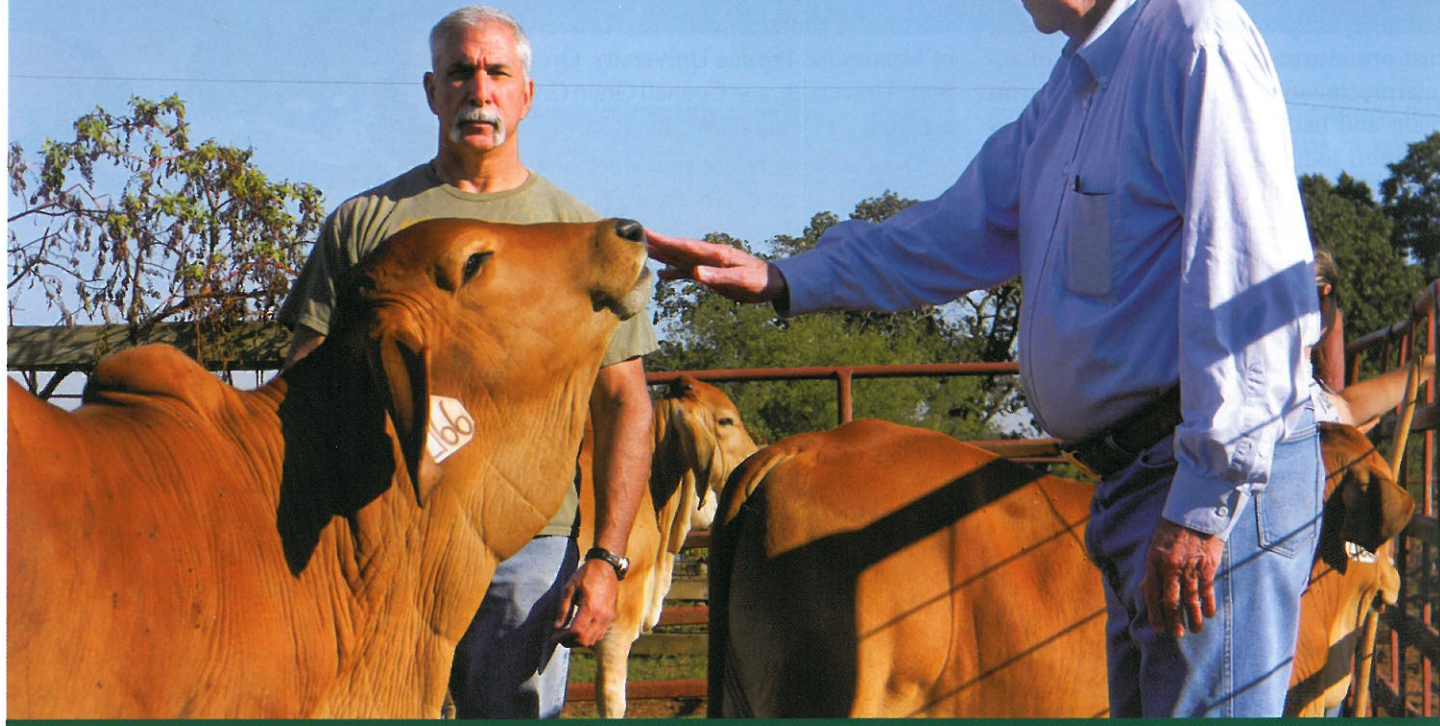


Temperament Plays Key Role in Cattle Health



Do you know someone who's temperamental? What about an animal? Amazingly, cattle can be temperamental too, which influences how they should be handled, how they perform, and even how they react to viruses that cause diseases.

For cattle, temperament is defined as the reactivity or fear response to humans or handling. Terms used to describe temperamental animals include "flighty," "excitable," and "high strung." These animals can potentially injure themselves or their handlers.

Beef cattle experience stressful events during routine management practices—weaning, transportation, social mixing, and vaccination. These practices have been shown to induce secretion of the stress-related hormones cortisol and epinephrine. Stress can negatively affect growth, reproduction, welfare, and immune function—predisposing cattle to infectious intestinal and respiratory diseases that cost U.S. cattle producers an estimated \$500 million per

year. Reducing adverse consequences of stressful incidents and identifying animals that may react differently to stressors may benefit cattle's growth and health.

A team of scientists in the Agricultural Research Service's Livestock Issues Research Unit (LIRU) in Lubbock, Texas, Mississippi State University (MSU), and Texas AgriLife Research—a member of the Texas A&M University System—are studying interrelationships of stress and cattle temperament with transportation, immune challenges, and production traits. They have found that, depending on temperament, cattle respond differently.

Testing Temperament

Most studies were done shortly after weaning to emulate what happens in the industry, says Ron Randel, animal physiologist at the Texas AgriLife Research and Extension Center in Overton, Texas. One of the most stressful times for an animal is after it is weaned.

The team was among the first in the United States to adopt and use the exit

velocity system developed in Australia, Randel says. The system measures the rate at which an animal exits a squeeze chute or scale box where it's been restrained or held after transport. A fast exit indicates the animal is showing fear and is stressed by handling and human activity.

Scientists also used pen scoring, a subjective measurement in which small groups of cattle are scored based on their reactions to a human observer. Scores range from 1—calm, docile, and approachable, to 5—aggressive and volatile.

