

# **Does Disposition Affect Reproduction in Beef Cattle?**

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## **SUMMARY**

Disposition has been shown to significantly affect feed intake and growth rates of beef cattle. However, little research has evaluated the effects of poor disposition, and methods to improve this trait, on reproductive function of beef females. Thus, two experiments were conducted to determine the effects of disposition and acclimation to human handling on reproductive function of mature cows and developing heifers. Results indicated that cows with poor disposition had impaired reproductive performance compared to cohorts with good disposition. Further, acclimation of beef heifers to human handling was an alternative to improve their disposition and consequently enhance their reproductive development. We concluded that disposition affects reproductive performance of beef females, whereas management strategies targeted to improve the disposition of the cowherd, such as selection for good disposition and/or acclimation to human interaction, will benefit reproductive rates and consequently the overall productivity of cow-calf operations.

## **INTRODUCTION**

For nearly a century, the word “disposition” has been used to define the behavioral responses of cattle when exposed to human handling. As cattle disposition worsens, their response to human contact or any other handling procedures becomes more agitated and/or aggressive. Within the beef cattle industry, producers consider disposition a selection or culling criteria for cattle primarily for safety reasons. Still, several research studies demonstrated that feedlot cattle with excitable disposition experienced reduced growth rates compared to cohorts with good disposition. This effect was attributed to reduced feed intake, and also to altered physiology of temperamental animals to support their behavioral responses. As an example, blood concentrations of cortisol, a hormone directly associated with stress responses, are typically elevated in cattle with excitable disposition. Cortisol can directly impair synthesis of hormones associated with growth, health, and reproductive function of cattle, which can lead to decreased performance and reproduction.

However, the effects of disposition on reproductive function of beef females are still unknown. Further, frequent human interaction and handling has been shown to improve disposition and reduce cortisol concentrations in beef cattle. Based on this rationale, two experiments were conducted to determine the effects of disposition and acclimation to human handling on reproductive performance of mature cows and developing heifers.

## **METHODS**

Both experiments were conducted, from 2006 to 2008, at the University of Florida–Range Cattle Research and Education Center, Ona. Three methods were used to characterize cattle disposition in both experiments (these methods are also being currently used at the Eastern Oregon Agricultural Research Center to determine disposition of the research cowherd):

- 1) Chute score: Observation of animal behavior when restrained in the chute. This score ranges from 1 to 5 (very calm to very agitated, respectively).
- 2) Exit score: The speed at which the animal leaves the chute is measured. Following that, velocities are ranked and animals are scored from 1 to 5 (slowest to fastest, respectively).
- 3) Pen score: Animal response to human presence in the pen after leaving the chute. This score also ranges from 1 to 5 (calm to aggressive behavior, respectively).

After all measurements are assessed, an overall disposition score is assigned to each animal, which is a combination of one-third of each individual measurement and is also referred to as disposition score.

### **Experiment 1**

Over 2 years, disposition scores and blood samples were collected from 400 Braford and Brahman x Angus mature cows after weaning (August). From August to January, half of these cows were subjected to an acclimation process, whereas the other half remained within normal production conditions. For the acclimation treatment, the same technician interacted with the cows twice weekly by walking among them and offering a small amount of range cubes. The amount of range cubes offered was too little to impact the cows nutritionally (0.2 lbs/cow weekly). In January, prior to the beginning of a 90-day breeding season, disposition scores and blood samples were collected a second time to determine treatment effects. Blood samples were analyzed for cortisol concentrations.

### **Experiment 2**

Growth rates, puberty attainment, and pregnancy rates of 80 replacement Braford and Brahman x Angus heifers were assessed during this 2-year study (40 heifers each year). Approximately 30 days after weaning (August), half of these heifers went through an acclimation process, whereas the other half remained within normal production conditions. Acclimation consisted of bringing heifers to the cowpens three times per week during a 1-month period where heifers were exposed to common handling practices, such as chute restraining. Disposition scores and blood samples of heifers from both groups were collected prior to and at the end of the acclimation period. Puberty attainment was monitored monthly until the beginning of the 60-day breeding season (January). Blood samples were analyzed for cortisol concentrations.

