BEEF CATTLE RESEARCH UPDATE

Britt Hicks, Ph.D., PAS
Area Extension Livestock Specialist
Oklahoma Panhandle Research & Extension Center

February 2011

Effect of Breed of Sire on Carcass Characteristics of Steers

Recent University of Illinois research determined the effect of sire breed on the carcass characteristics and rates of ultrasound backfat and marbling deposition in finishing steers.[1] This study used a total of 1,256 steers from Angus, Simmental, Simmental X Angus (SA), and 75% Simmental (75S) sires. There were 11 Angus sires with 241 progeny, 32 Simmental sires with 599 progeny, 18 SA sires with 296 progeny, and four 75S sires with 120 progeny. The effect of breed of sire on carcass characteristics of these steer progeny are shown in Table 1. Carcass backfat thickness was greater in the progeny of Angus bulls than in the progeny of bulls with Simmental breeding (0.55 vs. 0.49 in, $P < 0.05$). In addition, steers sired by Angus bulls had the greatest marbling scores ($P < 0.05$). Steers sired by SA bulls had greater marbling scores than steers sired by Simmental or 75S bulls. However, all breeds groups averaged either low or average choice. Steers sired by bulls with Simmental breeding had larger ribeyes ($P < 0.05$). The greatest rate of backfat deposition was observed in the progeny of Angus sires. Steers sired by Angus and SA bulls had the greatest rates of marbling deposition. Numerically steers sired by either Angus or SA bulls had the greatest deposition of marbling per inch of backfat. These researchers concluded that this data suggest that it may be possible to select sires that have a greater rate of marbling per inch of backfat deposition and thus improve both quality grade and yield grade.

Table 1. Effect of breed of sire on carcass characteristics.

	Breed of Sire				
Item	Angus	Simmental	Simmental-Angus	75% Simmental	P-value
Carcass Characteristics					
Backfat, in	0.55^{a}	0.48^{d}	0.51^{bc}	0.49^{cd}	0.01
Marbling Score*	584^{a}	543^{c}	568^{b}	543^{c}	0.01
Ribeye Area, in^2	13.59^{b}	14.25^{a}	14.31^{a}	14.24^{a}	0.01
Calculated Yield Grade	3.31^{a}	2.77^{b}	2.83^{b}	2.88^{b}	0.01
Rate of Ultrasonic Measurement					
Backfat rate, in/day	0.0036^{a}	0.0026^{c}	0.0029^{b}	0.0030^{b}	<0.01
Marbling rate, 1/100 marbling score units per day	1.16^{a}	0.91^{b}	1.14^{a}	0.93^{b}	0.03
Marbling/backfat rate, 100 marbling score units/in backfat	526	462	587	414	0.69

$^{a-d}$Superscripts with different letter differ ($P \leq 0.05$).
*Marbling score: 500 = Small^{0}, 600 = Modest^{0}.
Adapted from Trejo et al., 2010.

Effect of Liver Abnormalities on Carcass Merit

Liver abnormalities pose a significant economic liability to the cattle feeding and beef processing industries.[2] Research has shown that severe liver abscesses in feedlot cattle can reduce daily gains by up to 5.2% and reduce dressing percent by up to 1.7 percentage units.[3,4,5,6] However, data evaluating the influence of liver abnormalities upon carcass characteristics is minimal and the relationship with economic carcass performance has not been established in previous studies. For this reason, recent West Texas A&M University research further evaluated the association of liver abnormalities with carcass characteristics the association of liver abnormalities with carcass value.[2]

These researchers evaluated data collected by the Beef Carcass Research Center at West Texas A&M University on 76,191 carcasses from two databases. Database 1 (3,936 carcasses) included data collected in years 2005 to 2009. Cattle in this database did not receive anaphylactic treatment (tylosin) for liver abscesses. These data represented 6 feedlots and 14 independent harvest dates. Database 2 (72,255 carcasses) included data collected in years 1998 to 2009. No information on the dietary regimen was available for this database, but it was presumed that most of the cattle may have been fed antimicrobials to minimize liver

abscess damage. These data represented 55 feedlots and 200 independent harvest dates. In both databases, liver abnormalities were assigned as follows: normal = edible liver; A– = 1 to 2 small abscesses or inactive scars; A = 1 to 2 large abscesses or multiple small abscesses; A+ = multiple large abscesses; A+AD = liver adhered to gastrointestinal tract or diaphragm or both; A+OP = open liver abscess; cirrhosis; distoma (liver flukes); and telangiectasis.[2]

