

Performance Report

by John Crouch, director of performance programs



Beef Tenderness Not the Mystery That Some Believe

A preacher I know says he can find a Bible verse to support about any moral point of view. The catch, depending upon what you want to prove, is you might have to stand on the one verse and ignore all the rest of what is written on the subject.

I never put him to the test, but I know what he means. On a completely different subject, I can cite research to prove about any point of view on the relationship between beef marbling and tenderness. If you read all the research that has been done, however, it's difficult to come to but one conclusion — the two are tied closely together.

Those who believe there is no significant relationship between marbling and tenderness quote a single U.S. Meat Animal Research Center (MARC) research project citing a low correlation between marbling and tenderness. It's valid research, but it's only one verse out of the big research book.

Four research projects, three of which were conducted at the MARC and one at Oklahoma State University in 1992, 1994 and 1995, show a strong correlation

between tenderness and marbling. Furthermore, the research at least suggests heritabilities and genetic correlations may not be the same for all breeds and classes of cattle. This could possibly explain the results of the single research project that seems to be at odds with the other four.

To briefly summarize, the four research projects demonstrate heritability of tenderness is moderately low, and heritability of marbling is moderately high. The genetic correlation between marbling and tenderness is also moderately high. Therefore if cattle producers select for marbling, tenderness will also improve. This is especially significant because it appears there are few antagonistic genetic relationships that exist between carcass traits and other production traits of economic merit.

Scientific cattle research aside, the market is calling for carcasses with more marbling in order to satisfy consumer demand. Consumers don't read college research. But they are telling cattle producers that well marbled beef is more

tasty and tender and they want more of it than the industry is supplying.

We at the American Angus Association know there are not enough cattle to supply the demand for lean beef that grades average Choice or higher. But it is not just the American Angus Association and our Certified Angus Beef Program that needs more high quality cattle to produce lean, well marbled carcasses.

A recent article in *Cattle Buyers Weekly* reported that SYSCO, which sells Supreme Angus Beef, with marbling in the upper two-thirds of the USDA Choice grade, could boost annual sales from 12 million pounds to as much as 20 million pounds if they could get the beef.

The National Beef Quality Audit also showed that there is a market for more higher quality beef than is being produced. Essentially they recommend the percentage of Choice be increased from 53 percent to 64 percent of total beef produced, and Prime production should be boosted from 2.3 percent to 7 percent. Only 29 percent should be Select compared to nearly 37 percent available today, and the 8 percent Standard and lower grades should be eliminated.

I'm not arguing that we know everything we need to know about beef tenderness. That is obvious. What we must do as an industry, however, is first accept the fact that we are producing a lot of the wrong kind of cattle. Furthermore, these cattle are wrong for the long range future of our business.

Starting today we should use all the information we have available to speed improvement.

We can't wait and hope for some new development to save us. Until something better comes along, we can select for marbling and improve beef tenderness at the same time. Industry-wide application of this genetic fact would help us dramatically improve consumer acceptance of beef.



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Research Supports Correlation Between Marbling, Tenderness

The genetic correlation between marbling and beef tenderness is supported by four recent research projects. Three were conducted by MARC scientists and the other by Oklahoma State University researchers.

Readers need to understand a few terms before reviewing the results of the research. Following are the definitions and the summary of the four research projects:

- **Tenderness:** The difficulty or ease a trained taste panel has in chewing a portion of steak. The genetic component involves the animal's ability to marble, level of calpastatin or enzyme activity, and the amount and kind of connective tissue; whereas the environmental component involves cooking techniques and the amount of aging to which the carcass has been subjected.
- **Shear Force:** Machine measured pressure required to force a shaft through a portion of cooked steak.
- **Heritability:** That portion of a trait passed from parent to offspring.
- **Marbling** The amount of fat interspersed with the lean in the ribeye muscle. The genetic component involves the steer's genetic ability to marble plus the environmental component involving how he was fed and handled.
- **Correlation:** The relationship between two traits. The range in correlations is from -1.0 to +1.0 with zero meaning no relationship and 1.0 depicting a perfect relationship.
 - a. Genetic Correlation: The genetic relationship between the genetic components of marbling and tenderness.
 - b. Phenotypic Relationship: The sum of the relationship between the total components both genetic and environmental, between marbling and tenderness.

Research Summary

Gregory et al. *J. Anim Sci* 1994, reports a genetic correlation between shear force and marbling of -1.00 (which means as marbling increases the amount of force required to shear meat decreases) and a genetic correlation between tenderness and shear force of .98.

This same study shows tenderness to have a heritability of .21 and shear force .12. The heritability of marbling, however, is cited at .52 and the genetic correlation between tenderness and marbling is given as .34

Van Vleck et al. *J. Anim Sci* 1992, found the genetic correlation between marbling and shear force to be -.53 and the genetic correlation between tenderness and shear force to be -.96. The heritabilities were listed as .10 for tenderness and .09 for shear force. The heritability for marbling was .45 and the genetic correlation between marbling and tenderness was .74

Gregory et al. *J. Anim Sci* 1995, almost the same genetic relationships as Van Vleck. Interestingly, Gregory observed variations in heritabilities for tenderness of .12 for purebreds and .51 for composites. These data suggest that perhaps heritabilities and genetic correlations may not be the same for all breeds and classes of cattle.

Mays et al. *J. Anim Sci* 1992, reported correlations of -.61 between marbling score and shear force and .51 between marbling score and tenderness.