

# Beef Cattle Research Update

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## Interactions Between Nutrition and Reproduction in Beef Cows

Virginia Tech animal scientist, John Hall, presented an excellent review of the interactions between nutrition and reproduction at the Applied Reproductive Strategies Conference. Following is a brief summary of key management strategies he presented (Hall, J.B. 2005. Proc. Applied Reproductive Strategies in Beef Cattle, Nov. 1-2, 2005, Lexington, KY).

1. Ensure sufficient energy is available to support reproduction.
  - a) Body condition score (BCS) females and achieve BCS 5 in cows and BCS 6 in heifers by calving time (latest) or 60 days before calving (preferred).
  - b) Maintain body condition from calving through breeding for cows in proper body condition, and increase body condition in cows that are below optimal BCS at calving.
  - c) Feed thin cows and first-calf heifers in separate group(s) from the main herd.

- d) Provide energy supplementation from the most economical local source in order to minimize costs.
  2. Provide optimum level of dietary protein.
    - a) Rather than balancing diets on crude protein (CP), balance diets on metabolizable protein (MP), if possible, which is a measure of the protein reaching and absorbed by the small intestine.
    - b) Provide sufficient digestible intake protein (DIP) for adequate rumen function, especially in females on medium to low quality forages.
    - c) Avoid over-supplementation of protein, which may reduce pregnancy rates.
    - d) Inclusion of by-pass or undegradable intake protein (UIP) may not prove to be effective.
      3. If possible, include ionophores (e.g., Rumensin(r) or Bovatec(r)) in the diet, which can help decrease postpartum intervals in mature cows and first-calf heifers.
      4. Base mineral supplementation on forage mineral content and local mineral deficiencies.
        - a) Supplement phosphorus only when needed.
        - b) Pay attention to trace mineral levels, especially copper, selenium, manganese, and zinc.

## **Early Weaning Improved Carcass Wt., Quality Grade, and Meat Tenderness**

Univ. of Missouri and Southwest Missouri State scientists used 140 spring-born Angus and Angus-cross steer calves to evaluate the effects of early weaning (EW) vs. traditional weaning (TW) on growth, body composition and meat tenderness. Average ages were 90 days and 174 days for EW and TW calves, respectively. EW calves were fed a 39-46% corn diet from 90 to 201 days of age. Both groups were fed a finishing diet consisting of 50% corn from 202 days to slaughter, which occurred at an average age of 370 days.

- EW calves required more intense management and slight adjustments in feed during the first 56 days on feed.
- At slaughter, EW calves had significantly heavier carcasses (640 vs. 617 lb), and a higher percentage that graded Choice or greater (57 vs. 37%).
- There were no significant differences in ribeye area or backfat thickness.
- EW calves had significantly lower shear force values than TW steers after 14 days of postmortem aging, but there were no differences in tenderness after 21 days of aging.
- The minor health problems experienced by EW calves early in the experiment were not found at slaughter through evaluation of liver abscesses or scarring.

The authors concluded that the improvements in hot carcass wt. and quality grade of EW calves could be attributed to the extra time spent on feed. They also noted that the results of the study indicate that EW of calves may be used as a tool to more effectively manage the cow-calf production system without compromising the quality of the offspring (Meyer et al. 2005. *J. Anim. Sci.* 83:2752).

## **Preconditioning Programs Can Increase Returns to Both Cow-Calf Producers and Cattle Feeders**

Kansas State Univ. researchers used 5 years of data from a Kansas auction barn to estimate premiums received for preconditioned calves and the expected returns in the feedlot from a preconditioning program. Preconditioned calves sold in the fall received premiums that ranged from \$0.045 to \$0.05/lb compared with non-preconditioned calves. Premiums were less for calves sold in the winter, less for heavier calves, and less when cattle markets were strong. Based on a premium of \$0.045/lb along with seasonal and body weight price adjustments and total costs of \$60/head, a 45-day post-weaning preconditioning program increases returns by about \$14/head to cow-calf producers compared with selling calves at weaning time. Based on data from other studies, the authors concluded that the value of preconditioned calves is between \$40 to \$60/head in the feedlot, which equates to price premiums of \$0.07 to \$0.11/lb that could be paid for preconditioned calves (Dhuyvetter et al. 2005. *Prof. Anim. Sci.* 21:502).

## **Biosensor to Sort Meat into Tough and Tender Categories**

Calpastatin, a protein found in meat, is responsible for regulating meat tenderness by inhibiting the protein calpain, whose action is to break down muscle fibers, thereby enhancing tenderness. A higher level of calpastatin leads to tougher meat. Therefore, the ability to accurately evaluate the concentration of calpastatin at the packing house would enable processors to sort beef into tender and tough categories. Univ. of Missouri scientists developed a biosensor, using technology known as fluorescence resonance energy transfer (FRET), to predict calpastatin concentrations in meat. Response time for accurate prediction was very rapid (5 minutes), compared to other methods that require up to 3 days. The authors concluded that such a sensor could be installed in a commercial setting and could correctly sort carcasses into categories of tough and tender that would provide the ability to market guaranteed tender meat, allowing the meat industry to recapture millions of dollars that are annually lost due to inadequate tenderness (Grant et al. 2005. *Biosensors and Bioelectronics* 21:438).

## **Most U.S. Consumers Prefer Domestic Corn-Fed Steaks over Australian Grass-Fed or Canadian Barley-Fed Steaks**

In order to compare consumer acceptance of U.S. domestic corn-fed, Canadian barley-fed, and Australian grass-fed beef, Univ. of Nebraska scientists conducted 24 taste panels (273 consumers) in Denver and Chicago. Strip steaks were evaluated for flavor, juiciness, tenderness, and overall acceptability on an 8-point scale (1=extremely undesirable; 8=extremely desirable). A silent auction was used to obtain sealed bids on steaks from the same strip loins sampled in the taste panel.

