



# Research Briefs

► Summaries of current beef cattle research

## Calf management to consumer acceptance

*The following research highlights are provided by Harlan Ritchie, Steven Rust and Daniel Buskirk, all of whom are beef cattle specialists at Michigan State University, East Lansing, as part of their Winter 2004 Beef Cattle Research Update. The following are reviews of research projects recently reported at scientific meetings or in scientific publications.*

### Growth factor may enhance beef cattle efficiency

Alberta, Canada, researchers recently isolated and cloned a DNA sequence that encodes a 53-amino acid protein, bovine epidermal growth factor (EPG). Previous research in rodents and rabbits demonstrated EPG has the ability to stimulate proliferation of a number of cell types, including the epithelial cells that line the intestine. This work also indicated EPG can improve the absorption of nutrients across intestinal membranes. Furthermore, oral administration of EPG reduced the incidence

of intestinal infections and prevented weight gain reduction that results from infection.

Future research by Alberta scientists will focus on the biological effect of bovine EPG in cattle. The objective will be to determine if EPG has the ability to enhance the efficiency of nutrient absorption and reduce intestinal disease in beef cattle. The authors stated that because of the positive effects of EPG on intestinal function, it may have great potential as a feed additive in cattle diets.

*(Bilodeau-Goeseels et al. 2003. Agriculture and Agri-Food Canada, Lethbridge Research Centre)*

### Leptin gene polymorphism associated with increased marbling

Canadian scientists recently reported a polymorphism in the leptin gene of cattle that is associated with a change in body composition, most notably an increase in marbling. In this South Dakota State University (SDSU) study, genotypes for the polymorphism were determined on 492 crossbred calves. Individual animals were genotyped as CC (homozygous for the polymorphism), CR (heterozygous) or RR. Of the 492 calves, 118 were CC, 276 were CR and 98 were RR.

After weaning, the calves were finished in a commercial feedyard. Carcass traits were evaluated at a packing facility at an average age of 433 days. Carcass data were adjusted to three different end points — a carcass weight of 723 pounds (lb.), a fat thickness of 0.45 inches (in.), and an age of 433 days — in three separate analyses.

Genotype was not significantly associated with carcass weight or ribeye area in any of the three analyses. Associations of genotype with fat thickness; kidney, pelvic and heart (KPH) fat; and cutability were small and generally not statistically significant.

However, associations of genotype with marbling score were statistically significant

in the age- and fat-adjusted analyses and approached significance in the weight-adjusted analysis. Individuals with two copies of the C allele had marbling scores about 20 units higher than those with zero copies (approximately 407 vs. 386). Those with one copy were somewhere in between.

The authors concluded that the magnitude of difference observed in this study may be sufficient to justify genotyping of herds or populations in which most market animals have marbling scores near a quality grade or price threshold.

*(Bierman et al. 2003. South Dakota Beef Report)*

### **Effect of scours on calf weaning weight**

Montana State University (MSU) researchers evaluated health and performance records of 3,637 calves from inbred and outbred populations during a 14-year period. The inbred cattle were linebred Herefords. The outbred cattle consisted of four genotypes: 1) Hereford, 2) Angus × Hereford, 3) Simmental × Hereford and 4) Tarentaise × Hereford.

During the 14-year period, the average incidence of scours was 35%; the range was 13% to 64%. The incidence of scours was significantly higher for inbred than outbred calves (41% vs. 28%). The incidence of

scours was significantly higher in calves born to 2-year-old dams, and it decreased with increasing age of dam.

Scours significantly affected calf weaning weight. Throughout all years, scouring calves weighed 458 lb. at weaning while calves not affected by scours weighed 478 lb. Outbred calves were significantly heavier than inbred calves (483 lb. vs. 452 lb.).

The authors concluded that the economic benefit of managing to reduce the incidence of scours should exceed the expense to reduce the economic loss that can occur when calves are afflicted with scours.

*(Anderson et al. 2003. Prof. Anim. Sci. 19:399)*

### **Economically optimum rate of nitrogen fertilization**

Cool-season grasses are an important component of forage systems in various regions of the United States and Canada. Production of these grasses is largely dependent on the availability of nitrogen (N) in the soil. Knowing the economically optimum N application rate (cost of N vs. increased yield) for these grasses at levels that do not adversely affect the environment is critical.

