Cattle Health and Behavior can Effect Muscle Tenderness

The eating quality of beef is determined by a variety of factors. While flavor and juiciness are important, they are not too difficult to control, and unless we do something grossly wrong, they are generally going to be in the acceptable range. However, tenderness is another story. A large number of factors can affect tenderness and even though we think we are doing everything correctly, we can still end up with a product unacceptable in tenderness. Factors which may influence tenderness include genetics, nutrition, animal age, postmortem chilling, carcass suspension, aging and, perhaps most importantly, cookery. With all these variables, it makes tenderness hard to predict and control.

And to make it even more complicated, recent research has added a couple of new variables. We all know that taking good care of our livestock is beneficial because healthy animals grow faster and more efficiently. The benefits of healthy livestock also show up in improved carcass characteristics. Recently, Brown and Lawrence (2010) compiled data collected on 75,000+ cattle over several years to compare the effects of liver damage on carcass dressing percentage, marbling score, ribeye area and gross carcass value. In cattle treated to control liver abscesses, 82% of the livers were normal vs only 53% of the livers from untreated cattle. Carcasses with abnormal livers had lower live weights, lower carcass weights and lower dressing percentages. Additionally, abnormal livers caused smaller ribeye areas and less subcutaneous and kidney, pelvic and heart fat. Marbling and quality grade was also reduced in carcasses with abnormal livers. The net effect was a reduction in gross carcass value. Depending on the severity of the liver damage, gross carcass value was reduced by more than $80. The total value of condemned liver and other tissue is estimated to be more than $22 million per year. While these researchers did not make direct measurements of tenderness, it is likely the compromised health and decrease in quality grade corresponded to a decrease in tenderness.

Gruber et al (2010) from Colorado State University evaluated behavioral and physiological characteristics of cattle under pre-slaughter stress to ultimate tenderness of beef muscle. They measured heart rate, respiration rate, body temperature and various blood parameters of cattle being pushed through alleys, chutes and transportation to slaughter. Not surprisingly, cattle which showed acute stress when going through alleys and working chutes had increased body temperature, increased heart rate, and increased plasma concentrations of epinephrine, creatine kinase and lactic acid. These animals also produced steaks with higher shear force values. Visual appraisal and placing of animals into one of three categories; calm, restless or nervous, showed that animals exhibiting the most adverse behavior had the highest heart rate, temperature and plasma lactate concentration. They also produced steaks with higher shear force than animals that remained in the calm or restless categories. None of the animals were under enough stress to become dark cutters and the muscle pH was very similar for all behavior groups. Aging of beef, either in
the hanging carcass or in the vacuum bag, is often used to ensure tenderness. However, in this research, the increased toughness was still present even after 14 days of postmortem aging.

Those old bossy cows may be doing us more harm than the occasional chase around the corral. If their offspring have a bad attitude, or they cause all the other cattle to be skittish, it could have an effect on tenderness. The same can be said for liver flukes and anything else which compromises the liver.


**Upcoming Event**

50th Annual Performance Tested Bull Sale  
Friday, March 18, 2011  
Ag Science Center – Tucumcari, NM

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