- Domestic steaks were given significantly higher ( $P<0.001$ ) scores for all four palatability characteristics than Australian grass-fed steaks.
- Consumers placed an average value of \$3.68/lb on domestic steaks compared to \$2.48/lb on Australian grass-fed steaks ( $P<0.001$ ).
- Consumers scored Canadian steaks numerically lower for juiciness ( $P=0.09$ ) and significantly lower ( $P<0.005$ ) for flavor, tenderness, and overall acceptability than domestic steaks.
- Consumers placed an average value of \$3.95/lb for domestic steaks compared to \$3.57/lb for Canadian steaks ( $P<0.01$ ).
- In contrast to the majority of consumers surveyed, 19% preferred Australian grass-fed steaks, and 29% favored Canadian steaks.

The authors hypothesized that because a steady supply of corn-fed beef is available to most consumers in the U.S., Americans may have become accustomed to the flavor of corn-fed beef and therefore prefer it. They went on to say, however, that because a small proportion of American consumers preferred the imported products and was will-

ing to pay more for them, a niche market for them may be feasible in the U.S. (Sitz et al. 2005. J. Anim. Sci. 83:2863).

### **Carcass Price Spreads Are Widening**

Cattle Fax® recently reported that during the past 2 years (2003-2005), price spreads on various grades of boxed beef have widened significantly. Cyclically low beef production totals have limited the available supply at the same time that the demand for higher quality beef products has increased.

The Premium Choice (Avg. & Hi Choice) - Select spread has averaged \$15.66/cwt. Assuming an average carcass wt. of 750 lbs, this indicates that a Premium Choice carcass is worth \$117.45 more per head than a Select grade carcass. A Prime grade carcass (2.8% of available supply) has generated \$23.73/cwt or about \$178 more per head than a Choice carcass and \$247.50 more than a Select carcass. Other price spreads have been \$6.38/cwt for Premium Choice - Choice, and \$9.28/cwt for Choice - Select. These price spreads show why more producers are inclined to sell fed cattle on programs that reward carcass merit as opposed to selling on the average cash market.

Cattle-Fax analysts went on to predict that during the next 3 to 4 years, fed cattle supplies will grow, and product branding and niche markets will become more prevalent. As this happens, a growing percentage of the total fed cattle supply is expected to sell on grids, formulas, alliances, and branded beef programs. Producers that hit the target can reap significant rewards (SOURCE: Randy Blach, Cattle-Fax®).

### **Future Trends - Outlook for Cattle and Beef**

At its 2006 Outlook & Strategies Seminar, Cattle-Fax® analysts made the following points.

- Average per capita beef consumption in the U.S. has held steady at 65-67 lbs for the past 15 years.
- Beef demand growth has been phenomenal since 1999, which has allowed U.S. producers to sell the same amounts of product at prices 25% higher than before. This is what has led to the record high price levels on all classes of cattle in each of the last 3 years.
- If per capita beef consumption remains between 65-67 lbs for the next decade, the market will require a substantial increase in supply to meet the growing U.S. population.
- If this is the case, net beef supplies will be close to 30.5 billion lbs by 2015 compared to 27.8 billion lbs in 2005. Therefore, the U.S. cow herd is expected to grow during the balance of this decade.
- Prices for all classes of cattle will decline from their record 2005 highs during the remainder of the decade. Long-term projections for 2010 are as follows: fed cattle, \$75/cwt; feeder cattle, \$90/cwt; feeder calves, \$100/cwt.

### **Long-Term Beef Industry Trends**

Concentration in the cattle and food industries is occur-

ring at every level and is predicted to accelerate at an even faster pace in the future. The following table presents the current situation, based on data from CattleFax®.

### **Concentration in the Cattle and Food Industries**

Industry Segment	% of market share
Cow-Calf Producers, Largest 9%	51%
Feedlot Operators, Largest 2%	85%
Packing Companies, Top 5	83%
Supermarket Chains, Top 10	55%
Foodservice Distributors, Top 10	45%
Restaurant Chains, Top 10	30%

CattleFax analysts went on to make the following projections:

- About 50% of all beef is now sold through foodservice operations compared to only 30% twenty years ago. By the end of the decade, foodservice will likely account for about 55% of all beef sales.
- Since 1995, the top five supermarket chains have increased their marketshare from 26% to nearly 49%.
- By the end of this decade, there will be fewer operators and a larger average size in most of the industry segments.
- Coordinated production systems will continue to develop and the beef industry will become increasingly coordinated.
- Producers will make breeding decisions with a specific end market in mind.
- More cattle will be sold on a carcass merit system and fewer will sell in the open cash market.
- The U.S. beef market will become more highly branded and differentiated.
- Instrument grading will be in place during the next few years which will provide more pricing points in the market system.
- Individual animal I.D. systems will continue to develop, and source and age verification will become the norm.
- The market will send stronger economic signals to producers in the years ahead; larger premiums as well as larger discounts are expected.

### **Cattle-Fax® Price Projections for 2006**

Cattle-Fax® has projected that fed cattle are expected to average slightly lower in 2006 than in 2005 at \$86-\$87/cwt, ranging from the upper \$70's to the mid \$90's. Beef production is expected to increase by about 1 billion lbs (approximately 4%). Feeder cattle are projected to average \$2-\$4 lower at \$106-\$108/cwt for the year. Feeder calf prices are expected to average about \$125/cwt.

Cattle-Fax also noted that the increase in beef demand since 1998 has added about \$250 per head to the price of fed cattle and about \$200 per head to the price of calves. ■