

Managing the Effects of Stress and Temperament on Beef Cattle Reproduction

Temperament or disposition of cattle is associated with a number of production traits. Animals exhibiting more excitable temperaments have reduced dry matter intake, achieve lower average daily gains, and produce lower quality carcasses (King et al., 2006). Commercial producers can improve temperament in their herds through selection for docility and through culling of flighty, aggressive animals. However, making progress toward a more docile cow herd takes time, and even docile cattle can become stressed in response to management.

Animal stress can negatively impact reproductive performance in particular, so mitigating temperament-associated stress is essential both prior to and during the breeding season. Reduced pregnancy rates and increased pregnancy loss have been demonstrated by cows with excitable temperaments across various management systems and cattle types (Cooke et al., 2012). Several simple management strategies are available to mitigate temperament associated stress. Producers should evaluate their herd, facilities, and overall management to determine how implementation of the following practices might improve reproductive outcomes.

Temperament

Expressions of temperament are typically only observed when cattle experience abnormal scenarios or interact with humans or other animals. Unfortunately, cattle may experience many such events during the breeding season, such as interaction with new bulls, handling during synchronization protocols, or adjusting to new locations or management groups. The stress associated with these events can have systemic effects on reproductive processes among excitable cattle (Kasimanickam et al., 2014).

Several mechanisms have been suggested for the methods by which temperament and stress impact reproduction. Cows with excitable temperaments



Figure 1. University of Missouri Extension Livestock Field Specialist Eldon Cole records chute scores of heifer calves at the University of Missouri Southwest Research Center in Mount Vernon, Missouri. Monitoring and managing stress responses of beef cattle can result in long-term improvements in reproductive performance.

consistently demonstrate increased levels of the stress hormone cortisol, which directly influences reproduction through endocrinological interactions. Elevated cortisol has the ability to inhibit ovulation, slow follicular development, reduce oocyte quality, and delay puberty attainment (Cooke et al., 2009; Echterkamp, 1984; Li and Wagner, 1983). Indirect impacts are also observed in animals with excitable temperaments through altered behaviors, such as reduced feed intake and increased activity. Among both cows and heifers, these behaviors may create energetic deficits that result in reduced body

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condition or a negative plane of nutrition, subsequently reducing reproductive success (Nkrumah et al., 2007).

Genetics

Although all herds stand to benefit from management practices that reduce stress, significant progress can be made to reduce the degree to which the herd is prone to stress during handling. The heritability of temperament suggests progress can be made by selecting against excitable temperament in both the maternal and paternal lines (Kasimanickam et al., 2018). Many breed associations publish an Expected Progeny Difference (EPD) value for docility, and monitoring this EPD when selecting sires is an effective strategy to make genetic progress in temperament.

In addition, temperament can be considered when making selection or culling decisions. Including

acceptable temperament in the selection criteria for replacement heifers will improve herd temperament over time, and removal of one excitable heifer from a group of developing heifers is often observed to result in improved behavior of the group. Culling should also be considered for cows with particularly excitable temperament. Excitable temperament in calves is directly correlated to excitable temperament of the dam, so culling breeding females with poor temperament has the potential to ultimately impact the quality of the calf crop (Riley et al., 2014).

Producers can likely easily identify excitable animals. Scoring systems (Tables 1 and 2) have been developed to objectively evaluate temperament early in life (e.g., at weaning or at a pre-breeding evaluation) before acclimation of animals to handling. These systems consider factors such as the animal's reaction to human interaction in a pen (pen score), the animal's

Table 1. "Pen score" guidelines for evaluating temperament of cattle in a small group penned in a small lot.

1	Non-aggressive. Walks slowly, can be approached closely by humans, not excited by humans or facilities.
2	Slightly aggressive. Runs along fences, will stand in corner if humans stay away, may pace fence.
3	Moderately aggressive. Runs along fences, head up and will run if humans move closer, stops before hitting gates and fences, avoids humans.
4	Aggressive. Runs, stays in back group, head high and very aware of humans, may run into fences and gates even with some distance, will likely run into fences if alone in pen.
5	Very Aggressive. Excited, runs into fences, runs over humans and anything else in path, "crazy."

Source: Beef Improvement Federation

Table 2. "Chute score" guidelines for evaluating temperament of cattle individually restrained in a chute.

1	Docile. Mild disposition. Gentle and easily handled. Stands and moves slowly during processing. Undisturbed, settled, somewhat dull. Does not pull on headgate when in chute. Exits chute calmly.
2	Restless. Quieter than average, but may be stubborn during processing. May try to back out of chute or pull back on headgate. Some flicking of tail. Exits chute promptly.
3	Nervous. Typical temperament is manageable, but nervous and impatient. A moderate amount of struggling, movement and tail flicking. Repeated pushing and pulling headgate. Exits chute briskly.
4	Flighty. Wild, jumpy and out of control, quivers and struggles violently. May bellow and froth at the mouth. Frantically runs fence line and may jump when penned individually. Exhibits long flight distance and exits chute wildly.
5	Aggressive. May be similar to Score 4, but with added aggressive behavior, fearfulness, extreme agitation, and continuous movement which may include jumping and bellowing while in chute. Exits chute frantically and may exhibit attack behavior when handled alone.
6	Very Aggressive. Extremely poor temperament. Thrashes about wildly when confined in small, tight places. Pronounced attack behavior.