## **RESULTS AND DISCUSSION**

### **Experiment 1**

No differences were detected between treatments for disposition scores, cortisol concentrations, and pregnancy rates (Table 1). However, when analyzing data combined from both treatment groups, we found that disposition score and blood cortisol concentrations affected pregnancy rates during both years (Fig. 1). This analysis was performed within each year because mean days postpartum across breeds at the onset of breeding differed from year 1 to year 2 (88 versus 34 days, respectively), and suggests that excitable disposition and consequent elevated cortisol concentrations are detrimental to reproductive function of cows. Additionally, as observed in year 2, extremely reduced cortisol concentrations and disposition score during the early postpartum period may denote health disorders that negatively affect cattle reproduction, such as lethargy, lameness, and immunosuppression.

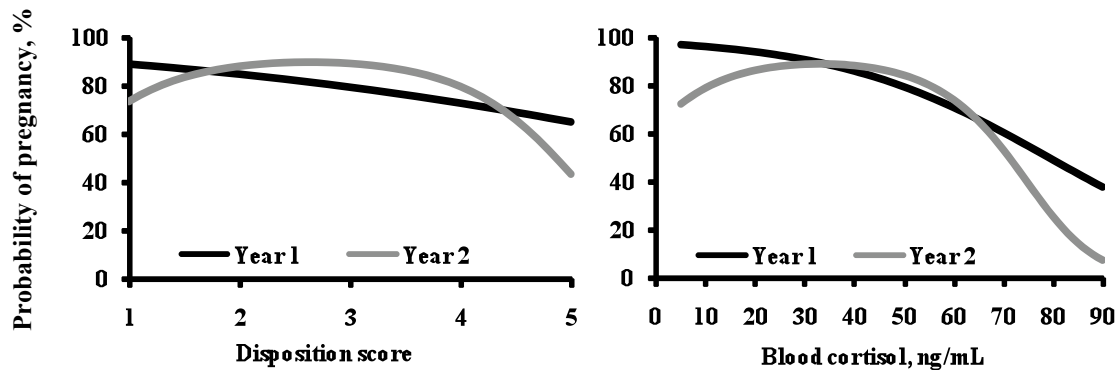
In conclusion, acclimation of beef cows to human interaction did not influence disposition, concentrations of blood cortisol, and pregnancy rates. Nevertheless, measurements

and physiologic responses associated with disposition influenced the probability of cows to become pregnant during the breeding season. Therefore, management strategies that improve cow disposition will likely benefit reproductive performance and consequent productivity of cow-calf operations.

*Table 1. Disposition score, blood cortisol concentrations, and pregnancy rates of beef cows exposed or not (control) to human acclimation procedures.*

Item	Acclimated	Control	<i>P</i> -value
Disposition score <sup>a</sup>			
Beginning of acclimation period	2.49	2.51	0.79
End of acclimation period	2.51	2.48	0.70
Cortisol, ng/mL			
Beginning of acclimation	35.6	35.1	0.78
End of acclimation	30.9	32.0	0.59
Pregnancy rates, %	84.1	84.9	0.78

<sup>a</sup> Disposition score: 1 = calm behavior; 5 = agitated/aggressive behavior.



*Figure 1. Effects of disposition score and blood cortisol concentrations, assessed at the beginning of the breeding season, on the probability of beef cows to become pregnant. Linear (year 1) and quadratic (year 2) effects were detected for both analyses ( $P < 0.05$ ).*

## Experiment 2

Acclimated heifers had decreased average daily gain compared with non-acclimated heifers (1.1 vs. 1.3 lbs/day, respectively; Table 2). We attribute this response to the additional exercise that acclimated heifers were exposed to during the frequent walking to and from the working facility. During each acclimation event, heifers had to walk nearly 1.3 miles in addition to the activity inside the handling facility, whereas control heifers remained on their pasture. This is likely the reason for the average daily gain difference since both groups were provided similar pastures and supplements. Despite the slight decrease in body weight gain, puberty and pregnancy attainment were hastened in acclimated heifers compared to control cohorts (Fig. 2). Further, after the acclimation process, acclimated heifers had decreased mean chute score (1.35

versus 1.86) and blood cortisol concentrations (37.8 versus 50.5 ng/mL) compared to non-acclimated cohorts (Table 2).

