

CATTLE TEMPERAMENT AND REPRODUCTIVE SUCCESS

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Cattle temperament is defined as the fear-related behavioral responses when exposed to human handling. As cattle temperament worsens, their response to human contact or any other handling procedures becomes more pronounced. The agitated and/or aggressive response expressed by cattle with excitable temperament when exposed to human handling can be attributed to their fear and consequent inability to cope with this situation. In addition to altered behavior, temperamental cattle may also experience changes in their body physiology, and the hormones produced during this fear-related stress reaction influence several factors, such as growth and health. Within the cattle industry, producers select cattle for temperament, primarily for safety reasons. However, our recent studies demonstrate cattle temperament may also have productive and economic implications to beef operations. Stress increases stress hormones such as cortisol levels and results in lowering the levels of reproductive hormones. Most cattlemen recognize that cattle under stress may not eat as well but may not know of its effect on reproductive behavior and physiology. This article will summarize our findings that could have an impact on the beef herd.

Cattle temperament assessment methods

A number of techniques have been used to assess cattle temperament, both subjective and objective in nature, with varying positive and negative attributes. At the farm level, if the goal is to base management decisions on temperament, it is crucial that these methods are easy to implement and consistent. Two of the most frequently used techniques for assessing beef cattle temperament, most likely due to their ease of execution, are chute temperament score and chute exit speed. Chute exit speed and gait methods with 5- or 6-point scales have been used to determine effects of temperament on production and reproduction. Cattle that are assigned a score of 1 or 2 on this scale are considered to be docile in temperament, and those assigned a 4 or 5 are considered to be excitable. Studies investigating the relationship between temperament assessment techniques most often look at the correlation between chute temperament score and chute exit speed. In general, results indicate a low to moderate positive correlation between chute temperament score and chute exit speed following a one-time assessment. Additional tests, including the Movement Measuring Device (MMD) and calculating exposed eye white percentage (EW) are being investigated as potential temperament assessment techniques. The MMD is used to

quantify the amount of movement made by an animal while restrained in a weigh scale, and is theorized to provide more information about the force and frequency of movement of restrained cattle. One of the first studies looking at exposed EW as a measure of temperament in beef cattle. In regard to EW, moderate to high positive correlations between exposed EW percentage and chute temperament score, and low to moderate correlation between exposed EW and a form of chute exit speed. The technique used to determine EW was reported to be highly repeatable and accurate, as multiple images per animal were analyzed twice and found to be highly, positively correlated.

In our studies, the 5- or 6-point scoring system was modified to a 2-point scoring method: **calm** - cattle that exited the chute slowly and walked towards herd mates; and **excited** - cattle that exited the chute jumping, trotting, or running towards herd mates.

Effect of temperament on Reproduction

In our first study, beef heifers at eight different ranches were scored for temperament by using “chute exit and gait” as a measure of excitability [1]. The scoring system was: 0 = calm (slow exit and walk); 1 = excitable (fast exit and jump or trot or run). The scoring was done at the time of initiation of synchronization program for artificial insemination (AI) along with taking a blood sample for cortisol, progesterone and substance-P (associated with the regulation of stress and anxiety). The percentage of heifers with excitable temperaments varied across the eight locations from 21 to 44%. The key outcome

was that temperament affected AI pregnancy rates. The AI pregnancy rates differed between heifers with excitable (51.9%) and calm temperament (60.3%). Another important finding was that the design of the cattle-handling facility also had an effect on temperament and consequently on AI pregnancy rate. Ranches with chute area alley-ways that had acute bends and turns or long straight alley-ways had lower AI pregnancy rates (53.5%, 56.3%) compared to those with a semicircular alley-way (67.0%). Handling facilities with alley-ways with acute bends and turns had a greater proportion of excitable heifers and higher stress hormones in their heifers.

In a subsequent study with two experiments, we looked at the effect of beef cow temperament on reproductive performance [2]. In the first, cows on eight ranches were evaluated for temperament using chute-exit and gait scores (as above), as well as body condition, before being turned out with the bulls. They were examined for pregnancy by palpation 35 days after the end of the 85-day breeding season. Cows with an excitable temperament took 24 more days to become pregnant compared to calm cows (median days to pregnancy, 35 vs 59 days). In the second experiment, cows were managed similarly but checked for pregnancy at 2 and 6 months after the end of the breeding season. Controlling for body condition, pregnancy loss was greater in excited versus calm cows (5.5 versus 3.2% loss).

In another study that looked at embryo transfer success, the team found that cows with a calm temperament had higher pregnancy rates after embryo

transfer compared to cows that were excitable (59 versus 52%) [3]. The study also compared cows given a non-steroidal anti-inflammatory drug injection or not at the time of embryo transfer. Excitable cows that were not treated with anti-inflammatory drug had lower pregnancy rates by 10% as well as lower progesterone and higher cortisol levels than calm cows. The calm cows' pregnancy rate was similar whether treated or not.

In a study published in 2018, they looked at factors that influenced calf temperament at weaning and the association of weaning temperament and temperament at breeding and effect on heifer AI pregnancy rate at three locations [4]. They also looked at cow age and the calf's sire docility EPD (the likelihood that the calf will inherit genes for acceptable behavior -- a greater docility EPD is associated with offspring exhibiting calmer behavior). Calves were observed for behavior from 1 to 4 weeks (nursing, play, interaction with cow and other calves, altered gait and resting) and treatment records were reviewed.

About half (51%) of the cows and 39% of the calves were classified as excitable. Factors that were associated with excitable calves included their dam's temperament, a reduction in play, illness, altered gait and sire docility EPD. A low sire docility EPD and cow excitability were associated with a greater likelihood for excitability in the calf. Circulating cortisol concentrations were greater in excitable females compared to calm females prior to weaning. Excitable temperament of calves at weaning had a greater likelihood of excitable temperament as heifers at breeding. The calf's excitable

temperament at weaning was associated with lower pregnancy to AI.

This research captures a pretty clear picture that cattle temperament has an effect on beef cow and heifer reproduction. Although temperament can be influenced by many factors, there is strong evidence that genetics plays a role and that beef producers have control over their herd's genetics. Another factor under their control is the design of their handling facilities as these too can influence the handling stress that cattle have to endure. Stress effects cortisol levels which can affect important reproductive hormone levels, leading to a better understanding of conception failure and pregnancy loss and why we should minimize stress when handling cattle.

In summary, excitable temperament is a fear-related behavioral response that has detrimental effects on the performance of cattle. This research provides evidence that cattle temperament has an effect on beef cow and heifer reproduction. Producers can evaluate cattle temperament by visual assessments that can be conducted during common handling procedures. Depending on the outcomes, producers can adopt management strategies to improve the overall temperament of the cow herd. Although temperament can be influenced by many factors, there is strong evidence that genetics plays a role and that beef producers have control over their herd's genetics. Another factor under their control is the design of their handling facilities as these too can influence the handling stress that cattle have to endure. Other factors are early age acclimation to human handling and consideration of temperament in selection/

culling decisions. This will bring benefits to cattle performance and the consequent productivity of beef operations containing temperamental cattle.

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