

SIRE DIFFERENCES FOR CARCASS MEASURES IN A MATERNAL/TERMINAL CROSS BREEDING SYSTEM

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Summary

Four hundred and thirteen Angus- and Simmental-sired steer calves from the University of Guelph's Maternal/ Terminal line project were finished on a high moisture corn diet at the Elora Beef Research Centre. Steers were either backgrounded on silage (either alfalfa or corn) before finishing or placed directly on the grain diet after weaning.

Results from the three maternal calf crops in the project demonstrated considerable variation in carcass traits of progeny from sires used. Carcass weights averaged 352 kg (775 lbs) across 25 sires with considerable variation among sires. Marbling also varied extensively across sires, even though all steers were marketed as close as possible to the same level of finish (to produce a Yield Grade 1 carcass).

Introduction

A major beef research project has been established through the co-operation of Agriculture and Agri-Food Canada (AAFC) at Kapuskasing, the New Liskeard Agricultural Research Station (NLARS) and the Elora Beef Research Centre (EBRC). The project includes the development of a "maternal" crossbred cow population, with part of the cow herd to be bred to "terminal" sires. The maternal cross was designed as basically an Angus and Simmental rotational cross because of their maternal ability. A feature of this development on the carcass side is that market cattle produced would be either of the "maternal" lines or maternal-terminal crosses. It was expected that market animals from the maternal lines would have lighter carcass weights, lower muscling and higher marbling than those from the maternal-terminal cross. In addition, it was expected that sires being used would vary for these traits. The purpose of this paper is to describe the market traits (carcass weight, rib-

eye area and marbling) of the maternal crosses and the sire differences found. Subsequent papers will report differences between maternal and maternal-terminal crosses, as well as nutritional effects.

Materials and Methods

Steer calves born from the maternal line cross in 1996 (F calves), 1997 (G calves) and 1998 (H calves) at the three centres were placed into the EBRC feedlot after weaning. The steers as produced through the rotational cross were Angus-sired from mainly Simmental-sired dams, and Simmental-sired from mainly Angus-sired dams. The F and G calves were fed one of three diets: 1) high grain from starting on feed to finish; 2) haylage for 112 days and then grain to finish; and 3) haylage for 112 days followed by pasture and then high grain to finish. The H calves were fed one of four diets - high grain from starting on feed to finish; or one of three types of corn silage for 112 days followed by high grain.

There were 413 calves fed, sired by 25 sires. All calves were shipped to the University of Guelph's Meat Laboratory once they reached a standard level of backfat as evaluated by ultrasound (a target of 7 mm).

The model used for the statistical analyses included the population average for the traits, year, management treatments (within year), sire and grade fat (as a covariate). Marbling scores were based on scores of 0 for B1, 1 for A, 2 for AA, 3 for AAA and 4 for Prime. Rib-eye area was also analyzed considering carcass weight (as a covariate) to get a measure of muscling.

Results and Discussion

Carcass weight, rib-eye area and marbling

Table 1 shows the averages for the three calf crops. Under the average feeding program in this trial, the average carcass weights of 352 kg (approximately 775 lbs) were above what is often considered as a desirable carcass weight for the restaurant trade (320 kg or 700 lbs). The average rib-eye area of 84 sq cm (13 sq in) is at the upper end of preferred rib-eye areas of 11 to 14 sq in. At the same time, marbling scores averaged between AA and AAA. There were 1 B1, 53 A, 221 AA, 157 AAA and 1 Prime (33% AAA or better). Heavier carcasses and larger rib-eye areas can be partially explained by the fact that steers were fed somewhat longer than planned, reaching 9 mm of backfat thickness rather than the planned 7 mm. Nutritional effects could modify the results as well, and these will be discussed in subsequent reports.

Breeds are known to affect carcass traits and the simple averages reported related to the use of Angus and Simmental sires in rotation. With this mating system, calves ranged from 25 to 75% British breeding. There was a difference of 12 kg in the carcass weights of calves that had Angus sires and Simmental maternal grandsires, compared with Simmental sires and Angus maternal grandsires.

Sires within breed are also known to influence traits. There were large differences in sire effects for all traits (Table 2). The range in sire effects on carcass weights was 42 kg (92 lbs) for the Angus sires and 34 kg (75 lbs) for the Simmental sires. There were similar large ranges for rib-eye area, associated with size of the carcasses. The range in marbling scores confirms that there are, in fact, differences in marbling from sire to sire, even when progeny are finished to the same extent (9 mm of backfat in this

case). The range in sire effects for marbling covers over half a grade, and choice of sire can be seen to be an important factor in determining the percent of carcasses grading AAA for example. Rib-eye area adjusted for carcass weight is a measure of muscling and the results show that, for these two breeds, there is a considerable range of muscling as well.

Conclusions

The crossbreeding system developed was partially effective in creating a highly-marbled product at a moderate weight. Sire effects were shown to be important for marbling at a common finish, as well as for carcass weight, rib-eye area and muscling. The information obtained will be useful in refining breeding programs (choices of breeds or composites, as well as individual sires) and feeding programs as necessary to produce carcasses which would meet consumer demand.

Significance to the Industry

The beef industry is competing for market share. Identifying diet and nutritional management programs, and breeds and sires which produce products destined to target markets can help the beef industry maintain or increase market share by producing a desirable product for the consumer.

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Table 1. Simple average and standard deviations (SD) of carcass traits (n=413).

Trait	Average	SD
Carcass weight (kg)	352	57
Grade fat (mm)	9.2	2.1
Rib-eye area (cm ²)	84	12
Marbling score (pt) ^a	2.2	0.7

^a Marbling score was 0 = B1, 1 = A, 2 = AA, 3 = AAA, 4 = Prime

Table 2. Ranges of sire effects within breed of sire adjusted to the same backfat thickness.

Trait	Angus-sired		Simmental-sired	
	Low	High	Low	High
Carcass weight (kg)	-23	19	-14	20
Rib-eye area (cm ²)	-4.5	4.1	-2.2	6.5
Marbling score (pt)	-0.2	0.26	-0.23	0.29
Rib-eye area (cm ²) adjusted for carcass weight as well	-4.8	6.9	-3.5	3.5