



BEEF CATTLE RESEARCH UPDATE

Britt Hicks, Ph.D.

Area Extension Livestock Specialist

Oklahoma Panhandle Research & Extension Center

October 2007

Effect of Nutritional Status on Carcass Traits

Recent research indicates that variations in nutritional status prior to entering the feedlot may have as much or more effect on performance and carcass characteristics as the nutritional management of the cattle while in the feedlot.^{1,2} This research suggests that marbling development begins early in a calves' life and doesn't occur just in the feedlot. The type of diet (grain vs forage) may affect marbling. High grain (starch) diets appear to result in greater marbling deposition. Two recent University of Illinois studies have looked at the impact of early weaning, creep feeding (grain vs fiber based) and dietary starch levels fed during a feedlot growing period on carcass quality and marbling deposition.

Effects of Weaning Age, Creep Feeding, and Type of Creep on Steer Performance & Carcass Traits:

Recently published Illinois research evaluated the effects of weaning age, creep feeding, and type of creep on the performance and carcass characteristics of feedlot steers.³ In this study, 168 spring-born Angus x Simmental steers were assigned to four different treatments: early weaned and program-fed a high concentrate diet, normal weaned and fed a grain-based creep, early weaned and fed a fiber-based creep, and normal weaned with no creep (control). The calves were weaned at either 63 or 189 days of age. The early weaned steers were program-fed a high-concentrate diet (71% whole shield corn) to gain the same as steers on the two creep-fed treatments from the time of early weaning until normal weaning. The major ingredients in the grain-based creep were corn (26%), soybean hulls (30%) and wheat midds (20%), whereas, the major ingredients in the fiber-based creep were soybean hulls (50%) and wheat midds (32%). Following weaning all calves were fed a high concentrate finishing diet (77% whole shelled corn). Ultrasound was used to determine backfat and predict harvest dates. A target backfat of 0.43 inches was used to sort the steers into two groups. Steers were then harvested at 323 or 349 days on trial (days from early weaning to harvest).

During the finishing phase of this study, no differences in performance between early weaned and normal weaned creep fed steers were observed. For the overall duration of the study, control steers gained less per day (2.82 vs 3.08 lb/day) and required 12 more days to reach harvest than the other three treatments. The early weaned steers had greater marbling scores, a greater percentage of steers grading Average Choice or greater (72.5 vs 39.3%), and a greater percentage of steers grading Low Prime or greater (12.5 vs 2.5%) than creep fed steers. There were no differences in marbling or carcass quality between the two creep fed groups. This result is in contrast with previous Illinois research that showed that creep feed energy source could affect carcass quality even when gains were similar while calves were on creep feed.^{4,5} In this earlier study, nursing crossbred steers were creep fed either cracked corn or ground soybean hulls for 113 days prior to weaning and then fed common diets during a 77 day growing period and 167 day finishing period. During the combined growing/finishing period, source of creep feed did not affect performance. However, calves that were creep fed corn produced carcasses with higher marbling scores resulting in higher quality grades. Perhaps, no differences in carcass quality were observed between steers creep-fed either grain-based or fiber-based feeds in the most recent study because the grain-based creep feed did not contain enough starch to initiate marbling (contained 26% corn).

In summary, these researchers concluded that program-feeding early-weaned steers high-concentrate diets improved carcass quality and marbling deposition compared with creep fed steers. Presumably, this occurred because the early weaned steers were fed high starch diets early in life.

No differences in carcass quality were observed between creep treatments possibly because the grain based creep contained insufficient starch. The control steers produced carcasses of less value than the other treatments (primarily due to 38 lb lighter carcasses).

Effect of Level of Starch in Growing Period on Performance and Carcass Traits of Feedlot Steers:

Additional Illinois research recently determined the effect of level of starch during a growing period on feedlot performance and carcass traits.⁶ In this study, 200 Simmental x Angus steers were early weaned at 65 days of age and after a 57 day adaptation period, randomly assigned to one of four diets during a 105 day growing period. These diets were 1) High Starch (71% corn and 0% soy hulls), 2) Intermediate Starch (47% corn and 23% soy hulls), 3) Low Starch (23% corn and 47% soy hulls), and 4) No Starch (0% corn and 71% soy hulls). These diets were equal in protein content with hay, soybean meal and mineral making up the remainder of the diet. After the growing period, all steers were fed a common finishing diet (83% corn, 10% hay and 4% soybean meal) for 172 days. After 105 days on feed, marbling, back fat thickness, and ribeye area were measured using ultrasound. The steers were slaughtered at 399 days of age and carcass data was collected.

During the growing period, average daily gain and efficiency (gain/feed ratio) decreased linearly as the amount of fiber fed increased. Ultrasonic measurements of marbling, back fat thickness, and ribeye area also linearly decreased as dietary fiber levels increased. During the finishing period, average daily gain and dry matter intake increased linearly as the amount of fiber fed previously increased (compensatory response). Over the overall growing/finishing period, no differences in performance were observed. In addition, no differences in carcass characteristics at harvest were reported. These researchers concluded that feeding higher levels of starch during the growing period increased marbling (measured by ultrasound) but differing rates of gain during the finishing period may have reduced these marbling differences at harvest.

¹ Berger, L. L. and D. B. Faulkner. 2003. Lifetime nutritional effects on feedlot performance and carcass merit. Plains Nutrition Council Spring Conference. Pub. No. AREC 03-13:63-78.

² Smith, S. B. and D. K. Lunt. 2007. Marbling: Management of cattle to maximize the deposition of intramuscular adipose tissue. Plains Nutrition Council Spring Conference Publ. No. AREC 07-20:26-40.

³ Shike, D. W., D. B. Faulkner, M. J. Cecava, D. F. Parrett, and F. A. Ireland. 2007. Effects of weaning age, creep feeding, and type of creep on steer performance, carcass traits, and economics. Prof. Anim. Sci. 23:325-332.

⁴ Faulkner, D. B., D. F. Hummel, D. D. Buskirk, L. L. Berger, D. F. Parrett, and G. F. Cmarik. 1994. Performance and nutrient metabolism by nursing calves supplemented with limited or unlimited corn or soyhulls. J. Anim. Sci. 72:470-477.

⁵ Hummel, D. F., D. B. Faulkner, D. F. Parrett, and D. D. Buskirk. 1991. The effects of corn vs soyhulls limited vs ad libitum intake as a creep supplement on calf performance, subsequent performance during growing and finishing and carcass characteristics. Univ. of Illinois, 1990-91 Beef Res. Rep. and Meeting Proc., pp. 8-12.

⁶ Bedwell, P. S., D. B. Faulkner, D. F. Parrett, L. L. Berger, and F. A. Ireland. 2007. The effect of level of starch in the growing phase on performance and carcass traits. J. Anim. Sci. 85 (Suppl. 2):68 (Abstr.).

Oklahoma State University, U.S. Department of Agriculture, State and Local Governments Cooperating. The Oklahoma Cooperative Extension Service offers its programs to all eligible persons regardless of race, color, national origin, religion, sex, age, disability, or status as a veteran, and is an equal opportunity employer.