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Do Ergot Alkaloids Negatively Impact Bull Semen Quality and Fertility?

(S. L. Pratt and J. G. Andrae, Clemson University)

The dominant cool-season forage in the southeastern United States is the tall fescue cultivar Kentucky 31 (KY31). Kentucky 31 possesses an endophyte which produces a family of toxins called ergot alkaloids. These toxins negatively affect the physiology of animals upon consumption. While the literature is clear that these toxins affect body weight, body temperature, blood flow and hair growth, their effect on bulls' reproductive biology is not well defined. We conducted four experiments evaluating semen quality and fertility of young beef bulls exposed to ergot alkaloids.

In Experiment 1, bulls were fed concentrate diets with or without ergot alkaloids for 126 days. All bulls were sacrificed at the end of the 126-day feeding trial or 60 days after removal from treatment. In Experiments 2 through 4, bulls were grazed on KY31 or a novel endophyte-infected tall fescue, which does not produce ergot alkaloids. Tissues obtained in Experiment 1 were subjected to end point RT-PCR and immuno-histochemistry using primers and antibodies specific for prolactin, dopamine and serotonin receptors. In all experiments, semen evaluations were conducted periodically. For Experiments 3 and 4, semen was extended and used to time AI cows to assess fertility.

- Semen quality did not differ in Experiment 1 for all variables examined.

- We identified the presence of prolactin receptor, dopamine and serotonin receptors in the testes, epididymis and on sperm cells.
- The prolactin receptor mRNA abundance was decreased in testis samples due to ergot alkaloid treatment at both slaughter dates.
- Using seminal fluid samples obtained from bulls in Experiments 1 and 2 and subjecting the samples to RIA, we found that prolactin is present in seminal fluid with concentrations in bulls grazing KY31 lower than those grazing NE, but no difference in seminal fluid prolactin concentrations were observed for Experiment 1.
- Further, bulls grazing KY31 in Experiment 2 exhibited a decrease in sperm cell morphology not observed in Experiment 1.
- Day 35 timed AI pregnancy rates for Experiment 3 were reduced for the KY31 treatment; however, no difference due to treatment was observed in Experiment 4.

These data tend to indicate that semen quality and fertility are altered when grazing KY31; however, these observations may be due to toxin by nutrition level interactions.

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Effects of Prepartum Mineral Supplement Source on Composition of Colostrum and Milk in Brangus and Angus Cows

(D. M. Price et al., University of Florida)

Effect of prepartum mineral supplement source on cow colostrum and milk composition was evaluated in mature pregnant Angus ($n = 20$) and Brangus ($n = 20$) cows, which were allotted to two mineral supplements containing either inorganic or organic trace minerals in a 2×2 factorial design. Mineral supplementation began approximately 90 days before expected parturition and continued through weaning. Colostrum (before calves suckling) and milk (30 days post-parturition) samples were collected by hand-milking and frozen at -4°F for eventual mineral and milk composition analysis. Colostrum analysis (percentage basis) included fat, total protein, total solids, lactose, as-fed ash, moisture and dry matter and somatic cell count. Centrifuged colostrum was analyzed for trace minerals (Co, Cu, Fe, Mn, Mo, Se and Zn). Milk analysis (percentage basis) included fat, true protein, total solids and lactose, plus milk urea nitrogen and somatic cell count.

- Treatment and breed did not affect colostrum fat ($5.06 \pm 0.42\%$), total protein ($16.67 \pm 0.44\%$), lactose ($2.97 \pm 0.08\%$), dry matter ($4.38 \pm 0.13\%$) or somatic cell count ($7.4 \pm 1.0 \times 10^6$ cells/mL).
- Colostrum total solids were greater for Angus ($27.10 \pm 0.89\%$) than Brangus ($24.56 \pm 0.86\%$).

- The Brangus ($75.44 \pm 0.8\%$) had greater colostrum moisture than Angus ($72.89 \pm 0.86\%$).
- Colostrum as-fed ash tended to be greater for Angus ($1.15 \pm 0.03\%$) than Brangus ($1.06 \pm 0.03\%$).
- Colostrum had no detectable concentrations of Co, Cu, Fe, Mn or Mo. However, Zn was greater for Angus ($90.80 \pm 2.15 \mu\text{g/g}$) than Brangus ($79.30 \pm 2.15 \mu\text{g/g}$).
- A treatment by breed interaction was observed for selenium colostrum (Angus-organic, 0.86 ± 0.06 ; Brangus-inorganic, 0.88 ± 0.06 ; Angus-inorganic, 0.74 ± 0.07 ; Brangus-organic, $0.72 \pm 0.07 \mu\text{g/g}$).
- Treatment and breed did not affect milk fat ($1.98 \pm 0.23\%$), true protein ($3.07 \pm 0.06\%$), total solids ($10.89 \pm 0.24\%$), lactose ($5.11 \pm 0.06\%$) and somatic cell count ($3.2 \pm 1.7 \times 10^5$ cells/mL).
- The milk urea nitrogen was greater for Brangus (12.12 mg/dL) than Angus ($9.40 \pm 0.75 \text{ mg/dL}$).

Results indicate breed had more effect on colostrum and milk composition than prepartum mineral supplement treatment.

The Ability of the Animal Science Blog to Transfer Information

(T. R. Troxel and M. S. Gadberry, University of Arkansas)

The objective was to determine the educational reach of the University of Arkansas Animal Science Extension blog. The blog was published using WordPress and was launched November 2011. The blog homepage provided up-to-date information to Arkansas livestock/forage producers. Additional menu items, linking viewers with web content, included 300 days of grazing, 4-H livestock, beef cattle, E-newsletters and videos, events, forages, horses, market news, poultry and sheep and goats. As of August 2014, there were 341 blog followers. The timeframe used for the data analysis was November 2011 through August 2014 (34 months).

