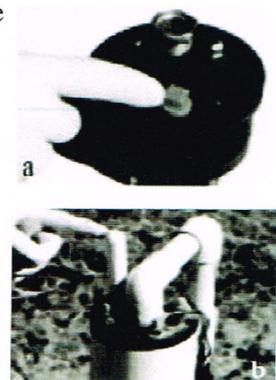
#### Materials Needed:

- One gallon of non-scented household bleach;
- Rubber gloves;
- Eye protection;
- Old clothes; and
- Funnel



**Step 1** – If your water is muddy or cloudy, run the water from an outside spigot with a hose attached until the water becomes clear and free of sediments.

**Step 2** – Determine what type of well you have and how to pour the bleach into the well. Some wells have a sanitary seal with either an air vent or a plug that can be removed (a). If it is a bored or dug well, the entire cover can be lifted off to provide a space for pouring the bleach into the well (b).





**Step 3** – Take the gallon of bleach and funnel (if needed) and carefully pour the bleach down into the well casing.

**Step 4** – After the bleach has been added, run water from an outside hose into the well casing until you smell chlorine coming from the hose. Then turn off the outside hose.



**Step 5** – Turn on all cold water faucets, inside and outside of

house, until the chlorine odor is detected in each faucet, then shut them all off. If you have a water treatment system, switch it to bypass before turning on the indoor faucets.

**Step 6** – Wait 6 to 24 hours before turning the faucets back on. It is important not to drink, cook, bathe or wash with this water during the time period – it contains high amounts of chlorine.



**Step 7** – Once the waiting period is up, turn on an outside spigot with hose attached and run the water into a safe area where it will not disturb plants, lakes, streams or septic tanks. Run the water until there is no longer a chlorine odor. Turn the water off.



**Step 8** – The system should now be disinfected, and you can now use the water.

**Step 9** – Have your water tested for bacteria 7 to 10 days after disinfection.

## Sampling and Testing the Well Water

Contact the local health department to have well water sampled and tested for contamination. Or, call your state laboratory certification officer to find a certified lab near you. You can get this number from the Safe Drinking Water Hotline (1-800-426-4791).

If the health department issues sterile bottles for the private well owner to collect water samples, follow all instructions for the use of these bottles.

After the pump is back in operation, the health department should sample and test the water at regular intervals.

**CAUTION: Because of the extensive flood area and the speed and direction of groundwater flow, your well may not be a safe source of water for many months after a flood. The well can become contaminated with bacteria or other contaminants. Waste water from malfunctioning septic tanks or chemicals seeping into the ground can contaminate the groundwater even after the water was tested and found to be safe. It will be necessary to take long-range precautions, including repeated testing, to protect the safety of drinking water.**

## Concerns and Advisories

If in doubt about the well water supply, follow health department drinking and bathing advisories.

Remember that there is a danger of electrical shock from any electrical device that has been



flooded; consult a certified electrician. Rubber boots and gloves are not adequate protection from electric shock.

Well disinfection will not provide protection from pesticides, heavy metals and other types of non-biological contamination. If such contamination is suspected, due to the nearness of these contaminant sources, special treatment is required.

Information on home water treatment units (also called point-of-use and point-of-entry units) is available from U.S. EPA by phoning the **Safe Drinking Water Hotline (1-800-426-4791)**.

If you observe chemical containers (including barrels and drums) that have moved to your property, call your state or county health department or the **Superfund Hotline (1-800-424-9346)**.

For information on long-term water quality conditions in the area, consult the state or county health department.

Well owners may have information about the construction or testing of their well, and this information will be helpful to the health department in determining water quality conditions.

Septic systems should not be used immediately after floods. Drain fields will not work until underground water has receded. Septic lines may have broken during the flood.

Source: United States Environmental Protection Agency, Office of Water (4606 M), [www.epa.gov/safewater](http://www.epa.gov/safewater), EPA 816-F-05-021, August 2005.

## What You Should Do If Your Water Well Has Been Flooded

It is best to assume water from a well that has been flooded is contaminated. Do not use the well water for drinking, cooking, making ice, brushing teeth or even bathing until you are satisfied that the water is not contaminated.

Floodwater can be contaminated by substances from upstream, such as sewage from flooded septic systems or wastewater treatment plants, manure, pesticides or fertilizer applied to cropland that was flooded. A septic system in the vicinity of a well also can cause contamination when the soil is flooded. Wells that are inside pits may be flooded even if the surface is not covered with water. In order to ensure that the water is safe, the well should be disinfected and then tested for pathogens.

### Disinfecting a Well

Well contractors or drillers may be contacted to disinfect the well, or you can do it yourself in some cases. The Indiana Department of Environmental Management's illustrated guide for disinfecting a well is included in the notebook and is available on the world wide web at the following address:

<http://www.ecn.purdue.edu/SafeWater/drinkinfo/welldisinfection.pdf>

Be sure to follow the instructions carefully, which include the following steps:

- Turn off electric power to the pump and remove the well cap.
- Prepare a bleach and water solution and pour the solution into the top of the well.
- Circulate the water by connecting a hose to a faucet and spraying the water back into the well and down the sides of the well for at least 15 minutes.
- Open every faucet in the system and let the water run until the smell of chlorine can be detected, then close all the faucets and seal the top of the well.
- Keep the chlorinated water in the system for several hours, preferably overnight.
- On the following day, open all the faucets until there is no chlorine odor.

### Testing Well Water

Before you resume using the well, collect a water sample and have it tested by a certified laboratory. Call your county health department to find a laboratory near you. Well disinfection will not provide protection from pesticides, heavy metals and other types of non-biological contamination. If such contamination is suspected, due to the nearness of sources for these types of contaminants, special treatment is required. Homeowners can call the EPA Well Care Hotline at (888) 395-1033 if contamination by non-biological elements is suspected.

### Well Damage

Another implication flooding can have on your well is the damage or deconstruction of the well in general. Fast-moving floodwater can carry debris that could dislodge well construction materials or distort the casing. The coarse sediment in floodwater also could erode pump components. Inspect the well for physical damage or look for signs of leakage. In the case of a damaged well, consult a licensed water well contractor to find out if repairs are needed.

Additionally, flooding can damage your well pump and electrical systems. If the pump and/or electrical system have been under water, **do not turn on the pump** because of the potential danger of electrical shock or damage to your well or pump. Once floodwaters have receded and the pump and electrical system have dried, have a qualified electrician check the wiring system.

## Obtaining Clean Water

Individuals with flooded wells are encouraged to find an alternative source of water for drinking, cooking and washing. For example, you may be able to get water from a neighbor's well if you know it is safe, or from a public water supply. Purchasing bottled water also is a good alternative. If you can't find a convenient source of safe water, boil your well water for five minutes before use.

Homeowners returning to their home after a flood may be eager to use the water. But remember that flooding presents special health risks and requires extra attention to protect your family's health.

Arkansas residents can contact their University of Arkansas Division of Agriculture Cooperative Extension Service county office for a copy of "Improving Home Water Quality." Of particular usefulness, when well contamination is an issue, is a section entitled "Shock Chlorination." This publication has a number of practical solutions to typical water system problems for those using their own well. Contact your local county Extension agent for more information on techniques to improve the quality of the water supplied to your home.

Adapted from Purdue "Safe Water for the Future" web site, Purdue University, Lafayette, IN.

*Flood / Portable Water*

## **Food/Potable Water**

Planning for Food after a Disaster (FSHED81)

A Quick Consumer Guide to Safe Food Handling (FSHED82)

Keeping Food Safe During an Emergency

Seven Food Safety Steps for Successful Community Meals

# Planning for Food After a Disaster

Easter H. Tucker  
Family and Consumer  
Sciences Specialist

No refrigeration! No electricity!  
Limited water!

Regardless of the cause of these problems, they can radically affect what foods we eat. Planning ahead helps assure good, nutritious food is available for our families in times of disaster.

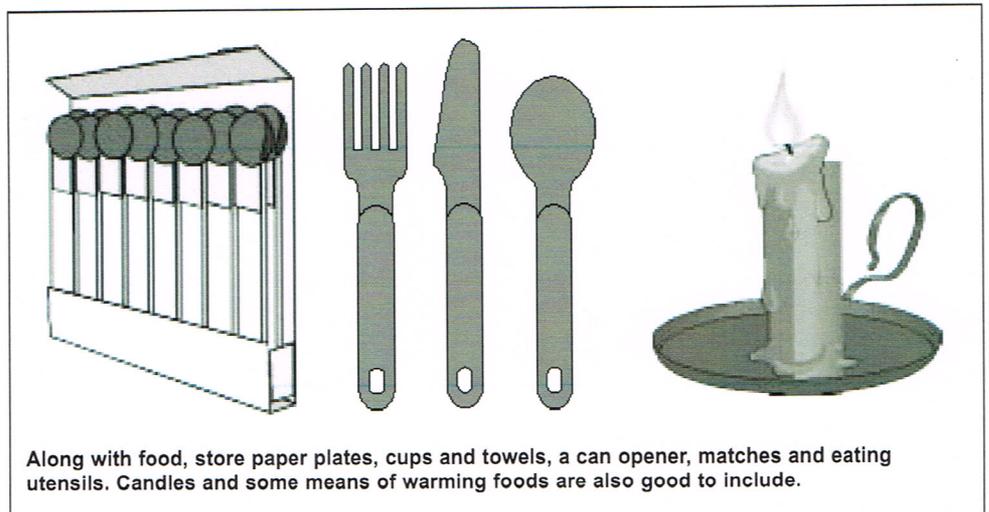
Planning ahead with regard to food involves establishing a food reserve to use when you cannot replenish regular food supplies. Experts generally predict that most services will be restored within three days after a disaster. However, you may want to plan on food for one to two weeks to assure you have enough to last until you can get more.

Establishing a food reserve may only involve making sure regular food supplies are large enough to supply needs during the disaster. You might

prefer to set up a separate emergency supply in a place specifically selected for easy access in times of emergency.

Select foods for this reserve that keep well without special handling, such as refrigeration, and that can be eaten with minimum preparation. When possible, choose can sizes that will supply one meal, since storage of leftovers may be difficult.

In setting up a reserve, include foods your family likes. During a disaster, family members have enough to cope with without having to accept unfamiliar foods. If canned and dried products are not part of your regular meals, you may want to introduce them into some meals. This will help family members accept them more readily when it is necessary to eat emergency supplies. Special treats, like candy and cookies, should also be included as morale boosters and for quick energy.



Along with food, store paper plates, cups and towels, a can opener, matches and eating utensils. Candles and some means of warming foods are also good to include.

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If there is a baby or other family member who requires special food, be sure an adequate supply of foods for their needs is included in the reserve. Reconstituted dry milk or canned milk may be used for short-term feeding of infants. These products do not satisfy nutritional needs of the infants, so long-term feeding of only these products is not recommended.

If family members need special medication, include these products in the reserve. Be sure to check with your physician or pharmacist about how long these medications can be stored and still remain effective.

It is impossible to predict when an emergency will occur. Therefore, food reserves may need to be maintained for a long period of time. To assure the food in a reserve is of highest quality, stored food should be used regularly and replaced. Foods placed in the reserve should be dated. Place new foods in back of the older stores. For best quality, no food should be kept longer than a year.

Choose a storage place that is cool and dry. Temperature of the food should never be higher than 70 degrees or lower than 40 degrees. Food in boxes must be protected from insects and rodents. A good

way to do this is to put the food, box and all, in a closed metal container.

Canned food is a good choice for a reserve. It will usually remain safe to eat as long as it has a good seal. Do not use canned foods that bulge, leak, squirt liquid, contain mold or have an off-odor when opened. Any of these may indicate the presence of bacteria which could be harmful if eaten.

Along with food, store paper plates, cups and towels, a can opener, matches and eating utensils. Candles and some means of warming food are also good to include.

Storing water is also recommended since water supplies may be cut off or contaminated. Recommendations say to plan on one-half gallon per person per day for drinking and food preparation. If bathing, brushing teeth, washing dishes or other uses of water are determined to be necessary, additional water will be needed. The amount of water for consumption might be reduced somewhat, depending on the total juices, soups, other drinks and high moisture foods available. Other sources of water available in emergency situations are the water heater, water softener containers and the water storage area of the toilet.

<b>Guide for Reserve Food Supply*</b>		
<b>Kind of Food</b>	<b>Amount Per Person for 1 Day</b>	<b>Suggested Food</b>
Milk	Equivalent of 2 glasses (fluid)	Powdered nonfat dry milk Evaporated canned milk Each of the following is equivalent to 1 quart of fluid milk: Evaporated      3 (6 ounce) cans 1 (14 1/2 ounce) can Nonfat dry milk   3 to 3 1/2 ounces
Canned meat, poultry, fish, cooked dry beans and peas	2 servings	Canned meat, poultry, fish Canned meat mixtures Canned dry beans Canned spaghetti and rice products Condensed soups containing meat or dry beans Peanut butter
Fruits and vegetables	3 to 4 servings	All types of canned vegetables and fruit Dry fruit, canned fruit juice
Cereal and baked goods	3 to 4 servings	Ready-to-eat cereal (1 ounce serving) Instant hot cereals
Spreads for bread and crackers	According to family practices	
Fats and vegetable oil	1 ounce	
Sugars, sweets	1 ounce	
Miscellaneous	According to family practices and extent of cooking possible	Coffee, tea, cocoa, powdered or canned beverage products, soda, baking powder, flavorings, soft drinks

\*Adapted from *Safe Handling of Food During Emergencies*, Cooperative Extension Service, Purdue University, West Lafayette, Indiana.

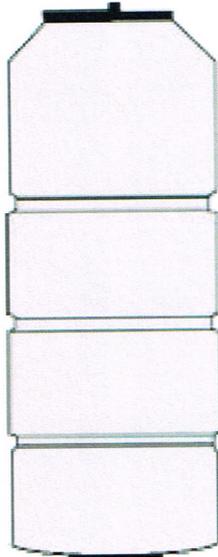
## Containers for Water Storage

Many types of containers are available for water storage. The most commonly used containers are glass, plastic and metal.

**Glass:** Glass provides a fairly effective container for storage, but it is easily broken and is heavier than plastic. Glass is non-permeable to vapors and gases; however, water in glass containers should not be stored near gasoline, kerosene, pesticides or similar substances.

**Plastic:** Plastic jugs are frequently used for water storage. These containers are lightweight and fairly sturdy. There are many types of plastic containers manufactured. Generally, polyethylene-type plastics are safe for storing water. Some, however, are not recommended for food storage because harmful chemicals could leach into the food. Most plastics used in waterbeds are not approved food storage plastics. Plastic containers which have previously been used for food storage or which are being advertised as food storage products will be safe. Plastic jugs with secure lids, which have contained milk or other edible substances are safe for water storage; however, it is essential that the milk bottles be thoroughly washed to remove the fat traces. Some lightweight gallon containers might split at the seams and leak. Chlorine bleach bottles may be a food-approved plastic, but contain an anti-static agent which prevents accumulation of dust during storage and are thus not recommended. Since plastic is permeable to certain vapors, water stored in plastic should not be near gasoline, kerosene, pesticides or similar substances. It is advisable to store plastic water containers away from direct sunlight.

**Metal:** Some metals, such as stainless steel, can successfully be used for water storage. A metal water storage container should be resistant to rust. A metallic taste can be picked up by the stored water in some types of metal containers. Water stored in metal containers should not be treated prior to storage with chlorine, since the chlorine compound is corrosive to most metals.



Storing water is also recommended since water supplies may be cut off or contaminated.

## Treatment for Stored Water

Water to be stored for long periods should be sanitized or disinfected. Be sure to use the best quality water possible for storage. Water from a system with a state division of health "approved" rating is recommended. Likewise, the containers should be clean.

**Heat Treatment:** One effective way to store water is in clean canning jars. Fill clean fruit jars with water, leaving 1 inch of headspace at the top of the jars. Prepare lids as for canning. Place unused, clean lids and screw band on jars and process the water in a boiling water bath as fruit is processed. Quart jars should be processed 20 minutes, 2 quart jars for 25 minutes.

**Chlorine Treatment:** Liquid chlorine bleach can be used to disinfect water for long-term storage. One gallon can be treated by the addition of 1/4 teaspoon of liquid chlorine bleach containing 4 to 6 percent sodium hypochlorite. (Most bleaches contain 5.25 percent.) This is equivalent to 16 drops of liquid chlorine bleach.

Closure of water containers should be secure. Stored water should be checked occasionally. If any changes, such as cloudiness or an odor, are noted, replace the water and treat as before.

## Emergency Disinfection of Water

Some emergency situations could occur where the only water available is contaminated by disease-causing organisms. In this case, the same procedures can be used as for treatment of stored water.

**Heat Treatment:** Boiling is the most preferred method. This heat treatment requires water to be boiled in a vigorous, rolling boil for 5 minutes. Taste may be improved by pouring the boiled water back and forth from one clean container to another several times to incorporate air.

**Chemical Treatment:** Chemical treatment is less desirable than heat treatment because the effectiveness is dependent on several variables, such as (1) the amount of organic matter in the water, (2) water temperature and (3) the length of time after the chemical is added until it is used.

**Chlorine Treatment:** Clear water can be treated with 1/4 teaspoon (16 drops) of liquid chlorine bleach per gallon. Mix the water and allow it to stand for 30 minutes before using. If water appears cloudy, chemical treatment is not recommended. A slight chlorine odor should be detectable in the water. If not, repeat the treatment and let stand an additional 15 minutes before using. Use fresh bleach.

**Water Purification Tablets:** Different types of tablets are available for water purification purposes. Be sure to follow the manufacturer's directions for treatment, and allow sufficient time for the chemical to work before using. Check the label for expiration date, since the tablets can become ineffective with time. Most tablets have a storage life of approximately two to five years unopened.

## Contamination by Radioactivity and Chemicals

No effective way for decontamination of water which contains radioactive or chemical fallout is available for home use. This decontamination should be supervised by local or state health officers.

Portions adapted from the Utah State University Extension.

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# A Quick Consumer Guide to Safe Food Handling

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Never had food poisoning?  
Actually, it's called foodborne illness.  
Perhaps you have, but thought you  
were sick with the flu. Some 33 million  
Americans will suffer from foodborne  
illness this year.

Why? Because at the right  
temperature, bacteria you can't see,  
smell or taste can make you sick.

It doesn't have to happen, though.  
Many cases could be avoided if people  
just handled food properly. So here's  
what to do...

## When You Go Shopping

**Buy cold food last,  
get it home fast.**



Shopping

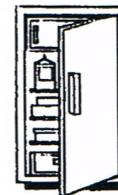
- When you're out, grocery shop last. Take food straight home to the refrigerator. **Never leave food in a hot car!**

- Don't buy anything you won't use before the use-by date.
- **Don't buy food in poor condition.** Make sure refrigerated food is cold to the touch. Frozen food should be rock-solid. Canned goods should be free of dents, cracks or bulging lids which can indicate a **serious** food poisoning threat.

## When You Store Food

**Keep it safe, refrigerate.**

Check the temperature of your refrigerator with an appliance thermometer. You can buy one of these at most stores that sell housewares. To keep bacteria in check, the refrigerator should run at 40°F, the freezer unit at 0°F. Keep your refrigerator as cold as possible without freezing your milk or lettuce.



Home Storage

- Freeze fresh meat, poultry or fish immediately if you can't use it within a few days.
- Put packages of raw meat, poultry or fish on a plate before refrigerating so their juices won't drip on other food. Raw juices often contain bacteria.

## When You Prepare Food

**Keep everything clean.  
Thaw in refrigerator.**

- Wash hands in hot soapy water before preparing food and after using the bathroom, changing diapers and handling pets.



Preparation

- Harmful bacteria multiply quickly in kitchen towels, sponges and cloths. Wash cloth items often in

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## Cold Storage

These SHORT but safe time limits will help keep refrigerated food from spoiling or becoming dangerous to eat. These time limits will keep frozen food at top quality.

Product	Refrigerator (40°F)	Freezer (0°F)
<b>Eggs</b> Fresh, in shell Raw yolks, whites Hardcooked Liquid pasteurized eggs or egg substitutes, opened unopened	3 weeks 2-4 days 1 week  3 days 10 days	Don't freeze 1 year Don't freeze well  Don't freeze 1 year
<b>Mayonnaise</b> , commercial Refrigerate after opening	2 months	Don't freeze
<b>TV Dinners, Frozen Casseroles</b> Keep frozen until ready to serve		3-4 months
<b>Deli and Vacuum-Packed Products</b> Store-prepared (or homemade) egg, chicken, tuna, ham, macaroni salads Pre-stuffed pork and lamb chops, chicken breasts stuffed with dressing Store-cooked convenience meals Commercial brand vacuum-packed dinners with USDA seal	3-5 days  1 day 1-2 days 2 weeks, unopened	These products don't freeze well
<b>Soups and Stews</b> Vegetable or meat-added	3-4 days	2-3 months
<b>Hamburger, Ground and Stew Meats</b> Hamburger and stew meats Ground turkey, veal, pork, lamb and mixtures of them	1-2 days  1-2 days	3-4 months  3-4 months
<b>Hotdogs and Lunch Meats</b> Hotdogs, opened package unopened package Lunch meats, opened unopened	1 week 2 weeks 3-5 days 2 weeks	In freezer wrap, 1-2 months
<b>Bacon and Sausage</b> Bacon Sausage, raw from pork, beef, turkey Smoked breakfast links, patties Hard sausage-pepperoni, jerky sticks	7 days 1-2 days 7 days 2-3 weeks	1 month 1-2 months 1-2 months 1-2 months
<b>Ham, Corned Beef</b> Corned beef in pouch with pickling juices Ham, canned, label says keep refrigerated Ham, fully cooked-whole Ham, fully cooked-half Ham, fully cooked-slices	5-7 days 6-9 months 7 days 3-5 days 3-4 days	Drained, wrapped, 1 month Don't freeze 1-2 months 1-2 months 1-2 months
<b>Fresh Meat</b> Steaks, beef Chops, pork Chops, lamb Roasts, beef Roasts, lamb Roasts, pork and veal Variety meats -Tongue, brain, kidneys, liver, heart, chitterlings	3-5 days 3-5 days 3-5 days 3-5 days 3-5 days 3-5 days 3-5 days 1-2 days	6-12 months 4-6 months 6-9 months 6-12 months 6-9 months 4-6 months 3-4 months
<b>Meat Leftovers</b> Cooked meat and meat dishes Gravy and meat broth	3-4 days 1-2 days	2-3 months 2-3 months
<b>Fresh Poultry</b> Chicken or turkey, whole Chicken or turkey pieces Giblets	1-2 days 1-2 days 1-2 days	1 year 9 months 3-4 months
<b>Cooked Poultry, Leftover</b> Fried chicken Cooked poultry dishes Pieces, plain Pieces, covered with broth, gravy Chicken nuggets, patties	3-4 days 3-4 days 3-4 days 1-2 days 1-2 days	4 months 4-6 months 4 months 6 months 1-3 months

the hot-cycle in your machine. Consider using paper towels to clean up meat and poultry juices. Avoid sponges or place them in the dishwasher daily to kill bacteria.

- Keep raw meat, poultry and fish and their juices away from other food. For instance, wash your hands, cutting board, knife and countertop in hot soapy water after cutting up the chicken and before slicing salad ingredients. Also use hot soapy water to wash sink and faucet handles the raw meat or your "meat-covered" hands have touched.
- Use plastic cutting boards rather than wooden ones. Wash cutting boards thoroughly after use.
- **What about antibacterial sanitizers in the kitchen?** Food handling experts feel hot soapy water used properly should protect you adequately against foodborne bacteria. However, kitchen sanitizers (including a mixture of bleach and water) can provide some added protection. NOTE: Sanitizer product directions must be followed carefully as products differ greatly.
- Thaw food in the microwave or refrigerator, NOT on the kitchen counter. Marinate in the refrigerator, too.

## When You're Cooking

### Cook thoroughly.

It takes thorough cooking to kill harmful bacteria, so you're taking chances when you eat meat, poultry, fish or eggs that are raw or only partly cooked. Plus, hamburger that is red in the middle, rare and medium-rare steak and roast beef are also undercooked from the safety standpoint.

- Cook red meat to 160°F. Cook poultry to 180°F. Use a meat thermometer to check that it's cooked all the way through.
- To check visually, red meat is done when it's brown or grey inside; poultry when juices run clear; fish when it flakes with a fork.
- Ground meat, where bacteria can spread throughout the meat during processing, should be cooked to at least 160°F. This means there is no pink left in the middle or in juices. You can allow large cuts like roasts to stay slightly pink in the center as long as they've reached at least 145°F (medium-rare). Do not serve any cut at this low temperature if you have scored (cut or poked with a fork) or tenderized it before cooking, thus forcing surface bacteria into the center.

- Salmonella, a bacteria that causes food poisoning, can grow inside fresh, unbroken eggs. So cook eggs until the yolk and white are firm, not runny. Scramble eggs to a firm texture. Don't use recipes in which eggs remain raw or only partially cooked.

Cooking Temperatures	
Product	Fahrenheit
<b>Eggs and Egg Dishes</b> Eggs Egg dishes	Cook until yolk and white are firm 160
<b>Ground Meat and Meat Mixtures</b> Turkey, chicken Veal, beef, lamb, pork	165 160
<b>Fresh Beef</b> Medium-Rare Medium Well Done	145 160 170
<b>Fresh Veal</b> Medium Well Done	160 170
<b>Fresh Lamb</b> Medium Well Done	160 170
<b>Fresh Pork</b> Medium Well Done	160 170
<b>Poultry</b> Chicken, whole Turkey, whole Poultry breasts, roasts Poultry thighs, wings Stuffing (cooked alone or in bird) Duck and Goose	180 180 170 Cook until juices run clear 165 180
<b>Ham</b> Fresh (raw) Pre-cooked (to reheat)	160 140

## When You're Microwaving

### Do it safely.

A great timesaver, the microwave has one food safety disadvantage. It sometimes leaves cold spots in food. Bacteria can survive in these spots. So . . .

- Cover food with a lid or plastic wrap so steam can aid thorough cooking. Vent wrap and make sure it doesn't touch the food.
- Stir and rotate your food for even cooking. No turntable? Rotate the dish by hand once or twice during cooking.

- Observe the standing time called for in a recipe or package directions. During the standing time, food finishes cooking.
- Use the oven temperature probe or a meat thermometer to check that food is done. Insert it at several spots.

## When You Serve Food

### Never leave it out over 2 hours.

- Use clean dishes and utensils to serve food, not those used in preparation. Serve grilled food on a clean plate too, not one that held raw meat, poultry or fish.



- **Never leave perishable food out of the refrigerator over 2 hours!** Bacteria that can cause food poisoning grow quickly at warm temperatures.
  - Pack lunches in insulated carriers with a cold pack. Caution children never to leave lunches in direct sun or on a warm radiator.
  - Carry picnic food in a cooler with a cold pack. When possible, put the cooler in the shade. Keep the lid on as much as you can.
  - Party time? Keep cold party food on ice or serve it throughout the gathering from platters from the refrigerator.
- Likewise, divide hot party food into smaller serving platters. Keep platters refrigerated until time to warm them up for serving.

## When You Handle Leftovers

### Use small containers for quick cooling.

- Divide large amounts of leftovers into small, shallow containers for quick cooling in the refrigerator. Don't pack the refrigerator – cool air must circulate to keep food safe.
- With poultry or other stuffed meats, remove stuffing and refrigerate it in separate containers.

## Reheating

- Bring sauces, soups and gravy to a boil. Heat other leftovers thoroughly to 165°F.
- Microwave leftovers using a lid or vented plastic wrap for thorough heating.

## When in Doubt, Throw It Out

Sometimes foods get forgotten in the refrigerator and may be kept too long.

- **Danger – never taste food that looks or smells strange** to see if you can still use. Just discard it.

- Is it **moldy**? The mold you see is only the tip of the iceberg. The poisons molds can form are found **under** the surface of the food. So, while you can sometimes save hard cheese and salami and firm fruits and vegetables by cutting the mold out – remove a large area around it – most moldy food should be discarded.



### Power's Out

#### Your Freezer

Without power, a full upright or chest freezer will keep everything frozen for about two days. A half-full freezer will keep food frozen one day.

If power will be coming back on fairly soon, you can make the food last longer by keeping the door shut as much as possible.

If power will be off for an extended period, take food to friends' freezers, locate a commercial freezer or use dry ice.

#### Your Refrigerator-Freezer Combination

Without power, the refrigerator section will keep food cool four to six hours depending on the kitchen temperature.

A full, well-functioning freezer unit should keep food frozen for two days. A half-full freezer unit should keep things frozen about one day.

Block ice can keep food on the refrigerator shelves cooler. Dry ice can be added to the freezer unit. You can't touch dry ice and you shouldn't breathe the fumes, so follow handling directions carefully.

#### Thawed Food?

Food still containing ice crystals or that **feels** refrigerator-cold can be refrozen.

Discard any thawed food that has risen to room temperature and remained there two hours or more. Immediately discard anything with a strange color or odor.

### Is It Food Poisoning?

If you or a family member develop nausea, vomiting, diarrhea, fever or cramps, you could have food poisoning. Unfortunately, it's not always easy to tell since, depending on the illness, symptoms can appear anywhere from 30 minutes to 2 weeks after eating bad food. Most often, though, people get sick within 4 to 48 hours after eating.

In more serious cases, food poisoning victims may have nervous system problems like paralysis, double vision or trouble swallowing or breathing.

If symptoms are severe or the victim is very young, old, pregnant or already ill, call a doctor or go to the hospital right away.

#### When to Report Foodborne Illness

You or your physician should report serious cases of foodborne illness to the local health department.

Report any food poisoning incidents if the food involved came from a restaurant or commercial outlet.

Give a detailed, but short, account of the incident. If the food is a commercial product, have it in hand so you can describe it over the phone.

If you're asked to keep the food refrigerated so officials can examine it later, follow directions carefully.

Originally adapted from USDA Home and Garden Bulletin No. 248, October 1995, by Dr. Pamela L. Brady, former Extension foods specialist.

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## Keeping Food Safe During an Emergency

Did you know that a flood, fire, national disaster or the loss of power from high winds, snow or ice could jeopardize the safety of your food? Knowing how to determine if food is safe and how to keep food safe will help minimize the potential loss of food and reduce the risk of food-borne illness. This information will help you make the right decisions for keeping your family safe during an emergency.

### ABC's of Keeping Food Safe in an Emergency

Always keep meat, poultry, fish and eggs refrigerated at or below 40°F and frozen food at or below 0°F. This may be difficult when the power is out.

Keep the refrigerator and freezer doors closed as much as possible to maintain the cold temperature. The refrigerator will keep food safely cold for about 4 hours if it is unopened. A full freezer will hold the temperature for approximately 48 hours (24 hours if it is half full) if the door remains closed. Obtain dry or block ice to keep your refrigerator as cold as possible if the power is going to be out for a prolonged period of time. Fifty pounds of dry ice should hold a full 18-cubic-foot freezer for 2 days. Plan ahead and know where dry ice and block ice can be purchased.

Be prepared for an emergency by having items on hand that don't require refrigeration and can be eaten cold or heated on the outdoor grill. Shelf-stable food, boxed or canned milk, water and canned goods should be part of a planned emergency food supply. Make sure you have ready-to-use baby formula for infants and pet food. Remember to use these items and replace them from time to time. Be sure to keep a hand-held can opener (not electric) for an emergency.

Consider what you can do ahead of time to store your food safely in an emergency. If you live in a location that could be affected by a flood, plan your food storage on shelves that will be safely out of the way of contaminated water. Coolers are a great help for keeping food cold if the power will be out for more than 4 hours. Have a couple on hand along with frozen gel packs. When your freezer is not full, keep items close together – this helps the food stay cold longer.

Digital, dial or instant-read food thermometers and appliance thermometers will help you know if the food is at safe temperatures. Keep appliance

thermometers in the refrigerator and freezer at all times. When the power is out, an appliance thermometer will always indicate the temperature in the refrigerator and freezer no matter how long the power has been out. The refrigerator temperature should be 40°F or below; the freezer, 0°F or lower. If you're not sure a particular food is cold enough, take its temperature with a food thermometer.

### Frequently Asked Questions

- Q. Flood waters covered our food stored on shelves and in cabinets. What can I keep and what should I throw out? How should I clean my dishes and pots and pans?**
- A. Discard all food that came in contact with flood waters including canned goods. It is impossible to know if containers were damaged and the seal compromised. Discard wooden cutting boards, plastic utensils, baby bottle nipples and pacifiers. There is no way to safely clean them if they have come in contact with contaminated flood water. Thoroughly wash metal pans, ceramic dishes and utensils with hot soapy water and sanitize by boiling them in clean water or by immersing them for 15 minutes in a solution of 1 teaspoon chlorine bleach per quart of water.
- Q. My home was flooded and I am worried about the safety of the drinking water. What should I do?**
- A. Drink only approved or chlorinated water. Consider all water from wells, cisterns and other delivery systems in the disaster area unsafe until tested. Purchase bottled water, if necessary, until you are certain that your water supply is safe. Keep a 3-day supply of water or a minimum of 3 gallons of water per person.
- Q. We had a fire in our home, and I am worried about what food I can keep and what to throw away.**
- A. Discard food that has been near a fire. Food exposed to fire can be damaged by heat from the fire or smoke fumes or the chemicals used to fight the fire. Food in cans or jars may appear to be okay, but the heat from a fire can activate food spoilage bacteria. If the heat is extreme, the cans or jars themselves can split or rupture, rendering the food unsafe.
- One of the most dangerous elements of a fire is sometimes not the fire itself, but toxic fumes

released from burning materials. Discard any raw food or food in permeable packaging – cardboard, plastic wrap, screw-topped jars, bottles, etc. – stored outside the refrigerator. Food stored in refrigerators or freezers can also become contaminated by fumes. The refrigerator seal isn't airtight and fumes can get inside.

Chemicals used to fight the fire contain toxic materials and can contaminate food and cookware. Food that is exposed to chemicals should be thrown away. The chemicals cannot be washed off the food. This includes food stored at room temperature, such as fruits and vegetables, as well as food stored in permeable containers like cardboard and screw-topped jars and bottles. Cookware exposed to fire-fighting chemicals can be decontaminated by washing in soap and hot water. Then submerge for 15 minutes in a solution of 1 teaspoon chlorine bleach per quart of water.

**Q. A snowstorm knocked down the power lines. Can I put the food from the refrigerator and freezer out in the snow?**

A. No, frozen food can thaw if it is exposed to the sun's rays even when the temperature is very cold. Refrigerated food may become too warm and food-borne bacteria could grow. The outside temperature could vary hour by hour, and the temperature outside will not protect refrigerated and frozen food. Additionally, perishable items could be exposed to unsanitary conditions or to animals. Animals may harbor bacteria or disease; never consume food that has come in contact with an animal. Rather than putting the food outside, consider taking advantage of the cold temperatures by making ice. Fill buckets, empty

milk cartons or cans with water and leave them outside to freeze. Then put the homemade ice in your refrigerator, freezer or coolers.

**Q. Some of my food in the freezer started to thaw or had thawed when the power came back on. Is the food safe? How long will the food in the refrigerator be safe with the power off?**

A. Never taste food to determine its safety! You will have to evaluate each item separately. If an appliance thermometer was kept in the freezer, read the temperature when the power comes back on. If the appliance thermometer stored in the freezer reads 40°F or below, the food is safe and may be refrozen. If a thermometer has not been kept in the freezer, check each package of food to determine the safety. Remember you can't rely on appearance or odor. If the food still contains ice crystals or is 40°F or below, it is safe to refreeze. Refrigerated food should be safe as long as power is out no more than 4 hours. Keep the door closed as much as possible. Discard any perishable food (such as meat, poultry, fish, eggs and leftovers) that has had temperatures above 40°F for 2 hours.

**Q. May I refreeze the food in the freezer if it thawed or partially thawed?**

A. Yes, the food may be safely refrozen if the food still contains ice crystals or is at 40°F or below. You will have to evaluate each item separately. Be sure to discard any items in either the freezer or the refrigerator that have come into contact with raw meat juices. Partial thawing and refreezing may reduce the quality of some food, but the food will remain safe to eat. See the attached charts for specific recommendations.

## Refrigerator Foods: When to Save and When to Throw Out

FOOD	Held above 40°F for over 2 hours
<b>MEAT, POULTRY, SEAFOOD</b>	
Raw or leftover cooked meat, poultry, fish or seafood; soy meat substitutes	Discard
Meat, tuna, shrimp, chicken or egg salad	Discard
Gravy, stuffing, broth	Discard
Lunchmeats, hot dogs, bacon, sausage, dried beef	Discard
Pizza – with any topping	Discard
Canned hams labeled "Keep Refrigerated"	Discard
Canned meats and fish, opened	Discard
<b>CHEESE</b>	
Soft cheeses: Blue/bleu, Roquefort, Brie, Camembert, cottage, cream, Edam, Monterey Jack, ricotta, mozzarella, Muenster, Neufchatel, Queso blanco fresco	Discard
Hard cheeses: Cheddar, Colby, Swiss, Parmesan, Provolone, Romano	Safe
Processed cheeses	Safe
Shredded cheeses	Discard
Low-fat cheese	Discard
Grated Parmesan, Romano or combination (in can or jar)	Safe

## Refrigerator Foods: When to Save and When to Throw Out (CONT.)

FOOD	Held above 40°F for over 2 hours
<b>DAIRY</b>	
Milk, cream, sour cream, buttermilk, evaporated milk, yogurt, eggnog, soy milk	Discard
Butter, margarine	Safe
Baby formula, opened	Discard
<b>EGGS</b>	
Fresh eggs, hard-cooked in shell, egg dishes, egg products	Discard
Custards and puddings	Discard
<b>CASSEROLES, SOUPS, STEWS</b>	
Discard	
<b>FRUITS</b>	
Fresh fruits, cut	Discard
Fruit juices, opened	Safe
Canned fruit, opened	Safe
Fresh fruits, coconut, raisins, dried fruits, candied fruits, dates	Safe
<b>SAUCES, SPREAD, JAMS</b>	
Opened mayonnaise, tartar sauce, horseradish	Discard if above 50°F for over 8 hours
Peanut butter	Safe
Jelly, relish, taco sauce, mustard, catsup, olives, pickles	Safe
Worcestershire, soy, barbecue sauces, hoisin sauce	Safe
Fish sauces (oyster sauce)	Discard
Opened vinegar-based dressings	Safe
Opened creamy-based dressings	Discard
Spaghetti sauce, opened jar	Discard
<b>BREAD, CAKES, COOKIES, PASTA, GRAINS</b>	
Bread, rolls, cakes, muffins, quick breads, tortillas	Safe
Refrigerator biscuits, rolls, cookie dough	Discard
Cooked pasta, rice, potatoes	Discard
Pasta salads with mayonnaise or vinaigrette	Discard
Fresh pasta	Discard
Cheesecake	Discard
Breakfast foods – waffles, pancakes, bagels	Safe
<b>PIES, PASTRY</b>	
Pastries, cream filled	Discard
Pies, custard, cheese filled or chiffon; quiche	Discard
Pies, fruit	Safe
<b>VEGETABLES</b>	
Fresh mushrooms, herbs, spices	Safe
Greens, pre-cut, pre-washed, packaged	Discard
Vegetables, raw	Safe
Vegetables, cooked; tofu	Discard
Vegetable juice, opened	Discard
Baked potatoes	Discard
Commercial garlic in oil	Discard
Potato salad	Discard

## Frozen Foods: When to Save and When to Throw Out

FOOD	Still contains ice crystals and feels as cold as if refrigerated	Thawed. Held above 40°F for over 2 hours
<b>MEAT, POULTRY, SEAFOOD</b>		
Beef, veal, lamb, pork and ground meat	Refreeze	Discard
Poultry and ground poultry	Refreeze	Discard
Variety meats (liver, kidney, heart, chitterlings)	Refreeze	Discard
Casseroles, stews, soups	Refreeze	Discard
Fish, shellfish, breaded seafood products	Refreeze. However, there will be some texture and flavor loss.	Discard
<b>DAIRY</b>		
Milk	Refreeze. May lose some texture.	Discard
Eggs (out of shell) and egg products	Refreeze	Discard
Ice cream, frozen yogurt	Discard	Discard
Cheese (soft and semi-soft)	Refreeze	Refreeze
Hard cheeses	Refreeze	Refreeze
Shredded cheeses	Refreeze	Discard
Casseroles, containing milk, cream, eggs, soft cheeses	Refreeze	Discard
Cheesecake	Refreeze	Discard
<b>FRUITS</b>		
Juices	Refreeze	Refreeze. Discard if mold, yeasty smell or sliminess develops.
Home or commercially packaged	Refreeze. Will change texture and flavor.	Refreeze. Discard if mold, yeasty smell or sliminess develops.
<b>VEGETABLES</b>		
Juices	Refreeze	Discard after held about 40°F for 6 hours.
Home or commercially packaged or blanched	Refreeze. May suffer texture and flavor loss.	Discard after held about 40°F for 6 hours.
<b>BREADS, PASTRIES</b>		
Breads, rolls, muffins, cakes (without custard fillings)	Refreeze	Refreeze
Cakes, pies, pastries with custard or cheese filling	Refreeze	Discard
Pie crusts, commercial and homemade bread dough	Refreeze. Some quality loss can occur.	Refreeze. Quality loss is considerable.
<b>OTHER</b>		
Casseroles – pasta, rice based	Refreeze	Discard
Flour, cornmeal, nuts	Refreeze	Refreeze
Breakfast items – waffles, pancakes, bagels	Refreeze	Refreeze
Frozen meal, entrée, specialty items (pizza, sausage and biscuit, meat pie, convenience foods)	Refreeze	Discard

Adapted for use from United States Department of Agriculture Food Safety and Inspection Services by Dr. Russ Kennedy, Associate Professor - Health and Aging Specialist, University of Arkansas Division of Agriculture Cooperative Extension Service.

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## Seven Food Safety Steps for Successful Community Meals

Whether preparing food for a disaster work crew, community gathering or family reunion, people who are great cooks at home don't necessarily know how to safely prepare and store large quantities of food for large groups. Food that is mishandled can cause food-borne illness. However, by following some simple steps, volunteer cooks can make the event safe and successful!

For more food safety information, call the toll-free USDA Meat and Poultry Hotline at **1-800-535-4555**; TTY: 1-800-256-7072; [www.fsis.usda.gov](http://www.fsis.usda.gov).

For a copy of *Cooking for Groups: A Volunteer's Guide to Food Safety*, write: FCIC, Item #604H, Pueblo, CO 81009.

### 1. Plan Ahead – Make sure the location meets your needs.

- Be sure you have enough oven, stovetop, refrigerator, freezer and work space.
- Find out if there's a source of clean water. If not, bring water for preparation and cleaning.

### 2. Store and Prepare Food Safely

- Refrigerate or freeze perishable food within 2 hours of shopping or preparing.
- Separate preparation areas for raw and cooked food.
- Never place cooked food back on the same plate or cutting board that held raw food.
- Wash hands, cutting boards, dishes, utensils and work surfaces frequently with hot, soapy water.

### 3. Cook Food to Safe Internal Temperatures – It's the only way to tell if harmful bacteria are destroyed!

- Use a food thermometer to check the internal temperature of meat, poultry, casseroles and other food. Check temperature in several places to be sure food is safely cooked.
- Never partially cook food for finishing later because you increase the risk of bacterial growth.

### 4. Transport Food Safely – Keep hot food HOT. Keep cold food COLD.

- Keep cold food at or below 40°F. Place in a cooler with a cold source such as ice or commercial freezing gels.
- Keep hot food at or above 140°F. Wrap well and place in an insulated container.

### 5. Need to Reheat? – Food must be hot and steamy for serving. Just “warmed up” is not good enough.

- Use the stove, oven or microwave to reheat food to 165°F. Bring sauces, soups and gravies to a boil.

### 6. Keep Food Out of the “Danger Zone” (40°–140°F).

- Keep hot food hot – at or above 140°F. Place cooked food in chafing dishes, preheated steam tables, warming trays and/or slow cookers.
- Keep cold food cold – at or below 40°F. Place food in containers on ice.

### 7. When In Doubt, Throw it Out!

- Discard food left out at room temperature for more than 2 hours.
- Place leftovers in shallow containers. Refrigerate or freeze immediately.

#### Fight BAC!

- When preparing for your special event, remember you have the power to Fight BAC and keep your food safe.

#### Clean

- Wash hands and surfaces often.

#### Separate

- Don't cross-contaminate.

#### Cook

- Cook to proper temperatures.

#### Chill

- Refrigerate promptly

## Internal Cooking Temperatures

Product	°F
<b>Egg and Egg Dishes</b>	
Eggs . . . . . Cook until yolk and white are firm.	
Egg casseroles . . . . .	160
Egg sauces, custard . . . . .	160
<b>Ground Meat and Meat Mixtures</b>	
Turkey, chicken . . . . .	165
Beef, veal, lamb, pork . . . . .	160
<b>Fresh Beef, Veal, Lamb</b>	
Medium rare . . . . .	145
Medium . . . . .	160
Well done . . . . .	170
<b>Fresh Pork</b>	
Medium . . . . .	160
Well done . . . . .	170
<b>Ham</b>	
Fresh (raw) . . . . .	160
Fully cooked (to reheat) . . . . .	140
<b>Roast Beef</b>	
Cooked commercially, vacuum sealed and ready-to-eat . . . . .	140
<b>Poultry</b>	
Chicken, turkey – whole . . . . .	180
Chicken, turkey – dark meat . . . . .	180
Poultry – breast . . . . .	170
Duck and goose . . . . .	180

Product	°F
<b>Stuffing</b>	
Cooked alone or in bird . . . . .	165
<b>Sauces, Soups, Gravies, Marinades</b>	
Used with raw meat, poultry or fish . . . . .	Bring to a boil.
<b>Seafood</b>	
Fin Fish . . . . .	Cook until opaque and flakes easily with a fork.
Shrimp, lobster, crab . . . . .	Should turn red and flesh should become pearly opaque.
Scallops . . . . .	Should turn milky white or opaque and firm.
Clams, mussels, oysters . . . . .	Cook until shells open.
<b>Leftovers</b> . . . . .	165

**NOTE:**

These temperatures are recommended for consumer cooking. They are not intended for processing institutional or food service preparation. Food Service Professionals should consult their state or local food code or health department.

Adapted for use from United States Department of Agriculture Food Safety and Inspection Services by Dr. Russ Kennedy, Associate Professor - Health and Aging Specialist, University of Arkansas Division of Agriculture Cooperative Extension Service.

Dr. Russ Kennedy, Associate Professor - Health and Aging Specialist

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Local Disasters

## **Local Disasters**

Special Note to County Agents



## Special Note to County Agents

County agents may wish to enter appropriate information under the “Local Disasters” tab.

- County agents may elect to enter information from the local Office of Emergency Management.
- Counties or areas of the state may be at risk for nuclear, railroad or other disasters that make it wise to “tailor” their Disaster Response Handbook to address these local concerns.
- Local fire departments or large companies in your county may have emergency or disaster protocols that include portions of the community.

Safety

## Safety

Disaster Rescue Procedures

Standby Power Generators

Using Standby Generators

Using ATVs Safely During a Disaster

Chain Saw Safety (FSA1009)

Agricultural Aviation Security (FSA1038)

Tree Removal Following a Storm

Disaster Response for Volunteers

Electrical Safety During a Flood or Ice Storm

What to Do During a Power Failure on the Farm

Basic First Aid

Emergency CPR

OSHA's Tips for Keeping Workers Safe in the Cold

## Disaster Rescue Procedures

1. Obtain first aid or medical care for anyone injured in the disaster. Notify your relatives of your safety. This may free local authorities from trying to locate you should you not send word. Use telephones only for essential emergency calls to allow others to obtain rescue or treatment.
2. Be on the alert for gas line leaks. Don't bring lanterns, torches, lighted cigarettes or open flames into damaged buildings. If there is any odor, shut off the gas supply immediately and contact your gas supplier as soon as possible. Open all windows and doors. Leave the building immediately. Don't reenter the building until professionals check and inform you that there is no longer a danger that gas may cause an explosion.
3. Fires can burst into flames or smolder for hours. Fire hazards, especially flammable products such as gasoline, may be spilled and some time later the vapors may reach a flammable concentration. If there is an ignition source for the flammable vapor, a home may burn up in minutes. If you can eliminate possible fire hazards without endangering yourself, do it safely.
4. Assist others needing emergency evacuation and medical care, to the degree you have the professional training. Contact the local emergency medical technicians for advice, allowing them to "talk you through" first aid procedures to provide the best care for those injured by the storm. If possible, call the emergency room at the local hospital to alert the medical staff about the injuries that need treatment. Consider neighbors, especially those who are elderly or disabled.
5. Do not enter any building damaged by a fire, flood or storm until it has been properly "shored" or deemed stable from further collapse. Wet plaster is dangerous. Ceilings and walls may not be secure and may collapse without much contact or force. Downed wires should be avoided and treated as if they are energized. Wait for an electrician or the power company to disconnect power to the damaged property. Allow qualified electricians to remove electrical hazards before attempting to reenter damaged property.
6. Evacuate if advised by the local authorities. Find alternate housing and be cautious about contaminated water and food until the disaster has passed and electricity has been restored to cool fresh food supplies.

## Standby Power Generators

Storms, flooding or wildfires may interrupt electrical power for just a few minutes or for hours or even for days. A standby power generator can be important to keep critical equipment operating or to provide heat and light during power outages. But several key factors need to be considered when buying, connecting and using standby generators.

The generator must be capable of supplying adequate power at the correct voltage. Generators are rated in kilowatts or KW. One kilowatt equals 1,000 watts. If the nameplate lists two kilowatt ratings, the larger number is the “short-time overload capacity.” The smaller number is the “continuous-output rating.”

An adequately-sized generator is critical to avoid electric motor overheating or “burnout.” Electric motors require three to five times more power (starting amperage shown on the nameplate) to start compared to full load or continuous operation. Add all of the ampere ratings or amp loads of the electric circuits that you plan to operate with a standby generator. The ampere rating of equipment to be powered can be converted to watts by multiplying its voltage by its amperage.

Whether a generator is an automatic- or manual-start generator determines how you should select your kilowatt rating or generator size. To size automatic-start units, add the wattage of all motors connected to the generator and multiply this number by 3.5. Then add the wattage of all other connected electrical loads. To size manual-start units, you need to know the starting wattage of your largest motor, then add this to the other total full load electric motor wattage demands and add any wattage requirements for lighting on the connected circuits to get the required generator size.

For example, a 5-horsepower, 5,000-watt running-load motor has a starting wattage of 17,500 watts, so an 18 KW generator is needed to start the motor. If there are 2,000 watts of additional

continuously-connected load, select a generator rated for at least a “short-time overload capacity” of 19.5 KW. For PTO-driven units, the tractor should have a horsepower rating at least twice the kilowatt capacity of the generator. An 18 KW generator requires at least a 36-horsepower tractor to maintain power for the generator under continuous load.

Portable generators with 4- to 5-kilowatt ratings are the minimum size needed for a typical three-bedroom home, and prices can range from \$500 to several thousand dollars. More expensive units run quieter, are more durable and have larger fuel tanks.

An extension cord may connect light electrical loads directly to a small generator receptacle. Otherwise notify your local electric utility company if you plan to use a standby generator in case of power failure.

Don't put yourself, your family or electric utility workers at risk. Have a double-pole, double-throw transfer switch properly installed by a licensed electrician. This switch disconnects the power utility lines from the standby generator and prevents the electricity you generate from energizing utility lines. The connection from your generator must be open to your transformer or otherwise “hot” utility lines can electrocute a utility repairman or a person who casually comes into contact with downed power lines. The switch must have the capacity to carry the total load of the house, farm or electrical distribution, even though the generator typically has less electrical capacity.

Follow instructions provided with your electric generator for proper grounding. Many electrocutions have been caused by failure to ground electrical circuits (properly) or working around “hot” circuits. Obtain a licensed electrician to assure that your electrical circuits are safe and that your standby generator is prepared to supply current when an emergency arises. Your electric power supplier may also be helpful if you have questions.

The engine exhaust should discharge away from confined areas; it shouldn't drift back into a window or garage. Keep children away from a portable generator to avoid an electrocution or a bad burn from the engine manifold.

Always store engine fuel in UL-approved containers; never inside your home or in your garage. Service the standby generator according to the guidelines given in your operator's manual in order to have it ready when electricity from your utility fails.

## Using Standby Generators

Extended power outages can disrupt activities that are typically essential for proper operation of homes, businesses and farms. During an ice storm or a tornado when power is disrupted, we experience how vital electricity is. Even brief outages are often costly, high risks for livestock operations such as dairy, poultry and other confined animals.

### Generator Selection

When selecting a generator don't focus only on the price per kilowatt of generator capacity. When selecting the size of generator to purchase, add the essential electric loads to determine the kilowatt capacity. Whether the generator is manual, semi-automatic or automatic influences the correct load rating and the cost. To reduce cost, size the generator to power only essential electric loads.

### Types of Generators

**Engine-driven generators** – Both the generator and the engine powering the generator are often sold together as a single package or “genset.” It can be an automatic-start standby generator or a manual start (pull cord) design. They are sized according to a KW (power) rating. Engine-driven generators range from large permanently mounted diesel units that are used for standby systems to small portable gasoline engine generators just large enough to power vital appliances.

**Tractor-driven generators** – These generators are powered from an agricultural tractor's power-take-off (PTO) shaft. These models have a lower initial cost and are expected to require less maintenance because an engine is eliminated. Tractor-powered generators are often mounted on a trailer; they may routinely be towed to different locations to power welders or other equipment in areas remote from electrical power or a transformer and a permanent service entrance (service drop).

### Connections

An electrician should make all connections to a home electrical circuit. Power from the transformer energizes the service entrance. A licensed electrician

or utility repairman should disconnect power so that the terminals aren't “hot.”

Temporary generator connections may be direct to the equipment through extension cords, may use a double throw switch or may connect through the utility electric meter base on the outside of the house to, potentially, feed all house circuits.

To connect through the electric meter, pull the electric meter, plug the cable equipped with a male connector into the posts on the house side of the meter housing. Again, the power supply side of the meter connections may be “hot” and is a potential source of electrocution.

- Always pull the meter or switch the double throw switch to the “off” position, before connecting the generator to any service. The meter should remain pulled and the switch disconnecting the power supply must remain “OFF” until after the generator male connection is plugged in.
- If a generator feeds both sides (240 v.) of an electrical breaker box, care should be taken to balance the load between the two bars in the breaker box.
- All breakers should be opened, i.e., left in the OFF position except the essential circuit.
- The ground wire should be connected carefully, according to the operator's manual, to avoid a potentially serious electrical shock while operating the generator.
- Turn electrical loads on in the proper sequence. Start with the largest electric motor, then a smaller motor and connect lighting last. Motors require from three to five times as much current to startup compared to their typical full running load.
- All connections exposed to the weather, should be covered with a durable, nonconductive, water-proof barrier. Apply electrical tape, plastic sheeting, etc., carefully so that the layers shed rather than trap water.

## Safety Practices

- Always pull the meter or disconnect the power supply by correctly setting the double throw switch before connecting the generator to any service. The meter should remain “pulled” or the double throw switch disconnected from the power supply line until the generator is no longer in use.
- Never run a generator in an enclosed area.
- Keep all guards and shields in place to protect the operator from moving parts.
- Always check for downed power lines or damaged circuits before connecting a generator.
- Use extreme caution, especially under wet conditions.
- Turn off the tractor engine before attaching or detaching PTO driven units.
- On PTO driven units, always set the tractor brake before starting the generator.
- Never refill (fuel) a generator engine that is hot or running. Never shut off the generator under load.
- Never store gasoline indoors or near the generator where gas vapors could be ignited by a spark from the generator.

