# Catering to Beef Consumers

## Researchers work to perfect tenderness predictions.

by Barb Baylor Anderson

Consumers want tender beef, and the beef industry has worked for years to increase tenderness through genetic selection and other methods. Yet, no quick method exists for beef producers to predict how tender meat will be from any given cow.

Researchers at the University of Missouri-Columbia hope to change that. Sheila Grant, assistant professor of biological engineering, and Carol Lorenzen, associate professor of meat science, are working with other Missouri researchers to develop such a method.

"Tenderness is one of the most important palatability characteristics influencing a consumer's eating experience, and consumers are willing to pay more for meat that is guaranteed-tender," Grant says. "We are developing an instrumental tenderness detection system that could be installed in a commercial setting and correctly sort carcasses into categories and provide the ability to market guaranteed-tender meat."

### Giving a guarantee

The system involves a biosensor that uses fluorescence resonance energy transfer to measure interactions between proteins in meat. The protein calpastatin regulates meat tenderness by binding to and inhibiting the protein calpain, which is responsible for breaking down the tissue structure. Once perfected, Grant says the biosensor will be able to accurately detect calpastatin levels in meat with a response time of about five minutes, rather than the current time of up to three days. The technology will be for carcass use only.

"The ability to accurately predict calpastatin concentration at the time of grading would lead to a more accurate assessment of the overall palatability of beef when it reaches consumers," Lorenzen says. "Use of the sensor to guarantee tender meat could help the industry recapture millions of dollars that are lost annually due to inadequate gauging."

The researchers tested the biosensor in processed beef and say the next step is to test it in unprocessed beef, which could happen as early as this year.

"One of our goals is to make the biosensor user-friendly. Some improvements are needed in order to make it user-friendly to nontechnical personnel," Lorenzen says. "Once our test protocol is optimized, our method will be much less time-consuming than current methods, but it is still too difficult to assess what this process will cost."

The research pair hopes within the next five years to have an instrument capable of "in-plant" testing. "The long-range goal is to have an instrumental tenderness detection system that can be used as part of a value-based marketing system for beef," Grant says.

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## Getting tough on tenderness

Work completed through the beef checkoff program confirms tenderness is the single-most important factor in determining consumer eating experiences. And, checkoff-funded surveys show beef tenderness has improved more than 20% since 1990, confirming beef producers are probably on the right path.

The Cattlemen's Beef Promotion and Research Board (CBB) announced last year that consumer demand for beef jumped sharply in 2004, with the Beef Demand Index up 7.74% compared to 2003, and more than 25% since reversing a 20-year decline in 1998. The index reflects such specific factors as per capita consumption and consumer spending, and is calculated from formulas developed and monitored by Wayne Purcell at Virginia Tech University.

The checkoff's beef tenderness study in 1999 also found that, except for the tenderloin, significant variation in tenderness existed among beef cuts. As part of the study, Colorado State University researchers were asked to assess the value of tenderness. The study found that the greatest positive effect tenderness exerts on retail prices seems to be for cuts that would grade USDA Choice or Select. For instance, a 1% improvement in tenderness could result in a 4.2% higher price for Select cuts.

The study concluded that by developing a product mix that generally is more tender, the beef industry could see more market equilibrium and better revenue opportunities among Choice- and Select-grading beef. At the time, the researchers estimated that a 10% improvement in tenderness would add about $150-$170 million to the industry.

The beef checkoff has also focused on tenderness through its Carcass Merit Project, managed for the CBB by the National Cattlemen's Beef Association (NCBA), to help develop genetic selection tools to aid in identifying cattle with quality traits that affect overall eating satisfaction. In 2003, DNA technology was used to evaluate 11 regions on various chromosomes in the cattle genome and their effect on such heritable traits as tenderness, ribeye area, juiciness, marbling and other qualities across 14 breeds.

"By improving the average tenderness level of beef available to consumers, the industry should see an increase in the value of beef and an overall increase in consumer expenditures," noted Bridgewater, Iowa, seedstock producer Dave Nichols, who was a Carcass Merit Steering Committee member at the time of the study.