Animal Science E-News

October 2016 Vol. 10, No. 4

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2016 Round Bale Haylage Survey

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Cool wet weather patterns in April and May can make timely harvest of cool-season grasses difficult. Certain warm-season grasses that produce a lot of tonnage, like sorghum-sudangrass, can also be difficult to cure during the humid days of summer, when pop-up showers occur on almost any afternoon.

In northern Arkansas, we've seen many livestock producers who harvest these grasses switch to preserving these crops as round bale haylage or baleage instead of hay. To gain a better understanding of the variation in nutritive value and some simple preservation characteristics of forages being preserved as haylage, Paige Tipton, summer intern with the University of Arkansas Cooperative Extension Service, along with Benton County Extension Agent Johnny Gunsaulis, conducted a sample survey of grasses and grass-legume mixes harvested as haylage. Samples were analyzed for nutritive value at the Southwest Research and Extension Center Ruminant Nutrition Lab.

Two round bale wrap methods were observed during the sample survey, including inline wrapped (Figure 1, left side) and individually wrapped (Figure 1, right side).

There are pros and cons to both systems. Some of the survey farms utilizing the line-wrapped bales were relying on custom wrapping to keep overhead cost down, and custom harvest scheduling may not always coincide with optimal harvest maturity. Farms utilizing the individually wrapped bales recognized the additional

Figure 1. Line (left) and individually wrapped (right) round bales.

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material cost and material handling at feeding but preferred that method because of the integrity of wrap and air restriction for each bale and reduced storage footprint. Harvesting more haylage than can be fed in a year's time is often not recommended due to loss of integrity of the wrap over time; yet, two farms with individually wrapped bales had packages that were in their second year of storage at the time of sampling, including the bales pictured on the right in Figure 1.

Air exclusion is the most important factor in "pickling" high moisture crops, and the second most important factor is moisture. Two challenges to air exclusion were observed during the survey. Figure 2 (left image) illustrates the primary challenge to plastic wrapped hay bales which is keeping the wrap intact. Tears (as illustrated), punctures and exposure at seams are places where oxygen can infiltrate and shift the outcome from preserved to spoiled. Tears and punctures can occur with handling or animals. Crops with large, stiff stems will be more prone to puncture wrap during handling, especially individually wrapped bales that are wrapped in the field instead of being wrapped at the storage site. Another, maybe less obvious issue, can be air entrapment that can occur when line wrapping round bales that are not uniform in shape, as seen in Figure 2 (right image).

The survey included 38 samples collected from 7 farms. Basic preservation characteristics measured included moisture and pH (acidity). Figure 3 illustrates the median (50th percentile) and range of moisture and pH among samples and the relationship between moisture and pH.

Ideally, haylage should be 50% to 60% moisture before baling. Moisture helps with bale density (oxygen exclusion) plus extended wilting time can increase loss of plant sugars. Fermentation of those plant sugars by microbes in an environment exclusive of oxygen (created by the wrap) helps acidify (lower pH) and preserve the high moisture forage. Some suggest harvesting haylage as low as 40% moisture is acceptable. Much lower may result in excessive heating, which can negatively impact nutritional value.

In the survey, the best pH generally occurred in haylage with at least 50% moisture (Figure 3 right). Among the haylage sampled, 50% ranged between 46% and 62% moisture, and the median moisture content among all samples was 53%.

Figure 2. Compromised silage wrap (left) and air pocket (right).