## Terminology

**Amperage (amps)** – A number (on the nameplate) indicating the load or flow of electrical current.

**Automatic-start standby generator** – A generator that starts automatically when the electric utility line voltage drops to about 70 percent of normal. Generator cycles on and off without any operator assistance.

**Battery-crank starters** – Option available for engines on larger generators.

**Gensets** – Shortened terminology for a complete generator and engine that are inseparable, i.e., sold together.

**Double throw switch** – Power supply switch that the operator can place or “throw” into two different positions. One position feeds power from the electric utility system to the load. The other position feeds power from the standby generator to the load; in this position the electric utility supply is disconnected from the generator, preventing an electrical shock from a downed power line.

**Kilovolt-amperes (kVA)** – Denotes the power needed for inductive loads, such as motors, fluorescent lighting and other electrical devices using transformers.

**Kilowatts (KW)** – Electrical power term that specifies the generator size; the most common standby generator rating. Sizing generators by the KW load provides adequate power capacity.

**Load** – The electricity used. It is the electricity generated.

**Overload rating** – The ability of a generator to handle short, intermittent periods of overload. This is particularly important during initial start-up.

**Standby generator** – A generator and starting control system designed to provide power during electric utility supply outages.

**Transfer switch** – Double throw switch that selects which power source energizes the connected load. The transfer switch rating must be sized to accommodate the largest amperage (typically, the electric utility feed).

**Voltage** – The potential that “forces” electricity to flow or power a load; for example, 120 or 240 v.

## Using ATVs Safely During a Disaster

If trees are down on roads or roads are flooded, all terrain vehicles (ATVs) may assist in a rescue or provide transportation. If ATVs are used recklessly, they become hazardous. Some precautions to remember when adrenaline may be high during a disaster are:

- The terrain may not be what you expect after a disaster. Always use caution and use a moderate speed because ATVs may become airborne and overturn onto a victim.
- ATV momentum resists turning when you wish to avoid an obstacle. Loose gravel has caused some ATVs to slip and the victims have collided with trees.
- Helmets protect you from some head injuries and save lives.
- ATVs aren't designed for passengers. In a Consumer Product Safety injury survey, 31 percent of the injuries were to multiple riders.
- You cannot exercise too much care for a safe path. Barbed wires, single wire strands and gates are hard to see, especially at dusk or after dark. Head injuries are common from these barriers.
- Don't overload or put an unbalanced load on the ATV; on rough terrain the ATV is prone to overturn.
- Many accidents occur when one ATV follows another ATV too closely and rides "up" the rear wheels of the lead ATV. Overturns, especially at high speeds, may be fatal.
- An inexperienced rider should be trained properly and not allowed on an ATV during disaster emergencies.
- Misusing an ATV may put another in harm's way as well as yourself. Don't risk an injury or death, but consider operating an ATV as a privilege.

Following too closely, excessive speed and extra riders have caused dozens of deaths in Arkansas during the last few years. Injuries on ATVs are much too common. Remember that the Arkansas Code states, "It shall be unlawful for any person to operate an all-terrain vehicle upon public streets and highways of this state." There are situations where ATV road use is permitted, but an ATV collision with another vehicle is often fatal to the ATV operator. Operate your ATV wisely.

# Chain Saw Safety

Gary Huitink  
 Extension Engineer

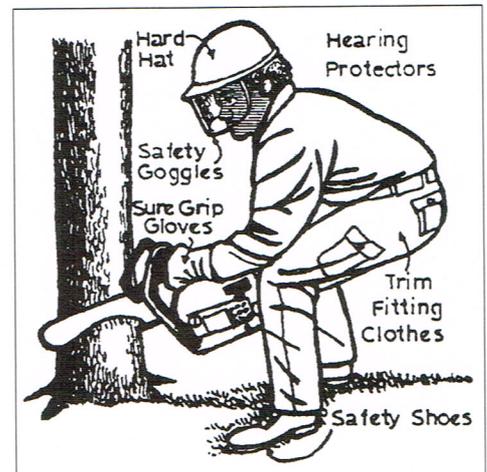
A skilled woodsman quickly reduces a large tree to manageable pieces. Inexperienced chain saw operators can gain some of these skills with training and using safe, efficient cutting practices. Even seasoned woodcutters should revise techniques that are hazardous. One analysis of chain saw accidents revealed that 70 percent of those injured had more than one year's experience. To avoid injuries, possibly even death, practice safe woodcutting while clearing, thinning, cutting firewood or cleaning up trees downed by a storm.

You should be well prepared before going into the woods. Cutting firewood, thinning timber stands or clearing is worthwhile and rewarding if done properly, but they can also be dangerous. Felling, limbing, bucking and trimming trees are hazardous tasks if not done carefully. This fact sheet gives basic safety precautions for reducing common woodcutting hazards. Each year a number of serious injuries to Arkansans could be prevented by following fairly simple precautions.

## Preparing to Use the Saw

You should be well-prepared before using a chain saw. Know how to operate the saw before you use it. Read and understand the operator's manual. Observe an experienced operator in action. Then use a saw for a period of time with supervision. Obtain the following personal protective equipment before starting to work and wear all protection while sawing.

- ▶ A **hard hat** to protect your head from falling limbs or branches. The best helmets have a face guard.
- ▶ **Safety glasses or goggles** to prevent injury from flying wood chips. Wear these during wood splitting also, to preserve your eyesight.
- ▶ **Ear muffs or ear plugs** to protect ears from permanent injury. Noise from some gasoline-powered chain saws can exceed 100 decibels.



- ▶ Lightweight **gloves**, preferably leather, to protect hands from abrasions and cuts.
- ▶ Heavy **work boots** or shoes with high tops and steel toes.
- ▶ **Trim-fitting clothing** free of ragged edges. Loose clothing will readily snag on limbs or get caught in the saw. Woodcutter's chaps are recommended to give leg protection during a mishap.

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Make sure that your saw is in top operating condition. Keep the chain properly sharpened. Maintain proper chain tension; carefully observe it, especially during the first half hour of cutting. The lower chain span should just touch the bottom bar rails. Raise up on the bar tip while tightening the bar fasteners. Follow manufacturer's recommendations for service and maintenance.

## Fueling the Saw

Good fire safety practices are necessary when refueling the chain saw. Refuel the saw in an open area after it has cooled, at least 10 feet away from where you wish to restart the saw and resume cutting. Fuel the saw at least 20 feet away from fires and lighted cigarettes. Use proper funnels and spouts to prevent spills. Wipe the saw dry of any spilled fuel before cranking it.



## Starting the Saw

Place the saw on a clear, firm, flat surface as close to the work area as possible. Get a good footing. Follow the owner's manual recommendations for starting the chain saw. Place your foot in the handle to restrain the saw if designed with this intention. **Never start the saw on your knee;** too many experienced woodsmen have slipped and cut their legs.

## Felling the Tree

Plan a safe approach to cutting the tree. Size up the tree. Note the wind direction and the way the tree is leaning. If the tree is leaning, try to fell the tree in that direction when the wind is not blowing against it. If you are inexperienced, try to fell only trees that will fall in a predictable, safe direction. Examine trees for loose, dead limbs before felling. Loose limbs that fall onto the tree cutter are a common cause of serious injuries and fatalities. Either remove the limb first or fell the tree from a position where the limb could not strike you if it was dislodged.

Clear a safe work area around the base of the tree. Remove limbs, underbrush and other obstructions. Be sure to have several open pathways away from the tree for an escape route when the trees begin to fall.

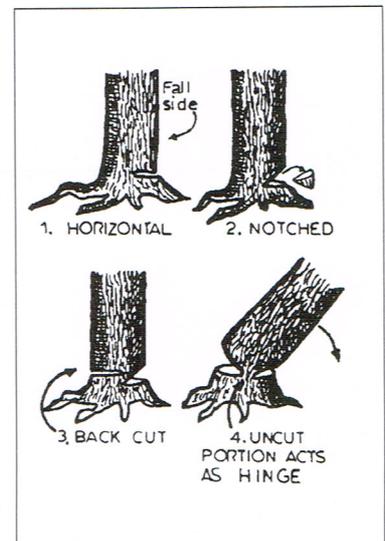
Be sure that clearance in the intended direction is adequate for the tree to fall completely to the ground. A lodged tree is very dangerous. Experienced loggers are often killed by trees that hang up or snag in adjacent trees. A tree springing back from the weight of a falling tree can whip a broken limb toward the cutter with tremendous speed.



After determining the direction of fall and clearing escape routes, cut the tree as follows:

- ▶ Make one cut through trees less than 8 inches in diameter.
- ▶ On larger trees, notch (undercut) at least one-third of the trunk diameter on the fall side of the trunk. Make the lower cut of the notch first to prevent the loose wedge of wood from pinching or bending the chain.

- ▶ Make a felling or backcut on the opposite side of the trunk two inches above and parallel to the horizontal cut in the notch. The tree should begin to fall when you are several inches from the inner face of the notch. Leave a narrow uncut portion to serve as a hinge for controlling the fall of the tree.



If the saw begins to bind in a closing cut, you may have misjudged it. At the very first indication of binding, remove the saw. If it is too late to remove the saw, do not struggle with it. Shut off the engine, and plan a way to remove the saw using wedges.

Wedges are the most dependable way of controlling the direction a tree falls. Using two wedges rather than one is best. Two wedges allow better control and ensure a forward fall of the tree.

The path of the butt of a falling tree is unpredictable. Being struck by the butt, rebounding limbs or broken tops is the second most common cause of death to those felling timber.

Controlling tree fall comes with experience. Get advice and help from an experienced person before attempting a difficult fall. Remember, accident statistics show that overconfidence can hurt experienced loggers. It may lead to dangerous shortcuts, such as not providing clear escape routes from a falling tree. Or it may lead to attempting too much, dulling the senses to danger signals.

## Limbing the Tree

The next job is to remove the limbs. Be alert for flexible limbs that wedge and whip a chain saw, and avoid cluttered work areas. Serious injuries may occur during the limbing operation. Some safety tips are:

- ▶ Begin limbing at the base of the trunk. The first limbs cut should be those on top of the trunk. Cut these as far up the top side of the trunk as possible before removing those resting on the ground.
- ▶ Stand on the opposite side of the trunk from the limb being cut. The trunk provides a barrier between you and the saw and helps protect from accidental contact with the chain.

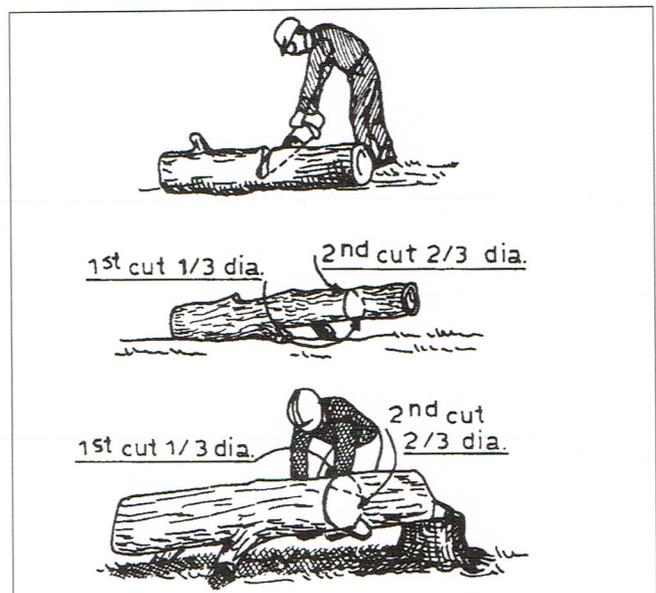


- ▶ Do not hold a running saw with one hand and clear limbs with the other. Shut off the saw and put it down until limbs have been cleared.
- ▶ Cutting branches resting on the ground may be necessary to clear the area as you work. Beware that the tree may sag or roll as a new branch is cut. The likelihood of the tree rolling increases as more branches are removed. Be alert for any trunk movement and be ready to move away quickly if necessary.

## Bucking the Logs

Bucking is cutting the trunk of the felled tree into desired lengths. The greatest hazards while bucking a tree are unexpected log roll and saw kickback. Here are a few safety tips:

- ▶ Always be sure of your footing. By keeping yourself in a well-balanced position at all times, you can react to unexpected log movement.
- ▶ Raise and chock the trunk when possible to prevent rolling. Work on the uphill side of the log. Since a log rolls downhill, working on the uphill side provides the greater safety.



- ▶ Bucking procedures differ depending on how you support the log. When the log is flat on the ground, cut it from top, then roll it over and cut it through from the opposite side. When the log is supported on one end, cut one-third of the diameter from the underside to avoid pinching and splintering, then cut the remaining two-thirds of the diameter from the top. On a log supported at both ends, make the first cut through the top one-third of the diameter. The remaining wood is then cut upward from the bottom.

When cutting firewood lengths, several methods can be used. One way is to make cuts about three-fourths of the way through for each length of firewood. By not cutting completely through, several lengths stay together and the log remains rigid. After all cuts are made from one side, roll the log over and complete cuts. Avoid sawing into the ground, which dulls the chain and shortens its useful life.

## Splitting the Wood

Splitting wood is a skill that improves with experience. Having the proper tools makes the job easier. Tools used to split firewood include a splitting ax, a sledgehammer, a splitting maul and wedges.

The quickest way to split small, easy-to-split pieces is with an ax. An ax can get stuck, however, in larger pieces. A splitting maul makes the job easier. A splitting maul is a combination of an ax and a maul,

with a wedge on one side and a hammer on the other. Use the wedge side just as you would an ax. The broader wedge keeps the blade from jamming as easily in wood. The hammer side can be used to pound the occasional wedge. You may need a sledgehammer and wedges for larger pieces that are very hard to split.

Felling trees, cutting firewood and operating a chain saw has a high risk of injury. Anyone near these activities should be alert to the hazards and communicate their intentions. Use a sharp chain saw, follow safe practices, maintain clear escape routes and plan ahead to work safely and profitably.

## Reference

Peters, P.A. 1991. Chain Saw Felling Accidents. Transactions of ASAE, Vol. 34(6), pp. 2600-2608. St. Joseph, MI.

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# Agricultural Aviation Security

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Aircraft, facilities, support equipment and chemicals represent an enormous investment that must be safeguarded. Safeguards should provide resistance to theft, vandalism, fire, weather and now terroristic manipulations. The events of September 11, 2001, have heightened our awareness of the need to enhance security measures. Proper planning may also help address all general security needs.

Good security measures are your best insurance against problems resulting from accidental or intentional damage by unauthorized personnel at your facility. A modest investment of resources and effort can prevent a substantial loss to your operation. Common sense and a generally heightened awareness about security should allow you to implement these and other ideas to enhance safety and security.

## Facilities

- ☑ Post contact numbers: Police, Fire, Emergency, Poison Control, Management and others.
- ☑ Make sure that there is an accessible phone in case of emergencies.
- ☑ Install a security fence, locked storage building and other means of preventing unauthorized public access to your property.
- ☑ The main entrance to the facility should have a sign indicating that all persons must check in at the main office immediately upon arrival. This will allow you to know who is on the site and provide proper assistance.
- ☑ Lock all gates and doors when your facility is unattended.

- ☑ All valves on bulk product tanks should be secured with locks.
- ☑ Equip sight gauges on bulk storage tanks with bottom valves that are normally turned off and locked.
- ☑ Lock all sump pumps from containment areas.
- ☑ Application equipment containing product that is stored overnight should be parked on a rinse pad, secured and equipped with locked discharge valves.
- ☑ Install adequate lighting in all product storage and handling areas.
- ☑ Seal or eliminate containment drain lines. Septic systems with leach fields should never be used for disposal of any liquid that may contain agri-chemical contaminants.
- ☑ Provide automatic proximity sensor activated security lights for worker protection and to minimize vandalism at containment and mix/load facilities. These proximity sensors may also be used to trigger some type of alarm if needed.
- ☑ Use security alarms for facilities, equipment and offices.
- ☑ Use local law enforcement.
  - Periodic patrols of airport.
  - Provide list of activity times and people involved.
  - Provide list of employees and associates.
- ☑ Transient (non-based) pilots register aircraft with airport/Fixed Base Operator (FBO) upon arrival and notify at departure.
- ☑ Post contact information to report suspicious activity/emergencies.
- ☑ Limit keys, and document who has each key with accurate and up-to-date accounting.

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- ☑ Airports with combination lock access points will help control who is allowed on the property during all hours. Combinations should be changed often and access given only to those with a real need.
- ☑ Post all signs and emergency instructions in dual languages as appropriate.

## Aircraft

- ☑ Use of anti-theft devices/lockable control surface devices.
- ☑ Utilize prop/tail wheel locks.
- ☑ Lock hopper gate or hopper door in the open position.
- ☑ Locks on hangars to prevent unauthorized entry.
- ☑ Secure aircraft/remove keys when unattended.
- ☑ Encourage pilots to escort visitors at all times.
- ☑ Block passages with trucks or other items.
- ☑ Aircraft departing for an extended period of time should notify airport manager/FBO.

## Airport Businesses/Flight Schools/Flying Clubs

- ☑ Utilize photo ID to identify.
- ☑ Use key lock boxes with limited access and distribution.
- ☑ Aircraft should remain locked and secure when unattended.
- ☑ Refueling vehicles should remain locked and secure when unattended.

## Airport Community Watch Program

- ☑ Coordinated locally by pilots/airport officials.
- ☑ Establish a community monitoring network.
- ☑ Encourage proactive participation in:
  - Aircraft security
  - Facility security
  - Heightened awareness
- ☑ Post signs promoting the program warning that the airport is watched.
- ☑ Provide training to employees for recognizing suspicious activity and appropriate response tactics.
- ☑ Utilize law enforcement personnel for airport community education.
- ☑ Periodic meetings of airport community.

## Fuel Storage

- ☑ Put locks and consumption recording devices on all fuel outlets.
- ☑ Locate all on-site fuel tanks above ground in a secondary containment or utilize tanks with built-in secondary containment.
- ☑ All underground storage tanks should be registered and appropriate procedures and records maintained according to state and federal laws.
- ☑ All new underground petroleum tanks must be equipped with leak detection and corrosion protection systems. The design specifications and periodic fuel volume reconciliation must be

documented and maintained in a permanent file according to state and federal regulations.

- ☑ Fuel and chemical product tanks and piping should be protected from vehicle collision damage.
- ☑ Appropriate NFPA Fuel Warning and No Smoking placards must be posted at fuel storage facilities.
- ☑ Employees must be instructed not to smoke or eat while handling pesticides or fuels.
- ☑ Material Safety Data Sheets (MSDS) for all hazardous materials (pesticides, ammonia or acids) used at the facility must be readily available for worker access.

## Pesticide Storage and Security

The appearance of your operation is a direct reflection of your professional business management to customers, neighbors, the general public and regulatory officials. Good housekeeping creates a positive impression while a disorganized, unclean or generally sloppy appearance may be an indication of other potential problem areas. Use the following practices.

- ☑ Clean mixing/loading and storage areas daily or after each use.
- ☑ Use collection containers to catch drips when connecting or disconnecting hoses.
- ☑ Inspect tanks regularly for cracks, leaks, sludge and rust.
- ☑ Clean up pesticide leaks and spills immediately.
- ☑ Keep sumps covered when not in use to keep out trash, dirt and debris.
- ☑ Use collected storm water as makeup water or dispose of properly.
- ☑ Keep a spill cleanup kit readily available near the mixing/loading area for quick, efficient cleanup of spills.
- ☑ Use dry break connectors on hoses that are connected frequently.
- ☑ Mix only the amount of pesticide that will be used.
- ☑ Segregate rinse water by crop commodity or label restrictions so that it can be used as diluent in future loads.
- ☑ Store triple-rinsed empty containers neatly in a secured dry area before disposal.
- ☑ Rinse container caps and outside of containers to remove pesticide residues.
- ☑ Do not allow rainwater to run off containers onto the ground – there may some undesirable residuals washed off.
- ☑ Regularly log, inspect and inventory chemicals on hand to be sure of exact amounts.

## Storage and Handling

Prevention of air, surface and groundwater contamination should be a top priority in the operation of your facility. This should be accomplished while enhancing the overall efficiency of the facility.

- ☑ Store pesticides and fertilizers in separate containments.

- ☑ Storage areas must be well ventilated using explosion proof electrical control wiring and fan motors with **at least 6** air exchanges per hour.
- ☑ Make sure storage facilities are placarded with the appropriate warning and hazard signs.
- ☑ Place appropriate fire extinguishers outside near storage entrances.
- ☑ Store dry pesticides above liquid pesticides or in separate areas.
- ☑ Use corrosion-proof metal shelving with a retainer lip at the front of each shelf.
- ☑ Maintain an inventory of type and quantity of each chemical at the local fire department. This should be updated when there are significant changes in quantity and/or type of chemical.
- ☑ Manually operate all containment sump pumps unless authorized otherwise by state regulation.
- ☑ Place each small volume container (up to 5 gallons) in a separate "rubber tub" containment.
- ☑ A detailed diagram of inventory storage locations should be on file with appropriate local emergency police and fire fighting personnel.
- ☑ Use tarps, plastic sheeting or catch pans under fertilizer conveyor transfer points to contain leaks and spills.
- ☑ Keep all pesticide containers closed.
- ☑ Used closed transfer handling of pesticides for worker safety.

## Dry Fertilizer

By law, fertilizers and pesticides **must** be stored in separate containments. Fertilizer containment overflows may drain into pesticide containment, but pesticide containment overflows cannot drain into fertilizer containments.

- ☑ Store all dry fertilizer products under roof.
- ☑ Divert rainwater away from the fertilizer storage area.
- ☑ Contaminated rainwater should be collected and applied as product.
- ☑ Recover and use any spilled product immediately.
- ☑ Fugitive dust from storage and transfer areas should be contained and used.
- ☑ Dry fertilizer handling areas should have containment diking.
- ☑ Clean storage areas daily or after each use.

## Liquid Fertilizer

- ☑ Liquid fertilizer tanks should have secondary containment. Containment sizes should be the same as outlined in the pesticide section below.
- ☑ Tank outlets should be locked.
- ☑ Storage areas should be fenced with controlled access.
- ☑ Tank bottoms should be kept dry if possible. This may be accomplished by placing the tank on 6 inches of loose pea gravel in a containment ring and then keeping the main floor pumped dry.

## Pesticides

All pesticides must be stored in a separate area isolated to prevent possible contamination of animal feed, grain, fertilizer or other materials.

- ☑ Keep flammable/combustible materials segregated from all ignition sources.
- ☑ Store all bulk chemicals inside a diked containment area under roof.
- ☑ Store collected rainwater from diked areas for use in future application blends or mixes, or pump it out if it is clean and is allowable by regulations in your area.
- ☑ Pesticide secondary containment tanks under roof should hold a containment volume at least 110 percent of the largest tank in the containment area, including the displacement volume of all tanks and equipment in the area.
- ☑ For a containment area not under roof, the containment volume should hold 125 percent of the volume of the largest tank in the containment area, including the displaced volume of all tanks in the area, plus freeboard (6 inches is typical), plus rainfall amounts as prescribed by your state regulations, usually a 25-year storm (see MWPS-37 Handbook for 25-year storm graph for your region of the United States).
- ☑ If the pesticide containment area is outside, consider plans to roof the pad to eliminate storm water accumulation.
- ☑ Locate all transfer pumps, pipes, hoses and valves within a containment structure above the highest anticipated flood or spill level for easy inspection and operation.
- ☑ Make routine inspections of the storage area to check for leaks and spills daily during the application season, then weekly or bi-weekly.
- ☑ Document primary inspection factors (time, date, place, conditions, etc.) in a log book.
- ☑ Repair leaks and clean up contaminated pad area immediately.
- ☑ Clean up spills immediately and properly dispose of the waste.
- ☑ Equip the containment area with a spill collection sump, sump pump or transfer pump suction hose and holding tank. A transfer suction pump dedicated to each product type may be useful when product cross contamination is a concern.
- ☑ Store all pesticide mini-bulk tanks in a pesticide storage containment area to avoid accidental runoff or drainage into streams, ditches or wellheads.
- ☑ Use stored rinsate and storm water immediately in suitable product mixes 1 part rinsate to 4 parts clean water. Check state regulations regarding rinsate concentrations allowed.
- ☑ Keep packaged chemicals inside a secure building designed with at least 6-inch depth internal containment to hold water or other chemicals used in fire extinguishing.

## Mixing-Loading Areas

- ☑ Properly ventilate inside mixing areas with at least 6 air changes per hour for pesticide handling.
- ☑ Prominently display appropriate warning signs regarding hazardous chemicals and non-smoking areas at all entrances and exits to a building.

- ☑ All product and rinsate storage should be properly labeled by content.
- ☑ Locate mixing and transfer tanks and pump systems within a containment area capable of holding 110 percent of its contents if under roof or 125 percent if not roofed.
- ☑ Design the load pad containment system to handle 110 percent of the volume of the largest transport truck or applicator vehicle if under roof or 125 percent if not roofed.
- ☑ Conduct all product loading over a containment load pad with a collection sump.
- ☑ Handle pesticide and fertilizer products using mix/load equipment in a common containment area but store them in separate containments.
- ☑ Secure all mix-load areas, drain valves, transfer lines and pumps.

## Personal Safety

- ☑ Proper personal protective equipment should be provided at each site for each employee as required by the Worker Protections Standard(s).
- ☑ All employees should receive adequate training in the use of appropriate protective gear and equipment for handling products.
- ☑ Proper use of safety equipment and clothing and laundry practices will protect you, your employees and families involved. Use washer and dryer at site to prevent transporting possible contaminated clothing home and mixing with family laundry. Therefore, changing clothes before leaving work is suggested.
- ☑ Use closed mixing/transfer systems for pesticide handling safety.
- ☑ Use a separate washer and dryer. Do not mix pesticide contaminated clothing with family clothing. Hang clothing outside in direct sunlight and wind to dry when possible.
- ☑ Use strong detergents and hot water for washing. Run empty washer with detergent and hot water cycle to clean after washing contaminated clothing.
- ☑ Provide and use appropriate face shields or goggles, rubber aprons, long sleeved shirts, rubber gloves and boots when loading and mixing pesticides.
- ☑ Office or non-storage areas must have separate exit doors from pesticide storage rooms.
- ☑ Storage areas must be well ventilated using explosion-proof electrical control wiring and fan motors with at least 6 air exchanges per hour.
- ☑ Emergency shower and eye flush fountains should be easily accessible. These should only be

used for emergencies and should trigger an alarm when used.

- ☑ A telephone should be installed near pesticide storage buildings with a list of appropriate emergency phone numbers.
- ☑ Do not store pesticides higher than 66 inches from floor level.

## Rinsate Handling and Reuse

- ☑ Rinse hopper, plumbing and boom equipment over the application site if possible and apply rinsate to the target while at the site to avoid rinsing at the facility upon return from the field.
- ☑ If spray equipment is rinsed at the facility, collect rinsate and segregate in holding tanks which are dedicated/marked according to crop for reuse to avoid pesticide cross-contamination damage.
- ☑ Thoroughly clean rinsate tanks used for different crops and/or chemicals that are not compatible.
- ☑ Exterior equipment wash-down should be done on a clean mix/load pad and the rinsate should be collected and sprayed on an approved target even though external rinse water has been defined as non-hazardous. Clean pad thoroughly after washing down.
- ☑ Apply the liquid collected from the mix/load pad sump immediately to an approved target (for the job the rinsate was generated from if practical) or temporarily store it in an aboveground tank for a short period of time until it can be used on another job requiring that chemical. Underground storage may not be allowed. Follow tank size and time allowances in your state.

## Suspicious Activities

- ☑ Beware of “copycats”!
- ☑ Attempts to purchase toxic materials – pesticides.
- ☑ Questions about operation of equipment.
- ☑ Lease or buy questions from unknown individuals.
- ☑ Anyone seeming unfamiliar with details of agricultural aviation asking questions.
- ☑ Acts nervous, seems uneasy or vague and avoids eye contact.
- ☑ Demands immediate possession of purchased material instead of available future delivery.
- ☑ Asks for material in smaller, individual containers rather than in bulk.
- ☑ Insists on paying in cash rather than with a credit card or check.
- ☑ Be observant!

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## Tree Removal Following a Storm

Following a storm, such as a tornado or ice storm, cutting and removing trees is complicated by tangled trees, twisted limbs and other snarled obstacles. Normally, experienced loggers avoid trees that are twisted, pre-loaded or fallen and tangled together. After a tornado, trees and limbs may be so matted together that clearing with chain saws becomes dangerous work. Experienced chain saw operators have developed approaches to minimize binding of limbs on the saw and to avoid getting pinned by falling trees. Caution and experience are essential because entangled limbs and trees do not react as they would if they were cut separately.

Many times trees with full foliage are warped causing unusual forces or weight distributions. Proper limbing varies from the normal cutting situation. Often, this will cause more saw kickback and pinching of the saw.

Before approaching a downed tree, check for any power lines or other hazards that may be present. Continue to be alert for overhead hazards, debris that could be dislodged as you work or trees lodging against the tree you are cutting.

Do not try to remove a tree that is leaning on or applying force onto a structure without having the structure inspected.

Begin limbing at the outer edges of the tree limbs. Always clear an area for your work as you advance. The first limbs to be cut are those on the top of the trunk. Cut these limbs as far toward the top of the tree as possible before removing the remaining limbs that are resting on the ground.

Do not make cuts above chest high with a chain saw. It's dangerous because it is easy to lose your balance and the result could be fatal.

Stand on the opposite side of the trunk from the limb being cut. The trunk provides a barrier between you and the saw and helps protect you from accidental contact with the chain.

When removing trees and residue after a storm (or disaster), keep in mind that your main objectives are to safely remove obstacles that may pose a hazard to individuals or structures and to clear a path for services to be resumed.

Doug Petty, Miller County Extension Agent - Staff Chair  
Gary Huitink, Associate Professor - Extension Engineer

When cutting trees after a storm, remember that you are not cutting firewood. The proper cut log length is determined by the weight that one person can handle. The length of limbs should not be so large as to hamper the removal of the brush pile by large equipment.

Bucking, cutting the log into sections, differs depending on how the log is supported. When a log lays flat on the ground, cut down from the top surface, then roll it over and finish the cut from the opposite side. When a log is supported on one end, cut one-third of the diameter from the underside to avoid pinching and splintering. Then cut through the remaining two-thirds of the diameter from the top. If a log is supported at both ends, make the first cut through the top one-third of the diameter. The remaining limb, tree trunk or log is then cut upward from the bottom.

Cutting branches resting on the ground may be necessary to clear the area as you work. Beware that the tree may sag or roll as a new branch is cut. The likelihood of the tree rolling increases as more branches are removed. Be alert for any trunk movement and be ready to move away quickly if necessary.

Do not hold a powered saw with one hand and clear limbs with the other hand. Shut off the chain saw and put it down until limbs have been cleared.

Limbs and brush are normally piled along roads following a storm. Service crews can load and dispose of debris later. Do not locate piles under utility lines or other places that will be dangerous or hard to reach with large loaders and other equipment.

Pay attention to what is going on around you at all times. Do not work as large groups in a manner that individuals interfere with each other or there is only one task. Normally, grouping four to six people for cutting and moving logs provides good teamwork to safely handle most projects without bumping into each other.

Take frequent breaks and drink plenty of water. Each person in a group should take turns taking breaks and supervising the safety of the other individuals. Using good judgment is essential for staying safe and doing a good job.

3/2006

## Disaster Response for Volunteers

Your neighbors and community need volunteers to assist, and you are prepared to help. Whether you are going into a disaster area to help rescue victims or restore vital needs, observe several precautions. In a situation so full of emotions, do what you can to help victims without hampering other volunteers or disaster workers. There are a few key items to observe.

Where possible, coordinate your efforts to contribute to the community effort. It is essential that volunteers support and contribute to recovery, not burden the strained resources.

Many volunteers are not trained rescue personnel, but all emergency workers follow a vital rescue principle: Your personal safety is your most important concern. Don't put yourself in a dangerous position where you could become a victim because medical personnel and facilities are already taxed to the limit. Precious efforts to locate missing persons or care for disaster victims will be diluted if you become injured. An injured person can't be of assistance to others, including caring for his or her family. Also, any injury will take you and others away from your tasks.

Here are pointers to enhance your effectiveness as a volunteer:

- Downed power lines should be given a wide berth. You can be electrocuted as the result of voltage transmitted by water or soil. Dangerous voltages may be encountered more than 10 yards from downed "hot" power lines. Allow electric utility company workers and trained electricians to handle all electrical-related hazards.
- Be alert to identify natural gas or LP gas leaks. If you smell mercaptan and know how to close the valve to the natural gas supply, do so immediately. Close the LP gas valve at the supply tank, unless heat may potentially cause an LP gas tank rupture that could endanger you. Make sure everyone stays a safe distance upwind and immediately contact the gas supplier if it isn't wise or obvious how to stop the gas leak.
- Respect all areas that are cordoned off.
- Don't park where traffic will be blocked.
- Buildings in areas with damaged structures shouldn't be entered until they have been thoroughly inspected by experienced construction personnel. Cleanup and repair can proceed in buildings that are determined safe for entry.
- Debris may be in unstable piles. Avoid them to prevent nasty falls, cuts and injury from nails, broken glass, etc.
- Experienced chain saw operators should clear downed trees. All those working in the area moving brush should understand the dangers of chain saws and falling trees. Alert people around you to respect chain saw operators, because they cannot hear and may not see an approaching individual.
- Providing clean water and food, as well as ice during warm weather, is critical. If you can bring enough to share with victims and disaster workers until power and potable water are restored, you have given vital aid. It is wise to take available first aid supplies with you so you can provide an initial antiseptic treatment, if it is needed.
- Where traffic lights aren't working, you should drive with courtesy and caution. Heavy construction equipment, military equipment, ATVs and four-wheel-drive vehicles may be in use. Be alert and respect them. All kinds of equipment may be moving to clear the way and rebuild vital infrastructure.
- Be alert around habitat for, and avoid, poisonous snakes and other displaced vermin seeking food and water after the disaster.

Assistance providing shelter and clothing to victims will give comfort during ice storms, flash floods or other disasters. A friendly, neighborly response during the first few days meets an essential need until other help, donations, etc., arrive.

## Electrical Safety During a Flood or Ice Storm

During or after storms or other disasters it is vital to avoid damaged electrical wiring. Initially, power substations may be disconnected, rendering distribution services both useless and harmless. However, never consider a circuit harmless until a qualified electrician repairs the damage, or at least disconnects all circuits that are potential hazards.

Water in the proximity of electricity may pose a lethal hazard. To protect yourself, your family and neighbors in the aftermath of an ice storm or flood or similar disaster, the University of Arkansas Cooperative Extensions Service offers this advice:

- Avoid stepping into a wet or flooded area. If there are submerged power distribution wires, they may energize the standing water and more than 10 yards around the perimeter. Within damaged or flooded buildings, electrical outlets, wiring or electrical cords may energize the water, posing a potential lethal danger.
- Portable electric generators are often put into use for temporary power. However, they can become deadly if improperly installed or operated. After a tornado in Little Rock, a utility worker was electrocuted by current flowing back into the power distribution, making a “downed” power line hot in contact with the worker.
- Every standby generator needs to be grounded properly. To avoid “shorts” and potential electrocution, keep the generator dry.
- Do not connect generators directly to household wiring. A qualified, licensed electrician should install your generator to ensure that it meets local electrical codes.
- Do not operate the generator in an enclosed or partially enclosed space. Gasoline or diesel engines may produce deadly levels of carbon dioxide. Engine exhaust should be vented where it is diluted into outside air.
- Take special care not to overload the generator. Assure that any extension cords connected to the generator are rated for the current load. It should have a grounded, three-pronged plug and be free of cuts and worn insulation.
- If it is possible, use ground fault circuit interrupters (GFCI) around any water hazard. This will help prevent electrocutions and electrical shock injuries. Portable GFCIs for electrical outlets that don’t require tools for installation are available in most electrical and hardware supply stores at prices ranging from \$12 to \$30.
- Don’t use electrical appliances that have been wet until they are sound. Water may damage electrical motors in furnaces and appliances, such as freezers, refrigerators, washing machines and dryers. If certain appliances have been under water, a qualified service repairman can recondition them.

Additional electrical safety information can be found on the Electrical Safety Foundation International website, [www.electrical-safety.org](http://www.electrical-safety.org).

## What to Do During a Power Failure on the Farm

A power failure or fuel shortage can cause problems on poultry and livestock farms, but being prepared can minimize the seriousness of these problems.

There are four areas of concern:

- Poultry
- Livestock
- Milk
- Equipment

### Poultry and Livestock

To protect poultry and livestock during a power failure, you should provide four essentials: ventilation, water, heat and feed.

#### *Ventilation*

- Most commercial poultry facilities should already be equipped with standby power generation for emergency ventilation.
- Ventilate shelter with standby power generators rather than natural ventilation.
- Do not close buildings tight to conserve heat, since animals could suffocate from lack of oxygen.
- Because oxygen will eventually be used up in mechanically ventilated production facilities, clear debris from all vents. Then open vents to facilitate natural airflow.
- In dairy facilities, open doors or turn cows outside, unless weather conditions prohibit (e.g., ice storm, tornado, etc.).

#### *Water*

- Provide all animals, especially cattle, with plenty of water.
- Your water pump might be adapted to be driven with a small gasoline engine and a belt. In some cases, a tractor may provide power for a standby

power generator. Otherwise you will need to haul water.

- If you have an outside source of water (pond or a stream), cattle can be turned out.
- Whatever the source of water, make sure it remains clean so animals can drink it.
- If no water is available, dairymen can feed cows their own milk as a last resort.

#### *Heat*

- Provide essential heat during cold weather. Use portable camp stoves and heaters as emergency heat sources for brooders. However, remember that stoves or heaters use oxygen and, if improperly managed, can present a fire hazard. Have qualified personnel inspect your standby heaters routinely in order to enhance fuel combustion and heat production; recondition or discard equipment that has potential to ignite a fire.
- Plan ahead to have this equipment ready when needed.

#### *Feed*

- Provide feed. Animals need extra energy for body heat during prolonged severe weather, especially if they are unsheltered. The best sources of energy are corn and other grains.
- If mechanical feeders are not connected to emergency power generation equipment, they will be inoperable during a power failure and emergency feeding procedures must be employed.
- Use pelleted cake or cake concentrate for emergency feed.

### Storing Milk

- Request that the marketing cooperative or processor pick up milk as soon as possible.

- A standby power generator can handle vital electrical equipment on the dairy during emergencies. Although such equipment can represent a sizable financial investment, one major power failure can pay for the equipment. While generation equipment can be borrowed during emergencies, be aware that travel may not be possible in ice storms, severe rain or wind storms and such equipment may already be in use.
- The intake manifold on a gasoline tractor engine may be used as a vacuum to operate select milking machines that do not have magnetic pulsators, but the vacuum levels may vary and increase the incidence of mastitis. If cows are not milked within 24 hours, the level of mastitis is likely to increase greatly.
- Even if you are short of extra milk storage facilities, do not store milk in stock tanks or other containers such as bathtubs. Dairy plants are not likely to accept milk that has been stored in anything other than regular milk storage containers.
- Check with your local marketing cooperative or processor about the policy from the Arkansas Department of Health regarding emergency storage of milk.
- If you are unable to cool your milk or have it picked up, check your tank for souring each time you add milk to it by looking for clumping or smelling for odors. This check could mean the difference between losing all or only part of your milk supply.

## Standby Power Generators

Emergency power generation is strongly recommended for commercial facilities caring for large numbers of animals. However, emergency power generation equipment must be properly sized, installed, maintained and routinely tested to be effective.

- Remember when sizing generators to account for both operating and start-up wattage needs.
- Mount generators securely in a location that protects the equipment from the weather, but permits the exhaust of gases and heat during the operation.
- Keep wiring runs as short as possible and size the wire for the maximum current load.
- Test generation equipment under full load for at least 30 minutes weekly and ensure that all equipment operates properly under generated power.
- Ensure that adequate fuel is available.

## Equipment

- Unplug or turn off all electric equipment to prevent damage when power is restored.

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3/2006

## Basic First Aid

Accidents happen anywhere and anytime. The first response to an accident is the most important. Oftentimes, first aid given at the scene can improve the victim's chances of survival and a good recovery. The right response is better than an incorrect quick one. Any response, even if it is wrong, is better than none at all.

### Remember Basic First Aid

- The first response to an accident is the most important – know what to do.
- Keep a shock victim covered to reduce heat loss.
- Try to stop bleeding by applying pressure to the wound.
- Do not remove a victim with a spinal injury unless further danger is imminent.

### Unconscious Victims

If the victim is unconscious, perform rescue breathing. (Rescue breathing is explained later.) If the victim's heart has stopped beating, perform cardiopulmonary resuscitation (CPR) if you have been properly trained.

### Shock

Shock usually accompanies severe injury or emotional upset. The signs are cold and clammy skin, pale face, chills, confusion, frequent nausea or vomiting and shallow breathing. Until emergency help arrives, have the victim lie down with the legs elevated. Keep the victim covered to prevent chilling or loss of body heat. Give non-alcoholic fluids if the victim is able to swallow and has not sustained an abdominal injury.

### Bleeding

Until emergency help arrives, try to control any bleeding. If possible, first put on rubber or latex gloves before touching any blood. If these are not available, a clean plastic bag may be used to cover your hands. It is important not to come in contact with blood because of the health risks.

If finger or hand pressure is inadequate to control bleeding, place a thick pad of clean cloth or bandage directly over the wound, and hold it in place with a belt, bandage, neckties or cloth strips. Take care not to stop the circulation to the rest of the limb. For injuries where a tie cannot be used, such as to the groin, back, chest, head and neck, place a thick pad of clean cloth or bandage directly over the wound and control the bleeding with finger or hand pressure. If bones are not broken, raise the bleeding part higher than the rest of the body. If the injury is extensive, the victim may go into shock and should be treated for it.

As a last resort, a tourniquet can be applied to stop bleeding. There is a risk of sacrificing a limb to save a life. A tourniquet is a wide band of cloth or other material tightly placed just above the wound to stop all flow of blood. A tourniquet crushes the tissue and can cause permanent damage to nerves and blood vessels. Once in place, a tourniquet must be left there until a physician removes it. The victim must be taken to medical help as soon as possible.

### Burns and Scalds

Until medical help arrives, immerse the burned area immediately in tap or cool water or apply clean, cool, moist towels. Do not use ice because it may cause further damage to the burned area. Maintain this treatment until the pain or burning stops. Avoid breaking any blisters that may appear. Do not use ointments, greases or powders.

For more severe burns or chemical burns, keep the victim quiet and treat them for shock. Remove any clothing. If the clothing sticks to the burned area, leave it there. For exposure to chemicals, flush the skin with plenty of water, but only cover the exposed area with a clean bandage if the chemical has caused a burn. If the burn victim is conscious, can swallow and does not have severe mouth burns, give plenty of water or other non-alcoholic liquids to drink. Get the victim to a physician or hospital as soon as possible.

### Broken Bones

For fractured limbs, take the following precautions until emergency help arrives. Place the injured part in as natural a position as possible

without causing discomfort to the patient. If the patient must be moved to a medical facility, protect the injured part from further injury by applying splints long enough to extend well beyond the joints above and below the fracture. Use firm material, such as a board, pole or metal rod, as a splint. Pad the splints with clothing or other soft material to prevent skin injury. Fasten splints with a bandage or cloth at the break and at points along the splint above and below the break.

Use a pressure bandage to control any bleeding.

For very serious fractures involving injuries to the body, neck or back, observe the following: Do not move the victim without medical supervision, unless absolutely necessary, and then only if the proper splints have been applied. If a victim with a suspected neck or back injury must be moved, keep the back, head and neck in a straight line, preventing them from being twisted or bent during movement. Use a board or stretcher to support the victim, if available.

## Spinal Injuries

Take special care when helping a spinal injury victim. All damage to the spinal cord is permanent, because nerve tissue cannot heal itself. The result of nerve damage is paralysis or death.

Do not move the limbs or body of a victim with a suspected spinal injury unless the accident scene is such that there is imminent danger of further injury or unless it is necessary to establish breathing. The victim's body should be stabilized to prevent any movement of the head, neck or body. Be aware that any movement of a victim with spinal injury may result in paralysis or death.

If the victim must be moved, keep the neck and torso of the body as straight as possible and pull in a direction that keeps the victim's spine in a straight line. Pull the body from the feet or shoulders (using both feet, both shoulders, or both arms pulled over the shoulders). It is also possible to pull the victim by the clothing. Grab the victim by the collar of the shirt and support the victim's head with your forearms while pulling. The clothes drag is preferred because the victim's head is supported while being moved. Do not pull the body sideways.

When providing patient care, it may be necessary to roll the victim over on his or her back to clear an airway or evaluate breathing. When rolling the victim over, the head, neck and torso should be moved together so that no twisting occurs.

## Rescue Breathing for an Adult

When breathing movement stops or when their lips, tongue and fingernails become blue, a person needs immediate help. When in doubt, apply rescue breathing until medical help arrives. Delay of rescue breathing may cost the victim's life. Start immediately. Seconds can count.

The American Red Cross teaches the following 10 steps to assist an adult who has stopped breathing.

1. Does the person respond? Tap or gently shake the victim. Shout, "Are you OK?"
2. Shout, "Help!" Call people who can phone for help.
3. Roll the person onto their back by pulling them slowly toward you. Slowly pull towards you until the victim is face up.
4. Open the airway by tilting the head back and lift the chin. Clear the mouth and throat of any obstructions with your fingers.
5. Check for breathing. Look, listen and feel for breathing for three to five seconds.
6. Give two full breaths. Keep the head tilted back. Pinch the nose shut and seal your lips tight around the victim's mouth. Give two full breaths for one to one and a half seconds each.
7. Check for pulse at the side of the neck. Feel for pulse for five to 10 seconds.
8. Phone emergency staff for help. Send someone to call for an ambulance.
9. Continue rescue breathing. Keep the head tilted back, lift the chin and pinch the nose shut. Give one full breath every five seconds. Look, listen and feel for breathing between breaths.
10. Recheck the pulse every minute. Keep the head tilted back and feel for the pulse for five to 10 seconds. If the victim has a pulse, but is not breathing, continue rescue breathing.

For infants and small children, follow the first five steps listed above. On the sixth step cover the child's mouth and nose in a tight seal and give two small breaths. Check for pulse and call for help. Begin rescue breathing, giving one small breath every three seconds for an infant and one every four seconds for a child.

## Choking

Choking occurs when food or a foreign object obstructs the throat and interferes with normal breathing. The following steps are advised if the choking victim is unable to speak or cough forcefully.

### For adults and children over one year of age:

1. Ask, "Are you choking?"
2. Shout, "Help!" Call for help if the victim cannot cough, speak or breathe, is coughing weakly or is making high-pitched noises.
3. Phone emergency staff for help. Send someone to call an ambulance.
4. Do abdominal thrusts. Wrap your arms around the victim's waist. Make a fist. Place the thumb side of the fist on the middle of the victim's abdomen just above the navel and well below the lower tip of the breastbone. Grasp the fist with the other hand. Press the fist into abdomen with a quick upward thrust.
5. Repeat abdominal thrusts until the object is coughed up or the victim starts to breathe or cough. If the victim becomes unconscious, lower the victim to the floor.
6. Do a finger sweep. Grasp the tongue and lower jaw and lift jaw. Slide the finger down inside of the cheek to base of tongue. Sweep the object out.
7. Open the airway. Tilt the head back and lift the chin.

8. Give two full breaths. Keep the head tilted back, pinch the nose shut and seal your lips tight around the victim's mouth. Give two full breaths for one to one and a half seconds.
9. Give six to 10 abdominal thrusts. If the air will not go in, place the heel of one hand against the middle of the victim's abdomen. Place the other hand on top of the first hand. Press into the abdomen with quick upward thrusts.
10. Repeat steps six through nine until the airway is cleared or the ambulance arrives.

### For infants less than one year old:

1. Place the victim's head in a downward position on the rescuer's forearm with the head and neck stabilized.
2. With the heel of the rescuer's hand, administer five rapid back blows between the victim's shoulder blades.
3. If the obstruction remains, turn the victim face up and rest on a firm surface.
4. Deliver five rapid thrusts over the breastbone using two fingers.
5. If the victim is still not breathing normally, administer mouth-to-mouth resuscitation as specified for an infant.
6. Repeat the above steps as necessary. If the obstruction cannot be removed, call for medical help immediately.



Adapted for use from the University of Maine Cooperative Extension Farm Safety Program by Dr. Russ Kennedy.

## Emergency CPR

### 1. CALL



Check the victim for unresponsiveness. If there is no response, call 911 and return to the victim. In most locations the emergency dispatcher can assist you with CPR instructions.

During cardiac arrest, the heart stops pumping blood, the blood pressure falls to zero and the pulse disappears. Within 10 seconds of cardiac arrest the person loses consciousness and becomes unresponsive. If you shake or shout at the victim, there will be no response. Sometimes a person in cardiac arrest may make grunting, gasping or snoring type breathing sounds for a couple of minutes. **Do not** be confused by this abnormal type of breathing. If a person is unresponsive (doesn't respond to shouts or shakes) and is not breathing (or is breathing abnormally), then call 911 and begin CPR.

### 2. BLOW



Tilt the head back and listen for breathing. If not breathing normally, pinch nose and cover the mouth with yours and blow until you see the chest rise. Give 2 breaths. Each breath should take 1 second.

Remember, a person in cardiac arrest may have abnormal breathing for a couple of minutes. This abnormal breathing is called "*agonal respiration*" and is the result of the brain's breathing center sending out signals even though circulation has ceased. The key point is that the abnormal breathing may sound like grunting, gasping or snoring. It disappears in 2 to 3 minutes. If you see this type of breathing, **do not** delay CPR. The person desperately needs air, and only you can provide it.

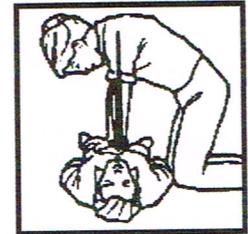
If the victim is still not breathing normally, coughing or moving, begin chest compressions. Push down on the chest 1 1/2 to 2 inches 30 times right between the nipples. Pump at the rate of 100/minute, faster than once per second.



In general, the chest should be pushed down 1 1/2 to 2 inches. Sometimes you may hear a cracking sound. Do not be alarmed. The sound is caused by cartilage or ribs cracking. Even if this occurs, the damage is not serious. The risk of delaying CPR or not doing CPR is far greater than the risk of a broken rib.

CONTINUE WITH  
2 BREATHS AND 30 PUMPS  
UNTIL HELP ARRIVES.

NOTE: This ratio is the same for one-person and two-person CPR. In two-person CPR the person pumping the chest stops while the other gives mouth-to-mouth breathing.



### Complications of CPR

Vomiting is the most frequently encountered complication of CPR. If the victim starts to vomit, turn the head to the side and try to sweep out or wipe off the vomit. Continue with CPR.

The spread of infection from the victim to the rescuer is exceedingly rare. Most cardiac arrests occur in people's homes – relatives or friends will be the ones needing to do CPR. Even CPR performed on strangers has an exceedingly rare risk of infection. There is NO documentation of HIV or AIDS ever being transmitted via CPR.

Adapted for use from United States Department of Agriculture Food Safety and Inspection Services by Dr. Russ Kennedy.

## OSHA's Tips for Keeping Workers Safe in the Cold

OSHA is urging employers and workers to take necessary precautions to prevent and treat cold-related health problems.

Prolonged exposure to freezing or cold temperatures may cause serious health problems, such as trench foot, frostbite and hypothermia. In extreme cases, including cold-water immersion, exposure can lead to death.

Danger signs include uncontrolled shivering, slurred speech, clumsy movements, fatigue and confused behavior. If these signs are observed, call for emergency help.

OSHA's *Cold Stress Card* provides a reference guide and recommendations to combat and prevent many illnesses and injuries. Available in English and Spanish, this laminated fold-up card is free to employers, workers and the public. Tips include:

### How to Protect Workers

- Recognize the environmental and workplace conditions that may be dangerous.
- Learn the signs and symptoms of cold-induced illnesses and injuries and what to do to help workers.
- Train workers about cold-induced illnesses and injuries.
- Encourage workers to wear proper clothing for cold, wet and windy conditions, including layers that can be adjusted to changing conditions.
- Be sure workers in extreme conditions take a frequent short break in warm, dry shelters to allow their bodies to warm up.
- Try to schedule work for the warmest part of the day.
- Avoid exhaustion or fatigue because energy is needed to keep muscles warm.
- Use the buddy system – work in pairs so that one worker can recognize danger signs.
- Drink warm, sweet beverages (sugar water, sports-type drinks) and avoid drinks with caffeine (coffee, tea, sodas or hot chocolate) or alcohol.
- Eat warm, high-calorie foods such as hot pasta dishes.
- Remember, workers face increased risks when they take certain medications, are in poor physical condition or suffer from illnesses such as diabetes, hypertension or cardiovascular disease.

Occupational Safety and Health Administration guidelines, U. S. Department of Labor

Stress

## **Stress**

Dealing With Stress

Children and Stress

Helping Children Cope With Stress

Recognizing Stress in Children

Outreach Materials for Children

## Dealing With Stress

Some stress can be a good thing. It is the tap on our shoulder that reminds us to finish a task, to try harder, to reach deeper and achieve our personal best. But when stress is excessive or unmanaged it becomes distress. When we become overwhelmed by the stress, not only do we become less effective in tackling our responsibilities, but we also increase the probability of a number of health-related problems. Distress may result in headaches, high blood pressure, backaches, insomnia and may reduce the body's resistance to illness and disease. Distress can also cause us to become discouraged and depressed.

It is common to believe that difficulties cause stress. For example, if you have recently experienced a death, a divorce, job loss or a move, you might expect to be stressed. But people are not machines. Different experiences affect different people very differently.

Major life events can be stressful. Even positive events, such as weddings, the birth of a baby, buying a house, can be stressful. But they affect people differently.

Daily hassles can be a major source of stress. Losing the keys, a child's sickness, lack of money may be as stressful as major life events. Sometimes it is the little things that become overwhelming.

When stress moves beyond that gentle nudge that encourages us and instead becomes mentally overwhelming and physically exhausting, it's time for action. It's time to relax. It's time to use our resources to control or alleviate our stress.

We all have resources – but we may not think to use them. For example, we may have friends who are willing to help us when an ice storm hits. We may have a sense of humor that helps us see our situation in a funny way. We may have a lifetime of experience with difficulties that helps us deal with them. We may have great organizational ability that we can use to make our lives run more smoothly. When we use our resources well, we can manage many of the stresses of life.

Even if our resources are limited, we can ask for help. There may be people at work or in our neighborhood or where we worship who will help us. We can use the resources we have to help us get the help we need.

