Development and implementation of low-input delivery systems for ethanol co-products in forage-based beef systems

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Development and implementation of low-input delivery systems for ethanol co-products in forage-based beef systems

Abstract
Increased corn production to fuel Iowa's ethanol plants leads to diversion of cattle pasture land to cropland. This project looked at the value of using distillers' grain (an ethanol by-product) as a supplement for beef cattle feeding in a forage system.

Keywords
Agroforestry, Animal management and forage, Market research and feasibility studies

Disciplines
Biotechnology | Marketing | Meat Science
Development and implementation of low-input delivery systems for ethanol co-products in forage-based beef systems

Are there practical ways to use distillers’ grains to stretch pasture supplies, and maintain or increase cattle numbers without overgrazing?

Methods exist to minimize waste in supplementation of grazing cattle and substitute corn co-products for forage. Producers must consider the cost tradeoffs and the rate of supplementation to be successful.

Background

Competition for land in Iowa has reduced the acres available for cattle grazing, and cattle producers are looking for alternative sources of nutrients to maintain healthy cattle numbers. One alternative is to use the low-cost by-products of the growing ethanol industry, particularly distillers’ grains. The investigators on this project looked at the feasibility, issues and challenges in delivering ethanol co-products in grazing regimens.

Objectives of this study were to:
- Evaluate alternative delivery systems for distillers’ grains in pasture and an extensive production environment,
- Assess the performance and pasture substitution of supplementation in an applied research setting,
- Test supplementation methods and strategies through on-farm demonstrations,
- Evaluate producer and consultant opinions on supplementation opportunities and challenges, and
- Develop educational materials based on the results of the project to be used in future Iowa Beef Center educational activities.

Approach and methods

Three on-farm demonstrations evaluated systems of feeding and delivery of corn co-products to beef cows in pasture or cornstalk grazing situations. Two stocker grazing trials at the ISU McNay Research Farm evaluated the level of supplementation on pasture substitution and stocking rates. Two surveys (of producers and consultants) were conducted to evaluate the attitudes and challenges of supplementation of beef cattle in pasture situations. The on-farm demonstrations evaluated several sources and formulations of co-products, including pelleted and cubed mixtures of distillers’ grains, and a bran product from a “new generation” ethanol plant. (“New generation” refers to cellulose and/or blended biomass.)
Results and discussion

The demonstrations confirmed the feasibility, palatability and practicality of these methods for providing additional nutrients to beef cows in grazing-based production systems. The surveys found that the primary limitation to supplementation of cattle in extensive pasture environments related to costs (labor and fuel) and accessibility, including weather.

The primary reason producers would consider supplementation was to increase carrying capacity or stocking rates. Supplemental nutrition was a secondary reason. The stocker grazing studies established that higher rates of supplementation were required before supplemented feed could replace pasture supplies. This observation is important because lower levels of supplementation typical of the rates often fed by cow-calf producers likely would not reduce pasture consumption and stretch pasture resources. More likely, with lower supplementation the cattle would increase their overall intake, nutrient composition and gain extra body condition.

Conclusions

Acceptance/animal performance. In general, cattle readily consumed the products with little adjustment time needed. One exception occurred in a demonstration with a high-quality, readily available pasture where a few of the animals did not consume the supplement readily. Animal performance is measured by average daily weight gain or body condition, which was improved at higher levels of supplementation. At low supplementation levels, body condition was unchanged or not improved by supplementation.

Physical form/waste. The traditional meal form of distillers’ grain is very finely ground and is easily wasted by wind losses and trampling when feeding on the ground, so it is best to use feed bunks. The bunks will add to the labor challenge when using rotational grazing as a management system. The pellet version of dry distillers’ grain works well for supplementing cattle on grass, but is not widely available. New ethanol plants will be better geared to produce pellet co-products. Wet distillers’ grains serve as a good pasture supplement, if they are available locally.

Timing/quantity. While daily feeding is the most common supplementation program, some producers opt to supplement three or five times weekly. This project provided supplementation either every other day or five times per week with good results. Labor can be a critical issue, so more research is needed to evaluate the trade-offs relative to feeding efficiency and frequency.

Forage substitution. For ethanol co-products to be effective in maintaining cattle numbers with decreased pasture, the cattle must reduce their forage consumption when supplemented. This project found little change in pasture consumption when supplementation was less than .5 percent of the animal’s body weight. At supplementation levels of 1 percent or more, forage consumption decreased by as much as 26 percent. There are factors that influence the level where forage substitution can occur, but if the goal is to stretch pasture supply, higher levels of supplementation than typically expected may be required.
**Impact of results**

Information from this project should help beef producers make better informed decisions about supplementation of beef cattle in grazing situations. However, the goal of using general distillers’ grains supplementation to maintain the size of beef cow-calf herds with reduced pasture acres available proved to be more complex than anticipated. Achieving this goal will require more strategic, targeted supplementation programs at higher rates.

Changes in the ethanol industry during the time of the project partially solved the problem of excessive waste in the delivery of corn co-products in pasture situations. Normal dried distillers’ grains are small, particle-sized, easily lost through wind and trampling, and difficult to feed as pellets because of the fat content. Newer generation ethanol plants that employ the fractionalization process can produce co-products that are more easily formed into pellets and can serve as high-quality cattle feed.

**Education and outreach**

Field days were held for producers in 2006 (demonstration projects) and 2007 (McNay Research Farm near Chariton). These events showed producers the feeding methods and progress of the project. Feedback from their sessions provided input for adjustments in the project design. A field day was sponsored for veterinarians in May 2007 at McNay. Two ISU Extension publications were produced documenting the results and project recommendations. They can be seen at: www.iowabeescenter.org/content/Forages%20and%20Grazing/ddgfactsheet.pdf and www.iowabeescenter.org/content/Forages%20and%20Grazing/grazingcornresidue.pdf. One covered supplementation of distillers’ grains to beef cattle and the other was on grazing corn residue. Displays were prepared for the Iowa Cattleman’s Association and the Corn Belt Cow-Calf conference.

**Leveraged funds**

No financial resources were leveraged, but a student intern used information from the project for independent study credits, and two other students worked on the project surveys as part of their capstone class in Agricultural and Biosystems Engineering at ISU.