



Beef Logic

► by R.A. "Bob" Long

Muscle

The muscle from cattle is termed beef, and beef is widely recognized as a prestigious, nutritious, healthful, good-tasting and satisfying food. Heavily muscled cattle (high muscle-to-bone ratio) yield a higher percentage of edible portion than do lighter-muscled ones. Therefore, among carcasses of acceptable weight and equal quality, the heavier-muscled ones are more desirable and bring more money in the marketplace.

Not double muscling

The majority of beef cattle breeders, both seedstock and commercial, associate heavy muscling with increased calving problems, reduced fertility and marbling. This is unfortunate, since there is no research data to support this dread of heavy muscling.

The breeder's tendency to resist selection for muscle may well be due to a combination of two factors — the gene for double muscling (muscular hypertrophy) and the introduction of the Continental breeds to the United States in the late 1960s and 1970s.

Double-muscled cattle are very heavily muscled with practically no fat deposits. There is reduced fertility in both sexes, serious calving problems occur and the meat is devoid of marbling. Obviously, these faults cannot be tolerated.

However, if the gene for double muscling does not exist in a herd or breed, selection for muscling does not result in its appearance. Muscle-to-bone ratio is a heritable trait. Therefore, selection for muscle, in populations free of the double-muscled gene, increases muscle, but without the faults found in double-muscled cattle.

Muscling got a bad rap

When the Continental breeds were introduced into this country they were, in general, heavier-muscled and larger at maturity than U.S. cattle. Their use in commercial herds resulted in calving problems, and this caused American

cattlemen to regard all heavily muscled cattle as dangerous.

Further, the majority of these cattle did not marble as well as the Angus and Shorthorn breeds, so the heavy muscling was blamed for the lack of marbling.

The degree of muscling does not determine the amount of marbling. For example, the Braunvieh is at least one Continental breed that is heavily muscled yet marbles very well, while Hereford cattle have a marbling problem and are not heavily muscled.

Complete selection profile

It seems logical then, that a breed of beef cattle can be fertile, easy-calving, fast-growing, heavily muscled and well-marbled. How? A balanced selection program based on complete, accurate performance and body composition data is the answer.

Finally, research data supports this possibility. W.A. McKiernan and co-workers at the Elizabeth Macarthur Agricultural Institute in New South Wales, Australia, initiated a beef cattle muscle selection study in 1990. Stage 1 involved the random selection of 300 head of Hereford cows, which were randomly divided into two groups. One group was mated with heavy-muscled Angus bulls, and the other with light-muscled Angus bulls. The degree of muscling of these sires was determined by both a visual muscle score and an ultrasound of the ribeye area.

In 1996 the data on some 500 head of progeny were summarized, revealing no differences in calving difficulty, birth weight or growth rate to weaning, harvest or maturity. The progeny of the high-muscle

bulls were significantly ($P < 0.01$) higher in muscle score and ribeye area at every age. Further, the progeny of the high-muscle sires were slightly, but consistently, smaller in height at the hips, carried less fat at the 10th rib, had less total fat, more meat in the hindquarter and a higher carcass value.

Stage 2 was initiated in 1996 by selecting 70 head of the heaviest-muscled heifers sired by heavy-muscled bulls and 70 head of the lightest-muscled heifers sired by light-muscled sires. These F_1 (Angus \times Hereford) females were then mated to Angus bulls. The high-muscled heifers were bred to heavy-muscled Angus bulls and the light-muscled heifers to light-muscled Angus.

A recent progress report for Stage 2 involves 448 progeny. This report by McKiernan states, "Cow fertility is not affected and weaning weights (an indicator of milk production) are the same between the muscle lines — indicating that selection for muscle so far has not impacted on cow productivity."

In the F_2 progeny the high-muscled cattle were significantly lighter at birth [72.1 pounds (lb.) vs. 74.6 lb.]. The carcasses had equal marbling; but, as in Stage 1, the high-muscle line had larger ribeyes and less fat and by a greater margin. This shows the importance of selecting for muscle on both sides of the pedigree and points out the fallacy of selecting females with light muscling in the belief that it indicates fertility and milking ability.

In his paper McKiernan says, "If we wish to make a substantial change in muscularity, then selection for muscularity in the females must occur. Traditionally, beef producers have emphasized the visual appeal of females for perceived maternal characteristics such as fertility and milking ability. These results suggest that this emphasis has in fact been detrimental to progress in increasing the meat yield potential of cattle. Selection for measured maternal characteristics such as number pregnant and calf weaning weight is not questioned. What is questioned is the overemphasis on visual characteristics, which are used as associated selection criteria."

This is McKiernan's way of suggesting that it is better to use performance records rather than thin necks, angularity and

CONTINUED ON PAGE 358

Selection for muscle, in populations free of the double-muscled gene, increases muscle, but without the faults found in double-muscled cattle.

■ BEEF LOGIC

CONTINUED FROM PAGE 108

refinement when selecting replacement females.

Economics

Finally, these Australian workers speak of the economic impact of selection for muscling. At their prices they calculate that selection for muscling in herd bulls made them \$20 per steer in the F₁ generation and \$63 per steer in the F₂s, where selection for

muscling was on the cow side as well. This increase in value was without loss in cow productivity and required no additional inputs in feed, labor or land costs. The only requirement is the selection of breeding stock with more muscle (higher muscle-to-bone ratio).

Caution: Accurate selection for muscularity is a must. Wide, thick-topped cattle are fat cattle, not heavily muscled cattle. Further, an ultrasound of ribeye area is only of value when used as ribeye area per unit of body weight. Finally, avoid development in the lower one-third of the body. It is simply waste.

Crossing with a heavily muscled animal of another breed will also improve cutability or improve meat yield, but this can introduce genetic material inferior in reproductive efficiency, marbling, etc. The selection program must include reproductive efficiency, growth rate and all carcass characteristics.



E-MAIL: bblong@net-magic.net