

Interaction between treatments (method of boning and method of curing) proved insignificant. Therefore, the insignificant effect observed on yield of corned beef due to curing method was not dependent on the boning treatment but was constant in both the hot and cold boning treatments.

### Literature Cited

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# Myofiber Width as Influenced by Breed Type in Baby and Weanling Beef Calves

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### Story in Brief

Myofiber widths were measured in three muscles of Angus and Charolais calves at approximately 25 and 240 days of age. Data showed that at 25 days of age, in all muscles, Angus calves had larger fiber diameters than Charolais. The increase in myofiber size at 240 days was not constant for all muscles examined. When the results were expressed as a percentage of initial myofiber widths, the 240-day fiber measurements suggested that radial growth rate in the ST and TBL muscles of Angus calves was greater than that of the Charolais. The increase in percent radial growth of the LD muscle, however, was approximately the same for both breeds.

Based on the percentage of myofiber width increase, it appeared that the ST and TBL muscles of Angus calves matured at a more rapid rate than those of Charolais calves, while the LD muscle seemed to mature at approximately the same rate in both breeds. These results would support the theory that Angus cattle mature more rapidly than Charolais cattle and could, in part, explain the muscling differences observed between these two breed types throughout development.

### Introduction

Of primary importance in beef production is the ability to promote muscle development in the live animal for its subsequent conversion to meat in the carcass. In an effort to determine causes of gross muscle size differences in different breed types of cattle, myofiber widths were measured in several muscles of Angus and Charolais calves at two stages of development. These two breed types mature at different rates, and thus expression of muscling at a constant age is affected. To follow the influence of

breed type on changes in the expression of muscling, Angus and Charolais cattle were examined for myofiber width accretion at two stages of growth, shortly after birth and at weaning.

## Materials and Methods

For this investigation, three Angus and three Charolais calves approximately 25 days old, and six Angus and six Charolais calves approximately 240 days old were used. The weaned calves (240 days old) were from the same herds and calving groups as their 25-day-old counterparts.

Within 30 minutes post exsanguination, the Longissimus dorsi (a section from the 12th rib to the fourth lumbar vertebra) (LD), the Semitendinosus (ST), and the Triceps brachii-lateral head (TBL) were removed, trimmed of external fat, wrapped in aluminum foil, frozen in liquid nitrogen and stored at negative 20°C until analyzed.

Determination of myofiber width involved cross sectioning muscles at 50 percent of their length and removing a transverse section approximately 1 cm wide. The section was visually divided into quadrants, and a 1/4-inch diameter core was removed from each of two randomly selected quadrants. The cores were fixed in 10 percent buffered formalin solution and disrupted in a Waring blender equipped with inverted blades. Twenty-five fibers from each core were measured under a light microscope fitted with an ocular micrometer.

## Results and Discussion

Data in Table 1 show that at 25 days of age, in each muscle examined, Angus calves had larger myofiber widths than Charolais. Thus, even though the Charolais were generally larger and had more total muscle at this young age, they had smaller myofibers. This indicated that the Charolais must have had a greater number of smaller myofibers in order to express the amount of muscling observed. (This theory was supported by myofiber enumeration data from our laboratory.)

Data at 240 days of age indicate that myofibers in all muscles of both breeds increased in radial growth from 25 to 240 days; however, the increase was not constant for all muscles. When expressed as a percentage of initial widths, the 240-day widths showed that radial growth in the ST (70.4 vs 57.6 percent, Angus vs Charolais) and

**Table 1. Effect of breed on myofiber width in LD, ST and TBL muscles.**

Muscle	Breed	Myofiber width	
		25 days <sup>a</sup>	240 days <sup>b</sup>
LD	Angus	33.8 <sup>c</sup>	55.6
	Charolais	29.7	50.3
ST	Angus	33.0	46.9
	Charolais	30.0	52.1
TBL	Angus	34.0	53.6
	Charolais	29.3	52.0

<sup>a</sup>Mean of 300 observations.

<sup>b</sup>Mean of 600 observations.

<sup>c</sup>Data expressed in microns.

TBL (63.4 vs 56.3 percent, Angus vs Charolais) muscles increased at a faster rate in the Angus calves than in the Charolais. Increase in percentage radial growth of the LD muscle was approximately the same for both breeds (60.8 vs 59.0 percent, Angus vs Charolais).

Within each breed, the three muscles examined had similar myofiber widths at 25 days. At 240 days, again the Charolais had similar myofiber widths for all muscles; however, the Angus calves showed more variation. In Charolais calves at 25 days, the average myofiber widths for the three muscles varied by only  $0.7\mu$ , but at 240 days this variation was increased to  $1.8\mu$ . In the Angus calves, the average myofiber widths varied  $1.0\mu$  at 25 days and  $8.7\mu$  at 240 days. These differences between the individual fiber widths of the muscles of the two breeds at 240 days might have been the result of differences in relative maturity of the individual muscles of the two breeds at that stage of growth. Since, as shown above, the ST and TBL muscles of Angus calves increased in width by a much larger percentage of their initial size than their Charolais counterparts, it was possible that these two muscles of the Angus calves were maturing more rapidly than the ST and TBL of the Charolais. This would be congruent with the theory that Angus calves mature more rapidly than Charolais and that muscle maturation proceeds dorsally in the limbs with the latest maturing muscles located in the thoracio-lumbar region. LD samples for this study were taken from this region and showed the least myofiber growth as a percentage of initial size of the three muscles. In fact, as previously stated, the LD of the 240-day-old Angus calves did not differ appreciably from the LD of the Charolais in percentage growth of myofibers. In accordance with the theory of muscle maturation, this section of the LD would be the latest to mature, which was what appeared to have occurred in the present study.

In comparing the 240-day results, it was noted that the Charolais calves did not follow the same trend as did the Angus in percent myofiber width increase. If, however, the Charolais were slower maturing cattle, as theorized, then perhaps they had not yet reached a stage where individual muscles would mature at different rates, and thus did not show the same magnitude of percent myofiber size increase as the Angus calves.

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