Here are ten ways you can use your resources to control the stress in your life:

1. **Participate in a physical activity.** Taking a walk, working in the yard or going for a bike ride can help relieve that “uptight” feeling. The body and the mind work together. During physical activity epinephrine is released, which produces feelings of euphoria. Sometimes the key to mental relief is found in a good physical workout.
2. **Toss stressors you can't change.** Much of what we worry about isn't real. Do you spend mental reserves processing “what if” scenarios? Other stresses are real, but out of our control. Make a list of all your stresses and worries. Determine what is real and in your control. Toss or bury the rest.
3. **Keep fit.** A healthy diet, regular exercise and plenty of sleep have long been the doctor's remedy for bouncing back from a physical illness. Since the mind and body are connected, keeping fit is good advice for physical and mental well-being.
4. **Find something to laugh about.** Humor is effective medicine. Laughing releases hormones that work to physically reduce anxiety. Find the funny side of life or read humor to help you deal with stress.
5. **Enjoy the moment.** Instead of reliving the frustrations of the past or anticipating the stresses of the future, focus on the present. Use the five senses to enjoy the here and now. Listen to sounds that usually go unnoticed. Count them. Savor the taste of a favorite food. Describe it. Feel the texture of a rose petal. Compare it. Smell the scent of a flower. Cherish it. In the words of one stress expert, “wherever you are, be there.”
6. **Build a support network.** Help is always available. No one needs to do it alone. Work with a mentor. Join a support group. Have a neighborhood party. Organize others around an issue. Call your family and friends. The best way to develop a support network is to be a support to others. Everyone wins when support is accepted graciously and extended freely.

7. **Write in a journal.** Sometimes writing about something brings it all back into perspective. As we write, we may also identify new resources or creative ways to address a challenge. We also may rally our own psychological reserves and be able to tackle our challenges with increased energy and clarity.
8. **Relax.** When we feel stress starting to build up, we can soothe ourselves and relax. Think about good things. Take a few minutes to sing or do something you love to do. Pray. Breathe deeply. Play a game with your children. Each of us knows what will work to help us restore peace to our lives. Sometimes a temporary solution may be to ignore it. This won't permanently solve problems, but it may provide a desperately needed break. Sometimes a break is all that is needed to approach things with renewed energy.
9. **Prepare.** A task, event or crisis is most stressful when we are unprepared to address it. The obvious solution is to prepare. Taking time to learn from our errors, develop new skills and collect resources or plot a strategy is time well spent.
10. **Look at things differently.** We can manage stress by the meaning we give to an event. We can change the way we think about things. One person may worry that her partner will desert her – because her father did. As a result she may worry and fret. She may even argue with her partner. But she can change the way she thinks

about him. “He has always been very faithful. I know he loves his family.” Rather than expecting the worst, we can hope for the best. Much stress is the result of worrying about things that never happen.

Even if a dreaded event happens, we can make the most of it. We can use our resources. We can see it as an opportunity for growth. In fact, some scholars say that stressful events are our friends; they help us grow and become stronger. There may be a recovery time after something difficult hits us – we should be patient as we heal from a painful situation – but we can be better as a result of our difficult experiences.

### Applications□

- Think about a stressful situation you are currently experiencing. What resources can you use to deal with the situation?
- Are there certain times that are most stressful for you? What can you do to deal with those?
- What are ways that you soothe yourself? How can you use this when you are feeling stressed?
- Do you have a certain friend who may help you feel more peaceful? Call that person, send an e-mail or go out to lunch with him or her.

## Children and Stress

How your child reacts to stress depends upon both your child and the source of stress. Many children have survived catastrophes without permanent emotional or psychological damage, while other children cannot easily adjust to less traumatic experiences. The personality of the child, as well as available support from family members, plays a major role in the child's ability to handle stressful situations.

### Recognizing Stress in Your Child

Stress is a physical tension of the mind and body which must be released for survival. Stress becomes a problem when pressure builds up to a point where the person can no longer adjust to changes in life. Releasing stress can be done in numerous ways which affect the child physically, emotionally and behaviorally.

Recognizing stress reactions in children is not always easy. Even if you regularly discuss issues with your children, you may discover that they are slow to talk about problems which trouble them. Children think the world revolves around them; therefore, they sometimes feel they cause events. Often these events are not positive and the children end up feeling misplaced guilt. Children may be scared or embarrassed to mention problems or negative feelings, especially if life at home is unsettled. You must not depend on words alone to signal when your child is upset. A child often will deny being troubled. Changes in behavior and personality are better signs of stress overload in children.

At times it may seem that children live in separate worlds of play and fantasy. Do not be fooled into believing that your children are not aware of changes taking place. Your children will not be protected or spared from any stress by being uninformed about major family events or crises. Children are talented at seeing and hearing matters from which they are supposed to be shielded.

Although children may recognize family events or crises and even be aware of global issues like the nuclear arms race, they do not have the same

resources as adults for dealing with the resulting stress. There are several developmental reasons for this:

- \* Children do not have mature reasoning skills;
- \* They lack an accurate understanding of cause and effect; and
- \* They have not had the chance to become skilled at handling stress.

### Natural Disasters

Your child can be prepared for handling emergencies such as a fire, storm or other disaster. Teach him or her basic safety and emergency rules. Many community agencies often hold first aid courses for children. Look into them for your child.

### What Parents Can Do to Help Reduce Stress

Promoting a stress-free lifestyle can help children feel competent and self-confident, traits that inspire success in life and in learning. The biggest stress reducer for children is good parenting. Children become resilient and acquire the skills to bounce back from stressful situations. Parents can help create resiliency in children by taking the following steps:

- Be sensitive to the child's feelings and let him/her know that you recognize that he/she has a problem.
- Be prepared to protect the child from the stressor.
- Show signs of affection such as hugs and more hugs.
- Spend time with your child to foster a healthy and supportive family relationship.
- Learn and teach the child anger management and conflict resolution skills.
- Include laughter, fun, meditation and exercise in the child's daily life.

- Put as much order and consistency in the child's life as possible.
  - Have realistic expectations for your child.
  - Reassure the child that all kids have pressures and fears and he/she is not alone.
  - Let your child express his/her feelings.
  - Provide a spiritual or religious base for the child.
  - Use non-punitive methods of discipline.
  - Help the child build friendships that support him/her.
  - Encourage healthy patterns of eating and sleeping.
  - Teach relaxation and meditation techniques.
  - Encourage daily physical activity.
- Signs of stress in children should be taken seriously, because stress can lead to problems in school and can affect a child's social and cognitive development.

Adapted from Purdue University Cooperative Extension Service, West Lafayette, IN. Joanne Samarzija, Child Development and Family Studies, and Judith A. Myers-Walls, Extension Specialist, Human Development.

## Helping Children Cope With Stress

While some stress is normal and even healthy, children today seem to encounter many stressful life events at earlier ages. Stress shows itself in children by complaints about stomachaches, being nervous, trouble sleeping, flaring anger and infections.

Stress is a life event or situation that causes imbalance in an individual's life. An unhealthy response to stress occurs when the demands of the stressor exceed an individual's coping ability. Often stress results from something that is beyond our control. Control has a great deal to do with levels of stress.

Some stress is normal. Daily and life challenges can be expected. For example, most children will attend school and will have to go through many transitions. Most adolescents will have to grapple with their sense of identity to determine where they "fit." Being afraid of the dark and feeling peer pressure are predictable stressors. Other stressors are not as predictable. Disruptions to what is considered normal for the child cause problems with stress. Small amounts of stress, as experienced before a test or when meeting new people, are necessary to present challenges for greater learning. Simple stress experienced when learning a new skill or playing an exciting game raises a person's level of excitement or pressure above the normal level.

### When Is Stress Distress?

Problems begin when ordinary stress becomes too much stress or distress. There are a variety of reasons for children to feel stress. Death, divorce, remarriage, moving, long illness, abuse, family or community violence, natural disaster, fear of failure and cultural conflict each heighten stress. Under stress, the heart rate and breathing are at a higher speed and muscles are tense. Multiple stressors worsen the stress level and the length of the stress. Our bodies need relief from stress to reestablish balance.

### Children's Reactions

Reactions to stress vary with the child's stage of development, ability to cope, the length of time the stressor continues, intensity of the stressor and the degree of support from family, friends and community. The two most frequent indicators that

children are stressed are change in behaviors and regression of behaviors. Children under stress change their behavior and react by doing things that are not in keeping with their usual style. Behaviors seen in earlier phases of development, such as thumb sucking and regression in toileting, may reappear.

### Typical Signs and Symptoms of Stress for Children

#### Preschoolers

Typically, preschoolers lack self-control, have no sense of time, act independently, are curious, may wet the bed, have changes in eating habits, have difficulty with sleep or speech and cannot tell adults how they are feeling.

Preschoolers under stress each react differently. Some behaviors may include irritability, anxiety, uncontrollable crying, trembling with fright, eating or sleeping problems. Toddlers may regress to infant behaviors, feel angry and not understand their feelings, fear being alone or without their parent, withdraw, bite or be sensitive to sudden or loud noises. Feelings of sadness or anger may build inside of them. They may become angry or aggressive, have nightmares or become accident-prone.

#### Elementary-Age Children

Typical elementary-age children can whine when things don't go their way, be aggressive, question adults, try out new behaviors, complain about school, have fears and nightmares and lose concentration.

Reactions to stress may include withdrawal, feelings of being unloved, being distrustful, not attending to school or friendships and having difficulty naming their feelings. Under stress, they may worry about the future, complain of headaches or stomachaches, have trouble sleeping, have a loss of appetite or urinate frequently.

#### Preteens and Adolescents

Adolescents typically are rebellious, have "growing" pains and skin problems, may have sleep disturbances, may go off by themselves, be agitated and act irresponsibly.

Adolescents and teens under stress may feel angry longer, feel disillusioned, lack self-esteem and generally distrust the world. Sometimes adolescents will show extreme behaviors ranging from doing everything they are asked, to rebelling and breaking all of the rules and taking part in high-risk behaviors (drugs, shoplifting, skipping school). Depression and suicidal tendencies are concerns.

## Building Safety Nets for Stress

Just as children's reactions are each different, so are their coping strategies. Children can cope through tears or tantrums or by retreating from unpleasant situations. Some are masterful at considering options, finding compromising solutions or finding substitute comfort. Usually a child's thinking is not developed fully enough to think of options or think about the results of possible actions. Children who live in supportive environments and develop a range of coping strategies become more resilient. Resiliency is the ability to bounce back from stress and crisis. For many children, a supportive environment is not present and many children do not learn a set of positive coping strategies.

Factors that support children and create a safety net for them during stressful times include:

- A healthy relationship with at least one parent or close adult.
- Well-developed social skills.
- Well-developed problem-solving skills.
- Ability to act independently.
- A sense of purpose and future.
- At least one coping strategy.
- A sense of positive self-esteem and personal responsibility.
- Religious commitment.
- Ability to focus attention.
- Special interests and hobbies.

Families can provide further protection by:

- Developing trust, particularly during the first year of life.
- Providing supportive family and friend relationships.
- Being and showing caring and warmth.
- Having high, clear expectations without being overly rigid.
- Providing ways for children to contribute to the family in meaningful ways.
- Being sensitive to family cultural belief systems.
- Building on family strengths.

Children who live in supportive environments and develop a range of coping strategies become more resilient.

## Coping Strategies

It is not necessary to be a therapist to help children cope with stress. One key element in reducing stress is a stress-free environment. A stress-free environment is based on social support, having the ability to find hope by thinking through solutions and being able to anticipate stress and learn ways to avoid it.

## Social Support

Social support means having people to lean on during difficult times. Parents who listen, friends to talk to, people who give hugs and help thinking through solutions are ways children feel support.

Specifically:

- Notice them. Well-developed observation skills are essential. Observe if more quarrels with playmates, poor concentration or bed-wetting occur.
- Encourage children and show you care. Be positive.
- Acknowledge feelings. Let children know it is okay to feel angry, alone, scared or lonely. Give children the names for their feelings and words to express how they are feeling.
- Have children view the situation more positively. Some stressors make the child feel ashamed.
- Structure activities for cooperation; don't promote competition. This allows individuals to go at their own pace and increases the learning of social skills.
- Involve parents, family members and friends. They can read books together, encouraging openness and listening. They also can ensure good nutrition and proper rest.
- Host regular, safe talks. Members of the family or classroom group who feel comfortable can share experiences, fears and feelings. Adults can recognize the steps a child uses to cope and help others learn from these experiences. Hold regular family conferences or classroom meetings to plan activities or to suggest solutions.

## Thinking It Through Clearly

Children must learn to think through a problem. Some specific strategies include self-talk, writing about the problem and making a plan. Thinking positively and thinking up real solutions is important.

Adults can:

- Show how they cope in a healthy way. Keep calm, control anger, think through a plan and share the plan with the family.
- Be proactive. Plan plenty of play time, inform children about changes and plan activities where children can play out their feelings. Books, art, puppetry, play and writing help children think through and name their feelings.
- Develop thinking skills. Help children think through the consequences of actions. Pose situations (friendship, stealing, emergencies) and think through actions. Ask open-ended questions about what the solutions to problems could include, such as “What could we do about this?”
- Help children tell reality from fantasy. A child’s behavior, for example, did not cause his or her parents’ separation or divorce.

For you, as an adult, focus on the stressor. Model how thinking through options for dealing with difficult people, situations or problems helps you find solutions.

- Find individual talk time. Talk about stressful events and everyday events.
- Use stories and books. Stories can help the child identify with the feelings of the character and tap their own feelings to ease them out for discussion and to discuss coping strategies.
- Use art for expressing feelings. Paint, clay, sand and water all allow for active expression.
- Encourage children to act out coping skills. Playing with dolls, boxes, toy telephones, puppets, blocks, cars and similar items provides another avenue to bring feelings out for discussion.
- Give the child some degree of control. Children should be allowed to choose within the framework of what is expected. Encourage them

to make some manageable decisions, such as how to arrange their room, to voice their opinion in some family decisions, which activity to complete, etc.

## Foresee Stressful Situations and Avoid Them

If we can foresee an event, we can often block it as a stressor. Ignoring problems, changing the subject, not worrying about it or changing an action can be coping strategies.

- Identify what could cause stress and plan ways to avoid it or how to deal with it.
- Use gentle humor or read a silly book to create laughter and to reframe negative thoughts into opportunities.
- Offer personal space. Modify the environment. Quiet space and alone time should be allowed. (Adjust noise levels and check the traffic pattern.)
- Teach relaxation and deep breathing techniques. Ask children to close their eyes and imagine a quiet and/or happy place (the beach with waves, a birthday party, a warm cup of cocoa).
- Teach conflict-resolution strategies. Teach children to think through alternative ways to solve problems. Who else can help solve given problems? What additional information do they need?

As adults, we can make sure we don’t add to children’s stress by expecting them to act in adult ways. We can be positive, seek positive solutions, help children name their feelings, teach fairness, help children learn to like themselves, be patient, teach honesty and give lots of love and encouragement, particularly during difficult times.

Adapted for use from Department of Family and Consumer Sciences, North Carolina Cooperative Extension, North Carolina State University.

## Recognizing Stress in Children

### Helping Children Cope With a Disaster

A disaster is frightening to everyone. Several factors play an important part in a child's reaction to the event. Children will be affected by the amount of direct exposure they have had to the disaster. If a friend or family member has been killed or seriously injured and/or the child's school, home or neighborhood has been destroyed or severely damaged, there is a greater chance that the child will experience difficulties.

Adults can help children grieve by patiently listening and being able to tolerate feelings. This is a major factor in a child's perception of adults' reactions to the disaster. Most of the time children are very aware of adults' worries, but they are particularly sensitive during the period of a disaster. Acknowledging your concerns to the child is important, as is your ability to cope with stress. Another factor that affects a child's response is his/her developmental age. Talking about the disaster together using words children can understand is important, as is being sensitive to their different responses.

Preschool children will cling to parents and teachers. They will worry about their parents' whereabouts. School-age children whose homes have been damaged by a fire may express the fear that life isn't safe or fair, whereas adolescents may minimize their concerns but fight more with parents and spend more time with their friends. It is important to listen to children's individual concerns and to be alert to signs of difficulty.

Children are the most vulnerable population. Times of disaster and trauma increase their vulnerability. Recognizing children's symptoms of stress is not easy. Some stress reactions may include the following:

- Sleep disorders
- Persistent thoughts of trauma
- Belief that another bad event will occur
- Conduct disturbances

- Hyperalertness
- Avoidance of stimulus or similar events, i.e., boating, swimming, baths, traveling
- Moving
- Regression, thumb sucking
- Dependent behaviors
- Time distortion
- Obsession about the event
- Feeling vulnerable
- Excessive attachment behaviors

Extension professionals, parents and caregivers can work with child care providers to help them understand that parents who are under stress may not be able to provide enough love and affection for their children. Some of this lack of affection can be supplemented in child care settings.

There are multiple factors that determine how to negotiate stress with children.

### Child's Developmental Level

Elementary school children in the developmental stage of accomplishing and feeling competent may not progress well in school. This is an interference in development. Research indicates that the stage of identity development (usually in adolescent and teen years) can be hampered if fear is pronounced.

Latent reactions observed in children experiencing the Buffalo Creek flood in New York were depression, powerlessness, vulnerability, difficulty distinguishing fact from fantasy, fear of separation and chronic anxiety.

### Child's Perceptions of Family Reactions

Sometimes, anxiety in children can be attributed to anxiety in parents. Children who realize that their parents are powerless (the inevitability of flood waters, for example) are fearful. Erikson suggests a loss in the belief of adults' power results in the questioning of adult authority in other instances and may manifest itself in juvenile misconduct.

Collaboration between parents, caregivers and social workers has worked in the past. Meaningful adaptations in children's environments will aid in their feelings of security.

## Expected Reactions of Children and Adolescents to Disasters

- Refusal to return to school or child care. This may emerge up to several months after the disaster.
- Fears related to the disaster (i.e., the sound of wind, rain, thunder, sirens, etc.).
- Sleep disturbances persisting several months after the disaster, manifested by nightmares and bed wetting.
- Misconduct and disobedience related to the disaster reflecting anxieties and losses that the child may not be talking about may appear weeks or months later.
- Physical complaints (stomachaches, fevers, headaches and dizziness) for which no immediate physical cause is apparent.
- Withdrawal from family and friends, listlessness, decreased activity and preoccupation with the events of the disaster. Many children may be confused or upset by their normal grief reaction. Children have reported that they do not feel enough support from adults during a disaster.
- Loss of concentration and irritability.
- Increased susceptibility to infection and physical problems related to the disaster.

The most common psychological disturbances found among children who have lived through a disaster include anxiety disorders, sleep disturbances, phobias, depression and post-traumatic stress disorder.

Children proceed through a variety of stages following a trauma. The following stages have been identified as stages one might expect following a disaster.

- *Terror* – Exhibited by children through crying, vomiting, becoming mute, loss of temper or running away.
- *Rage or Anger* – Adrenaline release, tense muscles and/or heart rate increases.
- *Denial* – Adults may exhibit denial differently than children. Some behaviors include feeling

numb, blocking off pain and emotion, dreaming, feeling removed from experiences or no feelings at all. Children may withdraw into noncustomary behavior patterns. One study reported avoidance and resistance to participating in art therapy by not drawing anything related to the actual disaster (Newman, 1976). Behaviors may appear non-responsive and be overlooked.

- *Unresolved Grief* – Unresolved grief could move into deep depression or major character changes to adjust to unresolved demands of grief and trauma. A child may stay sad or angry, passive or resistant.
- *Shame and Guilt* – Children do not believe in randomness and may even feel at fault after a disaster. Shame is one's public exposure of vulnerabilities. Guilt is private. There is a need to resolve these feelings, regain a sense of control, gain a new sense of independence and feel capable.

The effects of trauma in childhood can be found both immediately and after a long period of time. Trauma changes those involved. Knowing what to look for in children can lead caring adults to seek professional assistance.

Generally the world for small children is predictable and stable, served by dependable people. Any disruption in stability causes stress. The two most frequent indicators that children are stressed are CHANGE in behaviors and REGRESSION of behaviors. Children can change their behavior and react by doing things that are not in keeping with their usual style. Behaviors seen in earlier phases of development such as thumb sucking and regression in toileting may reappear.

Age groups differ in reactions. For example, loss of prized possessions, especially pets, holds greater meaning during middle childhood. Of concern to adolescents during or after a major disaster is the fear related to own body (intactness), disruption of peer relationships and school life. Adolescents feel their growing independence from parents and family is threatened. At this time, it feels different since the family needs to pull together during this time and less independence is allowed.

There will be a difference between age groups, as shown in the following table:

<b>Normal Behavior/Stressed Behavior</b>			
<b>Age Group</b>	<b>Normal Development</b>	<b>Possible Stressful Reactions</b>	<b>Consider Referral for Professional Assistance</b>
<b>Preschool (1-5)</b>	thumb sucking, bed wetting	uncontrollable crying	excessive withdrawal
	lack self-control, no sense of time, wants to exhibit independence (2+)	trembling with fright, immobile	does not respond to special attention
	fear of the dark or animals, night terror	runs aimlessly	
	clinging to parents	excessive clinging, fear of being left alone	
	curious, explorative	regressive behavior	
	loss of bladder/bowel control	marked sensitivity to loud noises, weather	
	speech difficulties	confusion, irritability	
	changes in appetite	eating problems	
<b>Middle Childhood (5-11)</b>	irritability	marked regressive behaviors	
	whining	sleep problems	
	clinging	weather fears	
	aggression, questions authority, tries new behaviors for 'fit'	headache, nausea, visual or hearing problems	
	overt competition with siblings for parents' attention	irrational fears	
	school avoidance	refusal to go to school, distractibility, fighting	
	nightmares, fear of dark	poor performance	
	withdrawal from peers		
	loss of interest/concentration in school		
<b>Early Adolescence (11-14)</b>	sleep disturbance	withdrawal, isolation	disoriented, has memory gaps
	appetite disturbance	depression, sadness, suicidal ideation	severely depressed, withdrawn
	rebellion in the home/refusal to do chores	aggressive behaviors	substance abuser
	physical problems (skin, bowel, aches and pains)	depression	unable to care for self (eat, drink, bathe)
<b>Adolescence (14-18)</b>	psychosomatic problems (rash, bowel, asthma)	confusion	much the same as middle childhood
	headache/tension hypochondriases	withdrawal, isolation	hallucinates, afraid will kill self or others
	appetite and sleep disturbance	antisocial behavior, i.e., stealing, aggression, acting out	cannot make simple decisions
	begins to identify with peers, have a need for alone time, may isolate self from family on occasion	withdrawal into heavy sleep OR night frights	excessively preoccupied with one thought
	agitation, apathy	depression	
	irresponsible behavior	poor concentration	

Adapted for use from Department of Family and Consumer Sciences, North Carolina Cooperative Extension, North Carolina State University.

Traci A. Johnston, Child Care Program Associate

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## Outreach Materials for Children

Both public and private agencies working in emergency service areas have sponsored the development of intervention and prevention materials directed to children themselves and to their families and/or teachers. The materials briefly described here can be easily adapted to specific emergencies and require a minimum outlay.

### Materials for Children

Intervention strategies for children include encouraging them to express their fears and anxieties regarding the disaster through stories and drawings. At the most simple level, allowing children to tell their own stories of a disaster and draw their own pictures of what happened to them and how they felt about it can be of considerable assistance in both diagnosis and therapy.

Books are also valuable resources. Local public libraries can put together lists of available books, by age group, about the environment and environmental hazards, separation and loss and adaptation and coping. Likewise, dolls, puppets and toys can be used in play to elicit children's concerns and conflicts and to help resolve them. Group games in which touching of persons is an important component can encourage mutual support among children and between children and their caretakers.

Reading about disasters, understanding what causes natural disasters and talking about feelings will help children who have experienced a disaster to communicate their feelings and fears. Through thoughtful questioning, children can be guided to relate their own experiences to those of the characters in the books. Select books that pertain to the actual disaster (i.e., a book about tornados for a group of children who may have experienced a tornado). Books can tap the same emotions so the child's emotions can be felt again and discussed. Children who then experience confusing, anxious feelings can retell their story. Retelling enables the child to deal with their feelings more and more each time they tell their story. This is part of the healing process.

### Treatment Principles

Some basic principles of treating child disaster victims emerge from research and training literature. A first principle is that victims of disaster are primarily normal people, but severe stress may have

temporarily disrupted their functioning. Most victims function adequately before the catastrophe, even though their ability to cope may have been impaired by the situation. Victims may show symptoms of physical or psychological stress, but they do not view their condition as pathological. Because catastrophes affect the entire cross-section of the population in an area of impact, disaster victims may come from any age group, socioeconomic class, or racial or ethnic group. Those studying children's reactions to stress point out the adaptive potential of children for many kinds of social and environmental stressors. These researchers emphasize the resilience of children, stemming from their personal dispositions, family supports and community networks, and show their considerable ability to meet and deal with stress.

A second treatment principle is that the family is the first line of resource for helping children and should be considered before involving other treatment resources. When treatment is indicated, the basic unit for services when possible should be the entire family and not just the individual child. The presence of a stable and caring parent is a crucial form of support for a child traumatized by an environmental crisis.

A third principle of treatment is that workers in disaster should seek out users of their services rather than waiting to be sought out. Outreach teams can use disaster assistance centers, schools, Red Cross evacuation centers and other community centers to provide information on the availability of services for children and families. These teams can also go to homes, mobile centers or other relocation areas. The media can be helpful in informing the public of available services.

In examining the responses of a community mental health center to a major school bus and train accident, it was found that reaching out quickly to the victims and primary caregivers during a crisis can avert the development of post-traumatic symptoms. This form of active intervention can be contrasted with the conventional wait-and-see approach of traditional community mental health services. School-based mental health counselors emphasize the importance of encouraging the school-aged victim of disaster to participate in daily activities, involving teaching staff and other adults to provide emotional support and opportunities for communication, assisting the child in confronting the crisis and

adjusting to loss, encouraging honest appraisal of the situation, and organizing schools to provide consultative services.

## Teacher Support

### Suggested Classroom Activities for Children to Understand Their Feelings

Disasters affect families in many different ways. For children, the horrors of the disaster are more than a movie or television show performed by actors. It becomes a reality that touches their very lives. For teachers to understand the individual reactions of each child in their classroom, they must look at the baseline circumstances of the families and how each family unit has been touched by the disaster.

As soon as possible it is critical to have children talk about their feelings. Following are some specific suggestions for classroom activities to help teachers help their students express themselves and thus work through the myriad of emotions they are experiencing.

### Talking Method

1. Establish an open forum (each morning) for students to ask questions, make comments, express concerns and basically talk about the disaster.
2. Ask:  
“How do you feel about (the disaster) today?”  
“What have you heard or seen on the news about the disaster?”  
“How do you think the disaster affects you?”  
“How does it affect your own family, your friends?”
3. Talk about recovery.
4. Place a box in the classroom for students to drop in written notes or questions. The next day (or sometime during that week), read the notes in the classroom, using these as a forum to encourage open discussion.

Adapted for use from Department of Family and Consumer Sciences, North Carolina Cooperative Extension, North Carolina State University

## Drawing Method

1. Ask students to draw pictures of how this disaster – or past disasters if they have experienced them – affects them and what reconstruction will be and look like.
2. Create a mural or a collage as a collective classroom project that expresses feelings about the disaster and what reconstruction will be and look like.

## Other Activities

Have students write letters to students in schools that were directly affected by the disaster as a way to express concern and caring.

Caution: Be sensitive to the different cultures and histories of nations that have experienced this kind of disaster or other trauma.

And remember: Understand the baseline circumstances of the children’s family prior to having children talk about their feelings. Above all, be honest without being too explicit. Dispel myths about class issues – for example, point out that the disaster has caused loss of people on many different levels emotionally and mentally as well as physically.

Tips on how you can help: Children are concrete thinkers for a great deal of their childhood. That is why we use real objects and pictures to guide discussion. Art, literature and play are primary ways we can provide children with props and other means to act out their feelings.

Tornados

## Tornadoes

How to Spot a Tornado

Seek Safety to Escape a Tornado

Tornado Warnings – What They Mean

Rules for Tornado Survival

Tornado Survival for Mobile Home Owners

Tornado Rescue Procedures

Clearing a Path for Access After a Tornado

Tornado Follow-Up

Insurance for Repairs of Tornado Damage

Recovery After a Tornado

When Repairing, Remodeling or Building Your Home

Managing Storm-Damaged Urban Trees

Tree Removal Following a Storm

What to Do During a Power Failure on the Farm

## How to Spot a Tornado

1. A tornado **watch** means the weather conditions exist for a tornado to form. If a tornado **warning** is issued, a tornado has been sighted. Take refuge if a warning is in effect in your area. Use a battery-powered NOAA weather radio, TV or radio to keep updated on the path of the storm and when it is safe to resume normal activities.
2. Learn how to recognize severe weather signs when tornadoes may develop. Tornadoes often develop when the weather is unseasonably hot and humid. Fairly calm winds may shift rapidly just before a tornado strikes. Look for a dark, sometimes greenish sky. A wall cloud often spawns a spinning tornado. Large hail may indicate that a tornado is near. If a tornado is imminent, a loud roar, similar to a freight train, is common. Focus on your personal safety immediately, seeking the nearest shelter in a basement, ditch or an interior room at the lowest level of a sturdy structure for protection from violent winds and airborne debris.
3. Know what a tornado looks like. Violently spinning clouds are sufficient cause for locating a safe shelter. A twisting “rope” or funnel can extend down from the base of a thundercloud in a moment or develop over 15 minutes. More intense tornadoes are shaped somewhat like an elephant trunk. A roar like a large plane or freight train indicates the tornado is very near.
4. Be more vigilant during the “high-frequency” tornado periods. In Arkansas, November and January through May have historically had more tornadoes than the summer months (see Tornado Safety, FSA-1024). Over the last 50 years, at least 18 tornadoes have occurred yearly. Most tornadoes in Arkansas occur from 3 to 8 p.m. At least seven Arkansas tornadoes had destruction paths at least one mile wide, according to National Weather Service records.
5. Heavy rains may obscure the sky, preventing you from seeing funnels that touch the ground, rise up and reverse direction. Violent weather, including multiple tornadoes, tornadoes which change direction and vary speed and funnel clouds which rise and drop in patterns that are impossible to predict, endangers people and property.

## Seek Safety to Escape a Tornado

Knowing where to go for protection during a tornado may be the difference between life and death. If you hear a tornado warning or see a tornado, seek shelter immediately. Basements, storm cellars, the ground floor of a sturdy structure, a nearby culvert or a deep ditch are possible shelters. Stay away from windows and protect your head. Specific options are given in *Tornado Safety*, FSA-1024.

### Office Buildings

Go to an interior hallway on a lower floor, preferably the basement or an area designated as a shelter in advance. If you're unfamiliar with the building choose the basement, or if there isn't a basement, go to the ground floor. Electric power failure may trap you, if you use an elevator.

### Factories, Auditoriums and Other Large Buildings with Wide-Span Roofs

These buildings are vulnerable to wind damage due to the distance between roof supports. Basements and pre-selected safe areas with adequate interior structures are preferred. Trained building employees should disconnect fuel lines and electric circuits. Trained tornado spotters should maintain a lookout from the time threatening conditions develop until the danger is past.

### Homes

Storm cellars, caves and underground excavations provide excellent protection during a tornado. Otherwise, seek refuge near a basement wall in the most sheltered and deepest part of the basement below ground. Consider sturdy central halls, closets or interior bathrooms if there isn't below-ground shelter. Where these options aren't available, take cover in the smallest room with stout walls near the center of the house. Stay on the lowest floor and pull heavy furniture over your body (head, especially) to protect yourself from broken glass and airborne debris. Take refuge and use an available NOAA weather radio, TV or radio to keep updated on the path of the tornado and when it is safe to resume normal activities.

### Mobile Homes and Modular Buildings

Arrange for the use of another convenient safe area in advance, should violent weather occur. Consider basements, a storm cellar, a designated community center, the ground floor of a sturdy structure or a nearby culvert or deep ditch. Fourteen of the 26 people who died in tornadoes on March 1, 1997, in Arkansas were in mobile homes. Abandon both mobile homes and modular buildings during tornado warnings, even if your mobile home is tied down.

### Schools

Go to an interior hallway on the lowest floor or other designated tornado shelter area. Avoid gymnasiums and other structures with large, free span roofs. Keep children away from windows, glass doors and outside walls.

### Shopping Centers

Go to a designated shelter area, lie flat outside in a ditch or on the lee side of a high-walled embankment...if you know which direction the tornado is moving. A ravine, culvert or under a bridge are possibilities if they are available. Do not stay in your car, due to the danger of airborne debris and broken glass.

### Open Country

If there is time and there is a route to drive at right angles away from the tornado's path, you may escape. This option frequently isn't available. Staying in a car in the path of a tornado is too dangerous due to the danger of airborne debris and broken glass. Lie flat in the nearest ditch, ravine, culvert or under a bridge.

Protect yourself from airborne debris. Most tornado damage is caused by winds of less than 125 miles per hour. However, some tornadoes have winds exceeding 250 miles per hour. Debris projectiles strike you like a bullet at tornado wind velocities.

## Tornado Warnings – What They Mean

A **tornado watch** indicates that weather conditions exist that may create tornadoes or severe thunderstorms in the watch area. Watches are usually issued for periods of 4 hours or less.

A watch does not mean that a tornado has been sighted. Residents of the designated watch area need not seek shelter or disrupt their normal routine during the tornado watch, but they should tune in to TV, NOAA radio or local radio stations to be alert for worsening weather. Warning time periods are often extended or terminated early, depending on the development of any threatening weather.

The National Weather Service offices issue **tornado warnings** when a tornado has actually been

sighted or indicated by radar. The warning may cover periods of less than one hour and is usually issued for small areas, usually parts of specified counties. The warning will indicate where the tornado was detected, when detected and the area through which it is expected to advance.

A tornado warning advises persons in the expected path of the storm to take shelter immediately. During one storm in 1997, 16 tornadoes were responsible for 25 deaths in Arkansas. The Little Rock National Weather Service issued 34 tornado warnings. The lead times for the communities where the deaths and majority of the injuries occurred was from 9 to 28 minutes, based on the first tornado warning issued for that immediate area.

## Rules for Tornado Survival

A tornado warning means that a **tornado has been sighted**. You cannot know whether you will have a couple of minutes to seek shelter, or as much as 20 minutes until a tornado appears.

1. Go to a below-ground location immediately, if one is available. In the order of preference, a storm cellar, root cellar or a basement provide greater protection. If this isn't available, seek a central room on the lowest (ground) floor of the building. Select an interior hallway or an interior room without a window, such as a laundry room, closet, bathroom or office. Most people are injured from airborne debris; some are victims of a collapsing building.
2. Do not stay in a vehicle or mobile home because they are hazardous during a tornado and can't provide shelter.
3. Protect yourself from glass blown at high velocities. A heavy desk or sturdy furniture will give some protection from building materials, furnishings or glass if you can crouch under it.
4. Protect your head and stay away from windows. **Do not** open windows or doors.
5. Remember typical tornado dangers and don't remain out in the open. Falling trees, airborne objects, broken glass, collapsing buildings and collapsing power lines are all likely.
6. Get in a culvert or ditch or under a bridge for protection from airborne debris if you are in an open area. Tornadoes can toss a truck or car, so you cannot risk getting picked up by tornadic winds.

Storm fronts may have several funnel clouds. A number of tornadoes reverse direction, so keep alert to these dangers, even after a tornado has passed. Be a survivor, not a victim, and wait patiently because rain and hail can easily mask another tornado. If you don't lose your electric power and television, the National Weather Service bulletins provide the best indication of when the damaging storms have passed your area.

## Tornado Survival for Mobile Home Owners

If a tornado **watch** is issued for your area, it is wise to make plans to leave your mobile home and take shelter in a below-ground shelter. If the weather situation permits, take time to turn off the mobile home gas supply, the electric service entrance at the meter and your water supply. Don't compromise reaching a designated shelter. (Every mobile home owner should identify a designated tornado shelter, such as a community center, etc., in advance, if an underground shelter isn't available.)

A tornado **warning** means that a **tornado has been sighted**. You cannot know whether you will have a couple of minutes to seek shelter, or as much as 20 minutes until a tornado appears. Fourteen of the 26 people who died in Arkansas tornadoes on March 1, 1997, were in mobile homes. Abandon your mobile home, even if it is tied down. Do not take time to disconnect utilities after a warning has been issued!

1. Go to a below-ground location immediately, if one is available. In the order of preference, a storm cellar, root cellar or a basement provide greater protection. If this isn't available, seek a central room on the lowest (ground) floor of the building. Select an interior hallway or an interior room without a window, such as a laundry room,

closet, bathroom or office. Most people are injured from airborne debris; some are victims of a collapsing building.

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Storm fronts may have several funnel clouds. A number of tornadoes reverse direction, so keep alert to these dangers, even after a tornado has passed. Be a survivor, not a victim, and wait patiently because rain and hail can easily mask another tornado.

## Tornado Rescue Procedures

1. Obtain first aid or medical care for anyone injured by the storm. Notify your relatives of your safety. This may free up local authorities from trying to locate you, should you not send word. Use telephones only for essential emergency calls to allow others to obtain rescue or treatment.
2. Do not enter any building damaged by a tornado until it has been properly “shored” or deemed stable from further collapse. Plaster, ceilings and walls may not be secure and may collapse without much contact or force. Downed wires should be avoided and treated as if they are energized. Wait for an electrician or the power company to disconnect power to the damaged property. Allow qualified electricians to remove electrical hazards before attempting to reenter damaged property.
3. Be on the alert for gas line leaks. Don’t bring lanterns, torches, lighted cigarettes or open flames into damaged buildings. If there is any odor, shut off the gas supply immediately and contact your gas supplier as soon as possible. Open all windows and doors. Leave the building immediately. Don’t reenter the building until professionals check and inform you that there is no longer a danger that gas may cause an explosion.
4. Assist others needing emergency evacuation and medical care, to the degree you have the professional training. Contact the local emergency medical technicians for advice, allowing them to “talk you through” first aid procedures to provide the best care for those injured by the storm. If possible, call the emergency room at the local hospital to alert the medical staff about the injuries that need treatment.

## Clearing a Path for Access After a Tornado

Volunteers with chainsaws can quickly restore access after a tornado. However, a fatal mistake can occur if you're too hasty. Felling trees, as well as operating a chainsaw, are dangerous enough that special precautions are important. Both falling trees and chain saws may become lethal if caution isn't used.

1. Avoid areas where electric power lines could electrocute a volunteer if the falling tree or severed limbs don't drop where one expects. Call the electric utility to disconnect power before beginning to cut in those areas.
2. If it is windy, attempt to find another way to reach your destination. Felling a tree in the wind requires an experienced woodsman and adds more danger. Careful preparations are necessary to avoid becoming a victim of a falling tree or from losing control of your saw.
3. Choose cuts to be efficient in clearing the path. Avoid making cuts above waist level, if it can be done without adding three or four extra cuts. Reduce fatigue by taking brief rests. Inform others about your plans, including that you're going back to cutting. After fatigue sets in from prolonged rescue or chain saw work, following these procedures is more critical because your judgment is no longer as attentive or sharp.
4. Determine your escape route from a falling tree before you begin your cut. If your path isn't clear 45 degrees from the line where you expect the tree to fall, clear the escape route first.
5. Examine the entire surface where you expect to cut. Avoid cutting through where the tree has "grown around" a wire or fence, etc. Chainsaw kick-backs often are caused by striking an object, especially with the tip of the blade. Kickbacks may cause severe lacerations, often with profuse bleeding. Take special precautions to avoid injury because access to medical care may be delayed considerably due to the destruction and injuries from storm damage.
6. Select your cuts so that the severed portion drops away without pinching the saw blade. Make certain your footing is firm and you are in a balanced position. Stand slightly off to one side of the saw to protect your body from a sudden "kick-back".
7. Fell trees away from other obstructions. If a tree falls onto another standing tree, the danger is much greater that the saw operator will be struck by one of the falling trees when the final cut is made.
8. While bucking, or cutting, the felled tree into manageable lengths, guard against unexpected log rolling. Block the log from rolling to avoid dangerous hazards including sudden saw shift or saw kickback. Experienced woodsmen work on the uphill side of the log after it has been chocked.

*Chain Saw Safety*, University of Arkansas Extension fact sheet FSA-1009, has additional pointers for successful cutting. Obtain a copy to review for your preparation before beginning to clear trees damaged by the storm.

## Tornado Follow-Up

1. Use only approved or chlorinated supplies of drinking water. Consider water from all wells, cisterns and other water systems in the disaster area unsafe until they are tested and proven safe. Until professionals check and inform you that the water is not contaminated, boil or chlorinate drinking water before using it.
2. Get food, clothing, medical care or shelter at disaster recovery stations. Stay out of the disaster area unless you live there or are requested by someone who lives there or are an emergency worker. Extra people who are unprepared to render aid slow other's access and may endanger you or a victim that is being rescued.
3. Contact your insurance agent as soon as possible if you have property damage insurance. FEMA may have disaster stations and/or information for enrolling, if you qualify for emergency measures and federal disaster loans in declared disasters. The local emergency management services office can supply details.
4. Don't reenter your home or other damaged buildings until the electric and gas utilities approve reentry. A utility may be restoring electric service or others may be connecting portable generators to power lines. Downed lines may be energized. Allow qualified electricians to remove electrical hazards before attempting to reenter damaged property.
5. Be alert for gas line leaks. Don't bring lanterns, torches, lighted cigarettes or open flames into damaged buildings. If there is any odor, shut off the gas supply immediately and contact your gas supplier as soon as possible. Open all windows and doors. Leave the building immediately. Don't reenter the building until the risk of a gas explosion is eliminated.
6. Check food supplies. Food may contain slivers of glass or other debris. Discard food with broken wrap, seams or exposed contents. Move food that needs refrigeration within a few hours once the refrigerator is opened. Follow guidelines in *A Quick Consumer Guide to Safe Food Handling*, FSHED-82, for refrigerated or frozen foods.
7. Cooperate in the general clean-up of debris. Often, trees need to be cleared from access roads and experienced volunteers are needed to move limbs. Observe chain saw safety procedures and encourage other volunteers to proceed carefully. See *Chain Saw Safety*, FSA-1009. Downed wires should be avoided and treated as if they are energized. Electrical hazards, fallen trees, chain saws and extra adrenalin can be an extremely dangerous mixture.
8. Do not enter any building damaged by a tornado until it has been properly "shored" or deemed stable from further collapse. Plaster, ceilings and walls may not be secure and may collapse without much contact or force.
9. Be alert for exposed nails and other hazards that one might step on or bump into after tornado damage. Glass and projecting nails may gouge flesh from hands or feet. During clean-up and repairs wear shoes and gloves. Fiberglass insulation can irritate and cause reactions on unprotected legs and arms as well.
10. Use telephones only for essential communications in order to allow others to complete essential calls.

## Insurance for Repairs of Tornado Damage

If your roof has suffered structural damage from a tornado, make family safety your first priority. In some cases, such as a partially collapsed roof, you may need to relocate until repairs are made. Next, report damage to your insurance company.

Call your insurance agent as soon as possible. If temporary living costs are partially covered by your insurance policy, work out these arrangements with the agent or claims adjuster. The sooner you talk to your agent, the sooner your claim will be filed and an adjuster can be scheduled to inspect your damage. The amount and type of coverage you have will affect how much of the loss will be covered by insurance. You may wish to get your agent's advice about your policy's coverage and how best to get reimbursement for the repair expenses.

If you must make temporary repairs before an insurance adjuster's visit, talk with your agent about how to get reimbursement. You may offer to take photographs or make a videotape of the damage.

Don't be in a hurry to settle your insurance claim. Instead, keep your agent current on repair estimates, repair progress and repair costs. Additional damage may be discovered after the repairs are underway. Be sure that you have all water damage, foundation and structural damage covered on the repair estimates. If the work has been completed to your satisfaction, use the final billing to get the insurance repayment, if possible.

If the claims adjuster works directly with the contractor, make sure you understand what repairs are being done before signing an agreement.

Keep copies of the important papers in a safety deposit box or secure place, so they're not damaged or lost. Good records will help recovery on insurance claims, applications for disaster assistance and income tax deductions.

## Recovery After a Tornado

1. Until professionals check and inform you that your water is not contaminated, boil or chlorinate drinking water before using it. Follow guidelines in A Quick Consumer Guide to Safe Food Handling, FSHE82, for refrigerated or frozen foods. If in doubt, throw it out. Get essential food, clothing, medical care or shelter at disaster recovery stations.
2. Obtain tarpaulins, polyethylene sheets and pressurized foam insulation as quickly as possible to contain water damage or limit progressive deterioration to your home. Shingles, sheetrock, framing and concrete blocks may be helpful in making a portion of your home usable. Consult with your insurance agent about what modifications you should pursue and if, or how, they are reimbursable. Keep good records.
3. After electric and gas utilities approve reentry into a damaged building, salvaging property and making repairs need to be done safely. Do not enter a damaged building until it has been properly "shored" or restrained from further collapse. Plaster, ceilings and walls may not be secure and may collapse without much contact or force.
4. Get an expert to check your house for structural damage, some of which may not be obvious.  
  
Inspect the interior of the house or building for structural damage. Using a good light, check the framing. Look for roof ridge separation, loose knee braces and loose rafters where the rafters join the walls.
5. Check clothing and blankets for fiberglass or mineral wool insulation before using. Fibers from these insulation materials can be irritating and a serious nuisance. Remove drapes and carpet to allow drying and provide access to inspect and repair structural damage.
6. Inspect the roof from the inside and outside. If you get inside the building on a sunny day and don't see leaks, get a partner to help you. Apply water with a garden hose to the roof while someone below watches for drips that indicate a roof leak.
7. During clean-up and repairs, be alert for exposed nails that may penetrate your foot. Remove or flatten these nails and wear shoes and gloves. Glass, including fiberglass insulation, can irritate or cause skin reactions on unprotected legs and arms, as well as hands and feet.
8. Use telephones only for essential communications in order to allow others to complete essential calls.

## When Repairing, Remodeling or Building Your Home

Structures built to meet or exceed current model building codes for high-wind criteria have a much better chance of surviving violent windstorms. The Standard Building Code, supported by the Southern Building Code Congress International, Inc., is one source for guidance on strengthening your home against high winds. Although no home can withstand a direct hit from a severe tornado, good construction will help your home survive if it's off to the side of the tornado's path.

When inspecting your home, pay particular attention to the windows, doors, roof, gables and connections (roof-to-wall, wall-to-foundation). Residences often are not built to withstand high winds, and weaknesses in the connections and structure make your home more vulnerable to significant damage.

If you're aware of the Southern Building Code standards and are handy with a hammer and saw, you can do much of the work yourself. However, home repair, remodeling or construction may require a building contractor, or possibly, a registered design professional, such as an architect or an engineer. Any repair or remodeling should be done only after determining where the electrical wiring is routed to avoid contact with electricity.

**Windows** – Impact-resistant window systems have a much better chance of surviving a major windstorm. After a storm, check that sashes are sturdy and will slide, repairing as necessary. Repair cracked putty and clean.

**Entry Doors** – Install doors with at least three hinges and a dead bolt security lock that has a bolt at least 1 inch long. Door frames must anchor securely to wall framing. Inspect hinges, latches and door perimeter fit to assure that the frame isn't twisted so that rain blowing against it doesn't leak into the house.

**Patio Doors** – Impact-resistant assemblies with laminated glass or plastic glazing are more resistant to tornadoes. Consider other sturdier types of doors, if that is an acceptable option.

**Garage Doors** – Install permanent wood or metal stiffeners. Garage doors are highly susceptible to wind damage, especially doors that are wider than 8 feet.

**Roofs** – Confirm that rafters and trusses are securely connected to the walls. Using a good light, check for ridge separation, loose knee braces or loose rafters or trusses where they are fastened to the wall. (See Connections below.) Replace damaged sheathing, flashing and shingles. Water leaks caused by loose nails or damaged flashing can be located using a garden hose. Replace or install a roof covering designed to resist high winds.

**Gables** – Brace the end wall of a gable according to current "high-wind" building code criteria.

**Structure and Connections** – If your house has more than one story, make certain the upper story wall frame is securely connected to the lower level framing. Do this inspection when remodeling or repairing damage. Inspect the interior of the house for structural damage. Remove broken plaster or sheetrock or split siding to inspect the structure. Make certain that walls are properly anchored to the foundation. Inspect the foundation where the wall joins it to assure they haven't separated (or pulled plate bolts loose). A registered engineer or architect can recommend proper repair that a qualified contractor can repair, retrofit or remedy.

**Masonry, Chimneys and Gutters** – Repair or caulk cracks and seams in masonry. Correct the pitch of gutters and straighten gutters and downspouts. Flush the gutters and wash the entire house exterior. Caulk and paint to protect the exterior finish and reduce hot and cold air leaks or loss from the heated or air conditioned space.

Use a ladder carefully for inspections and repair. Falls are one of the most common severe home hazards. Use a sturdy ladder that is tall enough and position it properly to inspect or work on your home.

## Managing Storm-Damaged Urban Trees

Arkansas has more than its fair share of winter and summer storms that damage trees. Once power is restored after a storm and cleanup initiated, land and homeowners can begin to assess damage to their landscape trees. The good news is that there is no need for homeowners to pay a premium for services in the first few weeks after the storm. In the case of ornamental trees, cleanup and tree trimming doesn't have to be done immediately unless life or property are threatened. Forest landowners also should not be panicked into accepting a salvage price for timber without first evaluating whether salvage is really necessary.

Storm damage to landscape trees can range from relatively minor damage with only the smallest branches being injured to splitting of the trunk and uprooting of the tree. While minor injuries seldom result in permanent damage to the tree, severe injuries can increase a tree's susceptibility to insect and disease attack, ultimately killing the tree. Damage to landscape trees should, therefore, be properly treated and repaired to maintain the health of the tree. Some types of damage can be treated by the homeowner. Other more serious damage should be treated by a tree specialist, especially if extensive bracing, cabling or removal of large branches is required. As always, never try to remove branches or trees from utility lines. Let the professionals do it. As with all things, there is a right and a wrong way to repair storm-damaged trees.

First, let's put your mind to rest over what to do about some types of storm damage. The following categories of storm-damaged trees will survive for now and can wait to be harvested later when emergency salvage operations are over and, for forest landowners, when timber prices (and removal costs) are back to normal:

1. Trees with broken tops which still have four or more live limbs remaining.
2. Trees leaning less than 45 degrees.
3. Windblown trees with roots still in the ground.

Assuming the decision has been made to repair the tree, the next question is: "Am I capable of repairing the damage myself or should I seek

professional help?" Major repair will undoubtedly require the use of a chain saw and climbing equipment. Unless you are experienced in the use of such equipment and comfortable working off the ground, it may be best to have the work performed by a competent professional. The names of qualified firms can be obtained from local nurserymen. Also, look for listings of professionals under Tree Service in the Yellow Pages. Make absolutely sure that they carry proper liability and workmen's compensation insurance before allowing them to begin work on the job.

To protect yourself and your property it's okay to ask for references or qualifications. You might want to hold on to your money until it has been completely earned by the person you have hired to do a job. Even under critical emergency conditions, complete, good quality repairs and tree removal must be done or more damage and deterioration can appear in the future. Again, don't let just anyone who has a chain saw and a truck remove your landscape trees.

Based on common types of storm damage, here's a few recommended practices to put your yard back into order. For trees with tops broken out, remove the broken snags down to the next major interior branch. Try not to top the tree. Topping the tree will result in branches that are weak and prone to future damage. If a tree is only partially damaged, pruning damaged branches can restore the tree. First, remove broken and hanging branches to ensure safety and prevent additional property damage. Second, trees that can be saved should have broken branches properly pruned using the "natural target pruning method." Correct pruning is the best thing you can do for your tree. Improper pruning will only cause more damage to the tree, weakening it further by exposing a larger area of the tree to decay organisms.

When a tree is severely damaged, the first question that must be answered is: "Is the condition of the tree such to make keeping it worthwhile?" Take the time and effort to save a tree only if a substantial portion of the tree remains intact and if, when repairs are made, the tree will still be attractive and of value to the property owner. This is particularly true if the tree has brittle wood and a branch structure

that makes it vulnerable to additional damage from future storms. In addition to its condition, other factors to consider in determining whether or not a tree is worth saving include its age, species, growing location, the value it adds to the property, sentimental value, etc. When all of these are considered, it may often be more desirable to replace the damaged tree than perform extensive repairs. If you are not sure, see a local nurseryman, professional tree service company or consulting urban forester for assistance. If it is determined the tree is not worth saving, remove the tree as soon as possible.

Pine trees that are severely bent will have cracks in the bark and resin flow which will attract beetles. Bent hardwoods are less likely to be attacked by insects or diseases. Severely bent trees will not be suitable for veneer, poles or lumber because of internal splitting (wind shake). Small trees less than 15 feet tall usually recover and straighten. Salvage larger hardwoods and pines that are severely bent or exhibit sap flow down the bark.

Some very simple guidelines are:

- Determine whether the tree can be repaired, or if it should be removed completely. If the main trunk is completely broken or if the tree is uprooted, it should be removed.
- Remove a broken branch to the nearest branch or to the tree trunk. Never leave a ragged stub. Remove large branches with three cuts. This will prevent splintering and peeling. Make the first cut upward from the bottom of the branch about 12 inches from the next branch. Cut about halfway through the branch, or until the saw begins to pitch. Make the second cut 5 or 6 inches further out, and continue cutting until the branch falls. With a third cut remove the stub cleanly without peeling.
- Contrary to popular belief, it is not necessary to treat trunk and limb wounds with tree paint. Research shows that painted areas can actually lead to increased rot and decay due to trapped moisture. Take care during the salvage operations. Do not bang up or damage any standing live trees because wounds of this type are ideal for invasion by decay-causing fungi. And, in the case of pines, wounded trees become and remain very attractive to this summer's and next year's bark beetles. Wounded pines could be the center of a bark beetle buildup next year, so it would be prudent to avoid damaging pine stems at any time of year.

## How to Reduce Future Storm Damage

Hazard tree inspections offer the best protection against future storm damage. Systematic inspections and assessments allow you to find and correct defective trees. Sound trees can withstand stronger winds than defective trees, so during storms the likelihood of tree failure is reduced.

A few tree species, including Chinese elm, silver maple, sycamore, boxelder, Bradford pear and various poplars, have brittle wood that breaks easily. These rapid-growing trees are particularly susceptible to storm damage. Homeowners should be aware of these characteristics and avoid planting such species close to buildings, utility lines, etc., where potential damage could occur. If such trees are already growing in these locations, some preventive practices, such as pruning and bracing or cabling, may help reduce the potential of storm damage. This is particularly true as the tree grows in size and the weight and surface of the leaf and branch area increases.

## Waste Disposal

Materials from fallen or salvaged trees can be used in several ways. The larger branches can be cut and used for firewood. Add smaller branches and twigs to the compost pile or cut up for kindling. Branches can also be converted into chips for use as compost, mulch or other landscaping purposes if chipping equipment is available. In some areas, landfills or other waste disposal facilities are available to local residents.

Following the cleanup and repair of storm-damaged trees, you may wish to make some new plantings. A few suggestions can help reduce future maintenance problems. First, make certain the tree being considered is hardy to the area. Then, consider the potential insect and/or disease problems that may be associated with a particular species. It is also helpful to know the approximate size and shape of the tree when mature. This will help determine where to plant it to avoid interference with utility lines, branches rubbing against the house or other buildings, etc. Finally, consider characteristics of the tree other than the provision of shade, such as presence of spring flowers, attractiveness to birds, fall color and winter appearance. Through careful selection it is possible to obtain species that will contribute to the overall landscape in more than just one way.

For more information concerning salvaging landscape trees or timber, contact your local offices of the Cooperative Extension Service, Arkansas Forestry Commission and landscape professionals in your area.

