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Abstract

The beef carcass quality grading system currently used has been challenged by many who say current standards are too high and that the amount of marbling to attain a given grade should be decreased.

Keywords

Cattlemen's Day, 1968; Report of progress (Kansas State University. Agricultural Experiment Station); 518; Beef; Marbling; Maturity; Tenderness

The Influence of Marbling and Maturity on Beef Tenderness

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The beef carcass quality grading system currently used has been challenged by many who say current standards are too high and that the amount of marbling to attain a given grade should be decreased.

This study attempted to determine the importance of marbling and maturity on beef tenderness; those two major factors in determining quality grades. Current grade standards state that "to stay within a given grade, marbling must increase as maturity advances." For example, a small amount of marbling is necessary for A carcasses (young) to grade choice, a modest amount of marbling is nesessary for B (older than A) carcasses to grade choice.

The longissimus (ribeye) muscle from both wholesale rib cuts of 60 steer carcasses was used to study tissues and chemical and tenderness traits. Three maturity groups (A=youngest; A-B=intermediate; B=most mature for choice grade) and two marbling levels (small and moderate) were used.

Steaks from moderately marbled carcasses (upper half of choice grade) were more tender than steaks from the small marbled carcasses (high good - low choice grade). Tenderness

is only one of three eating characteristics important to the consumer. The flavor and juiciness, the other two, were not considered; however, others have shown that higher marbling (for example moderate) produces juicier and more flavorful steaks and roasts than lower levels and lower quality grades. That is why many chain stores and others use average choice or better as their minimum quality standard.

Our results indicated that maturity may not be as important as once thought. No tenderness differences were noted between most youthful, (A) and most mature, (B) steaks from carcasses within the choice grade. This is contrary to Federal Grade Standards and early research; but it has been substantiated by others (Field et al, Wyoming, Romans et al, South Dakota and McBee et al, West Virginia). That maturity differences may not be so great as once thought is reasonable because nutrition and management systems have changed and younger animals now are marketed at weights similar to those of older animals in the past.

Persons in industry have thought that there may be differences in marbling between the right and left sides of an animal. However, we found no side differences for ether extract content, which is an indication of marbling.

Muscle fiber diameter was greater for moderate than for small marbled steaks and increased with maturity. Despite those differences, fiber diameter was not related to tenderness. Waviness of muscle fibers has been used as an indicator of muscle contraction and tenderness. Wavy fibers are more contracted so muscles with more wavy fibers are less tender. The correlation between shear values and waviness was 0.45, which indicates that 20% of the variation in tenderness can be accounted for by fiber waviness.

Summary

Marbling influenced tenderness more than did maturity and there was no indication that marbling requirements for "choice" beef should be lowered. There are some indications that some of the histological traits of beef muscle might be useful to predict eating characteristics in carcasses and eventually in animal on-hoof.

Influence of Marbling and
Maturity on Shear Force Values*

Maturity	A (Youthful)	AB (Intermediate)	B (More Mature)
	18.08	18.32	17.79

Marbling	Small	Moderate
	18.45	17.66

* The lower the value, the more tender.