Source: Beef Improvement Federation

behavior when restrained in a chute (chute score), or the speed at which the animal leaves the chute following handling (exit velocity). For detailed information regarding temperament scoring the herd, producers may consult the Beef Improvement Federation conference proceedings on the topic of “Selection Tools for Temperament” (Randel, 2012).

Facilities and handling

Improving the design of animal handling facilities can also benefit both cattle and personnel by ensuring direct human-animal interactions are low-stress. Facilities designed to with the natural predator-avoidance behavior of cattle in mind are less likely to induce expressions of aggressive or excessively flighty temperament. The “Bud Box” system, popularized by the late Bud Williams, is just one example of handling facilities designed to facilitate low-stress handling of livestock.

Ultimately, the stockmanship of the personnel handling the cattle is equally important if not more important than the design of the cattle handling facility. When animal interaction is necessary, such as when loading cattle into a squeeze chute or alley, handling practices can significantly increase or decrease stress associated with excitable temperaments. Personnel can avoid excessive excitement of cattle using the concept of pressure and release, moving by point of balance, limiting use of prods, and minimizing unnecessary noise or distracting stimuli. Inexperienced personnel should never handle excitable cattle without instructional supervision by an experienced stockman.

Consider enrolling in stockmanship training courses. Farms and ranches with employees should establish training requirements for all personnel who handle cattle. Periodic self-evaluation and/or personnel evaluation should occur to ensure that low-stress handling practices are being used across the farm or ranch. Likewise, cattle behavior should be monitored to ensure that “low-stress” practices are indeed resulting in low amounts of stress. While all cattle benefit from appropriate handling, these practices are especially effective in managing excitable individuals or herds.

For further information on cattle behavior and low-stress stockmanship, “Behavioral Principles of Livestock Handling” (Grandin, 1989) and “Stockmanship: A powerful tool for grazing lands management” (Cote, 2004) are suggested readings. Hands-on stockmanship educational opportunities such as “Stockmanship and Stewardship” (National Cattlemen’s Beef Association, 2020) are also recommended. For detailed explanations and design examples of low-stress handling facilities,

see “Livestock Handling Systems, Cattle Corrals, Stockyards, and Races” (Grandin, 2020).

Facilities that enable low-stress handling of cattle are particularly important if using artificial insemination or other reproductive technologies. If a lack of low-stress facilities is a limitation in carrying out an artificial insemination program, consider renting a portable breeding barn or similar facility. For more information, see MU Extension publication, G2003, [Facilities for Artificial Insemination of Beef Cattle](https://extension.missouri.edu/publications/g2003) (<https://extension.missouri.edu/publications/g2003>).

Acclimation

It is important to note that, while interactions during the breeding season may have direct impacts on reproductive success, patterns of handling early in life have the greatest long-term impacts on temperament. The negative impacts of temperament can be managed in mature cows, but evidence suggests that improving temperament is most effective when attempted before the first breeding season (Cooke et al., 2009). Opportunities for this improvement are indicated both before and after weaning.

Calves exposed to frequent human interaction in a low stress manner are less likely to express excitable temperaments in maturity. While repeatedly exposing calves to handling may be difficult to implement in some systems, producers may take advantage of existing events, such as when vaccinating or weaning, to implement low stress handling and avoid negative interaction.

These concepts should be applied throughout heifer development as acclimating heifers to facilities and handling has been shown to reduce cortisol levels, decrease temperament scores, and allow an earlier attainment of puberty (Cooke et al., 2012, 2009). Effective acclimation requires repeated interactions over a one to two-month period prior to the start of the breeding season. Similarly, heifer development programs should involve multiple handling events to implement vaccination programs, conduct prebreeding evaluations, and carry out estrous synchronization protocols. Producers can impact temperament by intentionally utilizing the handling events required throughout development as opportunities for acclimation to introduce heifers to the facilities, equipment, and interactions that they will encounter during the breeding season. Combining superior stockmanship with effective development during this time will improve reproductive outcomes for the current season and shift the temperament of the future cow herd.

Summary

Reproductive performance is critical to the profitability of any cow-calf or replacement heifer development enterprise. Minimizing stress prior to and during the breeding season is essential to ensure appropriate reproductive function. Selection and screening cattle for acceptable temperament can ultimately result in improvements in reproductive performance. Additionally, management practices that promote acceptable temperament, like low-stress stockmanship and acclimation of animals to handling, are low-cost ways to significantly impact reproduction and reduce stress for both cattle and producers.

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