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## Tree Removal Following a Storm

Following a storm, such as a tornado or ice storm, cutting and removing trees is complicated by tangled trees, twisted limbs and other snarled obstacles. Normally, experienced loggers avoid trees that are twisted, pre-loaded or fallen and tangled together. After a tornado, trees and limbs may be so matted together that clearing with chain saws becomes dangerous work. Experienced chain saw operators have developed approaches to minimize binding of limbs on the saw and to avoid getting pinned by falling trees. Caution and experience are essential because entangled limbs and trees do not react as they would if they were cut separately.

Many times trees with full foliage are warped causing unusual forces or weight distributions. Proper limbing varies from the normal cutting situation. Often, this will cause more saw kickback and pinching of the saw.

Before approaching a downed tree, check for any power lines or other hazards that may be present. Continue to be alert for overhead hazards, debris that could be dislodged as you work or trees lodging against the tree you are cutting.

Do not try to remove a tree that is leaning on or applying force onto a structure without having the structure inspected.

Begin limbing at the outer edges of the tree limbs. Always clear an area for your work as you advance. The first limbs to be cut are those on the top of the trunk. Cut these limbs as far toward the top of the tree as possible before removing the remaining limbs that are resting on the ground.

Do not make cuts above chest high with a chain saw. It's dangerous because it is easy to lose your balance and the result could be fatal.

Stand on the opposite side of the trunk from the limb being cut. The trunk provides a barrier between you and the saw and helps protect you from accidental contact with the chain.

When removing trees and residue after a storm (or disaster), keep in mind that your main objectives are to safely remove obstacles that may pose a hazard to individuals or structures and to clear a path for services to be resumed.

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When cutting trees after a storm, remember that you are not cutting firewood. The proper cut log length is determined by the weight that one person can handle. The length of limbs should not be so large as to hamper the removal of the brush pile by large equipment.

Bucking, cutting the log into sections, differs depending on how the log is supported. When a log lays flat on the ground, cut down from the top surface, then roll it over and finish the cut from the opposite side. When a log is supported on one end, cut one-third of the diameter from the underside to avoid pinching and splintering. Then cut through the remaining two-thirds of the diameter from the top. If a log is supported at both ends, make the first cut through the top one-third of the diameter. The remaining limb, tree trunk or log is then cut upward from the bottom.

Cutting branches resting on the ground may be necessary to clear the area as you work. Beware that the tree may sag or roll as a new branch is cut. The likelihood of the tree rolling increases as more branches are removed. Be alert for any trunk movement and be ready to move away quickly if necessary.

Do not hold a powered saw with one hand and clear limbs with the other hand. Shut off the chain saw and put it down until limbs have been cleared.

Limbs and brush are normally piled along roads following a storm. Service crews can load and dispose of debris later. Do not locate piles under utility lines or other places that will be dangerous or hard to reach with large loaders and other equipment.

Pay attention to what is going on around you at all times. Do not work as large groups in a manner that individuals interfere with each other or there is only one task. Normally, grouping four to six people for cutting and moving logs provides good teamwork to safely handle most projects without bumping into each other.

Take frequent breaks and drink plenty of water. Each person in a group should take turns taking breaks and supervising the safety of the other individuals. Using good judgment is essential for staying safe and doing a good job.

## What to Do During a Power Failure on the Farm

A power failure or fuel shortage can cause problems on poultry and livestock farms, but being prepared can minimize the seriousness of these problems.

There are four areas of concern:

- Poultry
- Livestock
- Milk
- Equipment

### Poultry and Livestock

To protect poultry and livestock during a power failure, you should provide four essentials: ventilation, water, heat and feed.

#### *Ventilation*

- Most commercial poultry facilities should already be equipped with standby power generation for emergency ventilation.
- Ventilate shelter with standby power generators rather than natural ventilation.
- Do not close buildings tight to conserve heat, since animals could suffocate from lack of oxygen.
- Because oxygen will eventually be used up in mechanically ventilated production facilities, clear debris from all vents. Then open vents to facilitate natural airflow.
- In dairy facilities, open doors or turn cows outside, unless weather conditions prohibit (e.g., ice storm, tornado, etc.).

#### *Water*

- Provide all animals, especially cattle, with plenty of water.
- Your water pump might be adapted to be driven with a small gasoline engine and a belt. In some cases, a tractor may provide power for a standby

power generator. Otherwise you will need to haul water.

- If you have an outside source of water (pond or a stream), cattle can be turned out.
- Whatever the source of water, make sure it remains clean so animals can drink it.
- If no water is available, dairymen can feed cows their own milk as a last resort.

#### *Heat*

- Provide essential heat during cold weather. Use portable camp stoves and heaters as emergency heat sources for brooders. However, remember that stoves or heaters use oxygen and, if improperly managed, can present a fire hazard. Have qualified personnel inspect your standby heaters routinely in order to enhance fuel combustion and heat production; recondition or discard equipment that has potential to ignite a fire.
- Plan ahead to have this equipment ready when needed.

#### *Feed*

- Provide feed. Animals need extra energy for body heat during prolonged severe weather, especially if they are unsheltered. The best sources of energy are corn and other grains.
- If mechanical feeders are not connected to emergency power generation equipment, they will be inoperable during a power failure and emergency feeding procedures must be employed.
- Use pelleted cake or cake concentrate for emergency feed.

### Storing Milk

- Request that the marketing cooperative or processor pick up milk as soon as possible.

- A standby power generator can handle vital electrical equipment on the dairy during emergencies. Although such equipment can represent a sizable financial investment, one major power failure can pay for the equipment. While generation equipment can be borrowed during emergencies, be aware that travel may not be possible in ice storms, severe rain or wind storms and such equipment may already be in use.
- The intake manifold on a gasoline tractor engine may be used as a vacuum to operate select milking machines that do not have magnetic pulsators, but the vacuum levels may vary and increase the incidence of mastitis. If cows are not milked within 24 hours, the level of mastitis is likely to increase greatly.
- Even if you are short of extra milk storage facilities, do not store milk in stock tanks or other containers such as bathtubs. Dairy plants are not likely to accept milk that has been stored in anything other than regular milk storage containers.
- Check with your local marketing cooperative or processor about the policy from the Arkansas Department of Health regarding emergency storage of milk.
- If you are unable to cool your milk or have it picked up, check your tank for souring each time you add milk to it by looking for clumping or smelling for odors. This check could mean the difference between losing all or only part of your milk supply.

## Standby Power Generators

Emergency power generation is strongly recommended for commercial facilities caring for large numbers of animals. However, emergency power generation equipment must be properly sized, installed, maintained and routinely tested to be effective.

- Remember when sizing generators to account for both operating and start-up wattage needs.
- Mount generators securely in a location that protects the equipment from the weather, but permits the exhaust of gases and heat during the operation.
- Keep wiring runs as short as possible and size the wire for the maximum current load.
- Test generation equipment under full load for at least 30 minutes weekly and ensure that all equipment operates properly under generated power.
- Ensure that adequate fuel is available.

## Equipment

- Unplug or turn off all electric equipment to prevent damage when power is restored.

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*Ice, Snow, Cold and Storms*

## **Ice, Snow, Cold and Storms**

Alternative Heat Sources

Frozen Plumbing

Freezers During Power Outage

Ice and Snow Accumulations on Roofs

Farm Practices During Ice and Snow

Evaluating Ice Damage to Forest Stands

Managing Storm-Damaged Urban Trees

What to Do During a Power Failure on the Farm

Tree Removal Following a Storm

Electrical Safety During a Flood or Ice Storm

OSHA's Tips for Keeping Workers Safe in the Cold

## Alternative Heat Sources

During severe winter storms, your home heating system could be inoperative for as long as several days. To minimize discomfort and possible health problems during this time, conserve body heat by dressing warmly; find or improvise an alternative heat source, such as a fireplace or electric space heater; confine heating to a single room; and keep safety a foremost consideration. While chances of freezing to death in your home are small, there's a greater danger of death by fire, lack of oxygen or carbon monoxide poisoning.

### Think "Safety First"

Safety is critical in a heating emergency. Follow these precautions:

- Do not burn anything larger than candles inside your home without providing good ventilation to the outside.
- Any type of heater (except electric) should be vented. Connect the stove pipe to a chimney flue if at all possible. Or hook up your stove to the flue entrance of the nonfunctioning furnace pipe. If no other alternative exists, consider extending a stove pipe through a window. Replace the window glass with a metal sheet and run the temporary stove pipe through the metal.
- If you chose a catalytic or unvented heater, cross-ventilate by opening a window an inch on each side of the room. It is better to let in some cold air than to run the risk of carbon monoxide poisoning.
- Do not use a gas or electric oven or surface units for heating.
- Do not burn outdoor barbecue materials such as charcoal briquettes inside, even in a fireplace.
- Do not try to use bottled gas in natural gas appliances unless you have converted the appliances for such use. Also, flues and piping made for gas-burning appliances may be unsafe for use with wood heaters.

- Have one person watch for unintentional fires whenever an alternative heat source is used. One person should also stay awake to watch for fire and make sure ventilation is adequate.
- All homes should have battery-operated smoke and CO (carbon monoxide) detectors with alarms installed.
- Keep firefighting materials on-hand.

### Conserve Body Heat

- Put on extra clothing.
- If cold is severe, your bed may be the warmest place. Use extra blankets and coverings to trap body heat; this is an especially good way to keep children warm.
- Farm families might consider taking refuge in a warm livestock barn.

### Find or Improve an Alternative Heat Source

You may have alternative heating resources around your home such as:

- Fireplace, space heater, catalytic camp stove
- Wood, gas or oil heater
- Gas-fired hot water heater

### Provide Fuel

Some common materials that could be used for fuel include:

- Firewood, newspapers, magazines
- Kerosene
- Woodchips, straw, corncobs

Tightly rolled newspapers and magazines can be used as paper "logs." Stack them as you would firewood to allow for air circulation. If the heating situation becomes critical, consider burning wood, including lumber and furniture.

## Heat One Room

Close off all rooms except the one to be heated. When choosing a room, consider the following:

- If you're using a vented stove or space heater, select a room with a stove or chimney flue.
- Confine emergency heat to a small area.
- Choose a room on the "warm" side of the house, away from prevailing winds.
- Avoid rooms with large windows or uninsulated walls. Interior bathrooms probably have the lowest air leakage and heat loss. Your basement may be a warm place in cold weather because the earth acts as insulation and cuts heat loss. Isolate the room from the rest of the house by keeping doors closed, hanging bedding or heavy drapes over doorways or putting up temporary partitions of cardboard or plywood.

Make sure you have a backup plan if you can't find a safe way to stay warm. Staying with relatives or going to a designated shelter might be an option.

## Frozen Plumbing

Frozen or broken water pipes cause damage to homes during extreme cold. If pipes in the walls aren't properly insulated, they can freeze and rupture. (A 1/8-inch crack in a pipe can release up to 250 gallons of water a day, soaking floors, rugs and furniture.)

Some steps that you can take to prevent this damage follow:

### Before Cold Weather

- Locate and insulate pipes which are the most susceptible to freezing, typically those near outer walls, in crawl spaces or in the attic.
- Use insulation made especially for insulating pipes.
- Wrap pipes with heat tape (UL-approved).
- Seal any leaks that allow cold air inside where pipes are located.
- Disconnect garden hoses and shut off and drain water from pipes leading to outside faucets. This reduces the chance of freezing in the short span of pipe just inside the house.
- Let hot and cold water trickle at night from a faucet on an outside wall.
- Open cabinet doors to allow more heat to get to uninsulated pipes under a sink or appliances near an outer wall.

- Make sure heat is left on and set no lower than 55°F.
- If you plan to be away, have someone check your house daily to make sure the heat is still on to prevent freezing.
- Drain and shut off sprinkler systems.

### If Pipes Freeze

- Shut off the water, in case pipes burst, to minimize the damage caused to your home. If possible, shut off water to just the affected areas. For example, shut off the valve normally located on the cold water side of the hot water tank if a hot water pipe is frozen. This will allow you to continue some of the preventative measures listed above.
- Call a plumber, and contact your insurance agent.
- Never try to thaw a pipe with an open flame or torch or an electrical device that is not fault protected.
- Always be careful of the potential for electric shock in and around standing water.

## Freezers During Power Outage

During a power outage or if there is potential for a sustained power outage, there are some actions that you can do or not do that will help keep your frozen food safe.

- Do not open the freezer door. Opening the doors hastens thawing.
  - Cover the freezer with blankets to help hold in the cold, but don't cover the vents.
  - Group meat and poultry to one side of the freezer or on a tray so that if they start to thaw the meat juices will not get onto other foods.
  - If the power might be off for several days, use dry ice to keep the temperature below freezing. Twenty-five pounds of ice should keep a full 10-cubic-foot freezer below freezing for three to four days and a half-full freezer for two to three days.
  - If there is a potential for power failure, set the freezer control for -10°F to -20°F. The colder the foods, the longer they will keep.
- Pile the foods together to keep the foods frozen longer.
  - Frozen meat will stay frozen longer than a freezer with lots of baked items.
  - A large freezer will keep the foods frozen longer than a small one.

Block ice is better than dry ice in a refrigerator or ice chest. If block ice is used in a refrigerator, place it in a container large enough to hold the water after the block melts. (This is not necessary when using dry ice, because there is no moisture involved.) A large block of dry ice could freeze everything. If dry ice is used, place cardboard, insulation or regular ice between the dry ice and food to prevent freezer burn.

**WARNING:** When using dry ice – Dry ice is -80°C. Keep foods away from the dry ice. Do not handle dry ice without gloves. When using dry ice, the room should be ventilated. Do not place dry ice in an airtight container, it could burst suddenly when it warms.

There are several factors which influence the speed of thawing.

- The food in a fully-loaded freezer will last longer than a half-filled one.

## Ice and Snow Accumulations on Roofs

All properly built roofs, whether for animal housing, commercial applications or residences, are built to withstand a “design” snow and ice load. The snow design load is based upon the expected frequency and severity of snowstorms. It also considers such factors as the type of structure, its construction and the risk to human life and safety.

In Arkansas, the design snow load for animal housing is typically about 5 to 10 lbs. per square foot. For residents, commercial buildings and essential services such as hospitals, the design snow loads can be as high as 25 pounds per square foot.

It should be remembered that the snow load is only a portion of the total design load, which will include wind and dead loads. Dead loads are loads that account for the weight of the roof structure itself. While the total design load may be 2 to 4 times greater than the design snow load alone, the weight of the snow, if it exceeds the design snow load, may cause structural failure. If the blueprint and construction documents for the structure are available, they should provide the design snow load.

Clearly, poor materials, construction and post-construction maintenance can result in a weaker structure with an actual load capacity significantly lower than the design load. Therefore, proper materials and techniques should be followed for construction. After construction, proper maintenance is vital and any damage should be repaired as soon as possible. Knowledgeable professional assistance should always be sought.

The presence of snow and ice on a roof exerts vertical loads that can cause a roof to sag or bow downward. This loading also transfers horizontal forces that may cause the walls to deflect, or move slightly outward. Depending on the construction design, the deflection may be at the top or bottom of the wall.

When roof loads are below the actual load capacity, any sagging or deflection that occurs is temporary and will disappear after the load is removed. This level of loading and minor sagging or deflection of the roof structure will probably not be noticed. When the loading exceeds the design loads, the sagging and deflections become permanent. In extreme cases the roof collapses.

An assessment of the risk of snow and ice accumulation on roofs, as with any potential disaster, is to:

- Determine what is at risk,
- What is the level of risk,
- What if, anything can be done to avoid or minimize the damage, and
- What are the potential adverse outcomes of the action.

For example, if you leave the ice and snow on a roof, the roof may risk collapse. If you remove the snow, brittle shingles are likely to be damaged, or the person removing snow may get injured. The expense and liability of having someone else remove the snow needs to be considered before taking action.

It is important to ask, is it possible and practical, with the available equipment and labor, to remove the snow and ice? What about the health and safety of the individual who is working on a snow and ice covered roof?

The first step to help answer these types of questions is to determine the design snow load of the structure. If plans and construction documents can be obtained, they should provide this information. A professional who is knowledgeable in construction practices may be of assistance. Finally, the general rule of thumb above provides some guidance.

It is also important to remember that poor materials and construction combined with poor building maintenance may result in actual load-bearing capacities being lower than the design snow load. So, the building condition must be considered.

The next step is to determine if the current snow load, or the potential snow load, is greater than the load-bearing capacity of the building. The most rapid method to do this is a visual inspection. If there is no detectable sagging of the roof line or no horizontal deflection of the walls, the load-bearing capacity probably has not been exceeded. If visible roof and wall deflections occur, it is very likely that the load-bearing capacity has been exceeded and there is an increased potential for damage.

A difficulty with the visual approach is that one cannot estimate the actual load on the roof for comparison with the design load.

## Measuring Weight of Snow and Ice

The weight of accumulated snow/ice, not the depth, is critical in assessing a roof's vulnerability. The water content of snow may range from 3% for very dry snow to 33% for a wet, heavy snow, to nearly 100% for ice. An inch of water depth weighs 5.2 lbs. per square foot. Thus, a roof designed to carry a snow load of 20 lbs. per horizontal square foot is expected to support nearly 12 inches of wet, heavy snow. Table 1 provides information on snow and ice densities and the equivalent inches of water for various snow loads.

Collecting samples of snow/ice is the only practical and accurate way to determine the roof load. The first step is to collect a uniform vertical column of snow from the snow surface to the roof surface. This can be done by thrusting a 3-pound coffee can (6 inches in diameter) repeatedly into the snow until reaching the roof. Empty the snow into a bucket each time the coffee can is filled. After the snow is collected, it is melted and poured back into the coffee can and water depth measured in inches. This depth multiplied by 5.2 provides the snow load in pounds per square foot. For example, if your melted sample measures 4 inches deep, your roof snow load is approximately 21 lbs. per square foot ( $4 \times 5.2 = 20.8$ ). If desired, Table 1 provides a rough estimate snow load.

If there is a layer of ice between the snow and the roof, you don't want to risk damaging the roof. Estimate the average thickness of the ice, then multiply by 5.2 and add this result to the snow moisture weight.

Generally, the most representative samples are taken from the center third of a roof (measured from the ridge to the eave). Loads on these areas are typically the most vital to assess the rafter's strength capabilities or the potential for failure.

In some cases, you should be concerned about the snow/ice loads on:

- Roof overhangs (especially large overhangs projecting several feet beyond the horizontal support), if there is substantial ice buildup
- Multilevel roofs (when the lower roof is subject to an accumulation of sliding or drifting snow or accumulation of snowmelt)
- Valleys (subject to substantial snow or ice accumulation due to drifting, sliding or melting)

Prior to sampling snow loads, safety risks should be weighed against the potential benefits of obtaining a sample to estimate the actual snow load.

**Table 1: Equivalent Snow Load Table**

Density Information				
	Light/Dry Snow	Heavy/Wet Snow	Ice	Water
Snow density (lb/cu ft)	3.12	20.81	57.25	62.43
% of water weight	5%	33%	92%	100%
Equivalent Inches				
Design Snow Load (lb/sq ft)	Light/Dry Snow	Heavy/Wet Snow	Ice	Water
5	19.2	2.9	1.0	1.0
10	38.4	5.8	2.1	1.9
15	57.7	8.6	3.1	2.9
20	76.9	11.5	4.2	3.8
25	96.1	14.4	5.2	4.8

Dr. Karl VanDevender, Extension Engineer  
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3/2006

## Farm Practices During Ice and Snow

Farming practices (such as driving a tractor) during snow, ice and cold weather require extra precautions. The braking ability on many tractors is affected significantly by snow and ice because most two-wheel-drive tractors only have brakes on their rear wheels. That problem is compounded when front-end loaders are carrying heavy loads of hay. Even tractors with front wheel assist have reduced stopping ability. Only the true four-wheel-drive tractors have four-wheel braking.

The use of front-end loaders requires considerably more caution in winter weather. Slippery conditions increase the hazard of maneuvering elevated loads.

Safe and proper ballasting of the tractor is needed with the use of a front-end loader in any season, but especially in winter. Calcium chloride solution used in the rear tires or solid weights are good options. Solid weights are more stable and have the advantage in winter or summer. Untreated water should never be used for ballast because it will freeze and could result in a tractor that is very dangerous and difficult to handle.

Cold temperatures and poor visibility can significantly affect reaction time. Allow additional time to perform tasks, and set realistic goals for daily work.



## Evaluating Ice Damage to Forest Stands

Dr. Tamara Walkingstick, Extension Specialist - Forestry

Arkansas has a history of ice storms and Arkansas forests are often damaged as a result. However, ice damage to trees often is not as bad as it looks. Forest landowners should evaluate whether or not a salvage harvest is necessary before accepting a salvage price for their timber or making a hasty decision to harvest their entire timber stand. One of the problems in salvaging timber immediately following a natural disaster of any type is that prices fall sharply as the material comes on the market. These prices can stay depressed for several months.

The following categories of ice-damaged trees will survive for now and can wait to be harvested later when the emergency salvage operations are over and timber prices back to normal:

1. Trees with broken tops which still have four or more living limbs remaining
2. Trees leaning less than 45 degrees
3. Windblown trees with roots still in the ground

Young trees that are bent will often straighten by themselves. Here are some examples from research. In Tennessee, an ice storm in March (1993) bent a stand of eight-year-old loblolly pine so that their tops touched the ground. By the following January, the trees had all recovered. Another example comes from Louisiana. An ice storm there broke an average of at least half the total length of live crown from each tree in an 11-year-old loblolly pine plantation. One year later, there were trees with forked tops, stag-headed tops and lyre-shaped tops, but enough trees had a new single dominant main leader to make an adequately stocked stand.

Other research in the southeast shows that loblolly pine trees bent less than 40 degrees from vertical can recover completely within two years. Trees bent 40 to 60 degrees recovered but demonstrated varying amounts of crook and sweep. Only trees bent more than 60 degrees did not recover enough to make acceptable growing stock. Research in Arkansas also supports these research findings.

When only a few trees per acre are damaged, it may not be worth saving them considering the low prices normally paid for salvaged trees. Salvage prices are often lower not only because of the crisis situation with so many trees being salvaged but also because ice or wind-damaged trees may have hidden internal damage such as ring shake that make them useless for lumber.

Landowners can wait until the following growing season before they harvest to provide the bent trees some time to recover. If a landowner decides to conduct a salvage harvest, he or she should take care during the salvage operations. Do not bang up or damage any standing, live trees because wounds of this type are ideal for invasion by decay-causing fungi. And, in the case of pines, wounded trees become and remain very attractive to this summer's and next year's bark beetles. Wounded pines could be the center of a bark beetle buildup next year, so it would be prudent to avoid damaging pine stems at any time of year.

Hardwood stands can also suffer damage from ice storms. Most mature hardwood trees with 25 percent to 75 percent crown damage will survive but the growth rate may be reduced. Trees with greater than 75 percent crown damage will not survive, except for ash, willow, basswood and poplar. Although a tree is severely damaged, it might take several years for that tree to decline and die. Landowners should wait until the end of the first growing season after the storm to decide which trees to harvest. Some trees might recover during this time. Landowners interested in managing their hardwood stands for wildlife might consider leaving some damaged or deteriorating trees to provide snags and cavity trees for wildlife.

In immature and planted hardwood stands, trees bent more than 60 degrees are not likely to straighten and can be cut down. However, allow bent trees until midsummer to recover before taking action. Broken trees and bent trees can be cut to the ground before they get their leaves in the spring to encourage sprouting from the stumps. Landowners can regenerate areas of the stand that do not recover by

midsummer by cutting all trees to the ground before the leaves come out the following spring.

It will take a few years before you will be able to determine the extent of the damage caused by a major ice storm. During this time, keep a close eye on the forest. Many different stresses can combine to cause serious damage. Check to see whether there are insect infestations or diseases. Look at leaf size, shape and color. Watch for resin or gum on the bark and signs of insect feeding, egg masses, conks and other fruiting bodies. Landowners might also consider getting expert advice on the potential and necessity of a commercial harvest, the implications of future changes in species composition and the best courses of action. Landowners can call upon their local Arkansas Forestry Commission office, Cooperative Extension Office, area forest consultants, and other forest management professionals for advice.

Landowners who have suffered significant timber losses should contact a knowledgeable tax attorney familiar with timber tax, especially tax losses from storm damaged timber. General information regarding timber taxes can be found at:

<http://www.soforext.net/formgmt/aghandbook.html>  
and  
<http://www.fnr.purdue.edu/ttax/>.

Although a landowner might not know just when an ice storm will strike, they can minimize some damage in older stands through appropriate forest management including periodic thinning and harvesting. Additional information about forest management can be found at your county Extension office, the Arkansas Forestry Commission and the Arkansas Forestry Association.

11/27/02

## Managing Storm-Damaged Urban Trees

Arkansas has more than its fair share of winter and summer storms that damage trees. Once power is restored after a storm and cleanup initiated, land and homeowners can begin to assess damage to their landscape trees. The good news is that there is no need for homeowners to pay a premium for services in the first few weeks after the storm. In the case of ornamental trees, cleanup and tree trimming doesn't have to be done immediately unless life or property are threatened. Forest landowners also should not be panicked into accepting a salvage price for timber without first evaluating whether salvage is really necessary.

Storm damage to landscape trees can range from relatively minor damage with only the smallest branches being injured to splitting of the trunk and uprooting of the tree. While minor injuries seldom result in permanent damage to the tree, severe injuries can increase a tree's susceptibility to insect and disease attack, ultimately killing the tree. Damage to landscape trees should, therefore, be properly treated and repaired to maintain the health of the tree. Some types of damage can be treated by the homeowner. Other more serious damage should be treated by a tree specialist, especially if extensive bracing, cabling or removal of large branches is required. As always, never try to remove branches or trees from utility lines. Let the professionals do it. As with all things, there is a right and a wrong way to repair storm-damaged trees.

First, let's put your mind to rest over what to do about some types of storm damage. The following categories of storm-damaged trees will survive for now and can wait to be harvested later when emergency salvage operations are over and, for forest landowners, when timber prices (and removal costs) are back to normal:

1. Trees with broken tops which still have four or more live limbs remaining.
2. Trees leaning less than 45 degrees.
3. Windblown trees with roots still in the ground.

Assuming the decision has been made to repair the tree, the next question is: "Am I capable of repairing the damage myself or should I seek

professional help?" Major repair will undoubtedly require the use of a chain saw and climbing equipment. Unless you are experienced in the use of such equipment and comfortable working off the ground, it may be best to have the work performed by a competent professional. The names of qualified firms can be obtained from local nurserymen. Also, look for listings of professionals under Tree Service in the Yellow Pages. Make absolutely sure that they carry proper liability and workmen's compensation insurance before allowing them to begin work on the job.

To protect yourself and your property it's okay to ask for references or qualifications. You might want to hold on to your money until it has been completely earned by the person you have hired to do a job. Even under critical emergency conditions, complete, good quality repairs and tree removal must be done or more damage and deterioration can appear in the future. Again, don't let just anyone who has a chain saw and a truck remove your landscape trees.

Based on common types of storm damage, here's a few recommended practices to put your yard back into order. For trees with tops broken out, remove the broken snags down to the next major interior branch. Try not to top the tree. Topping the tree will result in branches that are weak and prone to future damage. If a tree is only partially damaged, pruning damaged branches can restore the tree. First, remove broken and hanging branches to ensure safety and prevent additional property damage. Second, trees that can be saved should have broken branches properly pruned using the "natural target pruning method." Correct pruning is the best thing you can do for your tree. Improper pruning will only cause more damage to the tree, weakening it further by exposing a larger area of the tree to decay organisms.

When a tree is severely damaged, the first question that must be answered is: "Is the condition of the tree such to make keeping it worthwhile?" Take the time and effort to save a tree only if a substantial portion of the tree remains intact and if, when repairs are made, the tree will still be attractive and of value to the property owner. This is particularly true if the tree has brittle wood and a branch structure

that makes it vulnerable to additional damage from future storms. In addition to its condition, other factors to consider in determining whether or not a tree is worth saving include its age, species, growing location, the value it adds to the property, sentimental value, etc. When all of these are considered, it may often be more desirable to replace the damaged tree than perform extensive repairs. If you are not sure, see a local nurseryman, professional tree service company or consulting urban forester for assistance. If it is determined the tree is not worth saving, remove the tree as soon as possible.

Pine trees that are severely bent will have cracks in the bark and resin flow which will attract beetles. Bent hardwoods are less likely to be attacked by insects or diseases. Severely bent trees will not be suitable for veneer, poles or lumber because of internal splitting (wind shake). Small trees less than 15 feet tall usually recover and straighten. Salvage larger hardwoods and pines that are severely bent or exhibit sap flow down the bark.

Some very simple guidelines are:

- Determine whether the tree can be repaired, or if it should be removed completely. If the main trunk is completely broken or if the tree is uprooted, it should be removed.
- Remove a broken branch to the nearest branch or to the tree trunk. Never leave a ragged stub. Remove large branches with three cuts. This will prevent splintering and peeling. Make the first cut upward from the bottom of the branch about 12 inches from the next branch. Cut about halfway through the branch, or until the saw begins to pitch. Make the second cut 5 or 6 inches further out, and continue cutting until the branch falls. With a third cut remove the stub cleanly without peeling.
- Contrary to popular belief, it is not necessary to treat trunk and limb wounds with tree paint. Research shows that painted areas can actually lead to increased rot and decay due to trapped moisture. Take care during the salvage operations. Do not bang up or damage any standing live trees because wounds of this type are ideal for invasion by decay-causing fungi. And, in the case of pines, wounded trees become and remain very attractive to this summer's and next year's bark beetles. Wounded pines could be the center of a bark beetle buildup next year, so it would be prudent to avoid damaging pine stems at any time of year.

## How to Reduce Future Storm Damage

Hazard tree inspections offer the best protection against future storm damage. Systematic inspections and assessments allow you to find and correct defective trees. Sound trees can withstand stronger winds than defective trees, so during storms the likelihood of tree failure is reduced.

A few tree species, including Chinese elm, silver maple, sycamore, boxelder, Bradford pear and various poplars, have brittle wood that breaks easily. These rapid-growing trees are particularly susceptible to storm damage. Homeowners should be aware of these characteristics and avoid planting such species close to buildings, utility lines, etc., where potential damage could occur. If such trees are already growing in these locations, some preventive practices, such as pruning and bracing or cabling, may help reduce the potential of storm damage. This is particularly true as the tree grows in size and the weight and surface of the leaf and branch area increases.

## Waste Disposal

Materials from fallen or salvaged trees can be used in several ways. The larger branches can be cut and used for firewood. Add smaller branches and twigs to the compost pile or cut up for kindling. Branches can also be converted into chips for use as compost, mulch or other landscaping purposes if chipping equipment is available. In some areas, landfills or other waste disposal facilities are available to local residents.

Following the cleanup and repair of storm-damaged trees, you may wish to make some new plantings. A few suggestions can help reduce future maintenance problems. First, make certain the tree being considered is hardy to the area. Then, consider the potential insect and/or disease problems that may be associated with a particular species. It is also helpful to know the approximate size and shape of the tree when mature. This will help determine where to plant it to avoid interference with utility lines, branches rubbing against the house or other buildings, etc. Finally, consider characteristics of the tree other than the provision of shade, such as presence of spring flowers, attractiveness to birds, fall color and winter appearance. Through careful selection it is possible to obtain species that will contribute to the overall landscape in more than just one way.

For more information concerning salvaging landscape trees or timber, contact your local offices of the Cooperative Extension Service, Arkansas Forestry Commission and landscape professionals in your area.

## References

The above article was compiled from:

*Repairing Storm Damage to Trees.* Melvin R. Koelling and Russell P. Kidd. July 1980. Extension Bulletin E-1364, FILE 24.54 Forestry Department, Michigan State University, E. Lansing, MI.

*How to Prune Trees.* P. J. Bedker, J. G. O'Brien, and M. M. Mielke. 1995. USDA Forest Service, Northeastern Area, State and Private Forestry, St. Paul, MN. 30 pp.

*Tree-Pruning Guidelines.* ISA Performance Guidelines Committee. 1994. Savoy, IL: International Society of Arboriculture.

*Hazard Trees and Repairing Storm-Damaged Trees.* Ed Hayes and Mimi Barzen. Minnesota DNR-Division of Forestry. Grand Rapids, MN.

*How to Evaluate and Manage Storm-Damaged Forest Areas.* P. J. Barry, Coleman Doggett, R. L. Anderson, K. M. Swain. 1993. USDA Forest Service, Southern Region. Management Bulletin R8-MB 63.

## What to Do During a Power Failure on the Farm

A power failure or fuel shortage can cause problems on poultry and livestock farms, but being prepared can minimize the seriousness of these problems.

There are four areas of concern:

- Poultry
- Livestock
- Milk
- Equipment

### Poultry and Livestock

To protect poultry and livestock during a power failure, you should provide four essentials: ventilation, water, heat and feed.

#### *Ventilation*

- Most commercial poultry facilities should already be equipped with standby power generation for emergency ventilation.
- Ventilate shelter with standby power generators rather than natural ventilation.
- Do not close buildings tight to conserve heat, since animals could suffocate from lack of oxygen.
- Because oxygen will eventually be used up in mechanically ventilated production facilities, clear debris from all vents. Then open vents to facilitate natural airflow.
- In dairy facilities, open doors or turn cows outside, unless weather conditions prohibit (e.g., ice storm, tornado, etc.).

#### *Water*

- Provide all animals, especially cattle, with plenty of water.
- Your water pump might be adapted to be driven with a small gasoline engine and a belt. In some cases, a tractor may provide power for a standby

power generator. Otherwise you will need to haul water.

- If you have an outside source of water (pond or a stream), cattle can be turned out.
- Whatever the source of water, make sure it remains clean so animals can drink it.
- If no water is available, dairymen can feed cows their own milk as a last resort.

#### *Heat*

- Provide essential heat during cold weather. Use portable camp stoves and heaters as emergency heat sources for brooders. However, remember that stoves or heaters use oxygen and, if improperly managed, can present a fire hazard. Have qualified personnel inspect your standby heaters routinely in order to enhance fuel combustion and heat production; recondition or discard equipment that has potential to ignite a fire.
- Plan ahead to have this equipment ready when needed.

#### *Feed*

- Provide feed. Animals need extra energy for body heat during prolonged severe weather, especially if they are unsheltered. The best sources of energy are corn and other grains.
- If mechanical feeders are not connected to emergency power generation equipment, they will be inoperable during a power failure and emergency feeding procedures must be employed.
- Use pelleted cake or cake concentrate for emergency feed.

#### *Storing Milk*

- Request that the marketing cooperative or processor pick up milk as soon as possible.

- A standby power generator can handle vital electrical equipment on the dairy during emergencies. Although such equipment can represent a sizable financial investment, one major power failure can pay for the equipment. While generation equipment can be borrowed during emergencies, be aware that travel may not be possible in ice storms, severe rain or wind storms and such equipment may already be in use.
- The intake manifold on a gasoline tractor engine may be used as a vacuum to operate select milking machines that do not have magnetic pulsators, but the vacuum levels may vary and increase the incidence of mastitis. If cows are not milked within 24 hours, the level of mastitis is likely to increase greatly.
- Even if you are short of extra milk storage facilities, do not store milk in stock tanks or other containers such as bathtubs. Dairy plants are not likely to accept milk that has been stored in anything other than regular milk storage containers.
- Check with your local marketing cooperative or processor about the policy from the Arkansas Department of Health regarding emergency storage of milk.
- If you are unable to cool your milk or have it picked up, check your tank for souring each time you add milk to it by looking for clumping or smelling for odors. This check could mean the difference between losing all or only part of your milk supply.

## Standby Power Generators

Emergency power generation is strongly recommended for commercial facilities caring for large numbers of animals. However, emergency power generation equipment must be properly sized, installed, maintained and routinely tested to be effective.

- Remember when sizing generators to account for both operating and start-up wattage needs.
- Mount generators securely in a location that protects the equipment from the weather, but permits the exhaust of gases and heat during the operation.
- Keep wiring runs as short as possible and size the wire for the maximum current load.
- Test generation equipment under full load for at least 30 minutes weekly and ensure that all equipment operates properly under generated power.
- Ensure that adequate fuel is available.

## Equipment

- Unplug or turn off all electric equipment to prevent damage when power is restored.

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3/2006

## Tree Removal Following a Storm

Following a storm, such as a tornado or ice storm, cutting and removing trees is complicated by tangled trees, twisted limbs and other snarled obstacles. Normally, experienced loggers avoid trees that are twisted, pre-loaded or fallen and tangled together. After a tornado, trees and limbs may be so matted together that clearing with chain saws becomes dangerous work. Experienced chain saw operators have developed approaches to minimize binding of limbs on the saw and to avoid getting pinned by falling trees. Caution and experience are essential because entangled limbs and trees do not react as they would if they were cut separately.

Many times trees with full foliage are warped causing unusual forces or weight distributions. Proper limbing varies from the normal cutting situation. Often, this will cause more saw kickback and pinching of the saw.

Before approaching a downed tree, check for any power lines or other hazards that may be present. Continue to be alert for overhead hazards, debris that could be dislodged as you work or trees lodging against the tree you are cutting.

Do not try to remove a tree that is leaning on or applying force onto a structure without having the structure inspected.

Begin limbing at the outer edges of the tree limbs. Always clear an area for your work as you advance. The first limbs to be cut are those on the top of the trunk. Cut these limbs as far toward the top of the tree as possible before removing the remaining limbs that are resting on the ground.

Do not make cuts above chest high with a chain saw. It's dangerous because it is easy to lose your balance and the result could be fatal.

Stand on the opposite side of the trunk from the limb being cut. The trunk provides a barrier between you and the saw and helps protect you from accidental contact with the chain.

When removing trees and residue after a storm (or disaster), keep in mind that your main objectives are to safely remove obstacles that may pose a hazard to individuals or structures and to clear a path for services to be resumed.

When cutting trees after a storm, remember that you are not cutting firewood. The proper cut log length is determined by the weight that one person can handle. The length of limbs should not be so large as to hamper the removal of the brush pile by large equipment.

Bucking, cutting the log into sections, differs depending on how the log is supported. When a log lays flat on the ground, cut down from the top surface, then roll it over and finish the cut from the opposite side. When a log is supported on one end, cut one-third of the diameter from the underside to avoid pinching and splintering. Then cut through the remaining two-thirds of the diameter from the top. If a log is supported at both ends, make the first cut through the top one-third of the diameter. The remaining limb, tree trunk or log is then cut upward from the bottom.

Cutting branches resting on the ground may be necessary to clear the area as you work. Beware that the tree may sag or roll as a new branch is cut. The likelihood of the tree rolling increases as more branches are removed. Be alert for any trunk movement and be ready to move away quickly if necessary.

Do not hold a powered saw with one hand and clear limbs with the other hand. Shut off the chain saw and put it down until limbs have been cleared.

Limbs and brush are normally piled along roads following a storm. Service crews can load and dispose of debris later. Do not locate piles under utility lines or other places that will be dangerous or hard to reach with large loaders and other equipment.

Pay attention to what is going on around you at all times. Do not work as large groups in a manner that individuals interfere with each other or there is only one task. Normally, grouping four to six people for cutting and moving logs provides good teamwork to safely handle most projects without bumping into each other.

Take frequent breaks and drink plenty of water. Each person in a group should take turns taking breaks and supervising the safety of the other individuals. Using good judgment is essential for staying safe and doing a good job.

Doug Petty, Miller County Extension Agent - Staff Chair  
Gary Huitink, Associate Professor - Extension Engineer

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## Electrical Safety During a Flood or Ice Storm

During or after storms or other disasters it is vital to avoid damaged electrical wiring. Initially, power substations may be disconnected, rendering distribution services both useless and harmless. However, never consider a circuit harmless until a qualified electrician repairs the damage, or at least disconnects all circuits that are potential hazards.

Water in the proximity of electricity may pose a lethal hazard. To protect yourself, your family and neighbors in the aftermath of an ice storm or flood or similar disaster, the University of Arkansas Cooperative Extensions Service offers this advice:

- Avoid stepping into a wet or flooded area. If there are submerged power distribution wires, they may energize the standing water and more than 10 yards around the perimeter. Within damaged or flooded buildings, electrical outlets, wiring or electrical cords may energize the water, posing a potential lethal danger.
- Portable electric generators are often put into use for temporary power. However, they can become deadly if improperly installed or operated. After a tornado in Little Rock, a utility worker was electrocuted by current flowing back into the power distribution, making a “downed” power line hot in contact with the worker.
- Every standby generator needs to be grounded properly. To avoid “shorts” and potential electrocution, keep the generator dry.
- Do not connect generators directly to household wiring. A qualified, licensed electrician should install your generator to ensure that it meets local electrical codes.
- Do not operate the generator in an enclosed or partially enclosed space. Gasoline or diesel engines may produce deadly levels of carbon dioxide. Engine exhaust should be vented where it is diluted into outside air.
- Take special care not to overload the generator. Assure that any extension cords connected to the generator are rated for the current load. It should have a grounded, three-pronged plug and be free of cuts and worn insulation.
- If it is possible, use ground fault circuit interrupters (GFCI) around any water hazard. This will help prevent electrocutions and electrical shock injuries. Portable GFCIs for electrical outlets that don’t require tools for installation are available in most electrical and hardware supply stores at prices ranging from \$12 to \$30.
- Don’t use electrical appliances that have been wet until they are sound. Water may damage electrical motors in furnaces and appliances, such as freezers, refrigerators, washing machines and dryers. If certain appliances have been under water, a qualified service repairman can recondition them.

Additional electrical safety information can be found on the Electrical Safety Foundation International website, [www.electrical-safety.org](http://www.electrical-safety.org).

## OSHA's Tips for Keeping Workers Safe in the Cold

OSHA is urging employers and workers to take necessary precautions to prevent and treat cold-related health problems.

Prolonged exposure to freezing or cold temperatures may cause serious health problems, such as trench foot, frostbite and hypothermia. In extreme cases, including cold-water immersion, exposure can lead to death.

Danger signs include uncontrolled shivering, slurred speech, clumsy movements, fatigue and confused behavior. If these signs are observed, call for emergency help.

OSHA's *Cold Stress Card* provides a reference guide and recommendations to combat and prevent many illnesses and injuries. Available in English and Spanish, this laminated fold-up card is free to employers, workers and the public. Tips include:

### How to Protect Workers

- Recognize the environmental and workplace conditions that may be dangerous.
- Learn the signs and symptoms of cold-induced illnesses and injuries and what to do to help workers.

- Train workers about cold-induced illnesses and injuries.
- Encourage workers to wear proper clothing for cold, wet and windy conditions, including layers that can be adjusted to changing conditions.
- Be sure workers in extreme conditions take a frequent short break in warm, dry shelters to allow their bodies to warm up.
- Try to schedule work for the warmest part of the day.
- Avoid exhaustion or fatigue because energy is needed to keep muscles warm.
- Use the buddy system – work in pairs so that one worker can recognize danger signs.
- Drink warm, sweet beverages (sugar water, sports-type drinks) and avoid drinks with caffeine (coffee, tea, sodas or hot chocolate) or alcohol.
- Eat warm, high-calorie foods such as hot pasta dishes.
- Remember, workers face increased risks when they take certain medications, are in poor physical condition or suffer from illnesses such as diabetes, hypertension or cardiovascular disease.

Occupational Safety and Health Administration guidelines, U. S. Department of Labor

References

## References

Internet and Other Sources of Disaster-Related Educational Materials  
Firewise Landscaping for Woodland Homes, U.S. Forest Service  
Heating with Wood, MP247  
Improving Home Water Quality, MP292  
A Quick Consumer Guide to Safe Food Handling, FSHEd82  
Chain Saw Safety, FSA1009  
Tornado Safety, FSA1024  
Skid-Steer Safety, FSA1025  
Beef Cattle Herd Health Vaccination Schedule, FSA3009  
Water for Beef Cattle, FSA3021  
Nitrate Poisoning in Cattle, FSA3024  
Common Arkansas Plants Poisonous to Cattle, FSA3025  
Substituting Grain for Hay in Winter Rations for Beef Cows, FSA3036  
Heat Stress in Dairy Cattle, FSA3040  
Alternative Feeds for Beef Cattle, FSA3047  
Replacing Valuable Papers, FSHEC45  
Earthquake Preparedness, FSA9600  
Managing Financial Losses From a Natural Disaster, FSHEC67  
Planning for Food After a Disaster, FSHEd81  
Nutritional Disorders in Beef Cattle, FSA3071  
Agricultural Aviation Safety, FSA1038

## Internet and Other Sources of Disaster-Related Educational Materials

During a disaster, if electrical service is available, you may be able to access the University of Arkansas Division of Agriculture Cooperative Extension Service web site (<http://www.uaex.edu>) for current information and to find additional resources. In addition, there are a number of web sites listed below that you may wish to investigate. They have helpful information that you may wish to download, hole punch and enter into your three-ring Disaster Response Handbook.

However, in the event that electrical service is interrupted, it may be helpful to have some CES fact sheets to refer to or hand out, so they have been included in this section of the handbook.

If you have further suggestions, feel free to contact the appropriate specialist or Disaster Response Handbook committee member. We hope you find convenient and helpful resource information in this Disaster Response Handbook.

### General Disaster Preparedness/Response Sites

#### <http://www.eden.lsu.edu>

The University of Arkansas is a member of Extension Disaster Education Network, EDEN. This association of universities provides a home site with links from this home page to almost any kind of disaster-related response information imaginable. Some resources can be downloaded immediately, and as with some states' Extension publications, some can be ordered and billed online.

#### <http://www.lsuagcenter.com>

This is a direct URL to links to Louisiana State University web pages, and you can network to nonuniversity sites from most of the university home pages.

#### <http://www.ces.ncsu.edu/disaster/>

This site has two unique aspects that may interest anyone needing a Spanish version of Disaster Response information or anyone needing Disaster Preparation/Response lessons for a multi-class workshop. North Carolina State University provides a Disaster Handbook and other educational resources.

#### <http://www.msue.msu.edu/msue/emp/>

Michigan State University Extension provides an excellent, user-friendly "Disaster Response Handbook" online. This disaster preparation/response site has some novel entries.

#### <http://msucares.com/disaster/index.html>

Mississippi State University Extension provides a disaster manual and brief summaries on various disaster-related questions.

#### <http://www.cft.uwex.edu/ces/news/handbook.html>

The University of Wisconsin Cooperative Extension Service maintains a good disaster preparation/response web site and an electronic handbook.

### CD-Rom

#### <http://disaster.ifas.ufl.edu/>

A CD-ROM edition of a 1998 two-volume (equivalent) Disaster Handbook can be purchased from the University of Florida's Institute of Food and Agricultural Sciences. Also, a video and other resources are available through this site.

## **Safety**

**<http://bioengr.ag.utk.edu/Extension/ExtProg/Eden/>**

The University of Tennessee Extension Cooperative Extension Disaster home page emphasizes current weather warnings as well as other local hazards and current topics like West Nile Virus information. It also links to several safety topics.

## **Stress**

**[http://www.ksu.edu/wwparent/child\\_stress.htm](http://www.ksu.edu/wwparent/child_stress.htm)**

This Kansas State University site is recommended for information on various stress topics.

## **References**

**<http://www.colorado.edu/hazards/>**

This is a national clearinghouse for disaster information. The content often is research-oriented, but if you can't find an answer at other sites, you may try this one.

**[http://archnt2.tamu.edu/dbilbo/Taex%20Emergency/handbook/contents\\_of\\_handbook.htm](http://archnt2.tamu.edu/dbilbo/Taex%20Emergency/handbook/contents_of_handbook.htm)**

Texas A&M has one of the most detailed "downloadable" handbooks available. Contents include almost all of the topics addressed in the University of Arkansas Disaster Response Handbook, plus items on evacuation, emotional recovery, hurricanes, radiological accidents, residential fires, rodents, snakes, volcanoes and water systems.

Firewise is a project of the National Fire Protection Association 

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### *Saving lives and property from wildfire*

#### FROM OUR BLOG

##### A look at wildfire in Colorado

If you haven't seen it, the Denver Post posted recently a special documentary called, "The Fire Line: Wildfire in Colorado" highlighting the recent wildfires in Colorado and their impact on residents and the environment. Part of the documentary focused on the Waldo Canyon Fire and highlighted scenes from NFPA's 2013...

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##### IBHS Research Center ember (firebrand) storm test video

The Insurance Institute for Business and Home Safety published an interesting video demonstrating one of the many wildland-urban interface research projects they are actively working on. Related articles IBHS dispels myths about residential fire sprinklers Lessons from Waldo Canyon: Wildfire Preparedness Tips for Denver Homeowners

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#### HEADLINES

Gusty, dry conditions raise wildfire dangers in areas of Southern California

Big Sur fire destroys 15 homes, forces 100 to flee

Fire season tamer than expected; U.S. burn acreage far below average

Wildfire risk seen as high or extreme at 4.5 million U.S. homes

Students present wildfire research at LEGO competition

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# A Quick Consumer Guide to Safe Food Handling

Rosemary Rodibaugh,  
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 Extension Nutrition  
 Specialist

Never had food poisoning?  
 Actually, it's called foodborne illness.  
 Perhaps you have, but thought you  
 were sick with the flu. Some 33 million  
 Americans will suffer from foodborne  
 illness this year.

Why? Because at the right  
 temperature, bacteria you can't see,  
 smell or taste can make you sick.

It doesn't have to happen, though.  
 Many cases could be avoided if people  
 just handled food properly. So here's  
 what to do...

## When You Go Shopping

**Buy cold food last,  
 get it home fast.**

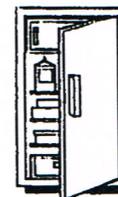


Shopping

- When you're out, grocery shop last. Take food straight home to the refrigerator. **Never leave food in a hot car!**

- Don't buy anything you won't use before the use-by date.
- **Don't buy food in poor condition.** Make sure refrigerated food is cold to the touch. Frozen food should be rock-solid. Canned goods should be free of dents, cracks or bulging lids which can indicate a **serious** food poisoning threat.

## When You Store Food Keep it safe, refrigerate.



Home Storage

Check the temperature of your refrigerator with an appliance thermometer. You can buy one of these at most stores that sell housewares. To keep bacteria in check, the refrigerator should run at 40°F, the freezer unit at 0°F. Keep your refrigerator as cold as possible without freezing your milk or lettuce.

- Freeze fresh meat, poultry or fish immediately if you can't use it within a few days.
- Put packages of raw meat, poultry or fish on a plate before refrigerating so their juices won't drip on other food. Raw juices often contain bacteria.

## When You Prepare Food

**Keep everything clean.  
 Thaw in refrigerator.**



Preparation

- Wash hands in hot soapy water before preparing food and after using the bathroom, changing diapers and handling pets.
- Harmful bacteria multiply quickly in kitchen towels, sponges and cloths. Wash cloth items often in

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## Cold Storage

These **SHORT** but safe time limits will help keep refrigerated food from spoiling or becoming dangerous to eat. These time limits will keep frozen food at top quality.

Product	Refrigerator (40°F)	Freezer (0°F)
<b>Eggs</b> Fresh, in shell Raw yolks, whites Hardcooked Liquid pasteurized eggs or egg substitutes, opened unopened	3 weeks 2-4 days 1 week  3 days 10 days	Don't freeze 1 year Don't freeze well  Don't freeze 1 year
<b>Mayonnaise</b> , commercial Refrigerate after opening	2 months	Don't freeze
<b>TV Dinners, Frozen Casseroles</b> Keep frozen until ready to serve		3-4 months
<b>Deli and Vacuum-Packed Products</b> Store-prepared (or homemade) egg, chicken, tuna, ham, macaroni salads Pre-stuffed pork and lamb chops, chicken breasts stuffed with dressing Store-cooked convenience meals Commercial brand vacuum-packed dinners with USDA seal	3-5 days  1 day 1-2 days 2 weeks, unopened	These products don't freeze well
<b>Soups and Stews</b> Vegetable or meat-added	3-4 days	2-3 months
<b>Hamburger, Ground and Stew Meats</b> Hamburger and stew meats Ground turkey, veal, pork, lamb and mixtures of them	1-2 days  1-2 days	3-4 months  3-4 months
<b>Hotdogs and Lunch Meats</b> Hotdogs, opened package unopened package Lunch meats, opened unopened	1 week 2 weeks 3-5 days 2 weeks	In freezer wrap, 1-2 months
<b>Bacon and Sausage</b> Bacon Sausage, raw from pork, beef, turkey Smoked breakfast links, patties Hard sausage—pepperoni, jerky sticks	7 days 1-2 days 7 days 2-3 weeks	1 month 1-2 months 1-2 months 1-2 months
<b>Ham, Corned Beef</b> Corned beef in pouch with pickling juices Ham, canned, label says keep refrigerated Ham, fully cooked—whole Ham, fully cooked—half Ham, fully cooked—slices	5-7 days 6-9 months 7 days 3-5 days 3-4 days	Drained, wrapped, 1 month Don't freeze 1-2 months 1-2 months 1-2 months
<b>Fresh Meat</b> Steaks, beef Chops, pork Chops, lamb Roasts, beef Roasts, lamb Roasts, pork and veal Variety meats —Tongue, brain, kidneys, liver, heart, chitterlings	3-5 days 3-5 days 3-5 days 3-5 days 3-5 days 3-5 days 1-2 days	6-12 months 4-6 months 6-9 months 6-12 months 6-9 months 4-6 months 3-4 months
<b>Meat Leftovers</b> Cooked meat and meat dishes Gravy and meat broth	3-4 days 1-2 days	2-3 months 2-3 months
<b>Fresh Poultry</b> Chicken or turkey, whole Chicken or turkey pieces Giblets	1-2 days 1-2 days 1-2 days	1 year 9 months 3-4 months
<b>Cooked Poultry, Leftover</b> Fried chicken Cooked poultry dishes Pieces, plain Pieces, covered with broth, gravy Chicken nuggets, patties	3-4 days 3-4 days 3-4 days 1-2 days 1-2 days	4 months 4-6 months 4 months 6 months 1-3 months

the hot-cycle in your machine. Consider using paper towels to clean up meat and poultry juices. Avoid sponges or place them in the dishwasher daily to kill bacteria.

- Keep raw meat, poultry and fish and their juices away from other food. For instance, wash your hands, cutting board, knife and countertop in hot soapy water after cutting up the chicken and before slicing salad ingredients. Also use hot soapy water to wash sink and faucet handles the raw meat or your “meat-covered” hands have touched.
- Use plastic cutting boards rather than wooden ones. Wash cutting boards thoroughly after use.
- **What about antibacterial sanitizers in the kitchen?** Food handling experts feel hot soapy water used properly should protect you adequately against foodborne bacteria. However, kitchen sanitizers (including a mixture of bleach and water) can provide some added protection. NOTE: Sanitizer product directions must be followed carefully as products differ greatly.
- Thaw food in the microwave or refrigerator, NOT on the kitchen counter. Marinate in the refrigerator, too.

## When You're Cooking

### Cook thoroughly.

It takes thorough cooking to kill harmful bacteria, so you're taking chances when you eat meat, poultry, fish or eggs that are raw or only partly cooked. Plus, hamburger that is red in the middle, rare and medium-rare steak and roast beef are also undercooked from the safety standpoint.

