



Temperament Affects Rangeland Use Patterns and Reproductive Performance of Beef Cows

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On the Ground

- The American beef industry is paying more attention to cattle temperament, but studies examining relationships between temperaments and grazing behavior or animal performance on rangelands are limited.
- We studied range beef cow temperaments using the behavioral syndromes framework. Cows classified into behavioral type groups on the basis of a suite of correlated behaviors showed contrasting rangeland use patterns and different reproductive efficiency. These differences resulted in temperament-related culling rates over time.
- We argue that the behavioral syndromes conceptual framework could be a valuable tool to advance current understanding about how cattle temperaments are related to grazing patterns and animal performance on rangeland.

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The American Beef Industry is Paying More Attention to Cattle Temperament

Cattle temperament has become increasingly important to beef cattle producers. The USDA National Animal Health Monitoring System's survey of 2,700 cow-calf operations¹ found that 16.6% of operations had sold at least one cow due to temperament, and that cow-calf operations sold on average 3.6% of cows solely due to temperament in 2007, a 10.2% and 1.9% increase from their 1997 survey, respectively.² Another survey found that 31% of producers included disposition

among their top three criteria for bull selection and 7% listed disposition as their number one criterion.³

Breed associations have noticed this preference for animals with a calmer temperament. In 1991, the Limousin Directions Breeders Symposium identified improving disposition as their number one breed priority.⁴ Using the Beef Improvement Federation (BIF) temperament scoring system, which scores an animal on a scale of one through six from docile to very aggressive while being processed through a chute, the North American Limousin Foundation (NALF) became the first breed in the industry to develop a docility expected progeny difference (EPD) index.⁴ Then, in 2008, the American Angus Association followed suit and included a docility EPD in their National Cattle Evaluation,⁵ followed by the American Simmental Association in 2011.⁶

The increasing importance given to the temperament of cattle may be explained by the advancing average age of cowherd owners (59 years), the decrease in available farm labor, or the increasing cost of healthcare.⁶ Another likely cause is the increasing evidence that docility affects animal performance in confinement. In feedlots, researchers have found that compared to calmer cattle, stressed animals exhibit reduced growth rates,⁷ decreased ADG (average daily gain),^{7–9} lower body condition score,⁸ lower feed conversion efficiency,^{7,8} lighter weights at slaughter,¹⁰ lighter carcass weights,^{7,10} tougher meat,^{8,11,12} and higher proportions of dark cutting beef.¹¹ Temperament-related differences in performance of feedlot calves can result in a \$62.19/head greater return on docile vs. aggressive animals.¹³

But Do Cattle Temperaments Really Matter in Rangeland Environments?

Studies examining relationships between cattle temperaments and grazing behavior or animal performance on rangelands are limited, but have generally concluded that regardless of the type of breed origin, whether *Bos taurus* or *B. indicus*, and class of

animal, whether steers or cows, temperament is unrelated to animal terrain use¹⁴ and animal performance.^{14–16} For example, no relationship between temperaments of steers and cows, assessed via a chute rating score, and levels of fat deposition (steers) or pregnancy rates (cows) were found in rangeland-raised cattle in northern Queensland, Australia.¹⁵ In Montana, researchers found that temperament of cows at calving assessed via a qualitative chute temperament score, were not related to terrain use patterns.¹⁴ In northern Colorado, researchers recently reported no relationship between steer temperament, assessed twice via chute exit velocity scores, and average daily weight gains on shortgrass prairie.¹⁶

It is frequently assumed that animals with docile vs. more aggressive temperaments perform equally well on rangelands because per capita space allowance is not limiting (usually many acres per animal) and handling by humans is infrequent.¹⁶ While this may be true, it is also possible that different temperament traits are relevant to animal performance in confinement vs. rangeland (see next section) or, more importantly, that measuring a single behavioral trait to infer animal temperament, as is often the case, is not sufficient.

