DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

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Beef Cattle Research Update

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

What's Inside

The Effect of Mature Body Weight and Stocking Rate on Cow and Calf Performance, Cow Herd Efficiency and Economics in the Southeastern United States

(Beck, P.A. et al., Division of Agriculture, Department of Animal Science, University of Arkansas and The Samuel Roberts Noble Foundation Inc.)

Journal of Animal Science: March 2016

The costs of maintaining a beef cow and the unit cost of production of weaned calves have increased over the past five years. Additionally, cow carrying costs (which include costs such as pasture management, stored forage and supplementation, interest and other assorted costs) have increased along with a 30 percent increase in cow mature size over the last 30 years. The objective was to test the effects of stocking rate and mature body size on cow and calf performance, cow herd efficiency and system economics.

- A 30 percent larger cow requires 22 percent more daily maintenance energy and will consume 22 to 28 percent more forage dry matter daily, decreasing cow carrying capacity of the farm or increasing input costs associated with pasture management, supplementation and stored forages.
- Stocking rate is a fundamental variable for managing pastures, with distinct impacts on individual animal performance, body weight production per unit of land area and economic returns to the producer, and there is a distinct relationship between stocking rate and animal performance for each environment and forage type.
- There were no effects of cow body weight on carrying cost or net returns; increasing stocking rate decreased total expenses by $102 per cow and increased net returns by $70 per cow.
- Increasing cow size can increase weaning weight of calves but does not affect total production per acre or profitability, even though weaning weight efficiency ratios were reduced.
- Increasing stocking rate reduced cow weight and body condition at weaning and increased feeding of conserved forages but did not affect pregnancy rates and led to increases in total calf weight weaned per acre and net returns.

A Meta-Analysis of Research Efforts Aimed at Reducing the Impact of Fescue Toxicosis on Cattle Weight Gain and Feed Intake

(Gadberry, M.S. et al., Division of Agriculture, Department of Animal Science, University of Arkansas)

Journal of Animal Science: 2015 93:5496-5505

The objective was to provide an overview of the effect of strategies researched to recover production losses attributed to diets containing toxic endophyte-infected tall fescue. The strategies presented include those 1) applied with forage systems, 2) based on pharmacological compounds and functional foods and 3) based on supplemental dietary nutrients.

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Cattle weight gain and dry matter intake was the dependent response evaluated.

- Among the forage systems reviewed, studies with nontoxic endophyte-infected tall fescue as a total replacement forage system demonstrated the greatest improvement in per-acre (136 pounds per acre) and per-animal (0.64 pound per day) weight gain. Studies with interseeded legumes have exhibited a small and highly variable weight gain effect per acre (46 pounds per acre) and per animal (0.24 pound per day). The legume response was seasonal, with summer exhibiting the greatest benefit.
- Studies with chemicals that suppress plant growth demonstrated weight gain responses (0.37 pound per day) equal to or greater than the response observed with legume studies. Cattle grazing toxic tall fescue responded well to anthelmentics, antimicrobial feed additives and steroid implants, and the use of these technologies may additively help recover production losses. As a group, functional foods have not improved weight gain.
- Studies with cattle supplemented with highly digestible fiber supplements observed a 0.33 pound greater weight gain compared with studies using starch- and sugar-based supplements. Weight gain was positively impacted by the level of supplementation (0.13 pound per dry matter intake as percent of body weight). Supplement feed conversion was estimated at 6:1 for the highly digestible fiber supplements compared with 11:1 for starch-based supplements. Tall fescue forage DM intake was predicted to maximize at a supplemental feeding rate of 0.24 percent body weight with a breakpoint at 0.5 percent body weight, and total maximum dry matter intake (forage plus supplement) occurred at 2.7 percent body weight when supplemental feeding approached 0.9 percent body weight.
- Many of the concepts tested have provided opportunities to partially recover production losses for cattle grazing toxic fescue without mitigating the effects of ergot alkaloids. It has been hypothesized that additive effects from simultaneous application of different management strategies may restore lost production. This may hold true when lost production is restricted to the simple response difference between toxic and nontoxic fescue diets.

The Effect of Calf Age at Weaning on Cow and Calf Performance and Feed Utilization by Cow-Calf Pairs

(Warner, J.M. et al., Department of Animal Science, University of Nebraska)

The Professional Animal Scientist: 2015 31:455-461

In beef cow-calf production systems, weaning most often occurs when calves reach a conventional age of six to eight months, independent of season of birth. Situations such as reduced forage availability, decreased milk production by the dam or low cow body condition may arise in which early calf weaning is a viable management strategy. The benefits of sparing available forage, enhancing reproduction and reducing cow maintenance energy requirements by early weaning are well documented. Given that early-weaned calves are inherently efficient at converting feed to gain, early weaning is often regarded as a more feed-efficient management practice by reducing the total feed energy required by a cow-calf pair.