- Cook red meat to 160°F. Cook poultry to 180°F. Use a meat thermometer to check that it's cooked all the way through.
- To check visually, red meat is done when it's brown or grey inside; poultry when juices run clear; fish when it flakes with a fork.
- Ground meat, where bacteria can spread throughout the meat during processing, should be cooked to at least 160°F. This means there is no pink left in the middle or in juices. You can allow large cuts like roasts to stay slightly pink in the center as long as they've reached at least 145°F (medium-rare). Do not serve any cut at this low temperature if you have scored (cut or poked with a fork) or tenderized it before cooking, thus forcing surface bacteria into the center.

- Salmonella, a bacteria that causes food poisoning, can grow inside fresh, unbroken eggs. So cook eggs until the yolk and white are firm, not runny. Scramble eggs to a firm texture. Don't use recipes in which eggs remain raw or only partially cooked.

Cooking Temperatures	
Product	Fahrenheit
<b>Eggs and Egg Dishes</b> Eggs Egg dishes	Cook until yolk and white are firm 160
<b>Ground Meat and Meat Mixtures</b> Turkey, chicken Veal, beef, lamb, pork	165 160
<b>Fresh Beef</b> Medium-Rare Medium Well Done	145 160 170
<b>Fresh Veal</b> Medium Well Done	160 170
<b>Fresh Lamb</b> Medium Well Done	160 170
<b>Fresh Pork</b> Medium Well Done	160 170
<b>Poultry</b> Chicken, whole Turkey, whole Poultry breasts, roasts Poultry thighs, wings Stuffing (cooked alone or in bird) Duck and Goose	180 180 170 Cook until juices run clear 165 180
<b>Ham</b> Fresh (raw) Pre-cooked (to reheat)	160 140

## When You're Microwaving

### Do it safely.

A great timesaver, the microwave has one food safety disadvantage. It sometimes leaves cold spots in food. Bacteria can survive in these spots. So . . .

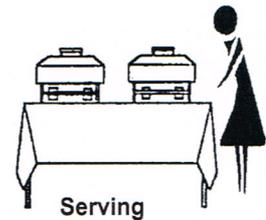
- Cover food with a lid or plastic wrap so steam can aid thorough cooking. Vent wrap and make sure it doesn't touch the food.
- Stir and rotate your food for even cooking. No turntable? Rotate the dish by hand once or twice during cooking.

- Observe the standing time called for in a recipe or package directions. During the standing time, food finishes cooking.
- Use the oven temperature probe or a meat thermometer to check that food is done. Insert it at several spots.

## When You Serve Food

### Never leave it out over 2 hours.

- Use clean dishes and utensils to serve food, not those used in preparation. Serve grilled food on a clean plate too, not one that held raw meat, poultry or fish.



- **Never leave perishable food out of the refrigerator over 2 hours!** Bacteria that can cause food poisoning grow quickly at warm temperatures.
- Pack lunches in insulated carriers with a cold pack. Caution children never to leave lunches in direct sun or on a warm radiator.
- Carry picnic food in a cooler with a cold pack. When possible, put the cooler in the shade. Keep the lid on as much as you can.
- Party time? Keep cold party food on ice or serve it throughout the gathering from platters from the refrigerator.

Likewise, divide hot party food into smaller serving platters. Keep platters refrigerated until time to warm them up for serving.

## When You Handle Leftovers

### Use small containers for quick cooling.

- Divide large amounts of leftovers into small, shallow containers for quick cooling in the refrigerator. Don't pack the refrigerator – cool air must circulate to keep food safe.
- With poultry or other stuffed meats, remove stuffing and refrigerate it in separate containers.

## Reheating

- Bring sauces, soups and gravy to a boil. Heat other leftovers thoroughly to 165°F.
- Microwave leftovers using a lid or vented plastic wrap for thorough heating.

## When in Doubt, Throw It Out

Sometimes foods get forgotten in the refrigerator and may be kept too long.

- **Danger – never taste food that looks or smells strange** to see if you can still use. Just discard it.

- Is it **moldy**? The mold you see is only the tip of the iceberg. The poisons molds can form are found **under** the surface of the food. So, while you can sometimes save hard cheese and salami and firm fruits and vegetables by cutting the mold out – remove a large area around it – most moldy food should be discarded.



### Power's Out

#### Your Freezer

Without power, a full upright or chest freezer will keep everything frozen for about two days. A half-full freezer will keep food frozen one day.

If power will be coming back on fairly soon, you can make the food last longer by keeping the door shut as much as possible.

If power will be off for an extended period, take food to friends' freezers, locate a commercial freezer or use dry ice.

#### Your Refrigerator-Freezer Combination

Without power, the refrigerator section will keep food cool four to six hours depending on the kitchen temperature.

A full, well-functioning freezer unit should keep food frozen for two days. A half-full freezer unit should keep things frozen about one day.

Block ice can keep food on the refrigerator shelves cooler. Dry ice can be added to the freezer unit. You can't touch dry ice and you shouldn't breathe the fumes, so follow handling directions carefully.

#### Thawed Food?

Food still containing ice crystals or that **feels** refrigerator-cold can be refrozen.

Discard any thawed food that has risen to room temperature and remained there two hours or more. Immediately discard anything with a strange color or odor.

### Is It Food Poisoning?

If you or a family member develop nausea, vomiting, diarrhea, fever or cramps, you could have food poisoning. Unfortunately, it's not always easy to tell since, depending on the illness, symptoms can appear anywhere from 30 minutes to 2 weeks after eating bad food. Most often, though, people get sick within 4 to 48 hours after eating.

In more serious cases, food poisoning victims may have nervous system problems like paralysis, double vision or trouble swallowing or breathing.

If symptoms are severe or the victim is very young, old, pregnant or already ill, call a doctor or go to the hospital right away.

#### When to Report Foodborne Illness

You or your physician should report serious cases of foodborne illness to the local health department.

Report any food poisoning incidents if the food involved came from a restaurant or commercial outlet.

Give a detailed, but short, account of the incident. If the food is a commercial product, have it in hand so you can describe it over the phone.

If you're asked to keep the food refrigerated so officials can examine it later, follow directions carefully.

Originally adapted from USDA Home and Garden Bulletin No. 248, October 1995, by Dr. Pamela L. Brady, former Extension foods specialist.

DR. ROSEMARY RODIBAUGH is Extension nutrition specialist, Cooperative Extension Service, University of Arkansas, Little Rock.

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## Chain Saw Safety

Gary Huitink  
Extension Engineer

A skilled woodsman quickly reduces a large tree to manageable pieces. Inexperienced chain saw operators can gain some of these skills with training and using safe, efficient cutting practices. Even seasoned woodcutters should revise techniques that are hazardous. One analysis of chain saw accidents revealed that 70 percent of those injured had more than one year's experience. To avoid injuries, possibly even death, practice safe woodcutting while clearing, thinning, cutting firewood or cleaning up trees downed by a storm.

You should be well prepared before going into the woods. Cutting firewood, thinning timber stands or clearing is worthwhile and rewarding if done properly, but they can also be dangerous. Felling, limbing, bucking and trimming trees are hazardous tasks if not done carefully. This fact sheet gives basic safety precautions for reducing common woodcutting hazards. Each year a number of serious injuries to Arkansans could be prevented by following fairly simple precautions.

### Preparing to Use the Saw

You should be well-prepared before using a chain saw. Know how to operate the saw before you use it. Read and understand the operator's manual. Observe an experienced operator in action. Then use a saw for a period of time with supervision. Obtain the following personal protective equipment before starting to work and wear all protection while sawing.

- ▶ A **hard hat** to protect your head from falling limbs or branches. The best helmets have a face guard.
- ▶ **Safety glasses or goggles** to prevent injury from flying wood chips. Wear these during wood splitting also, to preserve your eyesight.
- ▶ **Ear muffs or ear plugs** to protect ears from permanent injury. Noise from some gasoline-powered chain saws can exceed 100 decibels.



- ▶ Lightweight **gloves**, preferably leather, to protect hands from abrasions and cuts.
- ▶ Heavy **work boots** or shoes with high tops and steel toes.
- ▶ **Trim-fitting clothing** free of ragged edges. Loose clothing will readily snag on limbs or get caught in the saw. Woodcutter's chaps are recommended to give leg protection during a mishap.

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Make sure that your saw is in top operating condition. Keep the chain properly sharpened. Maintain proper chain tension; carefully observe it, especially during the first half hour of cutting. The lower chain span should just touch the bottom bar rails. Raise up on the bar tip while tightening the bar fasteners. Follow manufacturer's recommendations for service and maintenance.

## Fueling the Saw

Good fire safety practices are necessary when refueling the chain saw. Refuel the saw in an open area after it has cooled, at least 10 feet away from where you wish to restart the saw and resume cutting. Fuel the saw at least 20 feet away from fires and lighted cigarettes. Use proper funnels and spouts to prevent spills. Wipe the saw dry of any spilled fuel before cranking it.



## Starting the Saw

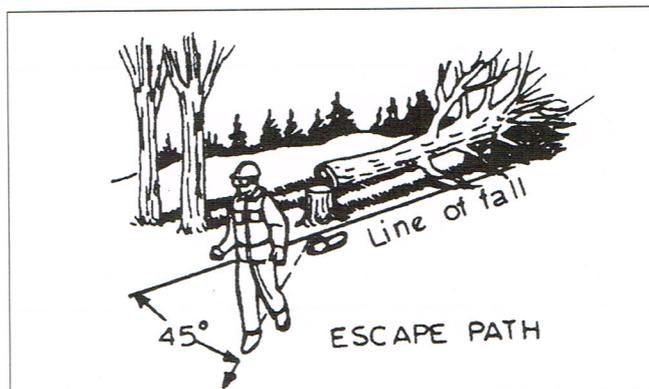
Place the saw on a clear, firm, flat surface as close to the work area as possible. Get a good footing. Follow the owner's manual recommendations for starting the chain saw. Place your foot in the handle to restrain the saw if designed with this intention. **Never start the saw on your knee;** too many experienced woodsmen have slipped and cut their legs.

## Felling the Tree

Plan a safe approach to cutting the tree. Size up the tree. Note the wind direction and the way the tree is leaning. If the tree is leaning, try to fell the tree in that direction when the wind is not blowing against it. If you are inexperienced, try to fell only trees that will fall in a predictable, safe direction. Examine trees for loose, dead limbs before felling. Loose limbs that fall onto the tree cutter are a common cause of serious injuries and fatalities. Either remove the limb first or fell the tree from a position where the limb could not strike you if it was dislodged.

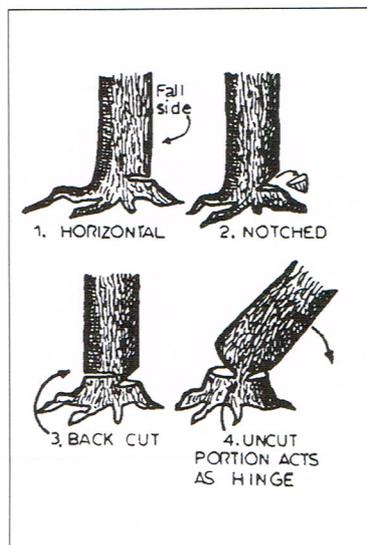
Clear a safe work area around the base of the tree. Remove limbs, underbrush and other obstructions. Be sure to have several open pathways away from the tree for an escape route when the trees begin to fall.

Be sure that clearance in the intended direction is adequate for the tree to fall completely to the ground. A lodged tree is very dangerous. Experienced loggers are often killed by trees that hang up or snag in adjacent trees. A tree springing back from the weight of a falling tree can whip a broken limb toward the cutter with tremendous speed.



After determining the direction of fall and clearing escape routes, cut the tree as follows:

- ▶ Make one cut through trees less than 8 inches in diameter.
- ▶ On larger trees, notch (undercut) at least one-third of the trunk diameter on the fall side of the trunk. Make the lower cut of the notch first to prevent the loose wedge of wood from pinching or bending the chain.
- ▶ Make a felling or backcut on the opposite side of the trunk two inches above and parallel to the horizontal cut in the notch. The tree should begin to fall when you are several inches from the inner face of the notch. Leave a narrow uncut portion to serve as a hinge for controlling the fall of the tree.



If the saw begins to bind in a closing cut, you may have misjudged it. At the very first indication of binding, remove the saw. If it is too late to remove the saw, do not struggle with it. Shut off the engine, and plan a way to remove the saw using wedges.

Wedges are the most dependable way of controlling the direction a tree falls. Using two wedges rather than one is best. Two wedges allow better control and ensure a forward fall of the tree.

The path of the butt of a falling tree is unpredictable. Being struck by the butt, rebounding limbs or broken tops is the second most common cause of death to those felling timber.

Controlling tree fall comes with experience. Get advice and help from an experienced person before attempting a difficult fall. Remember, accident statistics show that overconfidence can hurt experienced loggers. It may lead to dangerous shortcuts, such as not providing clear escape routes from a falling tree. Or it may lead to attempting too much, dulling the senses to danger signals.

## Limbing the Tree

The next job is to remove the limbs. Be alert for flexible limbs that wedge and whip a chain saw, and avoid cluttered work areas. Serious injuries may occur during the limbing operation. Some safety tips are:

- Begin limbing at the base of the trunk. The first limbs cut should be those on top of the trunk. Cut these as far up the top side of the trunk as possible before removing those resting on the ground.
- Stand on the opposite side of the trunk from the limb being cut. The trunk provides a barrier between you and the saw and helps protect from accidental contact with the chain.

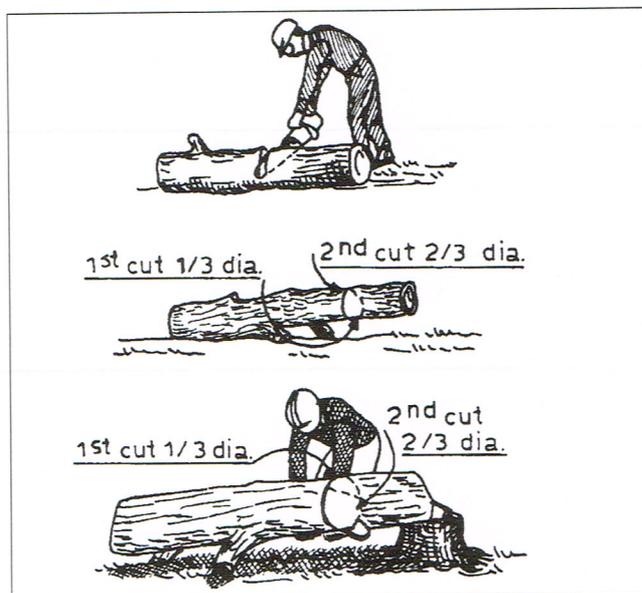


- Do not hold a running saw with one hand and clear limbs with the other. Shut off the saw and put it down until limbs have been cleared.
- Cutting branches resting on the ground may be necessary to clear the area as you work. Beware that the tree may sag or roll as a new branch is cut. The likelihood of the tree rolling increases as more branches are removed. Be alert for any trunk movement and be ready to move away quickly if necessary.

## Bucking the Logs

Bucking is cutting the trunk of the felled tree into desired lengths. The greatest hazards while bucking a tree are unexpected log roll and saw kickback. Here are a few safety tips:

- Always be sure of your footing. By keeping yourself in a well-balanced position at all times, you can react to unexpected log movement.
- Raise and chock the trunk when possible to prevent rolling. Work on the uphill side of the log. Since a log rolls downhill, working on the uphill side provides the greater safety.



- Bucking procedures differ depending on how you support the log. When the log is flat on the ground, cut it from top, then roll it over and cut it through from the opposite side. When the log is supported on one end, cut one-third of the diameter from the underside to avoid pinching and splintering, then cut the remaining two-thirds of the diameter from the top. On a log supported at both ends, make the first cut through the top one-third of the diameter. The remaining wood is then cut upward from the bottom.

When cutting firewood lengths, several methods can be used. One way is to make cuts about three-fourths of the way through for each length of firewood. By not cutting completely through, several lengths stay together and the log remains rigid. After all cuts are made from one side, roll the log over and complete cuts. Avoid sawing into the ground, which dulls the chain and shortens its useful life.

## Splitting the Wood

Splitting wood is a skill that improves with experience. Having the proper tools makes the job easier. Tools used to split firewood include a splitting ax, a sledgehammer, a splitting maul and wedges.

The quickest way to split small, easy-to-split pieces is with an ax. An ax can get stuck, however, in larger pieces. A splitting maul makes the job easier. A splitting maul is a combination of an ax and a maul,

with a wedge on one side and a hammer on the other. Use the wedge side just as you would an ax. The broader wedge keeps the blade from jamming as easily in wood. The hammer side can be used to pound the occasional wedge. You may need a sledgehammer and wedges for larger pieces that are very hard to split.

Felling trees, cutting firewood and operating a chain saw has a high risk of injury. Anyone near these activities should be alert to the hazards and communicate their intentions. Use a sharp chain saw, follow safe practices, maintain clear escape routes and plan ahead to work safely and profitably.

## Reference

Peters, P.A. 1991. Chain Saw Felling Accidents. Transactions of ASAE, Vol. 34(6), pp. 2600-2608. St. Joseph, MI.

Acknowledgment is given to **JOHN LANGSTON**, Extension engineer emeritus, for his assistance in the development of this fact sheet and to **RICHARD DESPAIN**, Extension illustrator, for all of the illustrations.

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# Tornado Safety

Biological and  
Agricultural  
Engineering

Tornadoes can be deadly. With good warning systems, you can be alerted before the tornado is visible. This additional time makes tornado survival more likely. During bad weather, you must be alert and tune in for warnings. If a tornado should strike, well-made plans for emergency shelter can overcome this disaster and bring you, your family and your community through without personal injury.

- Have a NOAA Weather Radio All Hazards with a battery backup and warning alarm to receive warnings.
- Listen to TV or radio for weather updates.
- If your activity is outdoors, listen to the latest forecasts and take necessary precautions (possibly delaying activities until the danger is past) during threatening weather.

## What You Can Do

### Before the Storm:

- Develop an emergency storm plan for all family members whether at home, work, school or outdoors.
- Teach children their county and neighboring counties because storm alerts are given by counties. Keep highway maps in several convenient locations to follow storm movements given by weather bulletins.
- Conduct frequent storm drills.

### If a Tornado Warning Is Issued or Threatening Weather Approaches:

- Move to a previously designated safe area, preferably a basement.
- If an underground shelter or “safe room” is not available, move to an interior room or hallway on the lowest floor. Crouching under a sturdy desk or rugged furniture is advisable if it is located near a central wall. Place pillows or blankets over your head and upper body for extra protection.
- Stay away from doors and windows.

### Know the Difference Between a Tornado Watch and a Tornado Warning

**TORNADO WATCH...**Tornadoes are possible in your area. Remain alert for approaching storms. Listen to NOAA Weather Radio All Hazards, commercial TV or radio for weather information.

**TORNADO WARNING...**A tornado has been sighted or indicated by weather radar. If you may be in the path of the storm, move to a previously designated safe area.

Tornado watches and warnings are issued as soon as the conditions are identified. Use the available time, once you note a warning, to prepare for one of nature's most destructive storms. Stay informed about the approaching storm.

Sometimes tornadoes develop so rapidly that advance warning is not possible. Remain alert for signs of an approaching tornado.

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## Doppler Radar

Do you know that new Doppler radar units can detect tornadoes that are forming? Doppler radar measures wind speeds and the direction of air currents within storms. This capability really enhances identification because a tornado is simply a violently rotating column of air, pendant from a cumulonimbus (thunderstorm) cloud. Several years ago radar gave only rainfall intensity and "storm conditions." Doppler radar capabilities improve the accuracy and timeliness of National Weather Service bulletins.

Doppler radar units are located at National Weather Service offices in Little Rock and Fort Smith, Arkansas; Memphis, Tennessee; Tulsa, Oklahoma; Jackson, Mississippi; Shreveport, Louisiana; and Springfield, Missouri.

- Do not try to outrun a tornado in your car. Instead, leave it immediately. If caught outside or in a vehicle, get out and lie flat in a nearby ditch or depression. Take shelter under highway overpasses only as a last resort.

**If a tornado strikes, watch out for fallen power lines. Stay out of damaged areas until power is disconnected to avoid accidental electrical shock.**

## Arkansas Statistics

Tornadoes occur in many parts of the world. However, three-fourths of the world's tornadoes occur in the U.S. These violent storms occur most frequently in the United States east of the Rocky Mountains during the spring and summer months. Arkansas is located in the lower Mississippi Valley where warm, moist air flowing northward from the Gulf of Mexico interacts with cool, dry air spreading southward and eastward from the Great Plains.

During the 56 years from 1950-2005, 1,351 tornadoes have struck Arkansas. Records show that they can occur any day of the year and any time of day. Tornado preparation requires constant vigilance.

While tornadoes in Arkansas normally occur during the spring and fall months, they can occur in any month. A total of 68 tornadoes occurred in January, 1999. This set a national record for the greatest number of tornadoes in the month of January. During 1999, 107 tornadoes were sighted, setting a new record for Arkansas.

Tornadoes occur with greater frequency during late afternoon to late evening, according to the National Weather Service records. In Arkansas, five in the afternoon is the time of the maximum tornado incidence.

The greater tornado frequency during afternoons and evenings can largely be explained from patterns of increased instability in the atmosphere. This air instability results from a buildup of heat near the earth's surface on warm afternoons. After sunset the layer of heated air near the earth's surface begins to cool. This usually restores more atmospheric stability and reduces the threat of tornadoes.

Any period of unseasonably warm and humid conditions should trigger caution about the possibility of a tornado. Monitor weather bulletins and watch the sky during approaching thunderstorms. Violently moving clouds indicate high air velocities which may develop into a tornado.

Tornadoes have killed a total of 1,528 Arkansans since 1880. A "killer" tornado is a tornado that causes the death of at least one person. The worst killer storms in the state's history occurred March 21, 1952. That day three tornadoes killed 111 persons and injured an additional 772. In recent years, an average of four Arkansans have died from tornadoes each year.

**Table 1. Some Notable Arkansas Tornadoes**

Date	Location	Deaths	Injuries
March 8, 1909	Sheridan to Northeast of Brinkley	58	633
January 3, 1949	Hopewell-Warren	57*	402*
March 21, 1952	Searcy-Judsonia-Kensett-Bald Knob	57	346
March 21, 1952	Hazen-Cotton Plant-Marked Tree	40	274
May 15, 1968	Jonesboro	34	350
December 14, 1987	West Memphis	6	200
April 21, 1996**	Fort Smith to Rudy	2	89
March 1, 1997	Southeast of Bryant to Prothro Junction	15	220
March 1, 1997	Hope to East of Malvern	6	113

\*Total of 58 deaths and 439 injuries in Arkansas and Louisiana.

\*\*Produced 300 million dollars of damage.

**Table 2. Tornado Occurrences by Month, 1950-2005\***

Yrs.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
50-59	9	20	33	33	24	9	6	2	2	3	11	4
60-69	6	16	30	35	44	9	7	5	4	1	9	2
70-79	10	14	26	83	39	19	12	8	11	5	20	18
80-89	4	1	13	57	29	9	5	0	3	12	17	34
90-99	76	6	54	43	36	24	13	2	10	12	18	6
00-05	5	23	4	40	79	2	3	0	15	13	55	39
Total	110	80	160	291	251	72	46	17	45	46	130	103

\*National Weather Service Records

## Tornado Variability

Recognizing conditions that may develop into tornadic winds is the first major step in avoiding this cruel disaster. Weather broadcasts can help avert tragedy. Be prepared to find suitable protection. Flying debris from tornadoes causes most deaths and injuries. Most tornado damage is probably caused by winds of 125 mph; however, maximum wind velocities may exceed 250 mph. The most damaging storm occurred in the Fort Smith-Van Buren areas on April 21, 1996, with associated costs around \$300 million.

Surface winds in connection with developing tornadoes are usually from the southwest. Sixty-four percent of the tornadoes in Arkansas move from the southwest to the northeast. But tornadoes can come from any direction. Some tornadoes have stopped their forward movement, turned and looped back across their path. Their average speed of advance is 30 mph, but a few move as fast as 70 mph.

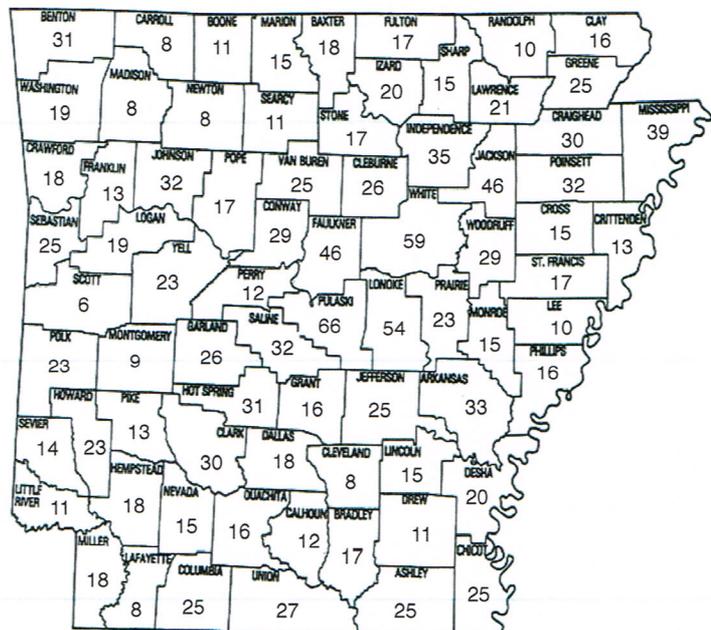
The diversity of their approach patterns and speed demands alertness, especially after a tornado warning has been issued for your area. Refrain from driving to locate family or friends. Make phone calls to notify those who may have missed the tornado warning broadcast, but keep an alert eye on the sky.

## Tornado Identification

Violent storms associated with low barometric pressures can spawn a tornado. Strong winds in the lower few thousand feet of the atmosphere may be noted by cloud movements. The storm cells develop from 20,000 to 40,000 feet elevation. Rotation of air (cloud movement) usually starts with a circulation near 20,000 feet and builds up and down.

Tornadoes often form near a thunderstorm's updraft. Often surface winds of 25 to 35 miles per hour are noted near a developing tornado. Small clouds will rise quickly into the larger cloud layer.

**Figure 1. Number of Tornadoes in Each County From 1950-2005 According to National Weather Service Records**



Near a tornado, the barometric pressure drops rapidly. The characteristic funnel may drop down, loop and appear to dissipate at times.

If a funnel is sighted, take shelter immediately. Tornadoes can reach you within a few minutes. Other funnels can spawn directly overhead.

Tornadoes may “mature” in a classic fashion. However, be aware that violent storm cells can cause two or more circulations. It is important to have a good view of the entire sky to avoid being surprised by another funnel that was obscured behind a ridge, buildings or a row of trees.

Any time you are observing a storm, be alert to the potential of being struck by lightning. Standing near a tree or house that projects above the landscape during violent weather risks being in a deadly path of lightning discharge. Any vertical projections, especially metal structures, can readily attract a fatal electrical current.

Tornadoes occur all over Arkansas. It is important to have a tornado plan and review it annually. If changes in a community warning system have occurred or a better shelter is now available nearby, take advantage of the new opportunities. Steps to survive a tornado are simpler and more important than earthquake precautions.

## Disaster Plans

Everyone should have a disaster plan to survive a tornado. Follow these basic steps to develop a family tornado disaster plan:

1. **Find out if your community has tornado warning sirens.** Learn your community’s warning signals and evacuation plans. Locate the safest areas in your home. To be better prepared for a tornado, contact your local National Weather Service office, local Office of Emergency Management, American Red Cross Chapter or county Cooperative Extension office to determine what they can provide.
2. **Meet with your family to create a plan.** Discuss the tornado warning measures available to you. Point out the safest areas in your home to assure that everyone knows where to go for shelter. A storm cellar or safe room offers the best protection. Funds to assist in the construction of safe rooms may be available from the Arkansas Department of Emergency Management. Please review their website at [www.adem.state.ar.us](http://www.adem.state.ar.us).
3. **Practice emergency drills and maintain your plan.** Ask questions to make sure each family member remembers the meeting place. Assemble in the assigned tornado shelter. Remind each one to use the telephone only if there is no immediate danger and then only to notify other family members of the violent weather concern or



tornado watch. Post emergency phone numbers and safety rules by the telephone. Teach children how and when to call 911 or the local emergency medical service number.

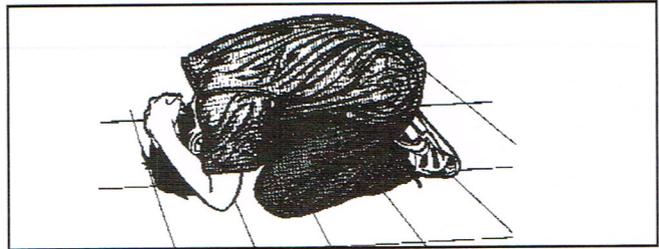
4. **Improve your plan.** (a) Review the emergency phone numbers posted by the telephones. (b) Install fire extinguishers and make other safety improvements to your house. (c) Teach your family how to use a fire extinguisher and how and when to turn off water, gas and electricity. (d) Review basic safety measures and/or enroll in CPR and first aid classes. (e) Maintain supplies in your home to meet your emergency needs for at least three days. Assemble a disaster supply kit with items needed for an evacuation. Store these supplies in sturdy, easy-to-carry containers such as backpacks or duffel bags.
5. **Protect valuable records.** Maintain a safety deposit box for family and business papers that cannot be replaced. Review specific wind and flood damage protection provided by your insurance policy. Prepare records that will help verify losses for insurance, tax or federal disaster declarations.
6. **Test and recharge (as needed) your fire extinguishers according to the manufacturer’s instructions.** Replace stored water every six months.

## School Disaster Plans

(Hospitals, nursing homes and other institutions should develop similar plans.)

- Develop a severe weather action plan and have frequent drills.
- Assign responsibility for activating the severe weather plan. This includes assuring severe weather is continually monitored with NOAA Weather Radio All Hazards and local TV/radio.

- Make sure several leaders know how to turn off electricity and gas in the event the school is damaged.
- Each school structure should be inspected and tornado shelter areas designated by a registered engineer or architect. Schools without safe rooms or basements should use interior rooms and hallways on the lowest floor and away from windows.
- If the primary power for the school's alarm is electricity, provide a charged-battery backup or have a compressed air horn or megaphone to activate the alarm during power outages.
- Have provisions for disabled students and those in portable classrooms.
- Move students quickly into interior rooms or hallways on the lowest floor. Have them assume the tornado protection position with their heads against the wall.
- Lunches, classes or assemblies in large, free-span cafeterias or auditoriums should be delayed if severe weather is anticipated.
- Keep children at school beyond regular hours if threatening weather is expected. Children are safer at school than in a bus or car. Students should not be sent home early if severe weather is approaching.



Tornado protection position

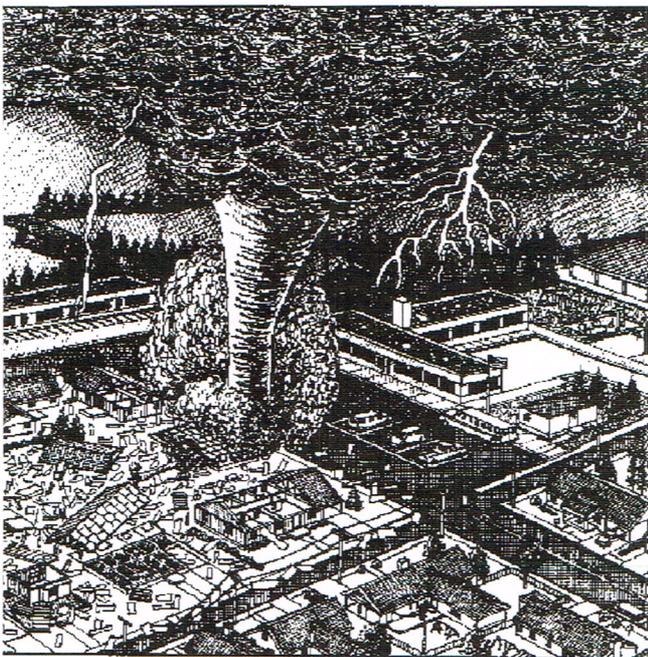
## NOAA Weather Radio

Weather information can be received 24 hours a day from NOAA Weather Radio All Hazards. In Arkansas, this is a joint effort between the National Weather Service and the state. The latest weather information is broadcast all day and all night, including severe weather details.

Special radio receivers are available at radio shops, electronics stores, department stores and discount stores. Many multiband radios and scanners can also receive the frequencies.

Some radio receivers have a "warning alarm" feature for severe weather watches or warnings that allows the National Weather Service to automatically turn on the radio, day or night. This warning alarm is tested each Wednesday between 11 a.m. and noon. If bad weather is occurring or is forecast, the test is postponed until the next good weather day.

Do not remain in auditoriums, cafeterias, gymnasiums or other structures with wide, free-span roofs because they offer no protection from tornado-strength winds.



**Table 3. NOAA Transmitter Locations and Assigned Frequencies (mhz) Serving Arkansas**

Broken Bow, OK	162.45
Cherokee Village	162.475
Dyersburg, TN	162.50
El Dorado	162.525
Fayetteville	162.475
Fort Smith	162.55
Fountain Hill	162.475
Grove, OK	162.50
Gurdon	162.475
Harrison	162.525
Jonesboro	162.55
Little Rock	162.55
Marvell	162.525
Memphis, TN	162.475
Mena	162.40
Morrilton	162.475
Mountain View	162.45
Mount Ida	162.425
Russell	162.40
Russellville	162.525
Springdale	162.40
Star City	162.40
Texarkana	162.55
Wardell, MO	162.525
Yellville	162.50

## Community Preparedness

A Warning Coordination Meteorologist (WCM) is located at the National Weather Service office in Little Rock. The WCM assists officials at all levels of state and local government as well as private individuals. The WCM provides severe storm spotter training to local Office of Emergency Management personnel, HAM radio operators and local groups. The WCM also presents severe weather preparedness programs at school assemblies and civic meetings. To contact the WCM, write to the National Weather Service Forecast Office, 8400 Remount Road, North Little Rock, Arkansas 72118.

Arkansas Department of Emergency Management personnel help prepare for and recover from disasters, including tornadoes. Contact your local Emergency Management Coordinator or the Arkansas Department of Emergency Management (phone 501-730-9750) to obtain information.

The University of Arkansas Division of Agriculture, Cooperative Extension Service, offers educational programs on tornado safety through 4-H, Extension Homemaker clubs or programs for the general public. If you would like an educational program on tornado safety, contact your county Extension office.

## Tornado Safety Locations

### Homes With Basements

Seek refuge near a basement wall in the most sheltered and deepest part of the basement below ground.

### Homes Without Basements

Take cover in the smallest room with stout walls under heavy furniture or a tipped-over, sturdy, upholstered couch or chair near the center of the house. The first floor is safer than the second or third. Don't take time to open or close windows; get away from them and go to a safe area immediately. Construction of a storm cellar is particularly advisable for those in homes without basements.

### Mobile Homes and Modular Buildings

Abandon mobile homes. Arrange for use of a convenient safe area in advance should violent weather occur. Consider basements, a storm cellar or safe room, the ground floor of a sturdy structure or a nearby culvert or deep ditch.

### Factories, Auditoriums and Other Large Buildings With Wide, Free-Span Roofs

These buildings are particularly vulnerable to tornadic wind damage due to the large roof expanse upon which wind forces act and the distance between roof-supporting walls. Basements of these buildings offer reasonably good protection. Smaller interior rooms at ground level or nearby sturdy buildings are options, depending on their construction and the urgency for shelter. Pre-select and mark designated safe areas. Hold tornado safety drills. Train building employees to direct occupants to designated safe areas. Trained spotters should assume their posts as soon as conditions become threatening.

### Office Buildings

The basement or an interior hallway on a lower floor of an office building is safest. Upper stories are unsafe. If there is not time to reach one of the lower floors, a small room with stout walls (closet or bathroom) or an inside hallway provides some protection against flying debris. Otherwise, getting under heavy furniture must do. Select and mark designated safe areas in office buildings. Train employees to direct occupants to designated areas.

**Note:** The Arkansas Department of Emergency Management and some local fire departments maintain a current set of criteria or specifications for a "safe room." Following these construction guidelines closely will provide a sturdy safe room if a storm cellar or basement is not accessible during a tornado warning.

Acknowledgment is given to Gary Huitink, retired Extension engineer and associate professor, Biological and Agricultural Engineering, and Newton Skiles, senior forecaster, National Weather Service, as authors of this publication.

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# Skid-Steer Safety

Gary Huitink  
 Extension Agricultural  
 Engineer

Skid-steer loaders are valuable “workhorses” for many farms. However, recent accidents emphasize that staying alert is vital for skid-steer operators and their co-workers. A moment of carelessness may result in broken bones, an amputation, a crushed torso or possibly death.

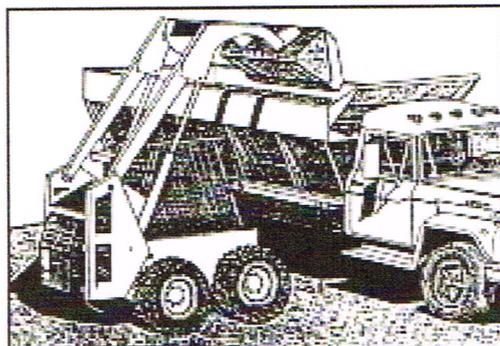
One operator was pinned under an overturned loader on a manure pile. A co-worker was fatally crushed in another accident. Several co-workers have been run over when they failed to get clear of a loader’s path when it changed directions.

Rollovers can occur when the bucket strikes an obstruction – an embankment, portion of a farm structure or a truck you may be loading. Certainly, operating the loader with the bucket raised requires caution and moderate speeds. Also, be cautious operating at high speeds with the bucket just above the floor or roadway. The bucket may catch when crossing a footing or bouncing over a ridge.

Momentum may cause an overturn when wheels on one side ride up on a pile of poultry litter or drop into a washout or similar drop-off. An upset at high speed is much more likely to cause a fatality.

## Follow These Basics

- Don’t overload a bucket or attachments, or carry a load which could fall. Lifting attachments can change the weight distribution of



the loader. They can also affect its stability and handling response. Be sure you can keep the machine under complete control at all times.

- When changing buckets or installing attachments, make sure all connectors are securely fastened.
- Never modify your skid-steer’s rollover protective structure. Doing so could result in severe injury or death.
- Know and avoid the pinch points and rotating parts on the loader.
- Never allow an untrained individual to operate the machine. Read the operator’s manual. Participate in a training course offered regularly.
- A skid-steer loader is a one-person machine. **Never permit riders!** Don’t use the bucket for a work platform or personnel carrier. An extra rider has no protection should any type of accident occur. Overturns are a common type of accident. An extra rider is often crushed when a skid-steer loader turns over.

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- Never overload the lift with hay bales, bales of cotton or materials that could injure someone if they fall. Keep the loaded bucket level as lift arms are moved, and as the loader climbs slopes or traverses ramps.
- Always look around before you back up or swing an attachment. Be sure that everyone is in the clear. Keep others away from the area of loader operation. **Never lift, swing or move a load over anyone.**

## Operate Loaders Safely

- Always keep the seat belt/operator restraint fastened.
- Never leave the operator seat without first raising the operator seat bar (if so equipped), lowering the lift arms (or engaging the lift arm restraints) and stopping the engine.
- Never attempt to work the controls unless properly seated. Keep all of your body inside the cab while operating a skid-steer loader.
- Avoid sudden stops, starts or turns. Operate controls smoothly – don't jerk the steering.
- Carry the bucket low for maximum stability and visibility. Any load should be carried high enough to clear floor or ground obstacles, but no higher than necessary.
- Raise loads slowly and at an even rate. Be ready to lower the load quickly if the machine becomes unstable.
- Never drive across excessively steep slopes.

## Work Safely

- Watch out for overhead obstructions. Poultry houses, cotton gins, fertilizer storage, etc., may have low-hanging electrical wiring. Walk through the area where you expect to operate because wiring is easier to see on foot, especially if the area is poorly lighted.

- When raising a load, especially in a poultry house, make sure it clears the lower beam of the roof trusses and the door opening.
- Poultry houses vary from 30 to 40 feet wide. Consider the fans, roosts and other components that narrow the area available for turning around.
- Don't get close to the trench wall when backfilling. Never operate a skid-steer too close to the edge of an overhang or gully. The edges could collapse, or a slide could occur.
- Never undercut a high bank.
- Don't lift loader arms too high or roll the bucket too far back when handling materials that could fall into the operator's compartment.
- Watch out for obstacles, and adjust speed to conditions.
- Routinely check the brakes and adjust them properly.
- Never attempt maintenance or other work under the bucket or around the lift supports without installing sturdy blocks or safety supports under the bucket. Guards and shields are to protect you, so don't fail to replace them after repairs or service.

Safety interlocks and "operator-present" controls are a vital part of your protection. To bypass them puts your well-being at risk and may add to your liability should someone else be injured.

**Rarely do safe practices require more time or money.** Most safe procedures can be adopted into your regular routine. Many farm, gin and fertilizer plant accidents can be prevented with good housekeeping, attention to safety warnings and proper equipment operation. And the payoff from making safety an integral part of everything you do is a better quality of life for you, your family and those who work for you.

The author acknowledges the contribution made by **DR. THOMAS COSTELLO**, professor of biological and agricultural engineering, University of Arkansas, Fayetteville.

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# Beef Cattle Herd Health Vaccination Schedule

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## Introduction

A herd health management plan is vital to profitable beef production. Some producers, however, do not vaccinate until they have a loss. The investment in disease prevention is less than the cost of disease treatment. Don't wait until a disease outbreak occurs before implementing a sound herd health program. For cattle to reach their performance potential, they must be healthy.

Many animal health problems can be controlled with good management, proper nutrition and vaccination against infectious diseases. Beef cattle vaccination programs vary, depending

upon the type of operation and area of Arkansas. The purpose of this fact sheet is to provide the cattle producer with a basic herd health vaccination program. It is important to contact your veterinarian to determine if additional vaccinations are required for your area.

**Table 1. Cattle Vital Statistics**

Rectal Temperature	101.5°F (38.5°C)
Heart Rate Beats/Minute	60 to 70
Respiratory Rate	30 breaths/minute
Estrous Cycle	18 to 23 days
Estrus	12 to 18 hours
Gestation Length	285 days

**Table 2. Vaccination Schedule: Cows and Bulls**

Vaccine	Recommended	Frequency
IBR	Recommended	Annual (killed or intranasal)
BVD	Recommended	Annual
PI3	Recommended	Annual
BRSV	Recommended	Annual
Leptospirosis (5-Way)	Recommended	Annual (every 3 to 6 months in some areas)
Vibriosis	Optional	Annual (30 to 60 days before breeding)
Trichomoniasis	Optional	Annual (30 to 60 days before breeding)
Pinkeye	Optional	As needed
Anthrax	Optional	Annual
Blackleg 7-Way	Optional	Annual

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**Table 3. Vaccination Schedule: Calves\***

Vaccine		
Blackleg 7-Way	Recommended	Prewearing
IBR-BVD-PI3	Recommended	Prewearing
Leptospirosis	Recommended	Prewearing
Brucellosis	Recommended	Heifers (4 to 12 months)
BRSV	Optional	As needed
Pasteurella	Optional	Prewearing
Haemophilus somnus	Optional	Prewearing
Pinkeye	Optional	As needed
E. Coli	Optional	Vaccinate cows (twice 30 days before calving)
Anthrax	Optional	As directed
Anaplasmosis	Optional	As directed

\*Do not use modified-live products on calves that are still nursing cows.

**Table 4. Vaccination Schedule: Heifers**

Vaccine	
Brucellosis	Calfhood (4 to 12 months)
IBR	Before breeding
BVD-PI3	Before breeding
BRSV	Before breeding
Vibriosis	Before breeding
Leptospirosis	Before breeding
Blackleg 7-Way	Before breeding
Anthrax	Optional as directed
Anaplasmosis	Optional as directed

## Conclusion

Vaccination programs should always be customized for your operation. Items to consider while establishing a vaccination program include geographic region, type of cattle operation, frequency of introducing new stock, post-vaccination problems and export or interstate shipping requirements.

For best results, always follow the manufacturer's recommendations for dosage, method of administration, number of times given and proper storage.

Preventing diseases through the use of a herd health management plan saves time and money. For best results, work with a veterinarian who is familiar with your beef cattle operation. Justifying the cost of preventive management is sometimes difficult. The annual cost of a vaccine health program ranges from \$3 to \$10 per cow-calf unit. Experiencing a health disaster certainly drives home the point that "an ounce of prevention is worth a pound of cure."

The University of Arkansas Division of Agriculture, Cooperative Extension Service, would like to thank Drs. Charles Hatfield, Tim Woody, Joe Melton and Jim Shearer of the Arkansas Veterinary Medical Association for their assistance in the development of the vaccination schedules.

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**JEREMY POWELL, DVM**, Extension veterinarian, is located in Fayetteville. **STEVEN JONES**, Extension horse specialist, **DR. SHANE GADBERRY**, Extension livestock specialist and **DR. TOM TROXEL**, Extension beef cattle specialist, are located in Little Rock. They are with the University of Arkansas Division of Agriculture, Cooperative Extension Service.

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# Water for Beef Cattle

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Extension Livestock  
Specialist

Livestock require the proper balance of water, carbohydrates (energy), protein, vitamins and minerals for optimal levels of performance. Of these nutrients, water is the most critical for all classes of livestock.

Cattle have little ability to adapt to water restriction, and feed intake will be greatly reduced following only short periods without water. Because of this, a plentiful supply of good quality water is necessary for profitable beef production.

## Water Requirements

Many factors influence the amount of water required by cattle. Table 1 shows average water needs for various classes of beef cattle. Note that water consumption varies considerably, depending on the temperature and stage of production. These allowances are not absolute requirements and should only be used as a guide in developing water sources, or as a starting point for supplying water to penned cattle.

Water consumption is influenced by other factors, such as moisture and protein level of the feed, salt intake,

relative humidity and the breed of cattle. When high moisture feeds such as silage or fresh forages are used, water intake as drinking water is reduced. Because of the need to excrete more urine, high levels of salt or protein in the feed increase water needs. In areas with high humidity, animals require somewhat less water because of lower losses to evaporation. Brahman cattle have a greater ability to adapt to hot, dry conditions than the temperate breeds of cattle, so they better withstand short-term water restriction. Because of the importance of water to body function and the difficulty in estimating requirements, cattle in all circumstances should have free access to all the quality water they will consume.

## Water Quality

Quality of drinking water for both humans and livestock is a growing national issue. Some water supplies have been contaminated by agricultural chemicals or contain naturally occurring contaminants that interfere with animal performance. The purpose of this fact sheet is to provide an outline for maximum tolerable levels

**Table 1. Estimated Daily Water Intake of Cattle, Gallons/Day (adapted from a table prepared by Paul Q. Guyer, University of Nebraska)**

Daily High Temp (F°)	Cows Nursing Calves <sup>1</sup>	Dry and Bred Cows	Bulls	Growing and Finishing Cattle			
				400 lb	600 lb	800 lb	1000 lb
Gallons/Day							
35	11	6	7	4	5	6	8
50	13	7	9	5	6	7	9
65	16	8	11	6	7	9	11
80	18	11	13	7	9	10	14
95	20	15	20	11	15	17	19

<sup>1</sup>First four months of lactation.

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of contaminants in water, and to promote practices that help to maintain water quality and prevent pollution of water sources by beef cattle.

**Salinity.** Waters that contain high levels of dissolved salts (TDS) can result in depressed performance of beef cattle. These waters are normally found in wells in coastal regions of the southeast. The following guidelines should be used with water high in TDS. In general, the type of salt (whether it is primarily sodium chloride or a complex mixture) has little influence on the acceptable levels. Cattle prefer water containing some salt, but increasing levels to about 5,000 ppm TDS reduces intake and average daily gain by about 10 percent for feedlot cattle. Water containing from 5,000 to 7,000 ppm TDS is safe for cattle in most cases but likely results in depressed performance. Water containing from 7,000 to 10,000 ppm TDS is safe only for dry cows under low levels of environmental stress, and water containing more than 10,000 ppm TDS should not be used for cattle.

When use of a water source high in TDS is necessary, gradually adapt animals rather than rapidly switch water sources. It is also important to consider the fact that consumption of salty feeds, such as a salt-limited protein or mineral supplement, is influenced by TDS in drinking water. When animals are fed salt-limited supplements and the water supply is highly saline, intake of the supplement is reduced and protein or mineral deficiency could result. Individual salt compounds may be measured to determine TDS, or electrical conductivity may be used to estimate salinity of water.

**Nitrates.** Nitrate in drinking water is rapidly becoming the most predominant water problem for livestock in the southeastern United States. A guide to evaluating water contaminated with nitrates is given in Table 2. Water test results generally have nitrates and nitrites combined and may report levels as nitrate nitrogen, nitrate ion or sodium nitrate. This can greatly affect interpretation of the results. Levels in Table 2 are expressed in the three major forms that may be reported.

Nitrate is not poisonous to livestock, but it can be converted in the gastrointestinal tract to nitrite, which impairs oxygen transport by the blood. Nitrite converts the hemoglobin (which binds oxygen) in red

blood cells into methemoglobin, which is brown in color and does not bind oxygen. Excessive nitrate intake (acute toxicity) may result in a lethargic animal and sudden death. Animals may adapt to high levels of nitrate if levels are raised gradually, but chronic exposure either in feed or water may result in depressed feed intake, depressed growth rate and abortions. In some situations, nitrate levels in water will be below maximum tolerable levels, but because of substantial levels of nitrate in forages, the water may contribute to a nitrate toxicity problem.

Nitrates in runoff from agricultural fields are quickly dissipated from rapidly flowing surface waters through volatilization, so nitrate is normally a problem met when using well water, especially shallow wells in agricultural areas. Avoid ditches and ponds as water sources because ditches and ponds on poorly drained land can collect runoff from cropland which may contain high levels of nitrates as well as other agrochemicals. Failure to test soil over many years results in excessive nitrogen fertilization in some areas. The nitrogen then leaches into the soil and enters shallow groundwater.

The leaching of nitrate from improper waste management facilities around livestock, especially heavy concentrations of swine operations on sandy soils, may contaminate shallow surface water.

When planning a forage system that may lead to high forage nitrate levels, it is strongly recommended that cattle drinking water be tested for nitrates.

**Blue-green algae.** Stagnant waters may contain excessive levels of blue-green algae, which may be toxic and result in death of cattle. Because of their stagnant, nutrient rich nature, small ponds and streams in late summer can have toxic algae blooms. Toxicity is most common following a rapid bloom in late summer when cattle are consuming a substantial amount of the algal surface scum. The problem is difficult to predict, and the first sign may be sudden animal death. Because of this, it is advisable to restrict cattle access to stagnant waters, especially when a substantial amount of algae scum is visible. Algae blooms can be controlled in ponds through the use of copper sulfate (blue stone), but the rapid die off of algae may result in a fish kill.

**Table 2. A Guide to the Use of Waters Containing Nitrate for Cattle (National Academy of Sciences, 1974)**

Acceptability	Form of Nitrogen Reported (ppm) <sup>1</sup>		
	Nitrate Nitrogen (NO <sub>3</sub> -N)	Nitrate Ion (NO <sub>3</sub> )	Sodium Nitrate (NaNO <sub>3</sub> )
Safe	Less than 100	Less than 443	Less than 607
Questionable <sup>2</sup>	100-300	443-1329	607-1821
Unsafe <sup>3</sup>	Over 300	Over 1329	Over 1821

<sup>1</sup> Water analysis labs will report values in one of these three ways. Values are reported in parts per million (ppm).

<sup>2</sup> These waters should be used with caution. High nitrate in forages, or high temperatures (high water intake), could result in problems.

<sup>3</sup> Cattle should not have access to these waters.

The best method to control algae is to eliminate the source of nutrients entering the pond. If copper sulfate is used, the recommended application rate to water depends on the alkalinity (total carbonates and bicarbonates) of the water. Copper ions can kill fish if the water's total alkalinity is below 40 ppm. Copper sulfate treatment may be ineffective if alkalinity of the water is greater than 300 ppm. *The maximum tolerable level of copper sulfate in water is 2.7 (sheep) and 6.8 (cattle) pounds of copper sulfate per acre foot.*

The formula to calculate the pounds of copper sulfate needed is as follows:

$$\frac{\text{Total alkalinity (ppm)}}{100} \times 2.04 \times \text{acre-foot volume} =$$

Pounds of copper sulfate needed

Do not exceed the application limits for livestock, especially sheep. Livestock (especially sheep) should not be watered for at least five days after the last visible evidence of the algae bloom. Care should be taken to avoid water that has algae cells, either from treatment with algicide or natural aging of the bloom, because most toxin is freed in the water only after breakdown of the intact algae cells.

*Substances in water.* Other substances in water that may cause problems for beef cattle are listed in Table 3, along with maximum safe levels. Problems that are common are high or low pH, or excessive levels of sulfates, hydrogen sulfide, iron or manganese. These factors may result in decreased water intake because of off flavors. In addition, excessive levels of some minerals may interfere with normal trace mineral absorption, especially of copper and zinc, and lead to nutritional deficiencies.

In some situations, shallow groundwater or surface water may be contaminated with agricultural chemicals such as pesticides. Any shallow well, stream or pond adjacent to cropland with a long history of agricultural chemical use should be tested for major chemicals before being used as the water source for cattle. Guidelines for pesticides and herbicides in water for beef cattle have not been established, so allowable levels in drinking water for humans are given in Table 4. Because of the possibility that these chemicals in water could lead to residues in meat, take every effort to prevent water contamination.

*Sampling water for analysis.* Water supplies should be taken for analysis if a producer suspects water is causing a problem, or when a new source of water is developed. If sampling will be done only once, take samples when water is at its lowest quality. Quality shouldn't vary much for springs and wells, but ponds and streams will normally be lowest in quality during late summer. Test streams and ponds when water is highest (winter) and lowest (summer) in quality. Care should be taken to get a sample representative of what the cattle are drinking.

*Maintaining water quality and preventing water pollution.* Because of the importance of high quality

water to beef production, producers should do everything possible to maintain the quality of their water sources. If a well is used as the primary water source, it should be properly graded and capped to prevent contamination by runoff surface water, and fertilizer and other chemical applications to adjacent pasture or cropland should be closely controlled.

Apply nitrogen fertilizers only according to soil test results. Forage systems decreasing the need for added nitrogen should be used. In addition, keep waterers as clean as possible. A waterer with excessive algal growth or other filth can decrease water intake and performance, even though the water is apparently of high quality.

**Table 3. Recommended Limits for Some Potentially Toxic Substances in Drinking Water for Beef Cattle**

Substance	Safe Upper Limit mg/L (ppm)
Arsenic	.2
Cadmium	.05
Calcium	500
Chloride	1500
Chromium	1.0
Cobalt	1.0
Cyanide	NE <sup>1</sup>
Fluoride	2.0
Iron	NE
Lead	.1
Magnesium	250
Manganese	NE
Mercury	.01
Molybdenum	NE
Nickel	1.0
Nitrate nitrogen	See Table 2
Salinity (total soluble salts)	3000
Sodium	1000
Sulfate	500
Total dissolved solids	2500
pH	Range 5.5 to 8.5
Vanadium	.1
Zinc	25.0

<sup>1</sup>No upper limit established because of limited experimental data.