The objective of the Pennsylvania State University (Penn State) trial was to

determine the N application rate for three cool-season grass species that would optimize economic return while minimizing the amount of N remaining in the soil. Four N rates were applied to established stands of orchard grass, tall fescue and timothy grass for three years. They were harvested three to four times per year.

Results showed the economically optimum N rates were 203 lb., 263 lb. and 204 lb. of N per acre, or 54 lb., 62 lb. and 62 lb. of N per ton of forage, harvested for orchard grass, tall fescue and timothy, respectively. Apparent N recovery ranged from 34% to 80% and was greatest at or near the economically optimum N rate. Soil N concentration was generally not elevated above background levels at the economically optimum N rate.

The authors concluded that the economically optimum N rate for these three grasses is greater, at approximately 11-15 lb. of N per ton of forage, than current recommendations for the northeastern quadrant of the United States, and soil N is not adversely elevated at this level of N application.

*(Hall et al. 2003. Proc. American Forage and Grassland Council Conference)*

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### Delaying initial implant improved quality grade

University of Nebraska (NU) evaluated how delaying the initial feedlot implant would influence performance and carcass traits in steer calves implanted twice during the finishing period. One hundred crossbred steer calves, averaging 476 lb., were used in the study. One-half were implanted with Synovex S® after a 14-day acclimation period. The remainder were implanted with Synovex S 30 days after the 14-day acclimation period. All calves were reimplanted 112 days later with Synovex Choice® and harvested after another 100 days.

Average daily gain (ADG; 3.74 lb.), final weight (1,269 lb.), hot carcass weight (799 lb.), fat thickness (0.48 in.), ribeye area [12.79 square inch (sq. in.)] and yield grade (YG; 3.2) were not affected by implant regimen. However, the delayed-implant steers had significantly higher marbling scores (570 vs. 527), and a higher percentage graded Choice (92% vs. 68%). The authors concluded that delaying the

administration of Synovex S until 30 days on feed can improve marbling score and quality grade without compromising feedlot performance.

(Funston et al. 2004. *Nebraska Beef Cattle Report MP 80-A*)

### Characterizing beef cow enterprises in eight Northern Great Plains states

SDSU researchers summarized data collected from 185 cooperating cow herds from 1991 to 1999 in eight Northern Plains states (North and South Dakota, Montana, Wyoming, Minnesota, Iowa, Nebraska, and

Kansas). Data were collected and analyzed by Standardized Performance Analysis (SPA) guidelines.

Compared to industry averages, these operations were large, averaging 508 breeding females. In addition to production data, 148 of the cooperators provided financial information. Although the results reported here (see Table 1) are not necessarily applicable to other regions, they provide benchmark data regarding practices, production levels and financial performance of enterprises in a major cow-calf producing area of the United States. Table 1 provides an abbreviated summary of results.

(Dunn et al. 2003. *South Dakota Beef Report*)

**Table 1: Characteristics of cow herds in eight Northern Plains states**

|  |       |
|--|-------|
| Acres per exposed female                     | 21.3  |
| Pregnancy percentage, %                      | 93.0  |
| Calving percentage, %                        | 91.4  |
| Weaning percentage, %                        | 86.7  |
| Female replacement rate, %                   | 19.7  |
| Avg. age at weaning, days                    | 199.0 |
| Avg. weaning weight per calf, lb.            | 519.0 |
| Pounds of calf weaned per female exposed     | 451.0 |
| Total assets per beginning-year female, \$   | 2,087 |
| Total expenses per beginning-year female, \$ | 397   |
| Total revenue per beginning-year female, \$  | 430   |
| Net income                                   | 33    |
| Return on assets, %                          | 3.1   |

### Using a reduced dose for initial implant for heifers

NU workers conducted a 177-day finishing trial to compare the effects of a new reduced-dose implant vs. a traditional higher-dose implant on performance and carcass characteristics when given to heifers as an initial implant. A total of 1,081 heifers, averaging 614 lb., were allotted to two treatments: 1) Revalor®-IH [8 milligrams (mg) estradiol, 80 mg trenbolone acetate (TBA)]; and

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2) Synovex-H (20 mg estradiol benzoate, 200 mg testosterone propionate). All heifers were reimplanted with Revalor-200 (20 mg estradiol, 200 mg TBA) as a terminal implant 81 days prior to harvest. Heifers were fed an average of 177 days.