Results from this experiment indicate that acclimation of heifers to handling procedures and human interaction reduced average daily gain because of the additional exercise that heifers were exposed to, but decreased blood cortisol concentrations, reduced chute score, and enhanced reproductive performance. Therefore, acclimation of replacement heifers to human handling after weaning may enhance their disposition and consequent reproductive development, and thus increase the efficiency of heifer development programs within cow-calf operations.

Table 2. Average daily gain, disposition and chute score, and blood cortisol concentrations of heifers exposed or not (control) to handling acclimation procedures.

Item	Acclimated	Control	<i>P</i> -value
Average daily gain, lbs/day	1.1	1.3	< 0.01
Disposition Score <sup>a</sup>			
Beginning of acclimation period	2.55	2.42	0.49
End of acclimation period	2.68	2.52	0.59
Chute score <sup>a</sup>			
Beginning of acclimation	1.89	2.03	0.38
End of acclimation	1.35	1.86	< 0.01
Cortisol, ng/mL			
Beginning of acclimation	39.2	42.1	0.32
End of acclimation	37.8	50.5	< 0.01

<sup>a</sup> Disposition and chute score: 1 = calm behavior; 5 = agitated/aggressive behavior.

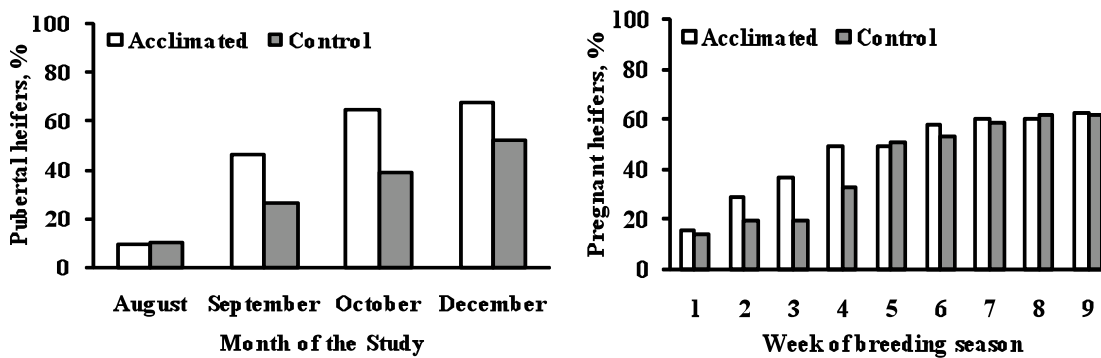


Figure 2. Puberty attainment and pregnancy rates of heifers exposed or not (control) to handling acclimation procedures. A treatment effect was detected for both analyses ( $P < 0.05$ ).

## MANAGEMENT IMPLICATIONS

These results indicate that excitable disposition negatively affects reproductive performance of beef females; therefore management strategies targeted to improve disposition of the cowherd will enhance the productivity of cow-calf operations. Acclimation to human handling may be an alternative; however, according to our data, only replacement heifers responded positively to the acclimation process. Perhaps disposition cannot be altered in mature cows, and selection or culling for this trait may be the most appropriate method to improve disposition of older animals. These experiments, however, were conducted with Brahman-crossbred cattle in a subtropical environment. Similar studies are being currently conducted at the Eastern Oregon Agricultural Research Center to determine the effects of disposition and acclimation procedures on reproductive function of Angus-influenced heifers and cows.

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