**Table 4. Maximum Allowable Concentrations of Pesticides in Human Drinking Water (From "Water Quality for Livestock," T. L. Carson, 1987)**

Pesticide	Maximum Concentration mg/L (ppm)
Aldrin	.001
DDT	.05
Dieldrin	.001
Chlordane	.003
Endrin	.0002
Heptachlor	.0001
Lindane	.004
Methoxychlor	.1
Toxaphene	.005
2,4-D	.1
2,4,5-T	.01

Cattle should not have unlimited access to ponds and streams. In addition to using these water sources for drinking, cattle will also loaf in water, especially in hot weather. This results in both fecal and urinary contamination. In ponds and slow flowing streams, this results in deteriorating water quality as summer progresses. Cows can also contract diseases such as mastitis and leptospirosis from lounging in dirty water.

When cattle have recently been sprayed with insecticides or tagged with fly tags, they should not be allowed to loaf in water. Allowing free access to ponds can result in fish kills, or possibly complete sterilization of a pond. Ponds can be kept clean and provide good quality water if they are fenced, and cattle have access to only a small area in one corner, or if water is run through a pipe to a tank at the base of the dam. Quality of the pond for recreational uses such as swimming and fishing will also be improved by keeping the cattle out.

Weeds and algae may be a problem in ponds, especially if they get drainage water from cropland, or if cattle have free access to the ponds. To control such problems, first find and eliminate the source of nutrients if possible. Herbicides can be used to kill off the weeds, and copper sulfate can be used to control algae.

When open streams are the water source, cattle cause stream bank erosion and contaminate the water with manure and urine. The sediment and nutrient-polluted water then flows to the next farm, and eventually enters rivers and lakes where it can cause algae blooms and fish kills. Likewise, water contaminants may enter the farm from upstream, and the contaminated water can result in spread of diseases such as leptospirosis. For these reasons, preventing cattle access to streams is advisable to protect the producers and their neighbors, as well as the general public.

## Developing Water Sources for Beef Cattle

In many situations, a new beef cattle operation is developed, or an attempt is made to upgrade existing water sources for more intensive grazing management. In these situations, a common question is, "What kind of water source should be developed?" This is usually a question of economics, but the all-around best options are establishing a deep well or pond, developing a spring or diverting flow from a perennial stream.

*Ponds.* If a new pond is to be built, plans should include fencing around the pond and a pipe to run drinking water to a tank at the base of the dam. Older ponds should also be fenced, and a drinking tank installed at the base of the dam. Freeze-proof tanks work very well in these situations. Ponds used for cattle in this manner provide a very high quality year-round water source.

*Wells.* Wells provide excellent quality water in most areas if they are deep enough to prevent contamination from leaching of chemicals and nitrates from agricultural fields. Wells should be located away from cropland, animal confinement areas and lagoons or septic systems. The biggest problem with wells is that they are relatively expensive to drill, and you still may end up with a dry hole. Be careful to ensure that there will be an adequate volume of water even in dry weather. In many cases, a deep well with a good production rate will be the safest, most reliable source of water for beef cattle.

*Springs and streams.* Springs and streams are relatively inexpensive sources of water for beef cattle if developed properly. Fence the water source (the spring head or stream) from cattle. Pipe the water to drinking tanks, or make water available at a stream crossing. Consider the reliability of the water flow from springs and streams before developing pastures. Using intermittent sources may leave you without water during the times when water requirements are highest – in hot, dry weather.

*Water for intensive grazing systems.* Most intensive grazing systems have utilized a centralized watering station with a lane(s) leading to the grazing paddocks. Under this system cattle must travel frequently between the grazing area and the watering station. This leads to excessive trampling of pastures, and transfer of nutrients off the paddocks and into the lanes and watering area.

Experience has shown that individual waterers in each paddock increase the amount of time animals spend grazing, improve animal performance and keep recycled nutrients in the pastures where they belong, reducing the inputs necessary to maintain adequate plant nutrition. Relatively inexpensive systems for moveable waterers utilizing quick-couplers and high density burst-proof pipe have been developed. Waterers can be constructed of inexpensive materials (such as plastic drums cut in half) equipped with float valves and can be moved along with the cattle with very little additional labor.

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# Nitrate Poisoning in Cattle

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Nitrate poisoning in cattle is caused by the consumption of an excessive amount of nitrate or nitrite from grazing crops, hay, silage, weeds, drinking water, lubricating oil, fertilizer, etc.

## Nitrate Accumulation in Plants

All plants contain some nitrate, but excessive amounts are likely to occur in forages which have been grown under conditions of excessive fertilization and/or stress. The buildup of nitrates in soil brought on by excessive fertilization with poultry litter or animal manure is a common cause of nitrate accumulation in plants. Commercial fertilizers aren't likely to cause excessive nitrate accumulation in plants when recommended application rates and practices are followed. However, plant species and adverse environmental conditions before harvest affect the concentration of nitrates even more than available nitrogen in the soil. Direct ingestion of fertilizers that contain nitrates can be toxic to livestock.

Any stress condition which causes an abrupt decrease in plant growth may contribute to plant nitrate accumulation, even with a normal nitrogen supply. Some of these conditions are:

1. **Lack of Sunlight** – Shaded valleys, continued cloudy days and high plant populations may contribute to excess nitrates in plants.



2. **Detrimental Weather** – Drought and high temperatures or low humidity, cold temperatures, hail damage and frost may slow or stop plant growth and cause nitrates to accumulate.
3. **Herbicides** – Spraying with herbicides such as 2,4-D may result in temporary high nitrate levels in plants. Herbicides disrupt the normal enzyme systems of plants, and this action interferes with the reduction of nitrates and their conversion into protein. Judicious, timely spraying of pastures to control young weeds will actually reduce the nitrate hazard because those weed species which are normally high in nitrates are killed early in the year. This reduces the overall threat of nitrate toxicity through more of the season.
4. **Diseases** – Diseases may destroy photosynthetic and/or conductive tissue that could cause nitrates to accumulate in plants by interfering with nitrate reduction, protein synthesis or the manufacture and translocation of carbohydrates.

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5. **Imbalance of Soil Nutrients** – A balance of soil nutrients is important in preventing nitrate accumulations. A lack of trace minerals, such as molybdenum, copper, iron, magnesium, sulfur or manganese that are involved in the enzyme system for using nitrates or potassium, may cause nitrates to accumulate in plants.

## Kinds of Plants

Nitrate toxicity in cattle is primarily a problem associated with some annuals, certain perennial weeds and some cool-season grasses (fescue, bromegrass, orchardgrass, small grains and ryegrass). Warm-season grasses, generally, cause fewer problems. Corn and sorghum have occasionally caused problems. Sorghum-sudan hybrids have probably caused more problems than any other summer annual forage.

Accumulators of nitrates, ranked from highest to lowest, are as follows:

- Weeds
- Corn
- Sorghums
- Sudangrass
- Cereal grains
- Tame forage grasses

While these plants are the most common cause of nitrate poisoning, any grass or weed beyond the seedling stage with a high stem-to-leaf ratio is more likely to be a problem than a less stemmy forage.

**Stage of Growth and Plant Parts** – The nitrate content is usually highest in young plants and decreases as the plant matures. However, at high levels of soil nitrate or under conditions of growth stress, the plant nitrate content may be high at maturity. The highest levels of nitrates occur just before flowering and decline rapidly after pollination and seed formation. The highest concentration of nitrate accumulates in the lower third of the plant stalk or stem. It is progressively diluted toward the top of the stem. Very little nitrate is found in the flowers or seed.

## Nitrates in Water

The effects of nitrate levels of forage, feed and water are additive. So, both feed and water must be considered when evaluating a nitrate problem.

Nitrates may reach dangerous levels in ponds, shallow wells or streams that collect drainage from manure, highly fertilized fields or industrial waste. Deep wells are usually safe sources of water. No safety standards have been set for livestock water, but it has been suggested that up to 100 ppm of nitrate nitrogen in water should be safe if cattle are consuming an adequate ration that is free of nitrates. This is 10 times the safe level set for humans.

## Nitrate Detection

Forage analysis is necessary to determine if nitrates are present at toxic levels. A field test can indicate if nitrates are present, but suggestions for diluting feeds are based upon a more precise laboratory analysis of the forage. When submitting a forage sample for laboratory analysis, be sure your sample accurately represents your feed. A good sample can be collected by taking 12 or more samples at various levels or locations within your silo or pasture. A hay probe is desirable for taking hay samples.

Nitrate analysis of forage and water samples is available from the University of Arkansas Agricultural Diagnostic Service Laboratory. Information on sampling, shipping and costs can be obtained from county Extension offices. (Ask specifically for a nitrate analysis.)

## Interpretation of Nitrate Analysis

Guidelines for uses of feeds with known nitrate contents are given in the table on page 3. Figure 1 shows the percentage of various hays tested at the UA Diagnostic Lab that falls within different tolerance ranges. Less than 50 percent of the 708 sorghum-sudan samples fall below 700 ppm nitrate nitrogen. Accurately categorizing the toxic dosage of nitrate is difficult because it depends on the tolerance of the animal, type and quantity of diet and the rate at which nitrate is consumed.

For example, about twice as much nitrate is necessary to kill cattle when nitrate is eaten in forage as opposed to when it is consumed quickly as in a protein supplement or a drench. Therefore, the toxic levels shown in the table are generally regarded as conservative but are the best recommendations available for a variety of circumstances.

## Causes and Symptoms of Nitrate Toxicity

Most forages contain some nitrate. Nitrate is not particularly toxic to cattle. When feeds containing nitrate are eaten by ruminants, the nitrate is normally broken down to ammonia and converted by bacteria into microbial protein. Nitrite, one of the intermediate products involved in this process, is the cause of "nitrate poisoning." Some of the nitrite is absorbed into the animal's bloodstream where the nitrite is capable of changing the normal oxygen-transporting substance, hemoglobin, into methemoglobin, a substance that cannot carry oxygen from the lungs to the tissues.

**Guidelines for Use of Feeds with Known Nitrate Content<sup>a</sup>**

Level (ppm, dm basis) <sup>b</sup>	Animal Response	Comments and Recommendations
<b>Below</b> 700 NO <sub>3</sub> -N 3080 NO <sub>3</sub> 5040 KNO <sub>3</sub>	Normal if on an adequate ration.	Safe to feed.
700-1400 NO <sub>3</sub> -N 3080-6160 NO <sub>3</sub> 5040-10,080 KNO <sub>3</sub>	May be hazardous to pregnant and very young animals.	Generally safe when fed balanced rations but best to limit the feed to half of the total dry ration for pregnant animals. Also be sure water is low in nitrate.
1400-2100 NO <sub>3</sub> -N 6160-9240 NO <sub>3</sub> 10,080-15,120 KNO <sub>3</sub>	May result in poor appetite, slow growth, abortions, vitamin A deficiency symptoms in the sixth to eighth week and a decrease in milk production (slow at first, increasing after six to eight weeks).	Limit the feed to less than half of the total dry ration. Be sure water is safe. Be sure ration is well fortified with energy, minerals and vitamin A.
<b>Above</b> 2100 NO <sub>3</sub> -N 9240 NO <sub>3</sub> 15,120 KNO <sub>3</sub>	Potentially lethal. Poor appetite, vitamin A deficiency, abortions, general production lowered.	Hazardous intake level for all animals.

<sup>a</sup>In most situations feed would refer to forages.

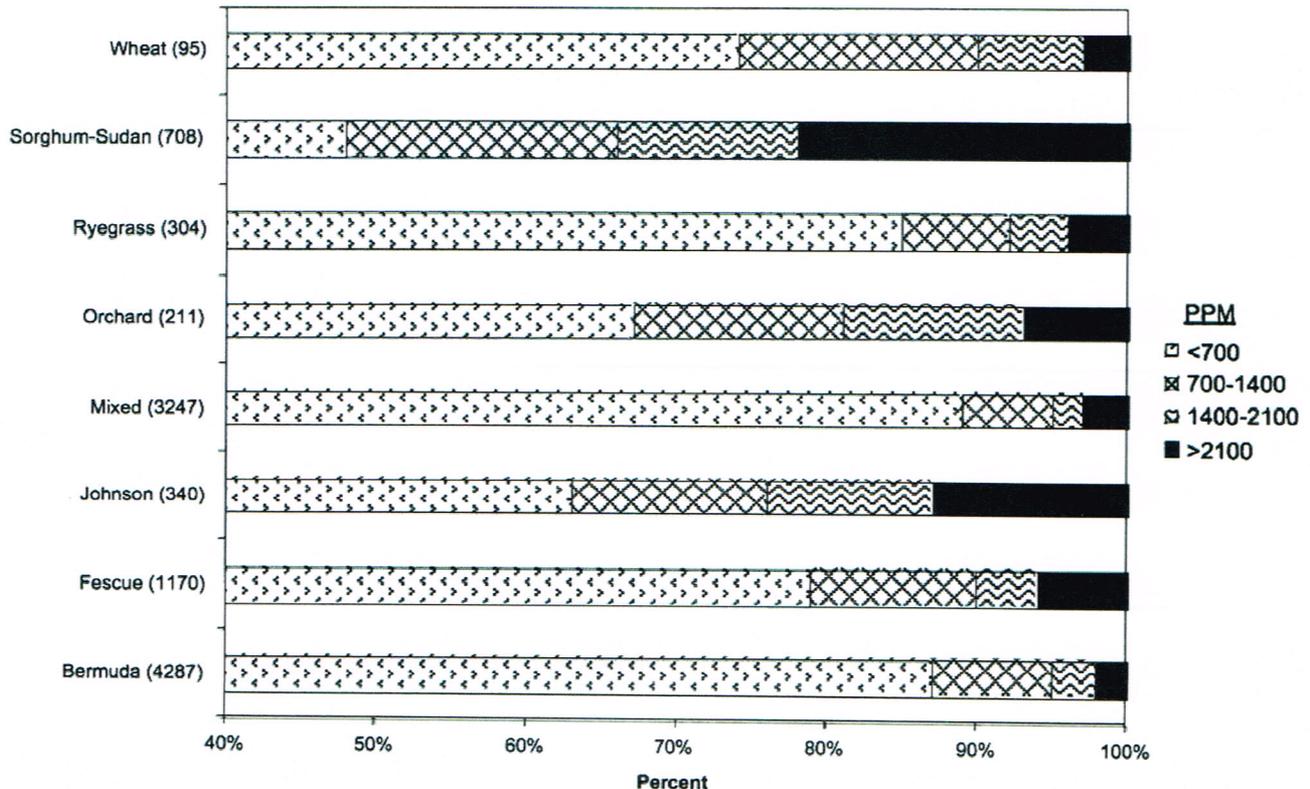
<sup>b</sup>Move decimal four places to left to convert ppm to percent (i.e., 700 ppm equals .07 percent).

NO<sub>3</sub> = nitrate

NO<sub>3</sub>N = nitrate nitrogen (value reported by UofA Diagnostic Lab.)

KNO<sub>3</sub> = potassium nitrate

**Figure 1. Percentage of hay samples for various species that fell within four different tolerance levels for nitrate-nitrogen in the diet of beef cattle**



Nitrates also cause dilation of blood vessels, and further lack of oxygen is caused by peripheral circulatory failure. Lack of oxygen to the tissues may be the cause of abortions, which sometimes occur following nitrate poisoning. Abortions due to nitrate should be accompanied or preceded by some evidence of nitrate problems in the adult animal, including death or bluish discoloration of unpigmented areas of the skin or mucous membranes.

The most likely signs of nitrate poisoning are difficult and painful breathing, cyanotic membranes, rapid breathing, muscle tremors, weakness, low tolerance to exercise, incoordination, diarrhea, frequent urination, dark- to chocolate-colored blood and collapse. Milk production may also be reduced.

Nitrate poisoning may cause death within one-half hour to four hours after symptoms appear. Symptoms usually appear when methemoglobin reaches 30 to 40 percent, and death occurs when methemoglobin reaches 80 to 90 percent.

Another condition can occur that complicates the diagnosis of either nitrate or urea poisoning. Excess ammonia in the rumen, which occurs in urea toxicity and may occur in nitrate toxicity, may prevent the absorption of magnesium and cause grass tetany. A complex chemical salt is known to form at about pH 6.2 to 6.4 when magnesium is present with ammonia and phosphorus. This insoluble salt apparently cannot pass through the rumen and intestinal walls into the bloodstream. When this condition occurs, the animal suffers from magnesium deficiency even though the ration contains an adequate level of magnesium.

## Treatment of Nitrate Toxicity

An injection of 1 percent solution of methylene blue (4 mg per pound of body weight) into the bloodstream is the preferred treatment to aid in the reduction of methemoglobin to hemoglobin. This dose may be repeated in 20 to 30 minutes if the initial response is not satisfactory.

## Prevention of Nitrate Toxicity

**Recommendations for preventing nitrate toxicity are as follows:**

1. Follow recommendations for nitrogen fertilization, and be careful not to exceed 4 tons of poultry litter yearly per acre on cool-season grasses. The risk will be minimized by spreading litter uniformly and limiting application to 2 tons per acre per application.
2. When a crop is grown under conditions that cause nitrate accumulation, delay harvest of the crop until conditions improve to permit nitrate content to drop to a safe level.
3. Consider making silage of drought-damaged forage. The ensiling process reduces the nitrate level 40 to 60 percent.
4. If high levels of nitrate have accumulated in plants, raise the cutter bar and leave more stem, the portion of the plant with the highest concentration of nitrate, in the field.
5. Have suspected forage tested before feeding to cattle.
6. Dilute toxic forage by mixing it with nontoxic forages and/or energy feeds such as molasses or corn. Use forage nitrate analysis to determine dilution rates. Energy feeds, such as shelled corn, when fed daily at a minimum of 2 pounds per head, will offset production losses as long as the average forage  $\text{NO}_3\text{-N}$  concentration does not exceed 1,500 ppm.
7. Feed a nutritionally balanced ration. Iodized salt and vitamin A or green feed supplementation lessen the toxicity of nitrates.
8. Adapt cattle slowly to elevated levels of nitrate. Don't give hungry animals a full feed. Never exceed maximum recommended levels of nitrate intake.
9. Feed suspect forage in small amounts several times a day rather than all at one feeding.
10. If forages are high in nitrates, ask your county Extension agent about an analysis of the drinking water.
11. Be aware that forage regrowth and volunteer plants are highly suspect following nitrate fertilization and drought.
12. Observe animals closely for signs of toxicity, and call a veterinarian immediately if symptoms are observed.

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# Common Arkansas Plants Poisonous to Cattle

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Livestock are accidentally poisoned in Arkansas each year from eating toxic plants in hay and pasture forage crops.

What is a poisonous plant? It is one that causes such problems as animal sickness, skin irritation, loss of appetite, loss of weight, reduced milk production or death.

All poisonous plants do not contain the same toxin. There are at least six different classes of poisons within plants. The two largest groups are alkaloids and glycosides. Within each of the six classes are several different poisonous compounds.

Twenty-one weeds are listed in this publication. They are among the 45 most common poisonous plants in Arkansas. However, their presence on a farm does not mean that animals will be killed or even show ill effects. The reasons are that (1) animals may not eat them, (2) the plants may not contain toxic levels of the poison at the time they are eaten, (3) animals eating the plants may be immune to the poisons they contain, (4) animals may not eat the poisonous part of the plant or (5) farmers may have rendered plants nontoxic by making hay or silage of them, by diluting the material eaten with other forage or by feeding certain materials to counteract the poison.

Some plants are likely to be a greater hazard to animal health than others because they (1) are so abundant in an area, (2) contain a more deadly poison or (3) because animals seek them out for selective grazing.

Livestock losses due to poisonous plants may be reduced or eliminated by weed control, by grazing practices, by keeping tame forage stands healthy and thick, by using caution during drought periods and by diluting contaminated feed with forage known to be free of poisonous materials.

## Severity of Poisoning

Some of the factors that influence the degree of hazard associated with poisonous plants are as follows:

**Plant Species** – All plants absorb nitrates, but plants such as the sorghums, small grains, corn, turnips, rape, kochia, orchardgrass, pigweed, lambsquarter and soybeans are more likely than other plants to accumulate nitrates in toxic levels.

**Plant Parts** – The entire plant (as in the case of johnsongrass) or only certain parts of plants (as in the case of acorns and buds of oak trees) may accumulate poisons to a lethal level.

**Environment** – Reduced light caused by shade or cloudy weather can encourage nitrate accumulation in plants; droughts may also encourage nitrate accumulation; and frost or freezing weather may release deadly levels of prussic acid from johnsongrass.

**Plant Age** – Poisons that occur in plants such as white snakeroot and johnsongrass are more likely to be hazardous in younger plants.

**Form of Feed** – Johnsongrass hay is likely to be a safer form of feed than johnsongrass pasture since prussic acid dissipates from hay.

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## 21 “Weeds” Most Likely to Poison Livestock in Arkansas

Plant	Toxic Part of Plant	Animals Affected If Known	Symptoms	Type Poison		Notes and Treatment*
				Category	Specific	
<b>Occasionally Hazardous</b>						
<b>Johnsongrass</b>	All plant parts. Particularly green stunted plants, frosted plants and second growth.	Cattle, sheep, goats, horses	1. Slow pulse 2. Dilated pupils 3. Labored breathing 4. Exhaled air has almond smell 5. Down cattle rarely recover	Glycoside	Prussic acid  Nitrates	1. Prussic acid poisoning is not likely with hay. 2. Nitrate content is ranked from highest to lowest concentrations in plant parts as follows: roots, stems, leaves, seed.
<b>Perilla Mint</b> 1. Square-stemmed annual 2. Oval, serrated, green and purple leaves 3. Distinct odor 4. Problems most likely in late summer		Cattle and horses most frequently	1. Cattle develop emphysema of lungs 2. Open mouth breathing 3. Tire easily 4. Grunt when exhaling	Perilla Ketone		1. Grows in shade. 2. Often seen around the edge of pastures. 3. Remains green in dry periods.
<b>Oak</b> Primarily white oak along streams	1. Acorns 2. Young buds	Cattle, horses, sheep, goats	1. Frequent urination 2. Dry muzzle 3. Constipation 4. Thirst 5. Rough hair coat	Toxic acid Pyrogallol		1. Does kidney damage 2. Can be eaten by most cattle without ill effect. 3. Feed 3 pounds of a feed mix daily/head that consists of 10% slake lime (CaOH).
<b>Wild Cherry</b>	Wilted leaves	Cattle, sheep, goats		Glycoside	Prussic acid	
<b>Hazardous in a Few Cases</b>						
<b>Redroot Pigweed</b> Problems most likely after spraying with herbicide or using heavy fertility		Cattle, sheep, ruminants			Nitrate	Treat with 2% methylene blue intravenously.
<b>Larkspur</b> (several species) Hazardous dose: 0.7% of body weight	1. Young leaves most 2. Entire plant	Cattle, horses, rabbits	1. Paralysis	Alkaloids	Ajacine Delphinine Delphinine Delphinoidine	Sheep graze it without harm.
<b>Coffee Senna</b> Problems most likely in fall	Green or dry leaves, stem, seed	Cattle and others; often yearlings	1. Cattle alert, but can't stand 2. Coffee-colored urine 3. Diarrhea			1. Plants produce large, flat sicklepods. 2. 8+ leaflets/leaf.
<b>Sicklepod</b> Problems most likely in fall	Green or dry leaves, stem, seed	Cattle and others; often yearlings	1. Cattle alert, but can't stand 2. Coffee-colored urine 3. Diarrhea			1. Mildly toxic. 2. Long, slender pods. 3. 4-6 leaflets/leaf.

\*See a veterinarian for specific treatments.

Plant	Toxic Part of Plant	Animals Affected If Known	Symptoms	Type Poison		Notes and Treatment*
				Category	Specific	
<b>Occasionally Hazardous</b>						
<b>Sesbania</b> Problems most likely in fall and winter	Seeds are the most toxic plant parts.	Livestock	1. Walk stiffly 2. Diarrhea 3. Hemorrhaging		Saponin	1. Cattle may crave seed. 2. 70+ leaflets/leaf.
<b>Woody Nightshade</b> 1. Perennial 2. Shiny red ripe berries occurring in clusters 3. Purple flower; orange center 4. Hazardous dose: 10 berries	1. Ripe berries most 2. All parts			Alkaloids	Atropine Hydrogen cyanide	Death is rare in animals.
<b>Deadly Nightshade</b> 1. A perennial 2. 3-4 berries can kill a child	All parts	Horses, cattle, goats, ducks, chickens		Alkaloids	Atropine Hyoscyamine	Death is rare in animals.
<b>Ground Cherry</b>	Unripe fruit and leaves					
<b>Potentially Hazardous</b>						
<b>Water Hemlock</b> 1. Perennial 2. Hollow, mottled stem 3. Lance-shaped leaves 4. Chambered lower-most stems 5. Tubers 6. Problems most likely in spring	1. Roots 2. All parts	Cattle more likely; horses, cattle, swine, sheep, goats, man	1. Paralysis of horse's hind legs 2. Frothing of mouth 3. Dilated pupils 4. Nervous 5. Trembling	Volatile alkaloids Volatile oil Resin	Aenanine Oenanthotoxin Terpine Cicutoxin	1. Lose toxin with age. 2. The most violent poisonous plant in the United States.
<b>Poison Hemlock</b> 1. Hollow stems 2. Leaves are carrot-like 3. Herbage smells mousy 4. Hazardous dose: 10-14 oz/cow 5. Problems most likely in spring	1. Roots and seeds 2. Entire plant	Livestock, poultry, man	1. Vomiting 2. Trembling 3. Dilated pupils	Alkaloids	Conine	Used by Greeks as a poison.
<b>Black Locust</b>	Inner bark, seed, flowers, leaves	Horses, cattle, sheep, poultry, humans	1. Purgative 2. Stupor 3. Perspiration	Glycoside Phytotoxin	Robinin	
<b>Pokeweed</b> Problems in spring, summer, fall	1. Roots are the most poisonous part 2. Entire plant	Cattle, horses, swine, man	1. Irritated skin 2. Vomiting 3. Diarrhea	Acrid alkaloid Oxalic acid	Phylolaccioxin Phylolaccin Phylolaccic acid	Phylolaccioxin is a saponin.
<b>Jimsonweed</b> Hazardous doses: • Man - 20 seeds • Horses - 5-8 oz. • Cattle - 6-12 oz. • Sheep - 3-8 oz.	1. Seeds are the most toxic part 2. Entire plant	Cattle, horses, swine, poultry, man, dogs	1. Pupils dilate 2. Thirst 3. Dry, burning skin	Alkaloids  Alcohol	Atropin Hyoscine Scopolamine Tremetol	Green or dry plants are hazardous.

\*See a veterinarian for specific treatments.

Plant	Toxic Part of Plant	Animals Affected If Known	Symptoms	Type Poison		Notes and Treatment*
				Category	Specific	
<b>Bracken Fern</b> 1. A perennial 2. Problems most likely in summer 3. Poison is cumulative 4. Hazardous dose is when cattle consume their weight of bracken fern in 1 to 4 months	All stages of plant growth	Cattle, horses, sheep; goats are insensitive	1. Bloody stool 2. Excessive bleeding from fly bites 3. Convulsions 4. Death	Enzyme	Triaminase	1. Hay can cause problems. 2. Vitamin B1 is inactivated. 3. Depression of bone marrow.
<b>White Snakeroot</b>	Leaves, stems, green flower-heads	Cattle, sheep, horses, man, domestic animals	1. Trembling 2. Slobbering 3. Vomiting	Alcohol Glycoside	Tremetol	1. Dry plants are slightly toxic. 2. Poison is cumulative.
<b>Buttercup</b> Problems most likely at flowering time	Stems, leaves	All animals	1. Death 2. Ulcerated skin 3. Red milk 4. Bitter milk	Irritant oil	Protoaemonin	1. Prickly sensation in mouth. 2. Harmless when dried. 3. Certain plant species are more hazardous.
<b>Equisetum</b> (scouring rush)	Tops	1. Cattle and sheep on pasture 2. Horses on hay		Enzyme Alkaloid	Thiaminase	1. Vitamin B1 is inactivated. 2. Treat with massive thiamine dose.

\*See a veterinarian for specific treatments.

Fortunately, most (but not all) poisonous plants must be consumed in large quantities to be lethal. Also, many have an undesirable taste, and animals do not consume them in toxic levels unless they are forced to do so by a shortage of forage that occurs during drought or long winter seasons.

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# Substituting Grain for Hay in Winter Rations for Beef Cows

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Rations composed largely of roughages are commonly considered to be most economical for wintering beef cows. Substituting grain for roughage may be economical when roughages are scarce and prices are high relative to grains. Drought tends to shift the economics toward feeding grain as more energy can be transported per ton of feed in this form compared to hay.

Substituting a high energy feed (grain) for a low energy feed (hay) becomes economical when cattle can be wintered to achieve the same level of production but at a lower cost. Since grain usually costs more per pound than hay, a smaller amount of grain must be fed to be economically substituted for hay in such rations. This will require some system of restricted feeding.

## Wintering Objectives

Pregnant cows should be wintered to maintain health and vigor and to support normal growth and development of the fetus. To rebreed successfully, cows should be fed to reach a moderate body condition (body condition score of 5) by the time of calving.

In wintering breeding stock, a basic question should be, "How can I provide an **adequate** ration at the **least** possible cost?" To find the answer to this question a producer needs to know:

- The animal's daily nutritive requirements.
- The nutritive value of common feeds.
- The substitution value of available feeds in relation to nutritive properties and cost.

## Nutritive Requirements

Meeting the nutrient requirements of the pregnant cow is the basic underlying objective of any type of a wintering program. This can be done in a number of ways, and economics will normally dictate the feed combinations that should be considered. However, another concern is that the nutrient availability matches the nutrient needs for the cow during the various phases of pregnancy and lactation.

## Substituting Grain for Hay

Table 1 shows the TDN (total digestible nutrient) value of various grains compared to prairie, sorghum-sudan, alfalfa and grass (bermuda-grass, fescue or a mixture of grasses) hay. By using this table, the approximate feeding value of various grains in relation to hay may be determined. For example, on the basis of TDN, corn grain is worth 1.7 times as much as good quality grass hay, or 1 pound of corn will replace 1.7 pounds of grass hay in a beef cow wintering ration.

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**Table 1. TDN Value of Various Grains Compared to Prairie, Sorghum-Sudan, Alfalfa and Grass Hay<sup>1</sup>**

Grain	TDN	Amount of Hay That Can Be Replaced by 1 Pound of Grain			
		Prairie (47% TDN)	Sorghum-Sudan (56% TDN)	Alfalfa (60% TDN)	Grass <sup>2</sup> (53% TDN)
Corn	90	1.9	1.6	1.5	1.7
Barley	84	1.8	1.5	1.4	1.6
Oats	77	1.6	1.4	1.3	1.5
Sorghum, Milo	83	1.8	1.5	1.4	1.6
Wheat	88	1.9	1.6	1.5	1.7
Ear Corn	83	1.8	1.5	1.4	1.6

<sup>1</sup>TDN content of grains and hays is on a dry-matter basis.

<sup>2</sup>Grass hay is bermudagrass, fescue or a mixture of grasses.

Table 2, which is based on TDN value of feeds, shows the price that could be paid for various grains in relation to the price of grass hay.

For example, if good quality grass hay costs \$50 per ton delivered, you could afford to pay up to \$4.25 per hundredweight for corn grain or \$3.75 per hundredweight for oats delivered. If grain can be bought for less than the value indicated in Table 2, the substitution of grain for part of the roughage in the winter ration of beef cows would be economical.

**Table 2. Comparative Value of Grass Hay\* and Grain for Wintering Cows**

Hay \$/ton	Value of Grain per cwt					
	Corn	Barley	Oats	Sorghum	Wheat	Ear Corn
30	\$2.55	\$2.40	\$2.25	\$2.40	\$2.55	\$2.40
40	3.40	3.20	3.00	3.20	3.40	3.20
50	4.25	4.00	3.75	4.00	4.25	4.00
60	5.10	4.80	4.50	4.80	5.10	4.80
70	5.95	5.60	5.25	5.60	5.95	5.60
80	6.80	6.40	6.00	6.40	6.80	6.40
90	7.65	7.20	6.75	7.20	7.65	7.20
100	8.50	8.00	7.50	8.00	8.50	8.00

\*Grass hay is bermudagrass, fescue or a mixture of grasses which contain 53 percent TDN on a dry-matter basis.

The value of the various grains in relation to the price of prairie hay, sorghum-sudan or alfalfa hay can be calculated from the relative energy values shown in Table 1. Multiply the price per ton of the hay by the relative energy value of the grain and then divide by 20 to convert to a hundredweight basis. For example, if prairie hay costs \$50 per ton, the amount you could afford to pay for corn would be  $\$50 \times 1.9 = \$4.75/\text{cwt}$ .

## Substitution Guide

In estimating total winter feed needs, the approximate amount of the various grains required to replace a ton of prairie hay, sorghum-sudan hay, alfalfa hay or grass hay is shown in Table 3.

**Table 3. The Amount of Various Grains Required to Replace 1 Ton of Prairie, Sorghum-Sudan, Alfalfa or Grass Hay**

	Grain Needed to Replace 1 Ton of Hay			
	Prairie	Sorghum-Sudan	Alfalfa	Grass*
Corn, lb	1052	1250	1333	1176
Barley, lb	1111	1333	1428	1250
Oats, lb	1250	1428	1538	1333
Sorghum, lb	1111	1333	1428	1250
Wheat, lb	1052	1250	1333	1176
Ear Corn, lb	1111	1333	1428	1250

\*Grass hay is bermudagrass, fescue or a mixture of grasses which contain 53 percent TDN on a dry-matter basis.

## Adapting to High Grain Rations

Acidosis, bloat and founder are always a risk when high grain rations are fed to ruminants. Grain should be substituted for only a part of the hay or other roughages. Be aware of the increased risk of digestive problems that may occur with high levels of grain. Adding Rumensin to the diet may help reduce the chances of digestive problems occurring.

To avoid digestive problems, start cattle on grain gradually. It usually takes two to three weeks to adapt to a high grain diet. A minimum roughage level of 0.75 percent of the body weight per day is suggested. If hay is extremely expensive, the daily hay allowance may be reduced to 0.5 percent, but there is an increased risk of digestive problems. Table 4 shows the minimum hay allowance for cows of various sizes.

**Table 4. Minimum Daily Hay Allowance for Various Sizes of Cows Fed at a Rate of 0.75 Percent of Body Weight Daily**

Body Weight Lb	100% Dry Matter	As-fed (88% Dry Matter)
lb hay/cow/day		
900	6.75	7.7
1000	7.50	8.5
1100	8.25	9.4
1200	9.00	10.2
1300	9.75	11.1
1400	10.50	11.9

Table 5 presents TDN requirements during late pregnancy (11 months since calving), the amount of TDN supplied by hay allowances in Table 4 and the amount of corn needed to make up the deficit. As shown in Table 5, the amount of corn required would range from 8.2 to 10.9 pounds per head per day.

Table 6 lists TDN requirements for mature cows two months after calving and producing 10 pounds milk/day, the amount of TDN supplied by the hay allowance in Table 4 and the amount of corn required to make up the deficit.

Table 7 shows the amount of corn required to make up the deficit for cows two months after calving and producing 30 pounds milk/day.

The amount of other grains such as milo, wheat, etc., required to meet TDN needs of cows on forage at 0.75 percent of body weight could be calculated using the same procedure above. For example, for an 1,100 pound cow (Table 7), divide the TDN deficit 14.3 by the TDN of milo (74 percent, as-fed basis) to obtain 19.3 pounds milo per day, instead of 18.1 pounds of corn.

Because of possible digestive problems, it is suggested that wheat make up not more than one-half to two-thirds of the grain fed. If wheat is to be used, it might be mixed with oats, barley or ground ear corn. Unless the price of the grain dictates otherwise, the use of grains with "built-in roughage" such as barley, oats, and ear corn is advisable. These grains will likely perform most satisfactorily over a longer period of time and be less apt to cause feeding problems. Cattle being limit fed will often continue to

**Table 5. Amount of Corn Required to Meet the TDN Deficit When Hay DM Is Fed at 0.75 Percent of Body Weight Daily to Mature, Gestating Cows (11 Months Since Calving)**

Body Wt. Lb	TDN Requirement Lb/Day <sup>1</sup>	TDN Supplied by Hay DM @ 0.75 Percent of BW <sup>2</sup>	TDN Deficit Lb/Day	Corn Required Lb/Day <sup>3</sup>	Crude Protein Required Lb/Day <sup>1</sup>
900	10.1	3.6	6.5	8.2	1.5
1000	10.9	4.0	6.9	8.7	1.6
1100	11.7	4.4	7.3	9.2	1.7
1200	12.6	4.8	7.8	9.8	1.9
1300	13.4	5.2	8.2	10.4	2.0
1400	14.2	5.6	8.6	10.9	2.1

<sup>1</sup>Based on NRC (1996) requirements.

<sup>2</sup>Based on hay containing 53 percent TDN, dry-matter basis.

<sup>3</sup>Based on corn containing 88 percent dry matter.

**Table 6. Amount of Corn Required to Meet the TDN Deficit When Hay DM Is Fed at 0.75 Percent of Body Weight to Mature Cows Two Months After Calving (10 Lbs Peak Milk)**

Body Wt. Lb	TDN Requirement Lb/Day <sup>1</sup>	TDN Supplied by Hay DM @ 0.75 Percent of BW <sup>2</sup>	TDN Deficit Lb/Day	Corn Required Lb/Day <sup>3</sup>	Crude Protein Required Lb/Day <sup>1</sup>
900	11.7	3.6	8.1	10.2	1.9
1000	12.5	4.0	8.5	10.7	2.0
1100	13.2	4.4	8.8	11.1	2.1
1200	13.9	4.8	9.1	11.5	2.2
1300	14.7	5.2	9.5	12.0	2.3
1400	15.3	5.6	9.7	12.2	2.4

<sup>1</sup>Based on NRC (1996) requirements.

<sup>2</sup>Based on hay containing 53 percent TDN, dry-matter basis.

<sup>3</sup>Based on corn containing 88 percent dry matter.

Table 7. Amount of Corn Required to Meet the TDN Deficit When Hay DM Is Fed at 0.75 Percent of Body Weight to Mature Cows Two Months After Calving (30 Lbs Peak Milk)

Body Wt. Lb	TDN Requirement Lb/Day <sup>1</sup>	TDN Supplied by Hay DM @ 0.75 Percent of BW <sup>2</sup>	TDN Deficit Lb/Day	Corn Required Lb/Day <sup>3</sup>	Crude Protein Required Lb/Day <sup>1</sup>
900	17.2	3.6	13.6	17.2	3.5
1000	17.9	4.0	13.9	17.6	3.6
1100	18.7	4.4	14.3	18.1	3.7
1200	19.3	4.8	14.5	18.3	3.8
1300	20.1	5.2	14.9	18.8	3.8
1400	20.7	5.6	15.1	19.1	3.9

<sup>1</sup>Based on NRC (1996) requirements.

<sup>2</sup>Based on hay containing 53 percent TDN, dry-matter basis.

<sup>3</sup>Based on corn containing 88 percent dry matter.

act hungry despite their nutrient requirements being met. Always monitor body condition and adjust feeding rate as needed to maintain cows in moderate body condition.

## Protein Not Considered

The comparative values of the various grains as shown in Tables 1 to 3 are based on estimated TDN values alone. Differences in protein content of feeds have not been considered. The higher protein grains (barley, oats and wheat) would be worth slightly more than is indicated in Table 2 especially if they are fed to younger stock which require more protein in the diet.

In many cases, especially with nursing cows, protein requirements are greater than the amount supplied by the grain and hay. Therefore, the hay should be analyzed for crude protein content and the amount of protein in the hay and grain should be determined. If the grain and hay fail to meet the protein requirement, a protein source such as cottonseed meal or soybean meal should be substituted for a portion of the grain to meet the protein needs of the animals.

## How to Feed Grain

Preparation for feeding grain during the winter is something that should be considered. A producer has the alternative of using bunks or having the grain pelleted so feeding on the ground would be feasible. The choice should depend on labor, facilities, cost of bunks and cost of pelleting.

A little pencil work will determine the most economical method. If bunk feeding is selected, grains could be fed whole, except sorghum (milo) which must be rolled or ground. If vitamins, minerals and high protein feedstuffs are added to the grain portion, grains will need to be processed, such as coarsely grinding, to allow a uniform mix and prevent separation during storage and handling. Feed in a manner so each animal has an equal opportunity to eat. Provide at least 30 inches of feed bunk space per cow and try to feed at the same time each day. Sorting the herd into nutritional groups will aid in limiting the amount of grain fed. Timid mature cows can be wintered with heifers so they can get their daily allotment of feed.

Some producers may wish to try a self-fed salt-grain mixture. Such a system of feeding grain to breeding stock should be attempted with great caution and with special care to ensure the desired intake. It should be remembered that the proportion of salt to grain required to control grain consumption varies according to (1) daily grain consumption desired, (2) age and weight of the animal, (3) fineness of the salt, (4) salinity of the water, (5) severity of weather, (6) quality and quantity of hay or forage available and (7) length of the feeding period.

If this method is used, some trial and error is necessary to determine the proper ratio of salt to grain (and this will probably change during the winter). One might start by mixing one part salt to four or five parts of grain and subsequently change the proportion of salt as needed to control intake.

**Warning:** Forced salt consumption increases water intake. Be sure that clean, ice-free water is available at all times.

## Don't Forget Vitamin A and Minerals

There is a good possibility that before spring green up beef cows may become deficient in vitamin A. Pregnant beef cows (900 to 1,300 pounds) need 25,000 to 35,000 I.U.'s of vitamin A per day before calving and 36,000 to 60,000 I.U.'s per day during lactation. Vitamin A may be included in the protein or energy supplement. A practical way to supplement vitamin A is to include it in the mineral mixture. This method works well if mineral and highly stable vitamin A are mixed weekly. Mineral consumption will vary, thus more vitamin A than is actually needed should be mixed with the mineral supplement.

Subcutaneous injections of vitamin A will bring liver stores up to normal. However, it is advisable to include vitamin A in the mineral or in the feed to ensure adequate amounts for cattle consuming poor quality hay or high amounts of grain.

Minerals most likely to be deficient in Arkansas forages are salt, phosphorus and magnesium. The trace minerals zinc, copper, selenium, iodine and cobalt may also be in short supply. When animals are

maintained on a limited feed of a high concentrate ration, they may also be deficient in calcium and potassium.

## Some Suggestions on Substituting Grain for Hay

- It is generally best to replace only part rather than all of the roughage. A minimum roughage level of 0.75 percent of the animal's body weight per day is suggested (see Table 4).
- The cattle should receive a balanced ration. It should provide adequate amounts of vitamins and minerals as well as protein and energy.
- Be sure you are equipped to feed grain. Grain should be fed in a manner so each animal has an equal opportunity to eat.
- Figure feed, equipment and labor costs carefully. Be sure there is a cost advantage to the specific program you choose.
- If wheat is used, it should make up not more than one-half to two-thirds of the grain portion of the ration.
- Grain sorghum (milo) should be rolled or ground before feeding.
- If practical, use those grains with "built-in roughage" such as barley, oats or ear corn.

Portions of this information were assembled and adapted for Arkansas conditions from a publication of the same title by David Whittington and Joe Minyard, South Dakota State University, and Dr. George Davis, former Extension livestock specialist.

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# Heat Stress in Dairy Cattle

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## Introduction

The heat and humidity of a typical Arkansas summer combine to make a very uncomfortable environment for lactating dairy cows. During hot summer weather, milk production may decrease by as much as 50 percent (Table 1), and reproductive proficiency of lactating dairy cows is greatly diminished. Some data indicate that only 10 to 20 percent of inseminations in "heat stressed" cows result in pregnancies.

## Signs of Heat Stress

Some signs of heat stress in lactating cows are obvious, especially the reduced milk production and the lethargic behavior of the cows. Moderate signs of heat stress may occur when the temperature is between 80° and 90°F with the humidity ranging from 50 to 90 percent (Figure 1). These signs include rapid shallow breathing, profuse sweating and an approximately 10 percent decrease in milk

production and feed intake by cows. As temperatures rise to 90° to 100°F and humidity remains in the 50 to 90 percent range, the cow will show severe depression in milk yield, usually greater than 25 percent, and in feed intake as her body temperature elevates. She will begin exhibiting more significant signs of heat stress, such as open mouth breathing with panting and her tongue hanging out.

Usually, the combined temperature and humidity that results in a temperature/humidity index of greater than 90 will result in severe signs of heat stress in the high producing cow and moderate signs in lower producing cows. In severe cases, cows may die from extreme heat, especially when complicated with other stresses such as illness or calving.

Higher producing cows exhibit more signs of heat stress than lower producing cows because higher producing cows generate more heat as they eat more feed for higher production. They must get rid of the

**Table 1. Relative changes in expected dry matter (DMI) and milk yield and water intake with increasing environmental temperature**

Temperature (°F)	Expected intakes and milk yields		
	DMI (lb)	Milk yield (lb)	Water intake (gal)
68	40.1	59.5	18.0
77	39.0	55.1	19.5
86	37.3	50.7	20.9
95	36.8	39.7	31.7
104	22.5	26.5	28.0

Sources: National Research Council. 1981. Effect of Environment on Nutrient Requirements of Domestic Animals. National Academy Press, Washington, D.C. Dr. Joe West, Extension Dairy Specialist, University of Georgia.

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**Figure 1. Temperature Humidity Index (THI)<sup>1</sup> for Dairy Cows. Modified from Dr. Frank Wierama (1990), Department of Agricultural Engineering, The University of Arizona, Tucson, Arizona.**

DEG F	RELATIVE HUMIDITY																				
	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
75																72	72	73	73	74	75
80																					
85																					
90																					
95																					
100																					
105																					
110																					
115																					
120																					

<sup>1</sup>THI = (Dry-Bulb Temp. °C) + (0.36 dew point Temp., °C) + 41.2)

If more than two cows out of 10 have respiratory rates exceeding 100 breaths per minute, then immediate action should be taken to reduce heat stress.

extra heat generated as a result of metabolizing greater nutrients in the feed. In general, the decrease in milk production results from less feed intake by the cow. Two pounds of milk production is lost for every pound of decreased dry matter intake when temperature and humidity levels are high.

If you have problems determining if your cows are affected by heat stress, lock up 10 cows and take their rectal temperatures. If more than seven of the cows have temperatures above 103°F, the cows are probably exhibiting heat stress. Temperatures will be greater in the afternoon when environmental temperatures are high. In severe heat stress, rectal temperatures of cows may exceed 104°F. You may also take respiratory rates on the 10 cows. If respiratory rates are greater than 80 breaths per minute on at least seven of the cows, they are also probably exhibiting signs of significant heat stress. If more than five cows out of 10 have respiratory rates greater than 100 breaths per minute, then immediate action should be taken to reduce heat stress. If the dry matter intake of the feed and your milk production has decreased by 10 percent or more, your cows are also exhibiting heat stress. During severe heat stress, intake and milk production may decrease by more than 25 percent and weak cattle may die, especially older or sick animals.

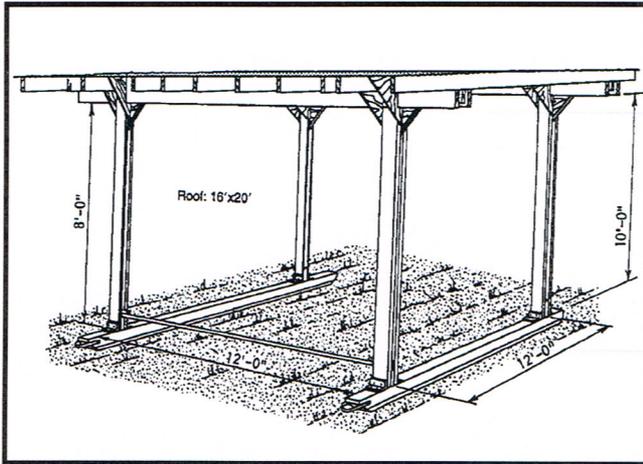
**Steps to Reduce Heat Stress**

**The first step to reduce heat stress is to provide cool water and shade for all milking and dry cows plus heifers.** Water is the primary nutrient needed to make milk, accounting for over 85 percent of the content of milk. Also, the cow’s

water requirement increases significantly as the environmental temperature rises. Cows drink up to 50 percent more water when the temperature/humidity index is above 80 percent. Table 1 shows that water intake goes from 21 gallons to 32 gallons as temperature goes from 86° to 95°F. It is extremely important that cows be provided cool water during periods of high temperature. It also is very important that cows have water in a location that is close to shade, since they will not travel great distances for water in a hot environment. Water should be placed away from the milking parlor but in an exit lane from the barn as well as near the feeding location of the cows. **Water should be available for cows near their loafing area, either in the shade of native trees or artificial shade.**

If cows are in close confinement, water should be placed every 50 feet. For many producers in Arkansas where cows are not housed in free stalls, water should be easily accessible to animals and located in a position such that cows do not have to cross areas of hot sun. In general, cows will not travel across 100 feet of open field when temperature, humidity and radiant solar heat are extremely high. Also, provide at least two water locations per group of cows. If possible, provide 2 feet of trough space for every 15 cows that use the water. For example, if you have 100 cows in a lot, you should have at least 12 feet of water trough. In addition, water flow should be at least 3 to 5 gallons per minute so that the trough will quickly refill. Minimum depths of 3 inches of water are necessary to accommodate the cow’s muzzle. A minimum of 0.65 square feet of surface area per cow at single- or double-position waterers should be

**Figure 2. Portable shade constructed with wood. Metal pipes also may be used.**



provided. As a general rule of thumb, if the waterers are ever empty, additional water troughs are needed.

Water also should be clean and cool. As needed, troughs should be cleaned to ensure that algae and other contaminants are not in the water. Water should always be fresh and at approximately ground temperature.

Shading from direct sunlight is also very important, as this allows cows to rest in a more comfortable environment. Although natural shade from trees is the best and most natural environment, cows will often compact the area around the trees, and the trees may die within a few years after cows are in the lot. It is also important for cows not to produce a mudhole in the shaded area where they congregate around the trees. This mudhole can result in greater mastitis as animals will often lie in the mud after milking and before the sphincter muscle on the end of the teat has tightened up following milking. One method of reducing the problem with mudholes from either natural or artificial shade is to use electric fences to fence out areas where mudholes are a problem. These areas are then rotated so that cows use shade in different pastures while the muddy ones dry.

Portable or temporary shades (Figure 2) can be used and rotated to a new area in different pastures if they are available. Portable shade cloth, as well as lightweight roofing material, may be used on the temporary shades. Usually, 2-inch diameter metal pipes or 4 x 4 treated wood are used for frames for the temporary structures. Hooks are provided for moving the cloth, or wire may be strung along the side of the structure. Twine or wire is used to support the cloth through the grommets on the shade cloth. Shade cloth is usually

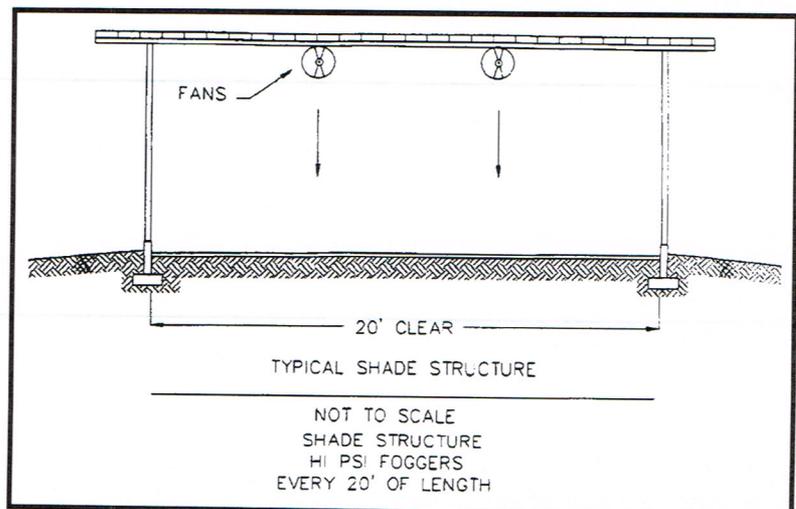
positioned 12 feet from the ground. At least 25 (and preferably 50) square feet of shade per cow should be provided.

Permanent shade structures (Figure 3) also may be used. These generally have an eave height of at least 12 feet with a center of at least 16 feet. If a dirt floor is utilized, mudholes again may develop and care must be taken. Lime may be added to the dirt to inhibit bacterial growth. Fly ash may also be used to complement the dirt [see FSA1043, *Reducing Mud Problems in Cattle Heavy Use Areas With Coal Combustion By-Products (Fly Ash)*]. If permanent shade structures include a concrete floor and cows are maintained in the barn at all times, much like a free stall barn, the roof pitch on the barn should be at least 4:12. In addition, the ridge vent should be at least 1 foot wide plus 2 inches for every 10 feet of structure width over 20 feet. The vent is best if uncapped, and usually will not allow snow and rain into the barn. If necessary, a ridge cap may be installed. It should be at least 1 foot above the roof peak. In permanent shade structures, allow 50 square feet of space per cow.

The best shade orientation depends on cow management and the type of flooring under the shade. For situations with dirt floors and cows able to move outside the structure, a north-south orientation is recommended. This allows sunlight to dry 50 percent or more of the floor while still providing shade outside the structure. For confinement facilities with concrete floors, an east-west orientation provides maximum shade under the roof.

Portable shades offer at least two important advantages over permanent shade structures. First, they are movable. This permits them to be moved as necessary to cleaner and drier locations. Secondly, they are cheaper to construct. Most can be

**Figure 3. Typical shade structure. Drawing by Joseph G. Martin III, P.E., Consulting Engineer, Gainesville, Florida.**



constructed for \$50 or less per cow. The disadvantages of portable shades are less protection from solar radiation and decreased longevity compared to permanent shade structures. However, with good maintenance, including keeping the shade cloth tight so that it is not damaged by the wind, portable shade structures can last five or more years.

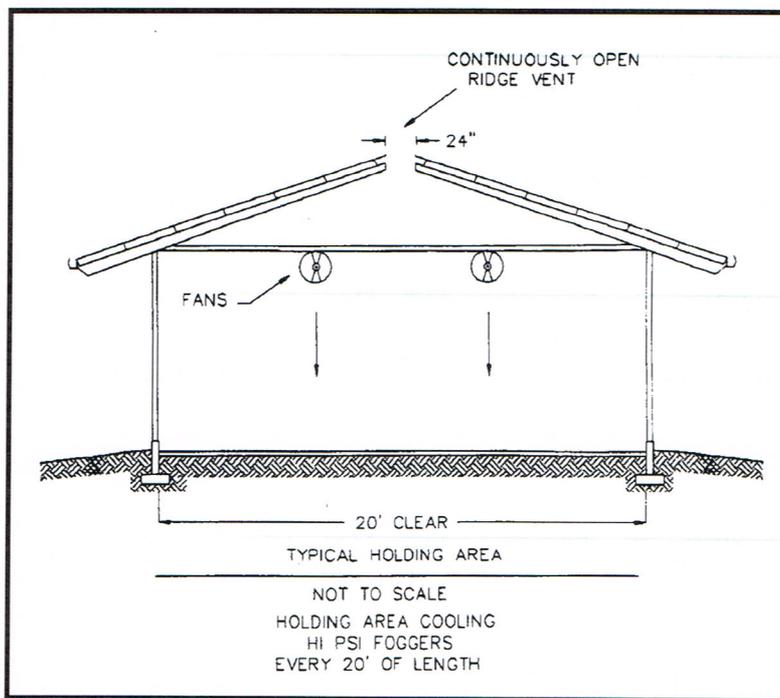
In addition to lactating cows, it is very important that shade and cool water be available to dry cows and heifers at all times. Since dry cows and heifers are not consuming the large quantities of feed that lactating cows eat, they will be generating less heat and are less susceptible to heat stress. However, research has shown that dry cows have heavier calves and better body condition scores when adequate shade and cooling are available to them. Heifers, also, will eat more feed and grow at a greater rate if shade and water are available to them when fed a properly balanced ration.