The exit velocity and pen score for each animal were then averaged together to come up with a temperament score, says Jeffery Carroll, LIRU research leader.

Calves were chosen for studies based on their temperament scores, which categorized them as most calm, intermediate, and most temperamental.

Challenging Behaviors

"Depending on whether an animal is classified as being really calm or really high strung, we're seeing differences in the way it deals with illness," Carroll says.

In the study, Brahman calves were classified by temperament and transported 478 miles from Overton to Lubbock. After the trip, blood samples and body temperatures were taken before, during, and after administration of an endotoxin to simulate illness. Sickness behavior was scored on a 1-to-5 scale that measured the severity of calves' behavioral responses to the challenge. A score of 1 indicated normal maintenance behaviors, and 5 indicated the greatest amount of sickness behaviors, such as head distension, increased respiration, and labored breathing.

"You could immediately tell that the calm animals had been given an immune challenge, because they showed visual signs and became ill," Carroll says.

The more temperamental animals continued to act high-strung and flighty after the endotoxin challenge. If a temperamental animal doesn't show signs of illness, managers might not realize that the animal is sick and needs treatment.

"We're not talking about one breed compared to another breed," Carroll says. "We're talking about animals within the same breed type, and the only difference is their temperament."

Results showed that the endotoxin increased body temperature and induced secretion of epinephrine and cortisol, hormones associated with coping with stress, says Tom Welsh, Texas AgriLife Research endocrinologist in College Station, Texas.

When animals are transported, they become stressed, contributing to the incidence of disease, Randel says. Therefore, identifying cattle that are more susceptible to stressors and subsequently have altered immune responses may help to reduce the impact of sickness after transport.

Previous studies indicate that human-animal interactions are probably the

most stressful events that the majority of cattle encounter.

"The duration of transportation is not the problem," Randel says. "It's the action of being handled and loaded into the trailer that is producing the stress." If cattle are handled in an appropriate manner and given water and feed at no more than 12-hour intervals, then getting on and off the trailer is the major stressor, he says.

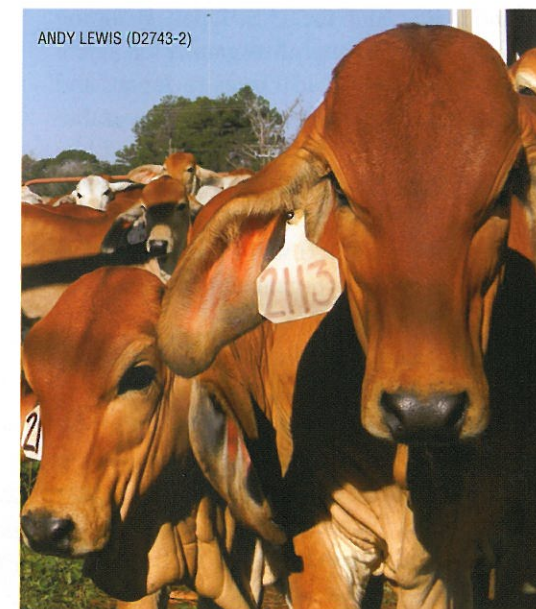
Making the Grade

While the handling process is more stressful for animals, transportation duration and conditions can have negative effects on intramuscular fat, says Rhonda Vann, MSU associate research professor.

"When animals are transported, they will use or mobilize intramuscular fat very quickly for fast sources of energy," Vann says. "The degree of intramuscular fat, or marbling, determines the quality grade of beef. High levels of marbling improve quality grade, whereas lower levels reduce it."

Vann and her colleagues looked at the combined effects of transportation and animal temperament on body composition traits. They took ultrasound images of muscle ribeye area, rib fat, intramuscular fat, and rump fat to evaluate and measure fat mobilization.

Temperamental cattle appeared to use more fat stores when stressed, Vann says.



Brahman calves just before transport to Lubbock, Texas. Each calf's stress response will be monitored before, during, and after transport to determine whether temperament is linked to the amount of stress experienced in transport.

Also, as the hauling distance increased, the percentage of intramuscular fat decreased.

"From a production standpoint, temperament of animals does make a difference in the ultimate quality grade—for example, choice versus select," Vann says. "As stressors and transportation times increase, temperamental animals could potentially have lower quality grades, and that could mean lower profits."

Tactics for Taming

Results show that temperamental cattle require special management practices to reduce stress before, during, and after transportation. Also, because temperament and resistance to bovine respiratory disease are both heritable traits, future research will include developing gene-based methods to select calm, stress-tolerant, and disease-resistant cattle.

"Information derived from our studies will enhance gene-based approaches to improving animal health and performance," Welsh says.

In the meantime, cattle producers can use temperament scoring to select calmer bulls for breeding less temperamental cattle and use pen scoring for replacement females to eliminate the more temperamental cows, Randel says.

"I'm not suggesting selecting for the calmest cattle," he says. "I'm suggesting that producers eliminate animals that are most temperamental to improve herd health and productivity, ensure animal welfare, and to protect animal and worker safety."

This research was partly supported by a cooperative research and development agreement between the U.S. Department of Agriculture and Texas AgriLife Research and was part of a project by Texas A&M graduate student Nicole Burdick, who is now with LIRU.—By **Sandra Avant**, ARS.

This research is part of Food Animal Production, an ARS national program (#101) described at www.nps.ars.usda.gov.

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