These researchers reported that there were 53.2 and 81.9% normal livers in databases 1 and 2, respectively. Rates of liver abscesses from database 1 were more than triple those of database 2 (42.8 vs. 12.2%). It was noted that more than likely this occurred because the cattle in database 1 did not receive anaphylactic treatment for liver abscesses, whereas those in database 2 probably did. The authors also suggested that data from database 1 may be indicative of the rate of liver abscesses that can be expected from cattle fed high energy rations under all-natural or organic marketing programs in which diets are absent antimicrobials.

In database 1, dressing percentages for carcasses with liver abnormalities were 0.28 to 0.89 percentage points less ($P < 0.05$) than for carcasses with normal livers. The presence of severe liver abscesses (A+) reduced dressing percent by 0.51 percentage units which is similar to that observed in previous research. In database 2, the presence of liver abnormalities reduced hot carcass weight by up to 71 lbs ($P < 0.05$), ribeye area by up to 1.1 in^2 ($P < 0.05$), and fat thickness by up to 0.09 inches ($P < 0.05$). As a result of these changes, calculated yield grade was reduced by up 0.22 units ($P < 0.05$) in carcasses with liver abnormalities. The only carcasses that had significantly reduced marbling score ($P < 0.05$) compared with normal carcasses were those that had livers with A+AD or A+OP abscess scores or distoma.

These researchers noted that the 18.1% incidence rates of liver abnormalities observed in database 2 pose a major economic loss to the beef processing industry. Based on this incidence rate of liver abnormalities and an average of 26,984,200 finished steers and heifers slaughtered annually in federally inspected plants in the United States, it was suggested that liver abnormalities pose an annual economic loss of $15,873,456 simply in unrealized liver value. The individual carcasses in this database were assigned carcass values ($/cwt) using data from the USDA Agricultural Marketing Service weekly beef carcass reports from 1998 to 2009 taking into account carcass weights discounts and quality and yield grade premiums and discounts. No difference ($P = 0.32$) in market price was detected between carcasses with normal livers and those with liver abnormalities. However, gross carcass value was up to $88 less ($P < 0.05$) for carcasses with liver abnormalities due to their lighter carcass weight. This data illustrates that cattle feeders can maximize value opportunities by implementing technologies to minimize liver abscesses and liver parasites.

---

[1] Trejo, C. O., D. B. Faulkner, A. Shreck, J. W. Homm, T. G. Nash, S. L. Rodriguez-Zas, and L. L. Berger. 2010. Effects of co-products and breed of sire on the performance, carcass characteristics, and rates of ultrasound backfat and marbling deposition in feedlot cattle Prof. Anim. Sci. 26:620-630.

[2] Brown, T. R., and T. E. Lawrence. 2010. Association of liver abnormalities with carcass grading performance and value. J. Anim. Sci. 88:4037-4043.

[3] Rust, S. R., F. N. Owens, and D. R. Gill. 1980. Liver abscesses and feedlot performance. Okla. Agr. Exp. Sta. Res. Rep. MP-107:148-150. Available at: http://www.beefextension.com/research_reports/1980rr/80-36.pdf.

[4] Shin, I. S., F. N. Owens, and D. R. Gill. 1988. Liver abscesses in feedlot cattle. Okla. Agr. Exp. Sta. Res. Rep. MP-125:204-207. Available at: http://www.beefextension.com/research_reports/1988rr/88-44.pdf.

[5] Brink, D. R., S. R. Lowry, R. A. Stock, and J. C. Parrott. 1990. Severity of liver abscesses and efficiency of feed utilization of feedlot cattle. J. Anim. Sci. 68:1201-1207.

[6] Bartle, S. J., and R. L. Preston. 1991. Effects of liver abscesses on steer performance and carcass characteristics. Anim. Sci. Res. Rep., Texas Tech Univ. Agric. Sci. Tech. Rep. No. T-5-297:57-58.