**The second step to alleviate heat stress in lactating cows is to provide a more comfortable environment in the holding pen** (Figure 4). The holding pen is the most stressful location for milking cows during periods of heat stress if it is not shaded and cooled. Data indicate that proper cooling of the holding pen can pay for itself in two hot summers. Another publication, FSA4019, *Cooling Dairy Cattle in the Holding Pen*, provides additional details on cooling in this location.

Cool the holding pen area with a combination of shade, air movement and water. When combined with air movement, water can increase cooling ability of the cow. However, adding water in humid or poorly ventilated holding pens or barns can make the situation worse. The water can actually hold the heat in the cow if it does not evaporate from the cow. If cooling is done effectively with fans and water in the holding pen, less cooling is required between milkings.

To provide cooling for the holding pen or loafing area, sprinkling with enough water to soak cows to the skin and then running fans constantly at 5 to 7

**Figure 4. Typical holding area.**  
Drawing by Joseph G. Martin III, P.E.,  
Consulting Engineer, Gainesville, Florida.



cows continuously. However, in some cases you may want the fans off for the period when the sprinklers are running if the water droplets blow out of the holding pen.

The 1/2 horsepower, 36-inch fan rated at 11,000 to 12,000 cubic feet per minute (cfm) will blow 20 to 30 feet, while a 48-inch fan with a 1-horsepower motor rated at 21,000 cfm will blow 30 to 40 feet. Usually, it is necessary to have at least two widths of fans in the holding pen. For many producers, four fans are needed, two in the front of the holding pen and two approximately halfway down the length of the holding pen. The fans should direct a high velocity breeze over the cows to allow them to dry faster so that the heat can be dissipated from their bodies (see FSA4019, *Cooling Dairy Cattle in the Holding Pen*).

An ample supply of water, usually 25 gallons per cow per day, is required to cool the cow throughout the day. This type of cooling system may be used not only in the holding pen but also in free stalls and area of feeding. The floor of the holding pen should be grooved or rough-surfaced concrete or some other suitable footing so that cows do not slip in the wet environment. As a general rule, water should not stand in the holding pen and the feet of cattle should be exposed to limited water.

If no covering is over a holding area, a shade cloth roof will be helpful, although a permanent structure is recommended. Additionally, a shade cloth or a poultry curtain may hang down over the side of the holding pen where the afternoon sun shines in.

miles per hour is recommended. These fans increase evaporation of water which helps cool the cows.

One system that works very effectively is to sprinkle the cows for a short period of time, e.g., 0.5 to 3 minutes, and apply 0.05 inches of water per cycle, just enough time to soak the cows to the skin. Avoid allowing water to run onto the udder. If water does reach the udder, it is possible that bacteria can be transferred into the mammary gland and result in more mastitis. If possible, blow air onto the

The eave height of the holding pen should be at least 12 feet if possible.

For a few producers, a sprinkler in the exit lane of the milking parlor serves to soak the cows to the skin as they leave the milking area. The cows will be cooled as the water evaporates. Such cooling devices need to be used with care when mastitis or somatic cell count problems occur. The object is to wet the cow's back without having water run onto the udder. A trigger, either manual or electronic, should turn water on the cow only for a few seconds.

**A third step to reducing heat stress on your cows is to provide shade and a cooling device around the feed manger** (Figure 5). A covered feed manger provides shade so that cows are more comfortable when they are eating. Also, the cover for the feed manger allows the feed to stay dry during periods of rainfall. For many producers, it works best to have a sprinkler system spraying away from the feed manger and toward the cows. Fans are then used to dissipate the heat from the cow by evaporative cooling of the water on the animal, as in the holding pen. It is important that water be sprayed away from the feed so that the feed does not get wet. It also is important that water does not reach the udder. The area also should have suitable footing to minimize slipping of cows in the wet environment. As in the holding pen, the feet of cattle should have limited exposure to water.

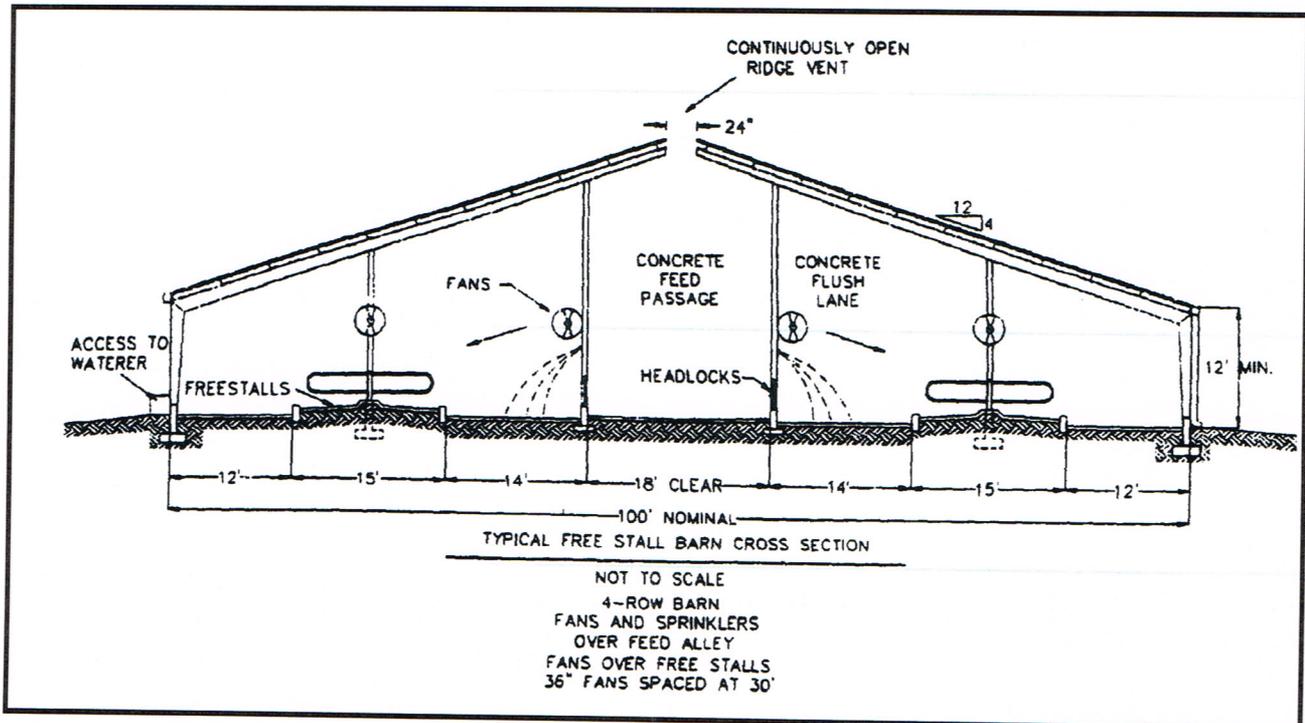
One system that works very well is to use 36-inch fans every 20 to 30 feet along the feed manger. This

keeps the air moving continuously. In addition, an ample supply of water must be sprayed or misted on the cow. Low pressure sprinklers (10 psi) work best. Lower pressure will produce less mist and drift of spray. However, fans usually must be turned off when the mist is present or the mist will be blown out of the barn. A main pressure regulator can be installed at the beginning of the pipeline, or smaller regulators may work in conjunction with each sprinkler nozzle. Sprinklers should have a base of at least 1/2 inch. Most high capacity sprinklers will have a 3/4 inch base. Usually these are available for an economical price at farm supply or poultry supply locations. Thirty-six inch fans, at the time of this printing, were selling for \$170 to \$270 per fan. Installation cost is extra.

If floors are flushed and require a concrete slab, the slope should be 1.5 percent to 4 percent, preferably 2 percent. Concrete should be 4 inches thick with a grooved surface for good footing. Floor space requirements vary from 19 to 65 square feet per cow. The more hot and humid the environment, the greater the square footage of floor space required. Shade structures 40 feet wide or less require a minimum eave height of 12 feet. Structures wider than 40 feet should have eave heights of at least 14 feet.

Painting metal roofs white or aluminum and adding insulation aids in reflecting solar radiation and helps to insulate animals from thermal radiation. However, due to shortened life from pest damage to the insulation and marginal additional benefit, it is not usually economical. If a polypropylene fabric is

**Figure 5. Typical free stall barn cross section. Drawing by Joseph G. Martin III, P.E., Consulting Engineer, Gainesville, Florida.**



used for the shade cloth, it usually provides around 80 percent obstruction of solar radiation.

**A fourth step to decrease heat stress is to increase the density of the ration.** High quality forages should be available to the animal if possible. These forages may include summer annuals or a high quality perennial. Silage, pasture and hay are acceptable. The primary reason that cows decrease in milk production during hot weather is that the cows eat less. Since cows will be consuming less as temperatures increase (Table 1), increasing the energy density of the diet can in part compensate for the decrease in dry matter intake.

To increase the energy density of the diet, a fat or feed that has a low heat increment (heat of digestion) may be included in the ration. The high-fat feeds include whole cottonseed, either tallow or bypass fat, and roasted soybeans, which are available in some areas of the state. Lower-fiber feedstuffs usually result in less heat increments than high-fiber feeds such as grass hays. Diets high in grain and low in fiber cause less heat stress for lactating cows because of the lower heat of digestion. However, it is critical to balance the ration properly, since milk fat may be depressed and digestive disorders may result when a high grain ration is fed. Feeding buffers such as sodium bicarbonate and magnesium oxide allow higher concentrate rations to be fed and can help in alleviating the low-fat milk syndrome.

Also, the ration fed to cows in hot weather should be balanced properly for minerals. Some mineral companies will have a "summer buffer." Increasing

potassium to 1.3 to 1.5 percent, sodium to 0.5 to 0.6 percent, and magnesium to 0.3 to 0.4 percent may result in less heat stress by allowing the animals to dissipate heat. Chlorine usually is at least 0.25 percent of the diet, which is the recommendation throughout the year.

Do not overfeed highly degradable protein, i.e., 65 percent or greater degradable crude protein in the rumen, because this also increases the heat increment and requires more heat to be dissipated from the animal. Proper supplementation of more undegradable protein appears to be effective in reducing the heat of digestion.

## Summary

Keeping lactating cows cool can provide a good return on your investment as it makes cows more comfortable, thereby making them more productive. Shade and cool water should be available to cows and heifers at all times. Cooling devices should also be installed in the holding pen and feeding area if possible. The ration should be properly balanced, and generally the energy density should be increased in the summer to help compensate for decreased dry matter intake of the cow. For more information, see your local county Extension agent.

## Reference

Bray, David R., and Ray Bucklin. 1996. *Recommendations for Cooling Systems for Dairy Cattle*. Fact Sheet DS-29. University of Florida Cooperative Extension Service, Gainesville, Florida 32611.

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# Alternative Feeds for Beef Cattle

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Supplemental feed is the major cost of producing beef. Traditionally corn, grain sorghum, cottonseed meal and soybean meal have been used to provide supplemental energy (TDN, total digestible nutrients) and protein needed by cattle consuming forage diets. Arkansas cattle producers, however, are fortunate to have an abundance of alternative or byproduct feeds available.

Alternative feeds provide nutrients needed by cattle often at a lower cost than traditional feeds. Several factors should be considered, however, before a decision is made to use alternative feeds in cattle diets. Factors discussed relative to alternative feeds include the following:

- Supplementation Basics
- Composition (nutrient density)
- Mineral Supplementation
- Description
- Availability and Storage
- Feeding and Limitations

## Supplementation Basics

### Energy

Total digestible nutrients usually make up the major portion of cattle diets. The TDN values of feeds are, however, often difficult to obtain because: (1) TDN content of purchased feed is not displayed on feed labels, (2) TDN content derived from a forage or feed analysis is estimated by using a prediction equation and (3) TDN values for many feeds change as the amount in the diet changes, especially when forage is replaced with concentrate.

Typical cattle producers can do little about the first two factors mentioned, but the third factor should be evaluated and the composition of the diet planned to optimize utilization of energy.

Changes in TDN value are referred to as associative effects and can be positive or negative. Corn grain, for example, contains high levels of starch and TDN (Table 1). When corn is used as a supplement, high levels of starch and sugar are rapidly fermented, resulting in a lower rumen pH. When starch intake reaches a critical level, this lowers feed intake and digestibility. The impact of this negative associative effect is relative to the amount of grain fed as well as the type and quantity of forage. *Several experiments indicate that when the sum of the starch plus sugars (Table 1) are fed at levels above 0.4 percent of body weight, forage intake and digestibility may be reduced.*

In reality, adding grain (corn, grain sorghum or wheat) to the diet of cattle beyond a threshold of about 0.5 percent of body weight may be counterproductive if the goal is to maximize forage intake and digestibility. In these situations, it is often desirable to choose a supplement with a low level of starch that provides TDN in the form of highly digestible fiber, such as soybean hulls, corn gluten feed, wheat middlings and dried distillers grains (Table 1). The TDN in these feeds is in the same form as in the forage. Therefore, negative associative effects are not nearly as dramatic as those seen with starch-based supplements.

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## Protein

Crude protein values for alternative feeds are included in Table 1. To maximize forage intake and digestion, protein requirements of cattle must be met. Protein supplements should be evaluated based on the digestive characteristics of the protein provided. A digestive characteristic of dietary protein is that it can be classified as either degradable intake protein (DIP) or undegradable intake protein (UIP).

Degradable intake protein requirements must be met to maximize forage intake and digestibility. If the diet is deficient in protein, a supplement high in DIP must be provided before TDN or UIP supplements are considered. Protein sources with high DIP values include those that have low UIP values in Table 1, such as soybean hulls, rice bran, corn gluten feed, wheat middlings and whole cottonseed. Soybean meal, cottonseed meal and urea are also high in DIP.

When DIP is adequate, supplementation of UIP enhances performance of young growing animals. Feeds high in UIP (formerly referred to as “bypass” protein) include feather meal, blood meal, corn gluten meal and distillers dried grains.

## Minerals

Beef cattle should be provided with adequate levels of minerals year-round. When feeding some of the alternative feeds shown in Table 1, special attention should be given to the calcium:phosphorus ratio of the diet. All of the alternative feeds shown, except soybean hulls and cottonseed hulls, are relatively high in phosphorus. Although those feeds usually provide an inexpensive source of phosphorus, care must be taken to maintain a calcium:phosphorus ratio of the diet of at least 1 part of calcium to each part of phosphorus. Depending on the level of supplement fed, several of these feeds may need to be supplemented with a calcium source. Many of these feeds are also good sources of potassium, magnesium, sulfur and some trace minerals. Therefore, a lower cost mineral supplement can often be used because of the minerals provided in these alternative feeds.

## Soybean Hulls

*Description* – Soybean hulls (seed coats) are a byproduct of soybean processing for soybean oil and soybean meal. During processing, soybeans are rolled or cracked to break the whole bean into smaller

**Table 1. Nutrient concentration and bulk density of feed ingredients**

Feed	Dry Matter	Concentrations in Dry Matter												
		Protein		TDN	Starch-Sugars	ADF	NDF	Fat	Ash	Ca	P	K	Mg	S
		CP	UIP											
Corn	90	9.8	55	90	75	2	11	4.1	1.5	.03	.32	.44	.12	.11
Soybean hulls	90	12.2	25	77	14	49	66	2.1	4.9	.53	.18	1.29	.22	.11
Rice bran	91	14.4	25	70	27	16	33	15.0	11.5	.10	1.73	1.89	.97	.20
Rice bran, defatted	88	16.3	--	56	--	18	--	3.2	--	.11	1.95	1.82	.96	--
Rice millfeed	91	6.8	32	42	9	50	60	6.4	17.2	.08	.60	2.20	.57	.30
Rice millfeed, defatted	90	7.7	--	35	--	53	--	1.2	--	.08	.63	.79	.57	--
Corn gluten feed	90	23.8	22	80	30	13	36	3.9	6.9	.07	.95	1.40	.40	.47
Wheat middlings	89	18.4	23	83	35	12	35	4.9	5.0	.15	1.00	1.13	.40	.19
Whole cottonseed	89	24.4	27	95	8	42	52	17.5	4.2	.17	.62	1.24	.38	.27
Hominy	90	11.5	53	91	52	13	23	7.7	2.0	0.5	.57	.65	.26	.10
Brewers' grain, wet	21	26.0	59	70	14	23	42	6.5	10.0	.29	.70	.58	.27	.34
Brewers' grain, dehydrated	90	29.2	50	66	14	31	49	10.8	4.0	.29	.70	.58	.27	.40
Corn distillers' dried grain	94	23.0	65	86	12	16	43	9.8	4.0	.11	.43	.18	.07	.40
Corn distillers' dried grain with solubles	90	30.4	52	90	16	21	46	10.7	4.6	.26	.83	1.08	.33	.44
Cottonseed hulls	90	4.2	50	42	--	65	88	1.7	2.9	.15	.09	.88	.14	.08

pieces so that the hulls can be removed. Soybean hulls are separated from the cracked seeds by an air stream. Hulls are usually toasted to destroy the urease activity and ground to the desirable particle size. Grinding the hulls decreases particle size and increases density for mixing and shipping purposes. Bulk density varies with fineness of grind, usually ranging from 20 to 24 pounds per cubic foot.

The protein content of the hulls varies widely, so the guaranteed analysis may be well below the actual protein content (Table 1). Testing each load may lead to large savings in protein supplement expenses. Soybean hulls are a good source of calcium, but relatively low in phosphorus content.

*Availability and Storage* – Currently, there is an increased availability of soybean hulls for feeding to cattle. Some processors sell soybean hulls directly to producers in a minimum 5 ton quantity.

Soybean hulls are dusty and usually handled in bulk although both meal and pelleted forms are often available. If the meal form is used, it is recommended that the producer wear a dust mask if working in an area with poor ventilation. Soybean hulls in the meal form work best in rations using wet ingredients because dust problems are minimized. Hulls may be stored in open-fronted sheds or grain bins. They auger slower than grain, but this is a convenient way to store them if equipment for loading and unloading the bins is available.

*Feeding and Limitations* – As with other highly digestible fiber byproducts, the TDN value of soybean hulls depends on the amount fed and the type of diet (concentrate versus forage or roughage). When fed to growing cattle as a supplement to forage diets at 0.5 percent of body weight or less, soybean hulls are equivalent to corn in TDN content. Therefore, growing diets should be formulated using the same value of 90 percent TDN (dry matter basis) for both soybean hulls and corn.

When higher levels of soybean hulls are fed, TDN value is reduced. Soybean hulls fed alone have a high passage rate and a much lower digestibility than when the diet includes at least one-third long-stem forage to slow passage rate and increase ruminal retention time.

Like other high-fiber byproducts, soybean hulls have a lower TDN value than corn grain when fed at a level greater than 20 percent of diet dry matter in high-concentrate diets. Research indicates that soybean hulls can be used to replace conventional grain sources as supplements for cattle or as a creep feed. Feeding soybean hulls to grazing cattle is safer than feeding corn, because the possibility of acidosis

is reduced or eliminated. They are palatable to cattle. Sometimes, however, several days may be required to get cattle to consume desired amounts especially when trying to start inexperienced weaned calves on feed. At weaning, calves should usually be started on a commercial preconditioner, and then gradually shifted to soybean hulls.

## Rice Bran

*Description* – Byproducts from processing rice include rice hulls, rice bran, rice polishings and broken rice grains. When harvested from the field, rice is in the form of paddy (or “rough”) rice, where the kernel is fully enveloped by the rice hull. After being dried, the first stage in milling is removal of the hull, yielding brown rice. Next, the outer layer is removed from the brown rice kernel to yield white rice. The separated brown layer is designated rice bran.

The composition of rice bran can be quite variable due to the degree of milling and quantity of constituents. Rice bran is nutritious, supplying protein, energy and minerals (Table 1).

Full-fat rice bran and defatted rice bran are sold for cattle feed. The major difference in these feeds is that full-fat rice bran is higher in TDN content (Table 1). Because research is limited on the use of defatted rice bran for cattle, this discussion will be limited to recommendations for feeding full-fat bran.

*Availability and Storage* – In Arkansas there is a large quantity of rice bran produced. The high fat content makes it more susceptible to rancidity during warm weather and less palatable. Rice bran is finely ground and has a powdery texture, making handling and storage in bins difficult due to stacking and bridging. Blending with other concentrates, such as grain, improves flow characteristics.

*Feeding and Limitations* – Small particle size, starch and fat content all add to the risk of digestive upset and the potential for nutritional imbalances. In general, beef cattle diets should not exceed 6 percent fat on a dry matter basis. Therefore, full-fat rice bran should be limited to no more than one-third of the diet. It has a higher TDN value for forage fed cattle, however, when supplemented at 0.4 percent or less of body weight. At this level it has approximately the same TDN value as corn grain. A research trial showed that when rice bran was supplemented at 0.76 percent of body weight, the TDN value was less than that of corn fed at 0.6 percent of body weight. Because of its high phosphorus content, calcium supplementation may be required to maintain an adequate calcium:phosphorus ratio of the diet.

## Rice Millfeed

*Description* – Rice millfeed may be highly variable in composition due to the varying amounts of rice hulls and rice bran included. Rice millfeed usually contains about two-thirds rice hulls and one-third rice bran. In recent years some processors have also produced a 50:50 mixture of hulls and bran for cattle feed. Also defatted rice bran has become available for cattle feed.

There is considerable difference in the nutritive value of rice bran and rice millfeed. Rice bran is much higher in crude protein and TDN content and considerably more costly than rice millfeed (Table 1).

*Availability and Storage* – As with rice bran, rice millfeed is readily available in the state. Handling characteristics are similar to rice bran, but rice millfeed has a longer storage life.

*Feeding and Limitations* – Rice millfeed is designed more for maintenance rations due to its high content of rice hulls which contain only about 12 percent TDN. Due to its lower fat content, millfeed can be fed at higher levels than rice bran. Also, rice millfeed is less likely to become rancid or cause digestive upsets. The quantity of rice millfeed that can be fed to cattle is primarily regulated by the level of TDN and protein needed in the diet. To achieve desired performance, usually a TDN and protein source is needed in the diet when rice millfeed is fed. Rice millfeed is very palatable to cattle. “Founder” has occurred in growing cattle fed a free-choice mix of 25 percent corn and 75 percent rice millfeed.

## Corn Gluten Feed

*Description* – Corn gluten feed is a byproduct of the wet milling industry which produces high-fructose corn syrup used by the soft drink industry. Corn gluten feed is that portion of the corn kernel that remains after extraction of starch, gluten and germ. It is composed primarily of bran (hull), the fibrous fraction of the kernel.

*Availability and Storage* – The recent switch of the soft drink industry to corn sweeteners (high fructose) has made corn gluten feed abundant. Corn gluten feed is available in both dry (88 to 92 percent dry matter) and wet (55 to 70 percent dry matter) forms. The dry product is usually marketed as pellets, although some mills sell it in the meal form. The wet form is usually restricted to areas relatively close to mills because of freight cost associated with transporting wet feed.

*Feeding and Limitations* – The moderate protein content (Table 1) and highly digestible fiber often make corn gluten feed an economical protein/TDN

supplement for cattle. When corn gluten feed is included in a forage diet at 0.5 percent of body weight or less, the TDN value is equivalent to or greater than that of corn. The TDN value relative to corn grain decreases as the level in the diet increases. In high concentrate diets, corn gluten feed has 85 to 90 percent of the TDN value of corn grain.

Generally, corn gluten feed should not make up more than 50 percent of the dry matter intake. Even at 50 percent, the TDN value will be less than when it is fed at lower levels. Corn gluten feed is low in calcium content so a calcium source may need to be added to the diet.

## Wheat Middlings

*Description* – Wheat middlings or “midds” are a product of the flour milling process. Wheat middlings and wheat mill run are often used interchangeably by the industry. Wheat midds cannot contain more than 9.5 percent crude fiber. For cattle, midds are a good source of protein and TDN but are deficient in calcium, carotene and vitamin D. Nutrient composition may be more variable than that of other byproducts.

*Availability and Storage* – Wheat midds are marketed in either pelleted or meal forms. The meal form has a lower bulk density than pellets resulting in some dust and logistical problems. Pelleted midds can be handled easily in conventional grain systems. Pelleting also improves their palatability to cattle. Midds are moderately palatable to most cattle, but some animals may not readily consume them unless they are mixed with other feeds.

*Feeding and Limitations* – Generally, midds should not make up more than 50 percent of the total dry matter intake. Palatability may limit their use in some situations. Relative to phosphorus, midds are low in calcium content, so supplemental calcium may need to be added to the ration.

## Whole Cottonseed

*Description* – Whole cottonseed is a byproduct of cotton production. Most of the cottonseed used by the beef industry has not been “delinted.” Whole cottonseed can be fed to ruminants before or after the “lint” has been removed. Cottonseed is high in TDN and protein content (Table 1). Cottonseed should be clean, free of foreign debris, white to whitish-gray in color and contain no more than 14 percent moisture.

*Availability and Storage* – Cottonseed supplies are seasonal, and prices tend to be lowest in the fall. Cottonseed is light (20 to 25 lb/cubic ft). It is usually hauled in dump trailers or trucks with a bottom conveyor, especially non-delinted seed which does not flow well in mechanical systems. Cottonseed are

usually handled with front end loaders or manually with a shovel. Storing cottonseed that is too wet may cause heating or molding, as evidenced in a dark or black seed. Heating results in damage to protein, making it unavailable, and eventually may cause spontaneous combustion.

*Feeding and Limitations* – Several factors make cottonseed an ideal supplement for cattle. It is a good source of protein, TDN and phosphorus – three nutrients likely to be deficient in many feeding situations. Cattle usually eat cottonseed after they have adapted to it. At first offering, whole seed may need to be mixed with other ingredients, but after adaptation, cattle usually consume it readily. Cottonseed does not need to be processed but may be fed whole. Cottonseed does not flow well in self-feeders. It is usually fed from a trough or in small piles on a well-drained surface.

Because cottonseed is high in fat content and diets exceeding 6 percent fat (dry matter basis) can reduce forage digestibility, the quantity fed should be limited. Also, gossypol, a potentially toxic compound found in cottonseed, limits its use. Gossypol is also found in cottonseed meal and cottonseed hulls. Fortunately, ruminant animals have the ability to detoxify gossypol to some extent during the fermentation process.

Clear guidelines regarding maximum tolerable levels of gossypol for cattle are not available. Maximum levels for feeding whole cottonseed generally should not exceed levels shown in Table 2. Although recommendations have been made for up to 10 percent whole cottonseed in the diet for developing young bulls, no recommendation is made here because research indicates potential reduced fertility in young developing bulls and the relatively low potential cost savings vs. risk when feeding whole cottonseed at the lower levels previously recommended.

**Table 2. Whole Cottonseed Feeding Recommendations**

	Percent of Animal Body Weight	Percent of Total Diet	Lb/Hd/Day
Mature Cows	0.5	20	5 to 7
Bulls (during the breeding season)	0.33	15	5 to 7
Growing Cattle (over 8 weeks of age)	0.3	15	1.5 to 2.5

Always feed a good quality mineral-vitamin supplement free-choice. In this case, the supplement should contain adequate calcium, because cottonseed is low in calcium content.

## Hominy

*Description* – Hominy is a byproduct of corn processing. It contains corn bran, corn germ and part of the starchy portion of either white or yellow corn kernels. Hominy is higher in TDN, protein, fat and fiber than corn grain (Table 1). The fat concentration can range from 5 to 12 percent, which will alter the TDN concentration.

*Availability and Storage* – Hominy is finely ground and can be stored, handled and fed similarly to ground corn.

*Feeding and Limitations* – Hominy is often used in rations as a replacement for corn. For finishing cattle, the maximum levels that can be added to the ration may be influenced by the fat content. Supplies should be fed within a month after purchase especially during warm weather to avoid the stale smell.

## Brewers' and Distillers' Grains

*Description* – Brewers' grains are spent grains (barley alone or a mixture of barley and other cereal grain or grain products) from the brewing of beer. Distillers' grains are byproducts of the distilling industry. Corn is the most widely used grain in alcohol production, but rye, sorghum and wheat are sometimes used.

Distillers' grains with solubles consist of distillers' grains plus the solubles of fermentation. Distillers' grains are identified by the type of grain from which they are made, for example, corn or milo distillers.

Brewers' and distillers' grains are a good source of UIP for ruminants. They are rich in protein, TDN, minerals and vitamins (Table 1).

*Availability and Storage* – Brewers' and distillers' grains can be fresh, dried or ensiled; however, the dried product is the easiest to handle and store. Because the product is shipped into the state, transportation costs are usually prohibitive for the fresh product. Also, the fresh product deteriorates rapidly in hot weather.

**CAUTION** – For an accurate comparison of the cost of wet grains vs. dry grains, the cost of wet grains should be adjusted to the same moisture level as dry grains. Most of the feeds in Table 1 contain about 90 percent dry matter, except wet brewers' grains. For example, if wet brewers' grains (21 percent dry matter) were \$35 per ton, their cost adjusted to 90 percent dry matter is \$150 per ton.

The following formula may be used to adjust wet feed to a 90 percent dry matter basis.

$$\text{Price/ton of high moisture feed} \times \frac{0.9}{\% \text{ dry matter in high moisture feed} \div 100} = \text{Price of high moisture feed adjusted to 90 percent dry matter}$$

For wet grains:

$$\$35/\text{ton} \times \frac{0.9}{0.21} = \$150 \text{ per ton}$$

*Feeding and Limitations* – Because of the high protein content of these grains and higher prices relative to other energy sources, they are generally considered as protein sources. However, when economically feasible, they are an excellent source of TDN. They may be included at 15 to 20 percent of the diet dry matter.

## Cottonseed Hulls

*Description* – Cottonseed hulls are the outer covering of cottonseeds. They are low in TDN and calcium and very low in protein and phosphorus (Table 1).

*Availability and Storage* – Nonpelleted hulls have been used for many years as a substitute for roughage. They are bulky and are difficult to transport and handle. Pelleted hulls are now available. In comparison to nonpelleted hulls, they are more digestible, require less transportation and storage space and are easier to handle.

*Feeding and Limitations* – Cottonseed hulls can be fed without further processing, but the use of pelleted hulls has increased in recent years because of ease of handling. In rations that contain high levels of TDN, pelleted hulls are not as effective as a roughage source as nonpelleted hulls.

Hulls are well liked by cattle even when fed as the only roughage. Dry matter consumption of hulls may be up to 25 percent greater than for most other

feed sources. When hulls are fed free-choice, the high rate of consumption increases nutrient intake significantly. Still, it is vital to provide supplemental protein, calcium, phosphorus, vitamin A, trace minerals and, in most cases, supplemental TDN to correct these deficiencies in hulls. With proper supplementation, cottonseed hulls may be a very economical source of roughage.

## Feed Brokers and Manufacturers

Byproduct feeds are available from many different sources. A few feed brokers and manufacturers are listed for your information. This list is not inclusive, and this is not an endorsement.

### Feed Brokers

J.W. Nutt Co.  
2500 Crestwood  
N. Little Rock, AR 72116  
800-643-8349

Riceland Foods  
P.O. Box 927  
Stuttgart, AR 72160  
870-673-5314

### Feed Manufacturers

Archer Daniels Midland (ADM)  
East 9th and Bond  
Little Rock, AR 72202  
800-255-9080

Planters Oil Mill  
P.O. Box 7427  
Pine Bluff, AR 71611  
870-534-3631

Other sources of information on the availability and cost of feed byproducts may be found on the Internet at the following locations.

U of A Cooperative Extension Service  
[http://www.aragriculture.org/lvstkgorg/livestock/beef/nutrition/commodity\\_feed\\_sources.asp](http://www.aragriculture.org/lvstkgorg/livestock/beef/nutrition/commodity_feed_sources.asp)

Oklahoma State University Feed Bulletin Board  
<http://www.ansi.okstate.edu/EXTEN/feedbull/>

University of Missouri  
<http://agebb.missouri.edu/dairy/byprod/index.htm>

Prices of various feeds (FOB Memphis) are updated weekly in the "Livestock Market Report" available at University of Arkansas Cooperative Extension Service offices throughout the state.

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# Replacing Valuable Papers

Laura Connerly  
Family and Consumer  
Sciences Associate

Valuable papers, although not used very often, may be needed quickly or unexpectedly. No one ever plans to lose family papers, but due to fire, natural disasters, moves or family changes, papers may be lost or destroyed.

It may take weeks or months to replace valuable papers, so begin the replacement process as soon as possible. Prompt replacement will prevent delays when the papers are actually needed.

<b>Valuable Papers</b>	<b>Source of Replacement Information</b>
Adoption Papers Birth Certificate Death Certificate Marriage License Divorce Certificate	Arkansas Department of Health Division of Vital Records 4815 West Markham, Slot 44 Little Rock, AR 72205-3866 Phone: (501) 661-2174 Web site: <a href="http://www.healtharkansas.com/certificates/certificates.html">http://www.healtharkansas.com/certificates/certificates.html</a>
Driver's License	Contact your local Revenue Office For more information or a list of county locations: Arkansas Department of Finance and Administration Office of Driver Services Web site: <a href="http://www.arkansas.gov/dfa/driver_services/ds_index.html">http://www.arkansas.gov/dfa/driver_services/ds_index.html</a>
Educational Records	School or schools attended
Health Records	Personal physician's office
Insurance Policies	Contact the agency providing coverage. For additional assistance in locating the company, contact: Department of Insurance 1200 West Third Street Little Rock, AR 72201-1904 Phone: (501) 371-2600 Fax: (501) 371-2618 Web site: <a href="http://www.state.ar.us/insurance">http://www.state.ar.us/insurance</a>
Military Service Papers	NPRC mailing address: National Personnel Records Center Military Personnel Records 9700 Page Avenue St. Louis, MO 63132-5100 Phone: (314) 801-0800 Fax: (314) 801-9195 Web site: <a href="http://www.archives.gov/research">http://www.archives.gov/research</a>

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**Valuable Papers**

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**Source of Replacement Information**

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Passports	Local Postal Service office
Property Deeds	Local Circuit Clerk's office
Social Security	Phone toll free: 1-800-772-1213 Web site: <a href="http://www.ssa.gov">http://www.ssa.gov</a>
Stock Certificates	Contact any brokerage firm (fees may be involved)
U.S. Savings Bonds	Contact the Bureau of Public Debt for Form 1048, Claim for Lost, Stolen or Destroyed United States Savings Bonds: Department of the Treasury, Bureau of Public Debt HH/H (paper) Savings Bonds P. O. Box 2186, Parkersburg, WV 26106-2186 E/EE/I (paper) Savings Bonds P. O. Box 7012, Parkersburg, WV 26106-7012 E-mail: <a href="mailto:SavBonds@bpd.treas.gov">SavBonds@bpd.treas.gov</a> Phone: (304) 480-7537 Fax: (304) 480-6010 Web site: <a href="http://www.treasurydirect.gov">http://www.treasurydirect.gov</a>
<b>Taxes</b>	
Federal Income Tax Returns	Complete IRS Form 4506 to request a copy of a previous return. Contact the IRS Service Center if filed in Arkansas: RAIVS Team 3651 South Interregional Highway Stop 6716 AUSC Austin, TX 78741 Web site: <a href="http://www.irs.gov">http://www.irs.gov</a>
Property and Personal Taxes	Contact county Tax Collector's office. A comprehensive list of tax assessors, collectors and other county officials is available from: Assessment Coordination Department 1614 West Third Street Little Rock, AR 72201-1815 Phone: (501) 324-9240
State Income Taxes	Send a letter to the Income Tax Section with your name as it appeared on the tax return and your spouse's name, if you filed as a married couple, social security number(s), the tax year or years for which you want copies. You must sign your request. Individual Income Tax Research Section P. O. Box 3628 Little Rock, AR 72203-3628 Web address: <a href="http://www.arkansas.gov/dfa">http://www.arkansas.gov/dfa</a>
Vehicle Titles	Contact your local Revenue Office. For more information or a list of county locations: Web address: <a href="http://www.arkansas.gov/dfa/dfa_vehicles.html">http://www.arkansas.gov/dfa/dfa_vehicles.html</a>

Dr. Judith R. Urich and Wanda W. Shelby, former Extension specialists, University of Arkansas Division of Agriculture, Cooperative Extension Service, Little Rock, prepared original manuscript.

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FSHEC45-PD-1-06RV

# Earthquake Preparedness

Ples Spradley  
Associate Professor -  
Pesticide Education

This fact sheet will help you plan for and survive a major earthquake. It tells you what to do before, during and after the quake to lessen the impact on your family and your home.

One of the worst earthquakes in recent history occurred along the New Madrid Fault in the winter of 1811-1812. This fault zone is of great concern to Arkansans because of the amount of damage that will result should another quake occur. Geologists predict that the chances of another major earthquake in the area are quite high. Being prepared can lessen the impact.

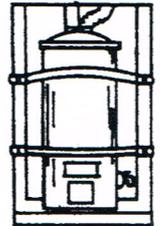
Be prepared to be self-sufficient for at least three days after the quake. Following are precautions to be taken before, during and after the earthquake.

## Before the Quake

1. Conduct a hazard hunt. Some possible hazards include:
  - Tall, heavy furniture which could topple, such as book-cases, china cabinets or modular wall units.
  - Appliances which could move enough to rupture gas or electrical lines.
  - Hanging plants in heavy pots that could swing free of hooks.
  - Heavy picture frames or mirrors over the bed.
  - Latches on kitchen or other cabinets which will not hold the door closed during shaking.
  - Breakables or heavy objects that are kept on high or open shelves.
  - A masonry chimney that could crumble and fall through an unsupported roof.

- Flammable liquids like painting or cleaning products that would be safer in a garage or outside shed.

- Hot water heaters which can be pulled away from pipes and rupture. To avoid damage, secure your water heater by strapping it to the wall.



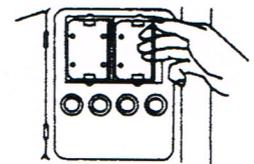
- Anything that can move, break or fall when your house starts to shake.

Take steps to correct these hazards. Secure or relocate heavy items.

2. Teach responsible members of your family how to turn off electricity, gas and water at main switch and valves. **Caution:** Do not shut off gas unless an emergency exists. If gas is ever turned off, remember that all pilot lights must be relit. Call your utility company.



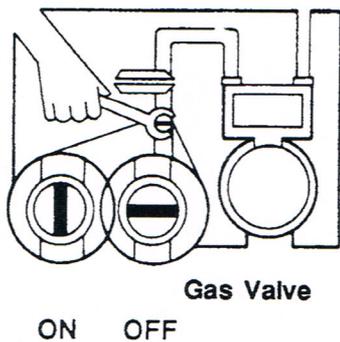
Circuit Breaker



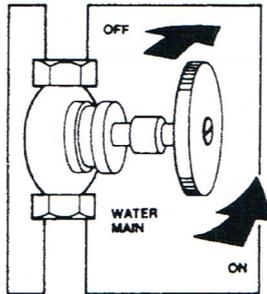
Pull-Out Cartridge Fuses

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Label water shutoff valve, found where water enters the house. Also label main water shutoff valve, found with meter in a concrete box away from the house.



- Family Earthquake Drill – It's important to know where you should go for protection when your house starts to shake. By planning and practicing what to do before an earthquake occurs, you can condition yourself and your family to react correctly and spontaneously when the first jolt or shaking is felt. An

earthquake drill can teach your family what to do in an earthquake.

- Each family member should know the safest and most dangerous spots in each room.
  - Safe spots: The best places are under supported archways, against inside walls and under heavy pieces of furniture like a desk or sturdy table.
  - Danger spots: Stay away from windows, hanging objects, mirrors, fireplaces and tall, unsecured furniture.
  - Reinforce this knowledge by physically placing yourself in the safe location. This is especially important for children.
  - In the days or weeks after this exercise, hold surprise earthquake drills. Call out "earthquake" and have each family member respond by moving to the safest place.
  - Be prepared to deal with what you may experience after an earthquake – both physically and emotionally.
  - Establish a point of contact for separated family members.
- Make sure you have emergency supplies on hand.
    - Flashlights with spare batteries. Secure a flashlight to your bed. Do not use matches or

The map predicts damage corresponding to Roman numerals on the Modified Mercalli Scale in an 8.6 earthquake. If an earthquake is around 7.16 on the Richter scale, reduce the zone Roman numerals by one. For example, substitute X for XI in Mississippi and Crittenden counties and read the damage on the Modified Mercalli Scale under X. If the earthquake is a 6.6, then reduce the zone numeral by two. For example, Mississippi and Crittenden counties would experience damage listed under IX on the Modified Mercalli Scale.

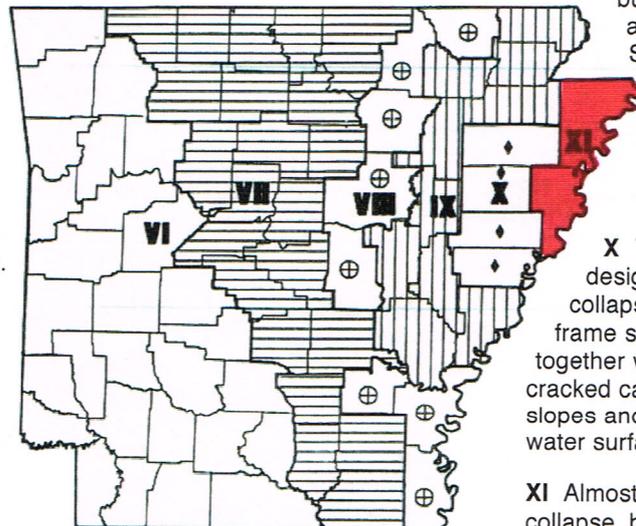
#### Modified Mercalli Intensity Scale

**VI** People are frightened and run outdoors. Heavy furniture may be moved; some instances of fallen plaster and toppling of chimneys. Slight damage.

**VII** Everybody runs outdoors. Damage is negligible in buildings of good design and construction, slight to moderate in ordinary structures and considerable in poorly built or

badly designed structures. Chimneys broken. Felt in moving automobiles.

**VIII** Some damage even in buildings of good design and construction. Considerable damage in ordinary buildings, with some collapsing.



Great damage in poorly constructed buildings. Panel walls thrown out of frame structures. Falling of houses and factory chimneys, columns,

monuments and walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Hinders driving of automobiles.

**IX** Damage considerable in buildings of good design and construction. Structures thrown out of alignment with foundations. Ground cracked conspicuously. Underground pipes damaged.

**X** Wooden houses of good design and construction collapse. Most masonry and frame structures destroyed together with foundations. Ground cracked causing damage, rails bent, slopes and embankments slide, water surface rises.

**XI** Almost all masonry structures collapse, bridges destroyed, fissures over entire surface of ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent prominently.

candles after an earthquake until you are certain no gas leaks exist.

- Portable radio with spare batteries. Most telephones will be out of order or used for emergency purposes, so radios will be your best source of information.
- First aid kit; first aid skills – Have a first aid book such as *Standard First Aid and Personal Safety* by the American National Red Cross. Take basic Red Cross first aid and CPR courses.
- Fire extinguishers. Keep a Class ABC fire extinguisher handy for small fires.
- Food. It's always a practical idea to keep a supply of nonperishable food on hand which can be rotated into your diet and replenished on a regular basis. Have a sufficient supply of canned or dehydrated food, powdered milk and canned juices for at least two weeks. Dried cereals and fruits and non-salted nuts are a good source of nutrition.
- Water should be stored in airtight containers approved for food contact and replaced every six months. Store at least enough water per person for a two-week period. Also have purification tablets such as Halazone and Globaline, but read the label on the bottle before using tablets. Liquid household bleach can also be used to purify water. Use 5.25 percent sodium hypochlorite (liquid household bleach, not fresh or lemon scent) in the following amounts for cloudy water: 1 teaspoon per 5 gallons of water, 16 drops per gallon of water or 4 drops per quart. The amounts can be reduced by one-half for clear water. Water from an undamaged water heater could be a good source of water.
- Special items. Have at least a two-week supply of medications and special foods needed for infants or those on limited diets. Be sure to check with your physician or pharmacist about how long these medications can be stored and still remain effective.
- Tools. Pipe wrench and crescent wrench for turning off gas and water mains.

## During the Earthquake

1. Stay as calm as possible. Remaining calm will help you control your situation, and others that are with you will be less likely to panic. They will draw courage from you and lessen the chances of injury.
2. Ride out the earthquake. During a major earthquake, you may hear a roaring or rumbling sound that gradually grows louder and feel a rolling sensation that starts out to be gentle and within a second or two grows violent and knocks you off your feet OR you may be jarred first by a

violent jolt – as though your house was hit by a truck. A second or two later you'll feel the shaking and you'll find it very difficult to stand up or move from one room to another.

The rumbling and rolling may frighten you, but the whole tremor will only take a minute or two. Remember, the myths about the earth opening up and swallowing you are NOT true. Injuries are not caused by the earthquake itself, but by falling objects. Try TALKING yourself through the earthquake to relieve the stress and provide a calming effect for other members of your household.

- If you are indoors, stay there. Get under a desk or table or in a corner like you practiced in your drills. Remember, stay clear of windows, book-cases, china cabinets, mirrors and fireplaces until the shaking stops.
- If in a high-rise building, get under a desk, stay away from windows and outside walls. Stay in the building on the same floor. Don't be surprised if the electricity goes out, or if elevator, fire alarm or sprinkler systems go on. **DO NOT USE ELEVATORS!**
- If you happen to be in the kitchen, turn off the stove at the first sign of shaking and quickly take cover under a counter or table.
- If in a crowded public place, do not rush for the doorway since other people are going to have the same idea. Move away from display shelves containing objects that may fall.
- If you are outside, get into the open away from buildings, trees, walls and power lines.
- If you are in your car, pull to the side of the road and stop the car. Do not park under overpasses or power lines. Stay in your car until the earthquake is over. If the earthquake has been severe, do not attempt to cross bridges or overpasses. They may have been damaged.

**PROCEED WITH CAUTION WHEREVER YOU ARE.** The possibility of encountering **FALLEN POWER LINES** is great. If you are in your car, you will most likely be protected from the live wires, unless you touch grounded metal. If you are on foot, make a wide path around the wires. **NEVER** assume downed power lines are dead – or **YOU** may be! People, metal and damp objects are good electrical conductors. To avoid shock and serious burns, **STAY WELL AWAY!** A wrong move trying to rescue someone else **COULD KILL YOU!**

## After the Quake

1. Check for injuries.
- If anyone has stopped breathing, give mouth-to-mouth resuscitation. Stop any bleeding injury by applying direct pressure to the wound. **Do not**

move seriously injured people unless they are in immediate danger of further injury. Cover injured persons with blankets to keep them warm.

- Do not use the telephone unless there is a severe injury. For more detailed emergency procedures, consult your first aid manual found in your standard first aid kit.
- Wear shoes in areas near fallen debris and broken glass.

2. Check for hazards.

- Put out small fires, if possible. If not, get out immediately. Alert your neighbors.
- Check gas, water and electrical lines and appliances for damages. If you smell gas or see a broken line, shut off all utilities. Do not switch on the gas or electricity again until the power company has first checked your home. Do not search for gas leaks with a lighted match.

## Three Day Survival Pack

### Top of the Barrel

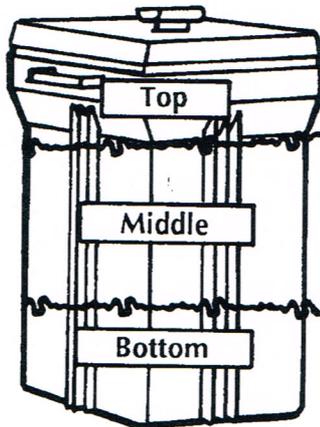


Standard First Aid Kit  
 First aid manual  
 Aspirin or pain relievers  
 Laxatives  
 Rubbing alcohol  
 Diarrhea medicine  
 Petroleum jelly  
 Soap  
 Salt  
 Gauze  
 Band-aids

Matches  
 Needles  
 Tweezers

Heavy string  
 Syrup of ipecac  
 Elastic bandage  
 Individual medical needs  
 Small splints, popsicle sticks  
 Triangular bandage (36" x 36" x 52")  
 Sanitary napkins (pressure dressing)  
 Disposable diapers (dressing/splint/padding)  
 Micropore adhesive, paper tape  
 Baking soda (1/2 teaspoon soda +  
 1 teaspoon salt + 1 quart water for shock)

Cotton balls  
 Cotton swabs  
 Safety pins  
 Scissors  
 Thermometer



### Middle of the Barrel

#### Food

Can opener  
 Three-day supply of food requiring no refrigeration.  
 Date all food items. Write out a menu for each day.

#### Examples

Commercially canned meat and food (1/2 lb/person)  
 Nonfat dry milk (1/2 lb/person)  
 Graham crackers (1/2 lb/person)  
 Dried apricots (1/2 lb/person)  
 Canned orange or tomato juice  
 Peanut butter (1/2 lb/person)  
 (Supplies daily 2,100 calories and essential nutrients.)  
 Water (1/2 to 1 gal/person per day). Store separately.



### Money

Other  
 Water purification tablets  
 Liquid chlorine/bleach  
 Eyedropper  
 Soap

### Bottom of the Barrel



#### Bedding

Sleeping bag/blankets  
 Plastic sheets/tarp

#### Clothing

One change/person

#### Personal Supplies

Toiletries  
 Towel  
 Good book  
 Paper/pencil

Infant/Children's Needs  
 if applicable

#### Fuel and Light

Matches  
 Candle  
 Signal flare  
 Sterno canned heat

#### Equipment

Can opener  
 Dishpan  
 Dishes (disposable)  
 Utensils (disposable)  
 Axe  
 Shovel  
 Bucket (plastic bag liners)

- Do not use electrical switches or appliances if gas leaks are suspected because sparks can ignite gas from broken lines.
- Do not touch downed lines or broken appliances.
- Clean up spilled medicines, bleaches, gasoline and other flammable liquids.
- Check to see that sewage lines are intact before using the toilet. Plug bathtub and sink drains to prevent sewage backup.
- Check food and water supplies. If water is cut off, use emergency water supplies found in water heaters and melted ice cubes.
- Check the building for cracks and damage, particularly the chimneys or masonry walls. Do not use fireplaces unless the chimney is undamaged and without cracks.
- Check closets and cupboards. Open doors cautiously. Beware of objects tumbling off shelves.
- Use charcoal broilers for emergency cooking, **ONLY OUT OF DOORS.**
- Be prepared for aftershocks. These are usually smaller than the main quake, but some may be large enough to do additional damage to structures weakened during the main shock.
- Do not use your vehicle unless there is an emergency. Do not go sightseeing through badly damaged areas. You will only hamper the relief effort. Keep streets clear for the passage of emergency vehicles.

For more information on earthquake hazards and ways to reduce risk, contact the **Arkansas Department of Emergency Management**, P. O. Box 758, Conway, Arkansas 72033-0758. Phone: 501-730-9750.

The original publication (Fact Sheet S107) was compiled and adapted for Arkansas by members of the Earthquake Preparedness Committee.

**Earthquake Preparedness Committee – Bringle Jennings, Chairman**, Wallace Cummings, Jimmie Lee Edwards, Mike Hedges, James Peachey, Mark Peterson, Carol Reiner, Glenda Rushing, and Eleanor Walls

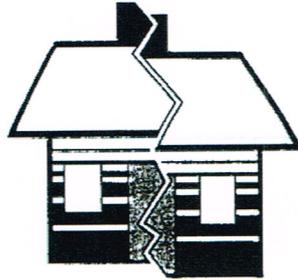
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# Managing Financial Losses from a Natural Disaster

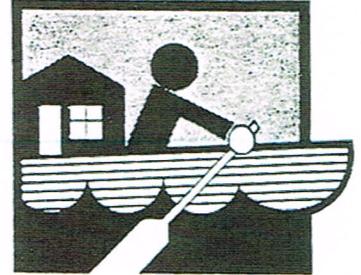
Laura Connerly  
Family and Consumer  
Sciences Associate



**Earthquake**



**Tornado**



**Flood**

Managing financial losses after a natural disaster – flooding, earthquake, tornado or other windstorms – is difficult. Preparing for possible financial losses now will ease your post disaster recovery.

## **Plan Ahead Before Disaster Strikes**

Are you prepared? An emergency fund, adequate insurance and being organized are keys to any pre-disaster financial plan.

### **Establish an emergency fund.**

\$ You will need funds to cover deductibles and co-payment clauses in your homeowners, flood, automobile or health insurance policies. Earthquake insurance riders also have deductible clauses.

\$ You may need funds for small, uninsured losses.

**Review your Insurance policies now to avoid misunderstandings later.**

\$ Know what is covered and what is not. Read your policies and ask questions. Do you have adequate coverage? Purchase needed insurance now.

\$ Separate policy protection is required for losses due to an earthquake or flooding.

### **Practice damage control.**

\$ Keep up your property. Perform needed repairs. For example, secure shingles, fix door hinges, strap-down your water heater and install earthquake resistant cupboard latches to prevent unnecessary destruction.

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## Update your records.

- \$ Inventory your personal property. Keep records in a safe place to help with any insurance settlement.

## Insure Your Risks

### Homeowners Insurance

Homeowners insurance protects your home and/or your personal possessions against certain risks. Check your policy for the list of risks which are included. If you rent, live in a condominium or mobile home, you can purchase a homeowners-type policy.

Coverage includes damages to the dwelling, other structures and your personal property (check for exemptions and reimbursement limits on specific items such as jewelry and guns). Coverage also includes additional living expenses and/or reimbursements for some or all of your costs for temporary housing while your damaged home is repaired or replaced.

Your homeowners policy may protect against perils such as fire and lightning or have extended coverage for damages from windstorm or hail, explosions, riot, other aircraft or vehicles, glass breakage or smoke. If you have Broad Form coverage, 17 perils are covered. Most home insurance policies do not cover losses and damages due to earthquakes or floods.

**Policies, premiums and services provided by different insurance companies will vary. When shopping for homeowner's insurance, consider the following.**

- \$ Protect yourself against catastrophic rather than small losses.
- \$ Cut premiums by increasing your deductibles.
- \$ Compare coverage with at least three different insurance companies.
- \$ Choose a carrier with a good reputation for claims service.
- \$ Ask about discounts and special rates. Nonsmokers, homes with smoke alarms, use

of dead bolt locks and fire extinguishers often qualify for lower rates.

- \$ If you buy homeowners and automobile insurance from the same company, you may receive a discount.

### Earthquake Insurance

Most insurance policies do not cover any loss resulting from any form of earth movement. However, coverage against loss resulting from any earthquake activity may be added to your homeowners insurance by an earthquake damage rider. Earthquake activity includes earthquake and volcanic eruptions, explosions or effusions (from earthquakes or volcanoes) that begin during the policy period.

The premium for an earthquake rider will depend on the location, structure and value of the home. In most cases, reimbursement for losses is subject to a deductible. Earthquake deductibles can be either a percentage of your total coverage or a dollar amount. Often there are separate deductibles – one for structural damages and another for damage to contents. If earthquake tremors occur at distinctly different times, reimbursements for damage from the second, third, etc., tremors may be subject to new deductibles. Check your policy.