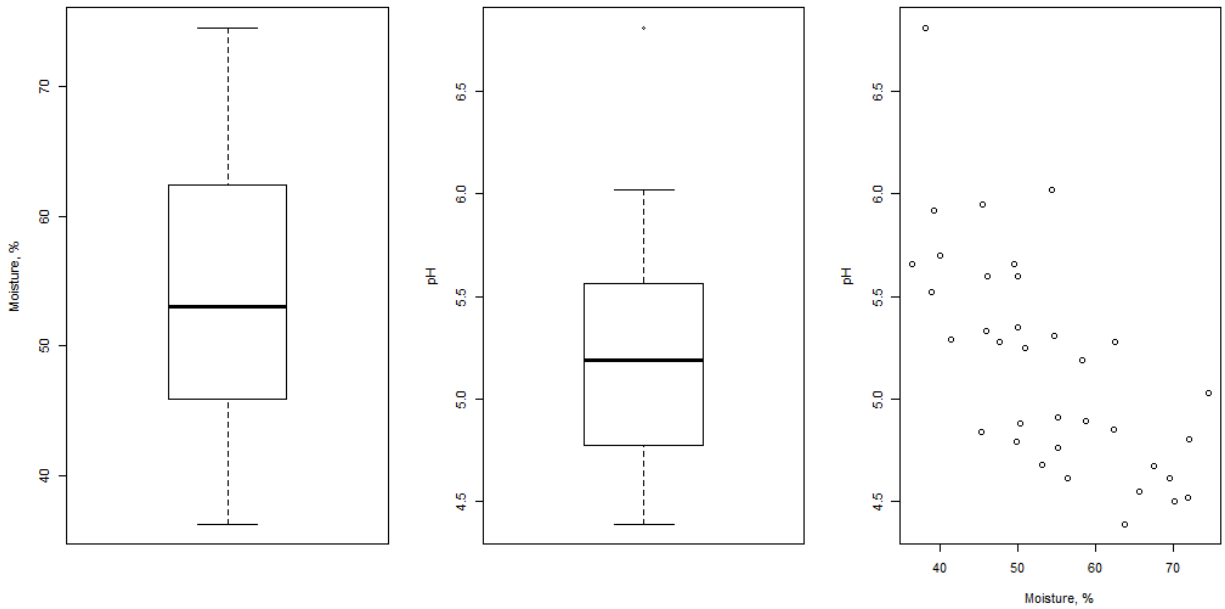

Figure 3. Moisture (left), pH (center) and pH response to moisture (right) among survey samples.

Few samples tested above 65% moisture. Harvesting haylage at too high percentage of moisture can also be detrimental to fermentation quality.

Fifty percent of haylage samples ranged between pH 4.8 and 5.6, with a median pH of 5.2 among all samples. The target pH for grasses and grass-legume mixes is 4 to 5. By comparison, 68% of grass silage samples submitted to DairyOne Labs range from 4 to 5.5, with an average of 4.7. Factors that can influence pH include plant maturity and moisture at baling, bale density and oxygen exclusion and inoculants. High plant protein content can keep pH from reaching the target level too, making legume mixes more challenging to ensile. Certain silage inoculants can result in an acceptably higher pH.

Figure 4 illustrates the plant protein and fiber components among the surveyed samples. The median crude protein among haylage surveyed was 13%. The distribution of crude protein among samples was skewed, as some samples were grass legume mixes with 18% to 24% protein content. Fiber components (acid and neutral detergent) were more normally distributed with a median value of 37% and 59%, respectively.

Table 1. Median protein and fiber components of select hays from the Arkansas Forage Database of producer samples submitted to the University of Arkansas Agricultural Diagnostics Laboratory

	Grass-legume mix	Fescue	Ryegrass	Sorghum-sudangrass
	Median value (50th percentile)			
Crude Protein, %	12.3	11.0	11.2	11.4
Acid Detergent Fiber, %	37	38	38	37
Neutral Detergent Fiber, %	62	66	64	64

Based on the protein and fiber components, the median total digestible nutrients (TDN, energy content) was 56%, which is sufficient TDN for nonlactating beef cows and beef cows in mid- to late-lactation, and 25% of samples exceeded early-lactation TDN requirement.

Table 1 contains the Arkansas Feedstuff Database analysis results of several types of cool-season and warm-season grass or grass-legume mix hays tested since the early 1990s.

By comparison, the median value for protein among the haylage surveyed was slightly greater in protein (1 to 2 percentage units); and in some instances, the neutral detergent fiber was 5 percentage units lower for the haylage surveyed compared to all other Arkansas hay samples of similar plant types.

Does this mean conserving forage as haylage instead of hay improves nutritive value? Not necessarily. Danny Griffin, Van Buren county agent, recently sampled windrows that would be harvested as haylage to determine protein and fiber if allowed to wilt to a moisture level safe for baling hay. The haylage samples, taken approximately 45 days after harvest, averaged 12.7% protein, 36.1% acid detergent fiber and 59.8% neutral detergent fiber. The composited windrow samples, which were allowed to wilt to a moisture level safe enough to bale for hay, tested 11.5% protein, 36.8% acid detergent fiber and 64.9% neutral detergent fiber. On average, the completely wilted plant material was slightly lower in protein and greater in fiber; however, the overall difference was not substantial. Controlled field research settings have also demonstrated grasses harvested as haylage versus hay at the same stage of maturity test similarly in protein and fiber.