Ecologists who investigate the biological significance of individual-based variation in animal behavior increasingly are using conceptual and analytical frameworks that take into account multiple co-varying behavioral traits.¹⁷ To date, there has been limited to nil adoption of these approaches among livestock ethologists. Our objective in this article is to report work conducted by our team that assessed range beef cattle temperaments using the behavioral syndromes framework.¹⁸

Behavioral Syndromes: A Different Framework to Assess Animal Temperaments

Behavioral syndromes are defined as suites of correlated behaviors that are consistently different among individuals across situations (feeding behavior on range pastures and in the feedlot), context (boldness in feeding, anti-predator, and mating behavior), and time.¹⁹ Behaviors included in a syndrome can be either inherited or learned and need not be constant throughout the lifetime of an individual. This notion sets behavioral syndromes apart from the closely-related concepts of personalities, coping styles, or temperaments, all of which consist of behaviors that are not necessarily correlated and that are assumed to be mostly controlled by inheritance.²⁰

Interestingly, most temperament tests done on cattle focus almost exclusively on the first of five general temperament trait categories described in the literature: shyness–boldness; exploration–avoidance; activity; sociability; and aggressiveness.²¹ While inferring temperament from shyness–boldness tests seems reasonable for feedlot animals whose contact with humans is frequent and living space is limited, in rangeland environments exploration–avoidance dimensions of livestock temperaments may be as important as shyness–boldness reactions, given the ever-changing nature of the foraging environment. The behavioral syndrome approach allows individuals to be classified into behavioral types on the basis of more than one of these five

temperament trait categories,²² making it a very useful tool to explore the connections between cattle temperament and performance on rangeland.

Behavioral ecologists have also shown that behavioral syndromes affect an animal's fitness because they can limit an individual's ability to adapt to varying environments.¹⁷ Based on these ideas, we reasoned that if we could assess temperaments using the behavioral syndromes framework, i.e., measuring suites of correlated behaviors on each animal, we might be able to detect the elusive temperament–performance connections.

Temperament–Performance Connections Revealed by the Behavioral Syndrome Classification Approachⁱ

Our team began this study in 2006 by conducting multiple tests with individually stalled pregnant or nursing young beef cows to determine the time it took each animal to consume a pound of cotton seed cake in confinement. We then selected the cows with the fastest and slowest supplement consumption rate (SCR), fitted them with GPS collars, and monitored their behavior in a 321-acre rangeland pasture for several weeks immediately after calving. We reasoned that if the behavioral syndrome idea were correct, differences in feeding style in the stalls (contrasting SCR) would have to translate into differences in the cows' approach to foraging on rangeland, which should eventually result in performance differences. We also hypothesized that we should be able to identify a physiological indicator that pointed to a potential mechanism that we could eventually rely on to explain temperament differences. So we also extracted multiple blood samples from each cow to measure individual serum cortisol levels. The team repeated this study two years in a row, with a different set of cows each year. A total of 36 cows were involved in the study, which was conducted at New Mexico State University Corona Range and Livestock Research Center located close to the geographic center of New Mexico.

We found that SCR was positively correlated with distance traveled from the water drinker, and negatively correlated with the amount of time cows spent loafing close to the drinker or under the juniper trees each day. We also found that cows with high SCR (fast eaters) had significantly higher serum cortisol levels than their low SCR (slow eaters) counterparts. We were able to separate cows into statistically different behavioral type groups on the basis of their pasture-use patterns or performance metrics (Table 1).

The first group, which included the fast eaters (high SCR) all of whom exhibited a 'go-getter' type of temperament spent about half as much time close to the drinker and explored a larger area of the pasture each day (+ 9 acres) compared with their slow eater (low SCR) 'laid-back' temperament type peers. Cows belonging to the 'go-getter' behavioral type,

ⁱ This section describes results from a study published by members of our team in 2012. We refer the reader to Wesley et al.²³ for a detailed account of experimental design, data analysis procedures, and results obtained.

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