Ask if the earthquake rider will cover the structure and the contents or just the contents. If you have a homeowners-type policy for your rental unit, check to see if you can purchase an earthquake rider on your possessions. Since each company is different, ask questions so that you understand the terms of your own policy.

### Flood Insurance

Standard homeowners policies do not cover flood losses. If your house is located in a flood-prone community which has a flood plain management program in compliance with the National Flood Insurance Program (NFIP), you may be eligible to purchase low-cost flood insurance. If so, you can purchase a separate flood insurance policy for your home, condominium, mobile home, farm or rental unit and also the contents. Flood insurance will be subject to a deductible, a standard \$500 on buildings and an additional \$500 deductible on contents of building.

Don't delay. There is a 30-day waiting period for the policy to become effective. Note, if your home is not in a flood-prone area, you cannot purchase flood insurance. For additional information, contact your insurance agent.

### **You May Need Both Earthquake and Flood Insurance**

Regions in Arkansas close to the New Madrid fault may also be subject to flooding in the event of strong earthquake activity. For example, levees could be disturbed or drains could be broken and water released. Too late, you may learn you needed both flood and earthquake insurance to cover losses. Ask your insurance agent how you may be affected.

### **Automobile Insurance**

Car damage is covered for windstorm, earthquakes, falling objects, missiles, explosions, hail, water and flooding if you have comprehensive coverage in your personal automobile policy. Check with your insurance agent.

## **What to Do After a Disaster**

### **Insurance Settlements**

The insurance industry plays an important role after a catastrophe. Insurance representatives will be on the scene immediately following a major disaster to speed up the handling of claims. Notify your insurance representative of any losses. Leave word of where you can be contacted. Hardship cases are a first priority – with service promised to all policyholders as soon as possible. And finally, don't assume your settlement will be the same as your neighbor's.

Some policy owners may find the insurance company will complete a follow-up visit to your home. The company wants to know if you used your claims check to complete your repairs.

## **Property Losses and Income Taxes**

Casualty write-offs from an earthquake or flood are equal to the amount of your losses not covered by insurance minus both a \$100 deductible and 10 percent of your adjusted gross income (AGI). Suppose your AGI is \$20,000 and your loss is \$10,000. You could deduct a loss of \$7,900 ( $\$20,000 \times 10\% = \$2,000 + \$100 = \$2,100$ ;  $\$10,000 - \$2,100 = \$7,900$ ).

### **Government Assistance**

In Arkansas, disaster relief begins at the city and county level. Depending on the severity of the disaster, local officials may request state assistance from the Governor, through the Arkansas Office of Emergency Services. The Governor may also request a presidential disaster declaration to secure federal assistance.

Individuals and families must apply for available governmental disaster assistance programs to determine eligibility. Before a disaster, store records in a safe place so you will have the information you need to complete the required paperwork. With today's coordinated efforts after a natural disaster, representatives from local, state, federal and volunteer relief programs will operate from a central location in your community to process applications and prevent duplication of effort.

At the state level, Temporary Housing Assistance Grants are available for one to three months for families whose homes were destroyed or uninhabitable after a disaster. Persons with additional living expenses coverage from a homeowners policy are not eligible. Individual and family grants to assist disaster victims with uninsured losses from a disaster are available. Grants can be used for medical expenses, limited home repair, repair/replacement of furniture, appliances, transportation, insurance deductibles and food.

If your damaged community receives a presidential disaster declaration, the federal Individual and Family Grant (IFG) Program may authorize funds for such needs as housing,

personal property, medical/dental, funeral and transportation. Each application is reviewed to determine specific needs and eligibility.

### Assistance By Volunteer Agencies

Churches, American Red Cross, Salvation Army and Mennonite Disaster Service provide food, clothing, shelter, workers, medicines and medical supplies and other emergency services and funds for immediate needs of disaster victims. These volunteer agencies have formed the National Voluntary Organizations Active in Disaster (NVOAD), [www.nvoad.org](http://www.nvoad.org), to coordinate resources with each other and government agencies.

**For more information on organizing your financial affairs, the following publications are available at your county Extension office.**

FSHEC75	A Sample Filing System
FSHEC52	Family Advisors
FSHEC15	Important Family Records What to Keep and Where
FSHEC45	Replacing Valuable Papers
FSHEC51	Safe Deposit Box Inventory

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FSHEC67-PD-1-06RV

# Planning for Food After a Disaster

Easter H. Tucker  
Family and Consumer  
Sciences Specialist

No refrigeration! No electricity!  
Limited water!

Regardless of the cause of these problems, they can radically affect what foods we eat. Planning ahead helps assure good, nutritious food is available for our families in times of disaster.

Planning ahead with regard to food involves establishing a food reserve to use when you cannot replenish regular food supplies. Experts generally predict that most services will be restored within three days after a disaster. However, you may want to plan on food for one to two weeks to assure you have enough to last until you can get more.

Establishing a food reserve may only involve making sure regular food supplies are large enough to supply needs during the disaster. You might

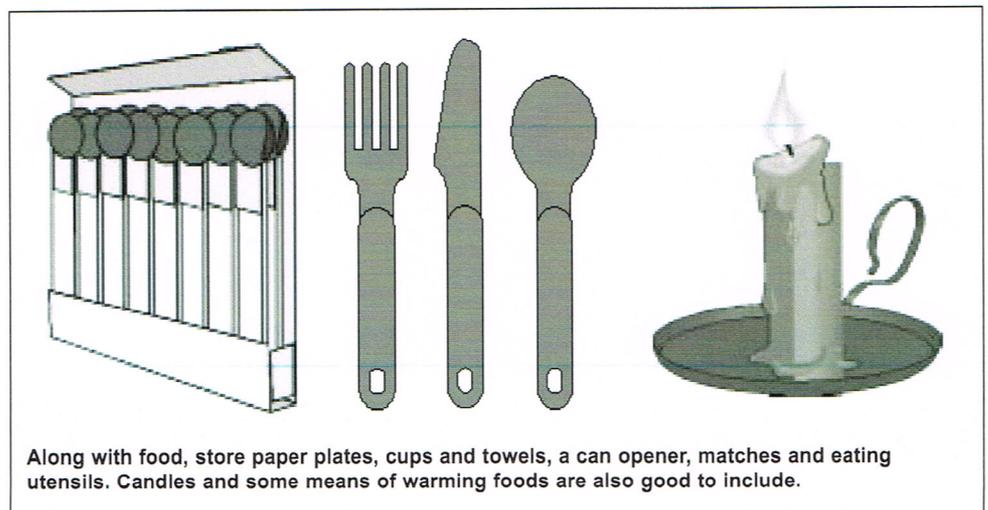
prefer to set up a separate emergency supply in a place specifically selected for easy access in times of emergency.

Select foods for this reserve that keep well without special handling, such as refrigeration, and that can be eaten with minimum preparation. When possible, choose can sizes that will supply one meal, since storage of leftovers may be difficult.

In setting up a reserve, include foods your family likes. During a disaster, family members have enough to cope with without having to accept unfamiliar foods. If canned and dried products are not part of your regular meals, you may want to introduce them into some meals. This will help family members accept them more readily when it is necessary to eat emergency supplies. Special treats, like candy and cookies, should also be included as morale boosters and for quick energy.

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Along with food, store paper plates, cups and towels, a can opener, matches and eating utensils. Candles and some means of warming foods are also good to include.

If there is a baby or other family member who requires special food, be sure an adequate supply of foods for their needs is included in the reserve. Reconstituted dry milk or canned milk may be used for short-term feeding of infants. These products do not satisfy nutritional needs of the infants, so long-term feeding of only these products is not recommended.

If family members need special medication, include these products in the reserve. Be sure to check with your physician or pharmacist about how long these medications can be stored and still remain effective.

It is impossible to predict when an emergency will occur. Therefore, food reserves may need to be maintained for a long period of time. To assure the food in a reserve is of highest quality, stored food should be used regularly and replaced. Foods placed in the reserve should be dated. Place new foods in back of the older stores. For best quality, no food should be kept longer than a year.

Choose a storage place that is cool and dry. Temperature of the food should never be higher than 70 degrees or lower than 40 degrees. Food in boxes must be protected from insects and rodents. A good

way to do this is to put the food, box and all, in a closed metal container.

Canned food is a good choice for a reserve. It will usually remain safe to eat as long as it has a good seal. Do not use canned foods that bulge, leak, squirt liquid, contain mold or have an off-odor when opened. Any of these may indicate the presence of bacteria which could be harmful if eaten.

Along with food, store paper plates, cups and towels, a can opener, matches and eating utensils. Candles and some means of warming food are also good to include.

Storing water is also recommended since water supplies may be cut off or contaminated. Recommendations say to plan on one-half gallon per person per day for drinking and food preparation. If bathing, brushing teeth, washing dishes or other uses of water are determined to be necessary, additional water will be needed. The amount of water for consumption might be reduced somewhat, depending on the total juices, soups, other drinks and high moisture foods available. Other sources of water available in emergency situations are the water heater, water softener containers and the water storage area of the toilet.

### Guide for Reserve Food Supply\*

Kind of Food	Amount Per Person for 1 Day	Suggested Food
Milk	Equivalent of 2 glasses (fluid)	Powdered nonfat dry milk Evaporated canned milk Each of the following is equivalent to 1 quart of fluid milk: Evaporated      3 (6 ounce) cans 1 (14 1/2 ounce) can Nonfat dry milk    3 to 3 1/2 ounces
Canned meat, poultry, fish, cooked dry beans and peas	2 servings	Canned meat, poultry, fish Canned meat mixtures Canned dry beans Canned spaghetti and rice products Condensed soups containing meat or dry beans Peanut butter
Fruits and vegetables	3 to 4 servings	All types of canned vegetables and fruit Dry fruit, canned fruit juice
Cereal and baked goods	3 to 4 servings	Ready-to-eat cereal (1 ounce serving) Instant hot cereals
Spreads for bread and crackers	According to family practices	
Fats and vegetable oil	1 ounce	
Sugars, sweets	1 ounce	
Miscellaneous	According to family practices and extent of cooking possible	Coffee, tea, cocoa, powdered or canned beverage products, soda, baking powder, flavorings, soft drinks

\*Adapted from *Safe Handling of Food During Emergencies*, Cooperative Extension Service, Purdue University, West Lafayette, Indiana.

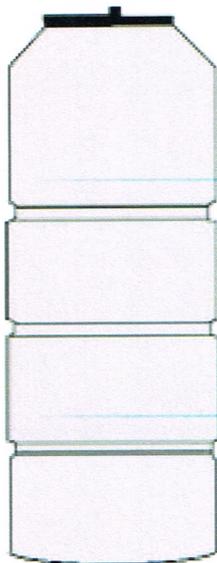
## Containers for Water Storage

Many types of containers are available for water storage. The most commonly used containers are glass, plastic and metal.

**Glass:** Glass provides a fairly effective container for storage, but it is easily broken and is heavier than plastic. Glass is non-permeable to vapors and gases; however, water in glass containers should not be stored near gasoline, kerosene, pesticides or similar substances.

**Plastic:** Plastic jugs are frequently used for water storage. These containers are lightweight and fairly sturdy. There are many types of plastic containers manufactured. Generally, polyethylene-type plastics are safe for storing water. Some, however, are not recommended for food storage because harmful chemicals could leach into the food. Most plastics used in waterbeds are not approved food storage plastics. Plastic containers which have previously been used for food storage or which are being advertised as food storage products will be safe. Plastic jugs with secure lids, which have contained milk or other edible substances are safe for water storage; however, it is essential that the milk bottles be thoroughly washed to remove the fat traces. Some lightweight gallon containers might split at the seams and leak. Chlorine bleach bottles may be a food-approved plastic, but contain an anti-static agent which prevents accumulation of dust during storage and are thus not recommended. Since plastic is permeable to certain vapors, water stored in plastic should not be near gasoline, kerosene, pesticides or similar substances. It is advisable to store plastic water containers away from direct sunlight.

**Metal:** Some metals, such as stainless steel, can successfully be used for water storage. A metal water storage container should be resistant to rust. A metallic taste can be picked up by the stored water in some types of metal containers. Water stored in metal containers should not be treated prior to storage with chlorine, since the chlorine compound is corrosive to most metals.



Storing water is also recommended since water supplies may be cut off or contaminated.

## Treatment for Stored Water

Water to be stored for long periods should be sanitized or disinfected. Be sure to use the best quality water possible for storage. Water from a system with a state division of health "approved" rating is recommended. Likewise, the containers should be clean.

**Heat Treatment:** One effective way to store water is in clean canning jars. Fill clean fruit jars with water, leaving 1 inch of headspace at the top of the jars. Prepare lids as for canning. Place unused, clean lids and screw band on jars and process the water in a boiling water bath as fruit is processed. Quart jars should be processed 20 minutes, 2 quart jars for 25 minutes.

**Chlorine Treatment:** Liquid chlorine bleach can be used to disinfect water for long-term storage. One gallon can be treated by the addition of 1/4 teaspoon of liquid chlorine bleach containing 4 to 6 percent sodium hypochlorite. (Most bleaches contain 5.25 percent.) This is equivalent to 16 drops of liquid chlorine bleach.

Closure of water containers should be secure. Stored water should be checked occasionally. If any changes, such as cloudiness or an odor, are noted, replace the water and treat as before.

## Emergency Disinfection of Water

Some emergency situations could occur where the only water available is contaminated by disease-causing organisms. In this case, the same procedures can be used as for treatment of stored water.

**Heat Treatment:** Boiling is the most preferred method. This heat treatment requires water to be boiled in a vigorous, rolling boil for 5 minutes. Taste may be improved by pouring the boiled water back and forth from one clean container to another several times to incorporate air.

**Chemical Treatment:** Chemical treatment is less desirable than heat treatment because the effectiveness is dependent on several variables, such as (1) the amount of organic matter in the water, (2) water temperature and (3) the length of time after the chemical is added until it is used.

**Chlorine Treatment:** Clear water can be treated with 1/4 teaspoon (16 drops) of liquid chlorine bleach per gallon. Mix the water and allow it to stand for 30 minutes before using. If water appears cloudy, chemical treatment is not recommended. A slight chlorine odor should be detectable in the water. If not, repeat the treatment and let stand an additional 15 minutes before using. Use fresh bleach.

**Water Purification Tablets:** Different types of tablets are available for water purification purposes. Be sure to follow the manufacturer's directions for treatment, and allow sufficient time for the chemical to work before using. Check the label for expiration date, since the tablets can become ineffective with time. Most tablets have a storage life of approximately two to five years unopened.

## Contamination by Radioactivity and Chemicals

No effective way for decontamination of water which contains radioactive or chemical fallout is available for home use. This decontamination should be supervised by local or state health officers.

Portions adapted from the Utah State University Extension.

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# Nutritional Disorders in Beef Cattle

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## Introduction

Nutritional disorders associated with both forage and feed consumption can have a large impact on the profitability of beef cattle operations. Forages are an important component of beef cattle production systems in Arkansas. Most cow-calf and stocker cattle enterprises in Arkansas rely heavily on forage-based nutritional programs. Forages are used for both livestock grazing and hay production. Arkansas has over 4.4 million acres of pastureland and harvests over 1.3 million acres of hay each year. Grains and by-product feeds are also included in the nutritional programs of many Arkansas cattle herds. These concentrate feeds are often fed as nutritional supplements to cattle during periods of low forage quality, when forage supply is limited, as part of performance testing programs or when feeding animals with elevated nutritional requirements.

Mineral imbalances and sudden shifts from high roughage to high concentrate diets are some of the factors associated with nutritional disorders in beef cattle. Simple management practices can be implemented to reduce the risk of

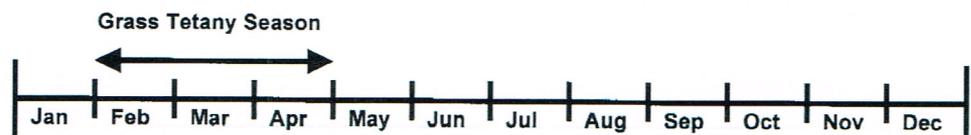
experiencing a nutritional disorder in a cattle herd. Identifying potential problems, using proper treatments, and preventing future occurrences of nutritional disorders can help protect both cattle health and profitability.

## Grass Tetany

**Cause:** Grass tetany is associated with low levels of magnesium or calcium in cattle grazing ryegrass, small grains (e.g., oats, rye, wheat), and cool-season perennial grasses (e.g., tall fescue, orchardgrass) in late winter and early spring. In Arkansas, the grass tetany season runs from February through April (Figure 1). During this time of the year, there is often a flush of new forage growth. Forages grown on soils deficient in magnesium, wet soils or soils low in phosphorus but high in potassium and nitrogen may contain very low levels of magnesium and calcium. This is also the time of the year when many spring calves are born and nursing. Grass tetany most commonly affects lactating cattle, particularly the highest-producing animals in the herd. Magnesium and calcium requirements of lactating cattle are far greater than those of dry cattle. This predisposes cattle to grass tetany during lactation. Grass tetany results

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**Figure 1. Grass tetany season in Arkansas**

when magnesium and calcium levels in forages are too low to meet the requirements of cattle and cattle do not receive adequate magnesium and calcium supplementation. Clinical signs of grass tetany include nervousness, muscle twitching and staggering during walking. An affected animal may go down on its side, experience muscle spasms and convulsions and die if not treated.

**Prevention:** Magnesium-deficient pastures should be limed with dolomitic lime, which contains magnesium. This may not be effective in preventing grass tetany on water-logged soils, since plants may not be able to take up sufficient magnesium under wet conditions. Phosphorus fertilization may also be useful for improving forage magnesium levels. However, environmental concerns associated with excessive soil phosphorus levels should be considered. Legumes (e.g., clovers, alfalfa, lespedezas) are often high in magnesium and may help reduce the risk of grass tetany when included in the forage program. **The most reliable method of grass tetany prevention is supplemental feeding of magnesium and calcium during the grass tetany season.** Both can be included in a mineral mix as part of a mineral supplementation program. Start feeding a high magnesium mineral one month prior to grass tetany season.

**Treatment:** Early treatment of grass tetany is important. Collapsed cattle that have been down more than 12 to 24 hours will seldom recover. Blood magnesium levels can be increased within 15 minutes by intravenously administering 500 ml of calcium borogluconate solution with 5 percent magnesium hypophosphate. The solution must be administered slowly, and heart and respiratory rates should be monitored closely during administration. After treating with the intravenous solution, orally administer one tube of CMPK gel (a source of calcium, phosphorus, magnesium and potassium) or intraperitoneally administer another 500 ml bottle of calcium borogluconate solution with 5 percent magnesium hypophosphate for slow absorption to decrease the possibility of relapse. If the animal is treated using subcutaneous (under the skin) administration, the desired effect may not occur for three to four hours. A 20 percent magnesium sulfate (epsom salt) solution is recommended for subcutaneous administration, because tissue sloughing may occur with a higher dosage.

## Bloat

**Cause:** Bloat results from the formation of a stable foam in the rumen that prevents eructation (belching) and release of gases produced normally from microbial fermentation. Gas production may

then exceed gas elimination. Rumen expansion from gases compresses the lungs and reduces or cuts off the animal's oxygen supply resulting in suffocation. Cattle will swell rapidly on the left side and may die within an hour in some cases. Cattle may exhibit signs of discomfort by kicking at their bellies or stomping their feet. Susceptibility to bloat varies with individual animals. There are two types of bloat: legume/pasture bloat or frothy/feedlot bloat. Several different forage species can cause legume bloat including **alfalfa, ladino or white clover and persian clover.** Other legumes contain leaf tannins that help break up the stable foam in the rumen and are rarely associated with bloat. These tannin-containing legumes include arrowleaf clover, berseem clover, birdsfoot trefoil, sericea lespedeza, annual lespedeza and crownvetch. Similarly, tropical legumes such as kudzu, cowpea, perennial peanut and alyceclover rarely cause bloat. Bloat can also occur on **lush ryegrass or small grain pastures, particularly in spring.** Feedlot bloat occurs in cattle fed **high grain diets.** Feedlot bloat is not a major concern for many cattle producers in Arkansas. However, "feedlot" bloat is a concern with cattle on high grain diets, e.g., bulls on feed-based on-farm bull performance tests.

**Prevention:** Do not turn shrunk or hungry cattle out onto lush legume or small grain pastures without first filling them up on hay. Poloxalene can be provided in a salt-molasses block (30 grams of poloxalene per pound of block) or as a topdressing to feed at a rate of one to two grams per 100 pounds of body weight per day. If a poloxalene block is provided, make sure cattle consume the blocks at least three days before placing them on a pasture with a significant bloat risk. Remove other sources of salt, and place poloxalene blocks (30 pounds per four to five animals) where they will be easily accessible to the cattle. Feeding Rumensin® in grain-based rations can reduce the risk of feedlot bloat. Cattle should be slowly adapted from forage-based diets to grain-based diets over a period of at least 3 weeks.

**Treatment:** Poloxalene may be administered through a stomach tube to help break up the stable foam and allow the animal to eructate (belch). **Do not drench a bloated animal** because of the danger of inhalation and subsequent pneumonia or death. Feed coarsely chopped roughage as 10 to 15 percent of the ration in a feedlot diet. A bloat needle (six to seven inches long) or a trocar can be used in extreme cases to puncture the rumen wall on the left side of the animal to relieve pressure inside the rumen. This treatment option should be considered a last resort as severe infections may result. Although there is no label claim, research indicates that Rumensin® reduces the incidence and severity of frothy bloat.

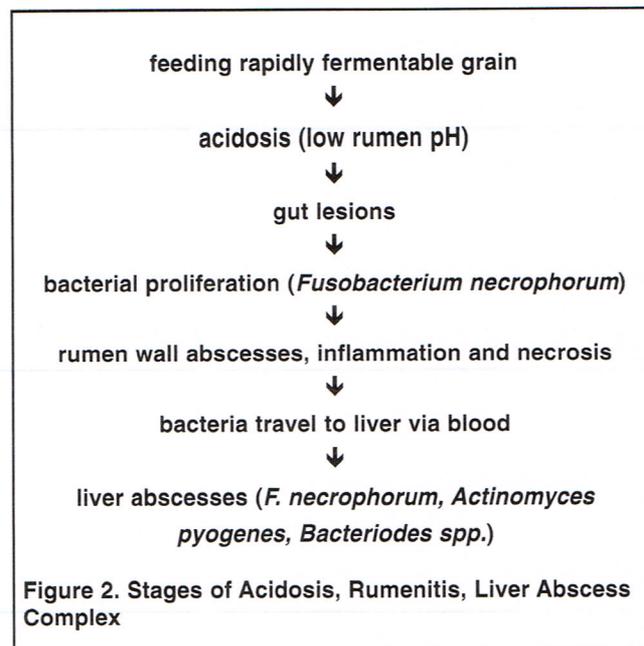
## Acidosis, Rumenitis, Liver Abscess Complex

**Cause:** Acidosis is a disorder associated with a **shift from a forage-based diet to a high concentrate (starch) diet**. This is a problem that is most often discussed as a feedlot problem, but acidosis may also occur in other cattle on **aggressive grain feeding programs** such as 4-H projects and on-farm bull tests. Acidosis is a potential problem for backgrounders using self-feeders and high starch feeds such as corn and bakery by-products.

As the name implies, acidosis results from **low rumen pH** (Figure 2). The rumen contains many different species of bacteria and other microorganisms. Some of the bacteria prefer forage (slowly fermented structural sugars) while others prefer starch (rapidly fermented sugars). During the change from a forage-based diet to a concentrate diet, the microbial population shifts from predominately forage fermenters to predominately starch fermenters. All bacteria in the rumen produce acids as a fermentation waste product. These acids are an extremely important source of energy for the ruminant animal. The dominating forage fermenters produce acetic acid (more commonly known as vinegar), which is a mild acid. The typical pH of the rumen on a forage-based diet is 6 to 7. As the amount of forage or roughage in the diet decreases and the amount of concentrate increases, the corresponding shift in the bacterial population results in an increase in propionic acid production. Propionic acid is a stronger acid than acetic acid and, therefore, it reduces rumen pH. The pH of the rumen now will be between 5 and 6 depending on the forage to concentrate ratio of the diet. Low pH (<5) may support the growth of lactic acid producing bacteria. Lactic acid is a very strong acid and reduces rumen pH even further. It is this low pH from lactic acid production that is associated with acidosis. **Acidosis is likely to occur when calves with developed rumens are exposed too quickly to a high concentrate diet.** This will result in fluctuations in eating behavior. The calf fills up on the high concentrate diet, and the rumen becomes acidic. The calf feels ill and goes off feed. The calf recovers, fills back up on the high concentrate diet, and the cyclical eating behavior starts all over again. Acute lactic acidosis can result in death.

Liver abscesses are often a secondary result of acidosis. The low pH from acidosis results in necrotic lesions of the rumen wall. Necrotic lesions of the rumen wall provide an escape route for the bacteria from the rumen into the blood supply connecting the rumen to the liver. The bacteria are transported to the liver where they take up residence. Damage to

the ruminal wall from acidosis can be further aggravated by damage from foreign objects (i.e., wire, nails) and predispose the animal to abscess formation. The National Beef Quality Audit—2000 revealed that the incidence of liver condemnations in beef carcasses was 30.3 percent, with the leading cause being liver abscesses. Too frequent liver condemnations ranked in the top ten quality challenges for the fed beef industry according to survey participants in the Strategy Workshop of the National Beef Quality Audit—2000. Severe liver abscesses may reduce feed intake, weight gain, feed efficiency and carcass yield.



**Prevention:** To reduce the incidence of acidosis, use a warm-up feeding period and ensure at least 10 percent roughage in the final diet. A warm-up period should consist of starting the calves with a diet that contains 40 to 60 percent roughage and over a three- to four-week period gradually reduce the roughage content of the diet while increasing the concentrate level. Keeping at least 10 percent roughage in the diet will help moderate rumen pH. The fiber should be long enough to serve as a “scratch factor” and stimulate rumination. Cud chewing stimulates saliva production, and saliva is a good source of buffers. Forages and cottonseed hulls are both good sources of effective fiber. Ionophores can help reduce incidence of acidosis as well. Research has shown that monensin (Rumensin™) may reduce intake and thus can help moderate concentrate intake when calves are started on higher concentrate diets. Always follow labeled instructions and withdrawals when using medicated feed additives.

**Treatment:** Treatment for acidosis is similar to prevention efforts.

## Urinary Calculi or “Water Belly”

**Cause:** Urinary calculi (kidney stones) are hard mineral deposits in the urinary tracts of cattle. Affected cattle may experience chronic bladder infection from mechanical irritation produced by the calculi. In more serious cases, calculi may block the flow of urine, particularly in male animals. The urinary bladder or urethra may rupture from prolonged urinary tract blockage, resulting in release of urine into the surrounding tissues. The collection of urine under the skin or in the abdominal cavity is referred to as “water belly.” Death from toxemia may result within 48 hours of bladder rupture. Signs of urinary calculi include straining to urinate, dribbling urine, blood-tinged urine and indications of extreme discomfort, e.g., tail wringing, foot stamping and kicking at the abdomen. Phosphate urinary calculi form in cattle on high grain diets, while silicate urinary calculi typically develop in cattle on rangeland.

**Prevention:** Strategies to prevent problems with urinary calculi in cattle include lowering urinary phosphorus levels, acidifying the urine and increasing urine volume. To lower urinary phosphorus levels, rations high in phosphorus should be avoided. **Maintain a dietary calcium to phosphorus ratio of 2:1.** Acid-forming salts such as ammonium chloride may be fed to acidify the urine. Ammonium chloride may be fed at a rate of 1.0 to 1.5 ounces per head per day. Urine volume may be increased by feeding salt at 1 to 4 percent of the diet while providing an adequate water supply.

**Treatment:** Limited success with treatments designed to facilitate passing or dissolving urinary calculi leaves few other treatment options. Surgery may be the most effective treatment. However, the cost of surgery should be considered and weighed against the value of the animal.

## Hardware Disease

**Cause:** Hardware disease may occur when **sharp, heavy objects such as nails or wire are consumed by cattle.** These objects fall to the rumen floor and are swept into the reticulum (another stomach compartment) by muscle contractions. A sharp object may puncture the reticulum wall and cause severe damage to and infection of the abdominal cavity, heart sac or lungs. Signs of hardware disease vary depending on where the puncture occurs. Loss of appetite and indications of pain are common signs. Fatal infection can occur if the object penetrates close to the heart.

**Prevention:** Cattle should be managed so that they do not have opportunity to ingest heavy, sharp objects. Keep pastures and paddocks free of wire, nails and other sharp objects (even heavy plastic items) that could be swallowed. Magnets can be placed on feeding equipment to catch some of the metal objects in feed. An intraruminal magnet can be inserted into the rumen to trap metal fragments. Ingested metal is drawn to the magnet instead of working its way through the stomach wall. The magnet will eventually “fill up” if enough metal is ingested, so a second magnet may be administered if signs of hardware disease persist. Magnets are relatively inexpensive particularly when compared to the cost of surgery.

**Treatment:** It is often difficult to diagnose hardware disease, yet it is prudent to administer an intraruminal magnet when hardware cannot be ruled out. Confinement and feed intake limitation may allow puncture sites to heal in less serious cases. If infection is suspected, a broad-spectrum antibiotic should be administered. Cattle with extensive infection in the heart or abdomen have a very poor prognosis and will often die of starvation despite attempts to encourage feed intake. In some instances, cattle suffering from hardware disease will respond only to surgery and physical removal of the object. These cattle may recover if infection is controlled after the object is removed. It is important to note that surgery may not be a cost-effective option, particularly for less valuable cattle.

## Polioencephalomalacia

**Cause:** Polioencephalomalacia is caused by a disturbance in thiamine metabolism. Thiamine is required for a number of important nervous system functions. This disease most commonly affects **young, fast growing cattle on a high concentrate ration** and may result from a **thiamine-deficient diet**, an increase in thiaminase (an enzyme that breaks down thiamine) in the rumen or an increase in dietary sulfates.

A thiamine-deficient diet is usually associated with an increase in the dietary concentrate:roughage ratio. When concentrates (feed grains such as corn) are increased and roughage (forage, cottonseed hulls, etc.) is decreased in the diet, rumen pH drops. This increases the numbers of thiaminase-producing bacteria in the rumen and decreases the amount of total useable thiamine. Thiaminase breaks down the form of thiamine that the animal could normally use. Some species of plants produce thiaminase and can cause a decrease in the useable amount of thiamine when consumed. Examples of these types of plants include **kochia, bracken fern and equisetum.**

A **high sulfate diet** can also inhibit an animal's ability to properly utilize thiamine. Feeds such as molasses and corn gluten are often high in dietary sulfates. Some water sources can also contain a high amount of sulfur (i.e., "gyp" water). When these are consumed in excessive amounts, clinical signs of polioencephalomalacia can occur.

Cattle that are affected with this disease usually exhibit several signs of generalized neurological disease. These signs can include but are not limited to: blindness, inconsistent and uncoordinated movements, head pressing, "goose" stepping, lateral recumbency (lying with full lateral contact of the body trunk, head, neck and legs with the ground with the head, neck and legs usually extended), tetany (muscle spasms), convulsions with paddling motions and death. These signs usually exhibit sudden onset, with the animals typically having normal temperatures and rumen function.

**Prevention:** Preventative strategies should focus on the diet. Risk factors such as high concentrate rations or high sulfate diets should be avoided if possible. Thiamine can also be added to a feed ration or a free-choice mineral supplement at 3-10 ppm. However, this may not be cost effective in some instances.

**Treatment:** For successful recovery, **early treatment is essential**. Thiamine should be administered at 5-7 mg/lb (10-15 mg/kg) intravenously. The initial treatment should be followed with intramuscular injections twice daily with the same dosage for the next 2-3 days. If calves are not treated early in the disease process, they may show residual neurological effects indefinitely.

## White Muscle Disease

**Cause:** "White muscle disease" (enzootic nutritional muscular dystrophy) most commonly affects cardiac or skeletal muscle of **rapidly growing calves**. This disease causes muscle **degeneration due to vitamin E and/or selenium deficiency**. This metabolic imbalance can be due to dietary deficiency or to calves being born to dams that consumed selenium deficient diets during gestation. There are two distinct syndromes of this disease: a cardiac form and a skeletal form. The cardiac form of the disease usually has rapid onset with the most common clinical sign being sudden death. Initially, animals may exhibit an increased heart rate and respiratory distress, but death usually occurs within 24 hours. The skeletal form of the disease generally has a slower onset. Calves affected by the skeletal form exhibit stiffness and muscle weakness. Although these animals usually have

normal appetites, they may have an inability to stand for extended time periods and exhibit respiratory distress if their diaphragm or intercostals muscles are involved. Some animals may show signs of dysphagia (difficulty swallowing and possible pain while swallowing) if the muscles of the tongue are also affected.

Necropsy of an affected animal often reveals pale discoloration of the affected muscle. The texture of the muscle is dry with white, chalky, streaked sections representing the fibrosis and calcification of the diseased tissue, hence the name "white muscle disease."

**Prevention:** Control of this disease is achieved through supplementation of vitamin E and selenium. Salt/mineral mixtures can be used to supplement the deficiencies. A free-choice mineral supplement with an expected intake of 4 ounces/head/day should contain 27 ppm of selenium. If you are in a known selenium deficient area, it is recommended to administer 25 mg of selenium and 340 IU of vitamin E intramuscularly approximately four weeks before calving.

**Treatment:** Treatment for the cardiac form of the disease is rarely successful. The skeletal form may be treated with an injection of vitamin E and selenium. The appropriate dose is 1 mg of selenium and 68 IU of vitamin E per 40 pounds of body weight intramuscularly. This dose may be repeated in two weeks if needed. There is a 30-day slaughter withdrawal period once calves have been treated. Supplements may be given simultaneously to help with recovery.

## Milk Fever

**Cause:** Milk fever (parturient paresis or hypocalcemia) is generally associated with older, high-producing dairy cattle. However, incidences of milk fever may also occur with beef cattle. Milk fever occurs **shortly after calving and the onset of milk production**. Milk fever occurs when the lactating cow is not capable of absorbing enough calcium from the diet or has not started mobilizing bone calcium to meet the increased calcium demand of lactation. Calcium losses from lactation coupled with inadequate supply results in a drop in blood calcium level. Since calcium is needed for muscle contraction, cows suffering from milk fever often lose their ability to stand.

**Prevention:** Numerous steps can be taken to prevent milk fever. The first is to evaluate the calcium and phosphorus levels of the diet. Excessive dietary calcium during late pregnancy could leave the

cow unprepared to absorb or mobilize (resorb from bone) enough calcium to meet elevated requirements when lactation starts. This situation sometimes occurs with feeding poultry litter. Feeding low calcium diets a month or two prior to calving was once thought to be the best method of prevention because the body would be geared to mobilizing bone calcium. However, this approach has had limited success with high-producing dairy cattle and is difficult with high forage diets. If milk fever is a common problem in the herd, feeding an anionic prepartum diet (a negative dietary cation – anion difference, DCAD) will help prevent milk fever. Adequate vitamin D is also important in preventing milk fever, but is not a problem with beef cattle on pasture.

**Treatment:** The most common treatment is slowly applying an intravenous injection of a calcium gluconate solution. Single dose bottles are typical and are available at local veterinary clinics and supply stores. Calcium may also be provided orally as calcium propionate in a gel form. Re-treatment is necessary in some cases.

## Summary

Nutritional disorders (Table 1) may not be a concern for cattle producers until animals in the herd are affected. That can be too late. It is important to be alert for “red flags” in animal behavior and appearance to catch a problem early and minimize losses. Your local veterinarian should be familiar with nutritional disorders that are common in your area and can assist you with prevention and treatment programs. A good defense (prevention) is a good offense when it comes to nutritional disorders. Understanding what causes nutritional disorders in beef cattle and implementing proper forage, feeding, and animal management practices may spare the experience of production, animal or economic losses associated with nutritional disorders. It is much less costly to prevent a problem than to try to treat one. Keeping Arkansas cattle herds healthy is not only beneficial to the pocketbook, it is good, sound animal husbandry.

**Table 1. Summary of nutritional disorders in beef cattle**

Disorder	Signs	Cause	Prevention	Treatment
<b>Grass Tetany</b>	Nervousness, muscle twitching, staggers, collapse, muscle spasms, convulsions, coma, death	Low blood magnesium or calcium levels	Provide magnesium and calcium mineral supplement during grass tetany season to lactating cattle  Use dolomitic lime on pastures  Use legumes in forage program	500 ml of calcium borogluconate solution with 5% magnesium hypophosphate administered slowly intravenously while monitoring heart and respiratory rate followed by one tube of oral CMPK gel to minimize the chance of relapse
<b>Bloat</b>	Distended left side, kicking at belly, stomping feet, absence of belching, frequent urination and defecation, labored breathing, suffocation, death	Stable foam in rumen prevents eructation (belching), animal eventually suffocates	Put out poloxalene (Bloat Guard™) salt-molasses blocks or feed additive to cattle at risk  Fill cattle up on hay before turning out onto lush pasture and provide hay during initial grazing days  Do not place animals on lush “problem” forage just after a frost  Keep legume levels in pastures at ≤50% of the available dry matter  Check cattle on legume pasture frequently and remove if signs of bloat develop  Keep water and salt available at all times on legume pastures  Feed Rumensin®	Insert 3/4” rubber hose into rumen via esophagus  Administer defoaming agent (poloxalene or mineral oil) via stomach tube (do not drench)  Use bloat needle or trocar to puncture hole in rumen wall to relieve pressure as a last resort

**Table 1. Summary of nutritional disorders in beef cattle (cont.)**

Disorder	Signs	Cause	Prevention	Treatment
<b>Acidosis, Rumenitis, Liver Abscess Complex</b>	Reduced feed intake, animal goes off feed, reduced weight gains, decreased feed efficiency, lameness in some cases	Overloading on concentrate after a period of reduced feed consumption, increasing concentrate level in diet too rapidly	Reduce concentrate to roughage ratio  Gradually increase the concentrate level in the diet when switching from a roughage-based diet  Feed Rumensin®	Similar to prevention
<b>Urinary Calculi “Water Belly”</b>	Straining to urinate, dribbling of urine, blood-tinged urine, signs of extreme pain (tail wringing, feet stamping, kicking at abdomen), death following urethral or urinary rupture	Sudden change in ration, calcium to phosphorus imbalance that promotes alkaline urine high in phosphorus	Maintain a 2:1 dietary calcium to phosphorus ratio; higher phosphorus levels can contribute to the problem  Feed ammonium chloride at a rate of 1.0 to 1.5 ounces per head per day to acidify urine  Feed salt (NaCl) at 1 to 4% of diet and provide adequate water to increase urine volume	Surgery (may not be cost-effective)
<b>Hardware Disease</b>	Loss of appetite, reduced milk production, abdominal pain, labored breathing	Ingestion of sharp objects that puncture the reticulum wall and may cause severe damage to the abdominal cavity, heart sac or lungs	Keep cattle in an area where they cannot find and eat wire, nails and other sharp objects  Magnets can be placed on feeding equipment to catch metal objects in feed  Intraruminal magnets can be used to trap metal fragments	May heal in mild cases if feed intake is reduced and animal is immobilized  Antibiotics  Surgery in severe cases (may not be cost-effective)
<b>Polioencephalomalacia</b>	Generalized neurological disease: blindness, uncoordinated movements, head pressing, “goose” stepping, lying with extended head and legs, muscle spasms, convulsions with paddling motions, death	Thiamine deficiency, particularly in young, fast growing cattle on a high concentrate ration	Evaluate dietary thiamine levels and avoid risk factors such as high sulfate diets  Add thiamine to feed ration or free-choice mineral supplement at 3-10 ppm (may not be cost effective)	Thiamine administered intravenously at 5-7 mg/lb (10-15 mg/kg) followed by intramuscular injections twice daily with the same dosage for the next 2-3 days (early treatment essential)
<b>White Muscle Disease</b>	Cardiac form: rapid onset commonly resulting in sudden death  Skeletal form: exhibit stiffness and muscle weakness, inability to stand for extended time periods, respiratory distress, difficulty swallowing, normal appetite, necropsy often reveals pale discoloration and dryness of the affected muscle with white chalky streaks	Muscle degeneration due to vitamin E and/or selenium deficiency	Mineral supplementation of 27 ppm selenium for free-choice feeding at 4 ounces per day or 54 ppm selenium for free-choice feeding at 2 ounces per day  In known selenium deficient areas administer 25 mg selenium and 340 IU vitamin E intramuscularly approximately four weeks before calving	Treatment for cardiac form rarely successful  For skeletal form administer intramuscular injection of 1 mg selenium and 68 IU vitamin E per 40 pounds of body weight repeated in two weeks if needed (30-day slaughter withdrawal after treatment)

**Table 1. Summary of nutritional disorders in beef cattle (cont.)**

Disorder	Signs	Cause	Prevention	Treatment
Milk Fever	Muscle stiffness, tremors, extreme weakness, incoordination, inability to stand, loss of consciousness	Drop in blood calcium levels, often occurs shortly after calving and the onset of milk production	Evaluate dietary calcium and phosphorus levels and avoid excessive dietary calcium  Feed an anionic pre-partum diet if milk fever is a common problem in the herd  Removal of poultry litter from the diet of gestating cows 30 days before calving	Intravenous injection of a calcium gluconate solution  Calcium provided orally as calcium propionate in a gel form (re-treatment may be necessary)

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# Agricultural Aviation Security

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Aircraft, facilities, support equipment and chemicals represent an enormous investment that must be safeguarded. Safeguards should provide resistance to theft, vandalism, fire, weather and now terrorist manipulations. The events of September 11, 2001, have heightened our awareness of the need to enhance security measures. Proper planning may also help address all general security needs.

Good security measures are your best insurance against problems resulting from accidental or intentional damage by unauthorized personnel at your facility. A modest investment of resources and effort can prevent a substantial loss to your operation. Common sense and a generally heightened awareness about security should allow you to implement these and other ideas to enhance safety and security.

## Facilities

- Post contact numbers: Police, Fire, Emergency, Poison Control, Management and others.
- Make sure that there is an accessible phone in case of emergencies.
- Install a security fence, locked storage building and other means of preventing unauthorized public access to your property.
- The main entrance to the facility should have a sign indicating that all persons must check in at the main office immediately upon arrival. This will allow you to know who is on the site and provide proper assistance.
- Lock all gates and doors when your facility is unattended.
- All valves on bulk product tanks should be secured with locks.
- Equip sight gauges on bulk storage tanks with bottom valves that are normally turned off and locked.
- Lock all sump pumps from containment areas.
- Application equipment containing product that is stored overnight should be parked on a rinse pad, secured and equipped with locked discharge valves.
- Install adequate lighting in all product storage and handling areas.
- Seal or eliminate containment drain lines. Septic systems with leach fields should never be used for disposal of any liquid that may contain agri-chemical contaminants.
- Provide automatic proximity sensor activated security lights for worker protection and to minimize vandalism at containment and mix/load facilities. These proximity sensors may also be used to trigger some type of alarm if needed.
- Use security alarms for facilities, equipment and offices.
- Use local law enforcement.
  - Periodic patrols of airport.
  - Provide list of activity times and people involved.
  - Provide list of employees and associates.
- Transient (non-based) pilots register aircraft with airport/Fixed Base Operator (FBO) upon arrival and notify at departure.
- Post contact information to report suspicious activity/emergencies.
- Limit keys, and document who has each key with accurate and up-to-date accounting.

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- ☑ Airports with combination lock access points will help control who is allowed on the property during all hours. Combinations should be changed often and access given only to those with a real need.
- ☑ Post all signs and emergency instructions in dual languages as appropriate.

## Aircraft

- ☑ Use of anti-theft devices/lockable control surface devices.
- ☑ Utilize prop/tail wheel locks.
- ☑ Lock hopper gate or hopper door in the open position.
- ☑ Locks on hangars to prevent unauthorized entry.
- ☑ Secure aircraft/remove keys when unattended.
- ☑ Encourage pilots to escort visitors at all times.
- ☑ Block passages with trucks or other items.
- ☑ Aircraft departing for an extended period of time should notify airport manager/FBO.

## Airport Businesses/Flight Schools/Flying Clubs

- ☑ Utilize photo ID to identify.
- ☑ Use key lock boxes with limited access and distribution.
- ☑ Aircraft should remain locked and secure when unattended.
- ☑ Refueling vehicles should remain locked and secure when unattended.

## Airport Community Watch Program

- ☑ Coordinated locally by pilots/airport officials.
- ☑ Establish a community monitoring network.
- ☑ Encourage proactive participation in:
  - Aircraft security
  - Facility security
  - Heightened awareness
- ☑ Post signs promoting the program warning that the airport is watched.
- ☑ Provide training to employees for recognizing suspicious activity and appropriate response tactics.
- ☑ Utilize law enforcement personnel for airport community education.
- ☑ Periodic meetings of airport community.

## Fuel Storage

- ☑ Put locks and consumption recording devices on all fuel outlets.
- ☑ Locate all on-site fuel tanks above ground in a secondary containment or utilize tanks with built-in secondary containment.
- ☑ All underground storage tanks should be registered and appropriate procedures and records maintained according to state and federal laws.
- ☑ All new underground petroleum tanks must be equipped with leak detection and corrosion protection systems. The design specifications and periodic fuel volume reconciliation must be

documented and maintained in a permanent file according to state and federal regulations.

- ☑ Fuel and chemical product tanks and piping should be protected from vehicle collision damage.
- ☑ Appropriate NFPA Fuel Warning and No Smoking placards must be posted at fuel storage facilities.
- ☑ Employees must be instructed not to smoke or eat while handling pesticides or fuels.
- ☑ Material Safety Data Sheets (MSDS) for all hazardous materials (pesticides, ammonia or acids) used at the facility must be readily available for worker access.

## Pesticide Storage and Security

The appearance of your operation is a direct reflection of your professional business management to customers, neighbors, the general public and regulatory officials. Good housekeeping creates a positive impression while a disorganized, unclean or generally sloppy appearance may be an indication of other potential problem areas. Use the following practices.

- ☑ Clean mixing/loading and storage areas daily or after each use.
- ☑ Use collection containers to catch drips when connecting or disconnecting hoses.
- ☑ Inspect tanks regularly for cracks, leaks, sludge and rust.
- ☑ Clean up pesticide leaks and spills immediately.
- ☑ Keep sumps covered when not in use to keep out trash, dirt and debris.
- ☑ Use collected storm water as makeup water or dispose of properly.
- ☑ Keep a spill cleanup kit readily available near the mixing/loading area for quick, efficient cleanup of spills.
- ☑ Use dry break connectors on hoses that are connected frequently.
- ☑ Mix only the amount of pesticide that will be used.
- ☑ Segregate rinse water by crop commodity or label restrictions so that it can be used as diluent in future loads.
- ☑ Store triple-rinsed empty containers neatly in a secured dry area before disposal.
- ☑ Rinse container caps and outside of containers to remove pesticide residues.
- ☑ Do not allow rainwater to run off containers onto the ground – there may some undesirable residuals washed off.
- ☑ Regularly log, inspect and inventory chemicals on hand to be sure of exact amounts.

## Storage and Handling

Prevention of air, surface and groundwater contamination should be a top priority in the operation of your facility. This should be accomplished while enhancing the overall efficiency of the facility.

- ☑ Store pesticides and fertilizers in separate containments.

- ☑ Storage areas must be well ventilated using explosion proof electrical control wiring and fan motors with **at least 6** air exchanges per hour.
- ☑ Make sure storage facilities are placarded with the appropriate warning and hazard signs.
- ☑ Place appropriate fire extinguishers outside near storage entrances.
- ☑ Store dry pesticides above liquid pesticides or in separate areas.
- ☑ Use corrosion-proof metal shelving with a retainer lip at the front of each shelf.
- ☑ Maintain an inventory of type and quantity of each chemical at the local fire department. This should be updated when there are significant changes in quantity and/or type of chemical.
- ☑ Manually operate all containment sump pumps unless authorized otherwise by state regulation.
- ☑ Place each small volume container (up to 5 gallons) in a separate "rubber tub" containment.
- ☑ A detailed diagram of inventory storage locations should be on file with appropriate local emergency police and fire fighting personnel.
- ☑ Use tarps, plastic sheeting or catch pans under fertilizer conveyor transfer points to contain leaks and spills.
- ☑ Keep all pesticide containers closed.
- ☑ Used closed transfer handling of pesticides for worker safety.
- ☑ Keep flammable/combustible materials segregated from all ignition sources.
- ☑ Store all bulk chemicals inside a diked containment area under roof.
- ☑ Store collected rainwater from diked areas for use in future application blends or mixes, or pump it out if it is clean and is allowable by regulations in your area.
- ☑ Pesticide secondary containment tanks under roof should hold a containment volume at least 110 percent of the largest tank in the containment area, including the displacement volume of all tanks and equipment in the area.
- ☑ For a containment area not under roof, the containment volume should hold 125 percent of the volume of the largest tank in the containment area, including the displaced volume of all tanks in the area, plus freeboard (6 inches is typical), plus rainfall amounts as prescribed by your state regulations, usually a 25-year storm (see MWPS-37 Handbook for 25-year storm graph for your region of the United States).
- ☑ If the pesticide containment area is outside, consider plans to roof the pad to eliminate storm water accumulation.
- ☑ Locate all transfer pumps, pipes, hoses and valves within a containment structure above the highest anticipated flood or spill level for easy inspection and operation.
- ☑ Make routine inspections of the storage area to check for leaks and spills daily during the application season, then weekly or bi-weekly.
- ☑ Document primary inspection factors (time, date, place, conditions, etc.) in a log book.
- ☑ Repair leaks and clean up contaminated pad area immediately.
- ☑ Clean up spills immediately and properly dispose of the waste.
- ☑ Equip the containment area with a spill collection sump, sump pump or transfer pump suction hose and holding tank. A transfer suction pump dedicated to each product type may be useful when product cross contamination is a concern.
- ☑ Store all pesticide mini-bulk tanks in a pesticide storage containment area to avoid accidental runoff or drainage into streams, ditches or wellheads.
- ☑ Use stored rinsate and storm water immediately in suitable product mixes 1 part rinsate to 4 parts clean water. Check state regulations regarding rinsate concentrations allowed.
- ☑ Keep packaged chemicals inside a secure building designed with at least 6-inch depth internal containment to hold water or other chemicals used in fire extinguishing.

## Dry Fertilizer

By law, fertilizers and pesticides **must** be stored in separate containments. Fertilizer containment overflows may drain into pesticide containment, but pesticide containment overflows cannot drain into fertilizer containments.

- ☑ Store all dry fertilizer products under roof.
- ☑ Divert rainwater away from the fertilizer storage area.
- ☑ Contaminated rainwater should be collected and applied as product.
- ☑ Recover and use any spilled product immediately.
- ☑ Fugitive dust from storage and transfer areas should be contained and used.
- ☑ Dry fertilizer handling areas should have containment diking.
- ☑ Clean storage areas daily or after each use.

## Liquid Fertilizer

- ☑ Liquid fertilizer tanks should have secondary containment. Containment sizes should be the same as outlined in the pesticide section below.
- ☑ Tank outlets should be locked.
- ☑ Storage areas should be fenced with controlled access.
- ☑ Tank bottoms should be kept dry if possible. This may be accomplished by placing the tank on 6 inches of loose pea gravel in a containment ring and then keeping the main floor pumped dry.

## Pesticides

All pesticides must be stored in a separate area isolated to prevent possible contamination of animal feed, grain, fertilizer or other materials.

## Mixing-Loading Areas

- ☑ Properly ventilate inside mixing areas with at least 6 air changes per hour for pesticide handling.
- ☑ Prominently display appropriate warning signs regarding hazardous chemicals and non-smoking areas at all entrances and exits to a building.

- ☑ All product and rinsate storage should be properly labeled by content.
- ☑ Locate mixing and transfer tanks and pump systems within a containment area capable of holding 110 percent of its contents if under roof or 125 percent if not roofed.
- ☑ Design the load pad containment system to handle 110 percent of the volume of the largest transport truck or applicator vehicle if under roof or 125 percent if not roofed.
- ☑ Conduct all product loading over a containment load pad with a collection sump.
- ☑ Handle pesticide and fertilizer products using mix/load equipment in a common containment area but store them in separate containments.
- ☑ Secure all mix-load areas, drain valves, transfer lines and pumps.

## Personal Safety

- ☑ Proper personal protective equipment should be provided at each site for each employee as required by the Worker Protections Standard(s).
- ☑ All employees should receive adequate training in the use of appropriate protective gear and equipment for handling products.
- ☑ Proper use of safety equipment and clothing and laundry practices will protect you, your employees and families involved. Use washer and dryer at site to prevent transporting possible contaminated clothing home and mixing with family laundry. Therefore, changing clothes before leaving work is suggested.
- ☑ Use closed mixing/transfer systems for pesticide handling safety.
- ☑ Use a separate washer and dryer. Do not mix pesticide contaminated clothing with family clothing. Hang clothing outside in direct sunlight and wind to dry when possible.
- ☑ Use strong detergents and hot water for washing. Run empty washer with detergent and hot water cycle to clean after washing contaminated clothing.
- ☑ Provide and use appropriate face shields or goggles, rubber aprons, long sleeved shirts, rubber gloves and boots when loading and mixing pesticides.
- ☑ Office or non-storage areas must have separate exit doors from pesticide storage rooms.
- ☑ Storage areas must be well ventilated using explosion-proof electrical control wiring and fan motors with at least 6 air exchanges per hour.
- ☑ Emergency shower and eye flush fountains should be easily accessible. These should only be

used for emergencies and should trigger an alarm when used.

- ☑ A telephone should be installed near pesticide storage buildings with a list of appropriate emergency phone numbers.
- ☑ Do not store pesticides higher than 66 inches from floor level.

## Rinsate Handling and Reuse

- ☑ Rinse hopper, plumbing and boom equipment over the application site if possible and apply rinsate to the target while at the site to avoid rinsing at the facility upon return from the field.
- ☑ If spray equipment is rinsed at the facility, collect rinsate and segregate in holding tanks which are dedicated/marked according to crop for reuse to avoid pesticide cross-contamination damage.
- ☑ Thoroughly clean rinsate tanks used for different crops and/or chemicals that are not compatible.
- ☑ Exterior equipment wash-down should be done on a clean mix/load pad and the rinsate should be collected and sprayed on an approved target even though external rinse water has been defined as non-hazardous. Clean pad thoroughly after wash-down.
- ☑ Apply the liquid collected from the mix/load pad sump immediately to an approved target (for the job the rinsate was generated from if practical) or temporarily store it in an aboveground tank for a short period of time until it can be used on another job requiring that chemical. Underground storage may not be allowed. Follow tank size and time allowances in your state.

## Suspicious Activities

- ☑ Beware of "copycats"!
- ☑ Attempts to purchase toxic materials – pesticides.
- ☑ Questions about operation of equipment.
- ☑ Lease or buy questions from unknown individuals.
- ☑ Anyone seeming unfamiliar with details of agricultural aviation asking questions.
- ☑ Acts nervous, seems uneasy or vague and avoids eye contact.
- ☑ Demands immediate possession of purchased material instead of available future delivery.
- ☑ Asks for material in smaller, individual containers rather than in bulk.
- ☑ Insists on paying in cash rather than with a credit card or check.
- ☑ Be observant!

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