- During this period there were 29,349 views, averaging 863 ± 600.21 (mean \pm SD) per month and 28.4 ± 19.50 per day.
- The number of views by season (spring, summer, autumn and winter) were not different.
- The number of monthly views for the first 8 months (November 2011 through June 2012)

averaged 41.1 ± 55.46 but increased to 1,844 in July 2012. The increase in views (July 2012) was probably due to a severe drought and the need of livestock producers for drought information. Viewership thereafter averaged $1,116.2 \pm 447.82$ per month.

- The menu items receiving the most clicks were beef cattle ($n = 790$), 300 days grazing ($n = 421$), forages ($n = 405$), sheep and goats ($n = 353$), 4-H livestock ($n = 347$), market news ($n = 344$), horses ($n = 209$) and poultry ($n = 154$).
- The top five countries with the most views were United States ($n = 21,391$), Canada ($n = 284$), India ($n = 203$), United Kingdom ($n = 120$) and Brazil ($n = 71$).
- The month with the most and least views was May 2013 ($n = 2,621$) and December 2011 and April 2012 ($n = 1$), respectively.

Although the blog was primarily used to communicate information to livestock producers, 48 reader comments were received. Comments requesting information or asking a question were answered. Rapid up-to-date electronic communication

is becoming more important to extension clientele. The Animal Science blog appeared to be successful in transferring the latest information in a timely manner to Arkansas livestock/forage producers.

Saving for a Wintry Day: Three Seasons of Workshops to Promote Managed Grazing of Stockpiled Tall Fescue

(S. R. Freeman et al., North Carolina State University)

In the Piedmont and mountain regions of North Carolina, tall fescue is the main forage used on pastures. Much of the pastureland is continuously stocked, with little thought going towards managing this valuable resource. The lack of thoughtful management may result in reduced yields and cause negative environmental impacts.

To stimulate interest in pastureland management, a series of on-farm demonstration workshops were conducted from 2009 to 2011 to promote the stockpiling and efficient utilization of late summer fescue growth for winter grazing. Working with county extension agents, 21 farms were selected in 12 North Carolina counties representing 397 acres of fescue.

A total of 32 workshops were conducted over the three-year period to demonstrate the benefits of managed grazing coupled with stockpiled fescue. Workshops were open to the public and publicized by local extension agents. Measurements of forage quantity, quality and botanical composition were made at each site over the course of each growing season. Host producers tracked time spent moving fences and feeding their cattle, fertilizer applications and feed and equipment costs for the grazing period.

- Over the three growing seasons, area grazed for the workshops per farm was 13 acres (± 5.65), and herd size varied from 6 to 90 animals but averaged

20.5 \pm 10.2 standard animal units where standard animal units = 1,200 lb. body weight. Mean dry matter yield was 2,789 lb/acre. Forage available for grazing was about 50% fescue, with the remainder being other cool-season grasses or broadleaf weeds.

- Fescue endophyte infection rate averaged 89% ($\pm 13\%$). Fresh forage had greater CP and TDN and reduced ADF contents than did hay fed at the same sites (14.6% CP, 67.8% TDN, and 31.3% ADF vs. 10.8% CP, 59.3% TDN, and 41.0% ADF for fresh forage and hay, respectively).
- Grazing stockpiled forage typically began around December 15 and ended in mid-February to cover a period of 63 days.
- Producers attained an average of 93 standard animal unit grazing days/acres and the cost per standard animal units per day was \$1.41 with a range of \$0.22 to \$2.84.
- Estimated costs for feeding hay during the same period of time and for the same herds were \$2.51/standard animal units/day.

Managed grazing therefore offered the producers an opportunity to save about 1.10/standard animal units/day of grazing as compared with feeding hay and provided a higher plain of nutrition.

Effects of Ralgro Implants Administered at Branding on Growth Performance of Steer Calves Through Weaning

(C. L. Bayliff et al., Oklahoma State University)

Previous studies have shown that Ralgro implants administered at 30 to 90 days of age increase weaning weight in suckling steer calves by 24 lb. (Mader et al., 1985) and 23 lb. (Gill et al., 1986). However, these and other peer-reviewed research results from experiments conducted in the U.S. were completed nearly three decades ago. Beef cattle genetics in the U.S. have changed dramatically during this time period. Specifically, aggressive selection for growth, milk yield

and muscling has occurred since 1985. Consequently, it is possible that the response to anabolic implant compounds may have changed as well. The objective of this experiment was to determine the impact of a Ralgro implant administered at 30 to 90 days of age on suckling phase growth rate and weaning weight. A total of 154 suckling steer calves weighing 254 lb. at branding (approximately 30 to 90 days of age) from two locations were used. Two hundred nine cow/calf pairs grazed

primarily bermudagrass pastures near Valiant, Oklahoma, at the Mac Lindley Research Station while 106 cow/calf pairs grazed primarily native grass rangeland at the Crosstimbers Research Station near Stillwater, Oklahoma. Cows and calves were sired by Angus bulls. Within location, steer calves were stratified by dam age, then randomly assigned to two experimental treatments; implanted with Ralgro (77 animals) and no implant (98 animals). The steers were weighed at the time of branding/implanting and again at weaning 134 days later.

- Implanted steers gained 20 lb. more body weight between the branding and weaning dates compared with nonimplanted steers.
- This resulted in a tendency for a 4% increase in weaning weight and an 8% increase in 134-day body weight gain.

Ralgro growth-promoting implants remain an effective and economical method to increase performance of suckling steer calves, and the response is similar to research results published in the 1980s.



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