- All crossbred cows and calves (n = 156) were fed a common diet from early to conventional weaning time over two years and two locations. Cows with weaned calves were limit fed (15.2 pounds of dry matter per cow daily), and early weaned calves were offered ad libitum access to feed (8.8 pounds of dry matter per calf per day). Nursing pairs were fed an equivalent amount of DM (24 pounds per pair per day).
- Body weight change from early to conventional weaning was 37 pounds greater for early weaned cows. Cow body condition and conception rates were not affected by weaning.
- Weaning calves at 90 days of age appears to have marginal effect on cow weight and body condition change, and pregnancy rates when cows are limit fed high energy diets to meet requirements, provided BCS is acceptable (≥ 5.0 BCS) before the beginning of the breeding season.
- Because calf ADG per unit of feed energy intake for the cow and calf combined were relatively similar, the total energy requirements for weaned cows and calves or nursing pairs do not appear to be markedly different. Thus, decisions regarding early weaning should be made on the discretion of management as opposed to feed efficiency.

Customer and Consumer Confidence in the Livestock Industry – Professional Ethics

(Bunting, L.D., and M. L. Galyean, Archer Daniels Midland Co. and Texas Tech University)
The Professional Animal Scientist: 2015 31:309-314

"Ethics" has been defined as "a set of moral principles; a system of moral values; a theory or system of moral values; the principles of conduct governing an individual or a group (professional ethics); a guiding philosophy; a consciousness of moral importance." "Professional ethics" refers to the application of guiding philosophies or ethical codes by learned professionals within the confines of an industry or activity that has generally well-described stakeholders.

Within a given area of endeavor, practices that are considered ethical are generally synonymous with those understood to be fair in outcome to all parties that either are or could have been affected by that practice. The livestock industry has been long regarded as having high ethical standards; however, there is a growing sentiment among industry professionals and producers alike that the occurrence of unethical behavior in business and in the sciences might be on the rise.

- With greater pressure on research funding and commercialization of research results, university scientists will very likely face increasing problems associated with issues of bias and conflict of interest.
- University researchers can limit the chances that obvious or subtle forms of bias or conflict of interest will occur by (1) carefully managing relationships with sponsors and external parties; (2) using research practices that ensure unbiased management of data and publications; and (3) appreciating that bias and conflict of interest also occur when researchers begin to assume roles as experts in both public and sponsored venues.
- We must reinforce to our colleagues and industry peers the extended consequences of ethical lapses, because they tarnish not only our personal reputations but also those of our universities and our companies.

Researchers Discover Methane Traits Are Heritable in Beef Cattle

(Holly Webb and Chloe Mitchell)
Taking Stock, American Society of Animal Science, March 24, 2016

For the first time ever, researchers in Australia have discovered that methane emissions from beef cattle are a heritable trait. The milestone research, published online in the *Journal of Animal Science*, offers the potential for using genetic selection to reduce greenhouse gas emissions from cattle, without altering cattle performance.

- Ruminants contribute 80 percent of global livestock greenhouse gas emissions, and this is mainly through the production of methane. Methane is a by-product of microbial fermentation in the rumen. Methane emissions vary between cattle. An animal's genetics may be partly responsible for this variation. Now, given this new research, genetics also could be part of the solution.
- "Genetic variation in methane emissions is present in beef cattle populations," said corresponding author Dr. Paul Arthur, a beef geneticist at the New South Wales Department of Primary Industries in Australia. "There is potential to use genetic selection to reduce methane emissions."
- During the study, the researchers found that the heritability of such traits as methane production and yield was "moderate" – which means methane traits stand a good chance of being inherited by offspring. The researchers also found that certain methane traits were weakly correlated with growth and body composition traits, so selection for lower methane production in cattle would not have detrimental effects on animal productivity.
- The study also addressed the high cost and impracticality of measuring methane traits in individual animals, further validating the potential of using genetic selection to reduce methane emissions.
- The results suggest that the use of DNA-generated estimated progeny difference (EPD) for methane traits in a selection program could reduce methane emissions in beef cattle by an approximate 5 percent over 10 years.
- Dr. Arthur said the study's findings are a step closer to paving the way for the development of tools that will allow cattle producers to identify superior bulls whose offspring will have lower methane emissions. All of this could be possible without impacting cattle productivity or producer profitability.
- The research has been published in two separate *Journal of Animal Science* articles: "Genomic heritabilities and genomic estimated breeding values for methane traits in Angus cattle," and "Genetic and phenotypic variance and covariance components for methane emission and postweaning traits in Angus cattle."

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