Dry-matter intake (DMI) was similar between treatments. Revalor-IH-implanted heifers tended to gain faster (3.65 lb. vs. 3.57 lb. per day) and had significantly improved feed conversions (5.26 vs. 5.39 feed:gain). There were no statistically significant differences between treatments in fat thickness, ribeye area, yield grade or percent of total carcasses grading Choice.

However, heifers implanted with Revalor-IH had improved marbling scores and significantly more carcasses grading in the upper two-thirds of Choice (23.6% vs. 14.9%). A simulated economic analysis using a value-based pricing grid showed that Revalor-IH-implanted heifers returned \$14.22 per head more than Synovex-H-implanted heifers. This difference was due to the higher percent of the upper two-thirds Choice carcasses and 9-lb. greater carcass weight for the heifers implanted with Revalor-IH. The authors concluded that an initial reduced-dose implant appears equal or better in feedlot performance to traditional higher-dose implants and improves marbling, percent of carcasses grading upper two-thirds Choice, and net return when heifers are sold on a value-based grid marketing system.

(Farran et al. 2004. *Nebraska Beef Cattle Report* MP 80-A)

## Rating consumer acceptability of strip loin steaks

Colorado State University (CSU) scientists studied the effects of changes in marbling score, Warner-Bratzler Shear Force (WBSF) and consumer sensory panel ratings on overall consumer acceptability of strip loin steaks (n=550). A total of 489 consumers evaluated the steaks for tenderness, juiciness and flavor on a nine-point scale (1=like extremely; 9=dislike extremely).

The probability of acceptance by consumers was high (85% or more) when average sensory rating for tenderness, juiciness or flavor was 3 or lower. Conversely, probability of acceptance was low (10% or less) when these ratings were 5 or higher. As sensory ratings decreased from 3 to 5, probability of acceptance declined very rapidly, from 90% to 10%, in a linear fashion. This suggests that small changes in consumer ratings for these traits can have dramatic effects on overall acceptability.

The study indicated acceptance increases approximately 10% for each full marbling score increase from Slight to Slightly Abundant.

The probability of consumer acceptability was S-shaped for WBSF, with a steep decline in acceptance as WBSF values increased from 6.6 lb. to 12.1 lb. Changes within the highest and lowest portions of the range in values had very little effect on probability of acceptance.

(Platter et al. 2003. *J. Anim. Sci.* 81:2741)

## Calf-fed steers graded higher, were more palatable

Research has shown variable results when calf-feds and yearlings are compared for quality grade and measures of meat

palatability. However, very few studies have made this comparison using contemporaries from the same herd. NU scientists used British-Continental steers to make this comparison in a two-year study where herdmates were assigned at weaning time to be finished as either calves or yearlings.

Calf-feds were placed directly in a finishing yard for 6 to 7 mo. and were 13 to 14 mo. old when harvested. Yearlings were backgrounded on various growing systems (drylot, cornstalks and pasture) and then finished for 3 mo. They were 19 to 20 mo. old when harvested. Both groups were fed to be harvested at a constant fat thickness end point of 0.5 in.

Yearlings had significantly heavier carcasses (828 lb. vs. 696 lb.) and greater ribeye areas (12.6 sq. in. vs. 11.3 sq. in.). There were no significant differences in fat thickness or yield grade. Calf-feds had significantly more marbling and a higher percentage of Choice carcasses than yearlings. Steaks from calves were significantly more tender as measured by shear force after 7, 14 and 21 days of aging. They were also scored higher by a sensory panel for tenderness, juiciness, flavor and overall acceptability after 7 and 14 days of aging.

Based on the shear force data, the probability of a tough steak from calf-feds was only 1.9%, 0.7% and 0.02% after 7, 14 and 21 days of aging, respectively. Yearlings showed a much higher probability of being tough: 29.2%, 11.9% and 4.0% after 7, 14 and 21 days of age, respectively.

(Brewer et al. 2004. *Nebraska Beef Cattle Report* MP 80-A)