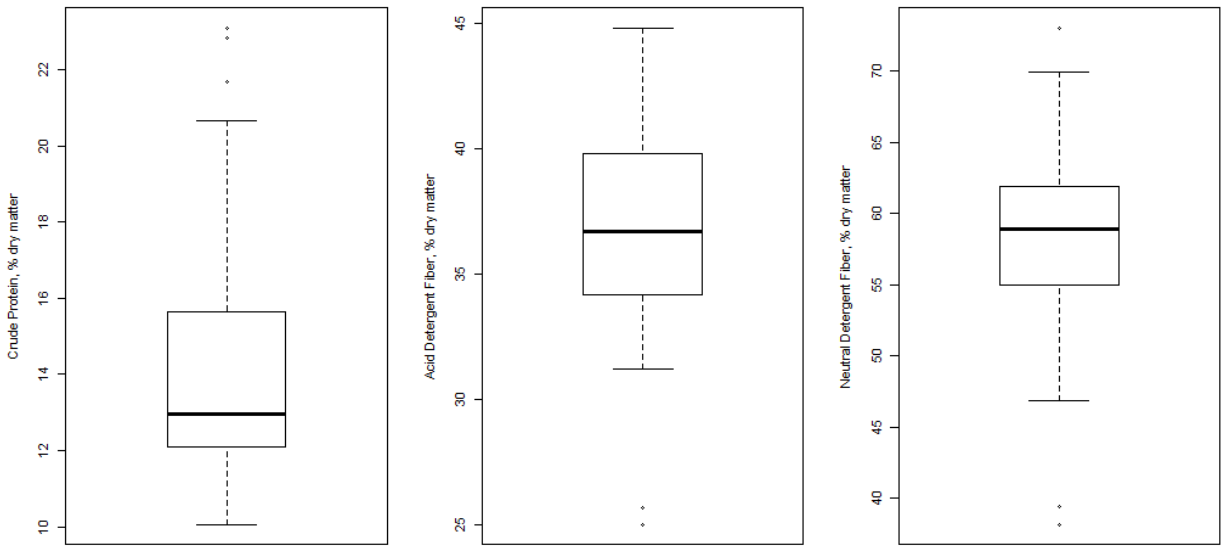

Figure 4. Crude protein (left), acid detergent fiber (center) and neutral detergent fiber (right) among haylage samples.

Cattle producers who have made the switch or partial switch to haylage have commented that cattle seem to waste less haylage in comparison to hay. Research led by Dr. Ryan Walker in Louisiana comparing ryegrass harvested as haylage compared to hay reported greater actual total tract digestibility and forage dry matter intake with haylage compared to hay, despite the two preservation methods resulting in similar protein and fiber levels. Certain hay balers capable of packaging haylage are equipped with precutting knives. Precutting may help improve density, feed mixing and possibly animal performance because smaller particle size can result in greater feed intake.

A final evaluation of the haylage was a subjective measure of odor. Samples were scored by two to three individuals as desirable, acceptable or undesirable. Undesirable odors included smells that could be described as "putrid," "dirt-like," "tobacco," "musty," "sweet" or "bold vinegar." Overall, 34% of the haylage had an odor that was not considered ideal. Scoring was done by novice not expert evaluators. Cattle producers need to pay attention to not only appearance but also odor when feeding silage and assessing animal acceptance and performance. Odors we tend to dislike, cows may avoid as well. Odors we identify as pleasant may, in fact, represent a silage that did not hold up well during storage and may not feed out as well as we would think. Interestingly, experts on silage making state that little to no odor or a mild vinegar odor when certain inoculants are used is more indicative of better fermentation results.

As a final note, some but not all producers were using an inoculant. Inoculating grass and legume haylage is recommended. There are different types of inoculants on the market, and choice should be specific to the type of crop harvested and past experience with managing silage moisture, ensiling success and how well the silage held up during feeding.

For more information regarding harvesting, storing, feeding or testing haylage for nutritive or fermentative characteristics, visit your local county Extension office.

Make Sure You Follow All Coggins Paper Requirements When Traveling to Events

Recently, the Livestock and Poultry Commission sent out a letter to all EIA Inspectors, Livestock Inspectors and EIA Verifiers. The purpose of the letter was to clarify the ***acceptable*** records of negative current official Equine Infectious Anemia (EIA) tests ***required*** for horses participating in equine activities as specified in current Arkansas Code A.C.A. 2-40-821, which states the following:

> (a) All equidae moving within the state to equidae exhibitions… or other equidae concentration points shall be accompanied by a record of a negative current official equine infectious anemia test within the ***past 12 months***.
>
> (b) A photo copy of a VS form 10-11 or other form prescribed by the commission shall not be accepted as an official record of the test.

Previous instructions and miscommunications have strayed from the requirements as specified in the statute. In an effort to resolve these issues and facilitate compliance with the current statutory requirements, the following will be in effect **January 1, 2017:**

1. Photocopies (including faxes, pictures, etc.…) ***will not be accepted*** as an official record of negative EIA test.
2. The records listed below ***will be accepted*** as an official record of a negative current official EIA test for equine events and activities:
   a. Original Hardcopy VS 11-11 or other form prescribed by the Commission.
   b. Official Electronic EIA Form via VSPS or Global Vet Link or other provider of official animal health documents.
   c. Equine Passport issued by the Animal Health Regulatory Agency in the state where the horse resides.
   d. EIA Card issued by Arkansas Livestock and Poultry Commission.
   e. Certified Copy originating from the Laboratory that performed the EIA test – must be stamped or identified as a Certified Copy, with original signature and date copy was produced.

Please note these requirements as you plan all of your future activities. If you have questions, please contact the Arkansas Livestock and Poultry Commission at **(501) 907-2400**.