

Assess Potential Gender Differences in Temperament of Feedlot Cattle and Evaluate Chute Side Physiological Measurements to Improve Classification of Temperament

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Introduction

Temperament in beef cattle has become a research focus due to increasing consumer awareness of animal welfare¹. Researchers have defined temperament as the behavioral response to a perceived stressful event, “Fight-or-Flight”²⁻⁴. These behavioral responses are influenced by environmental and genetic factors including age, sex, and breed^{2,5}. Temperament has a direct impact on feedlot performance, carcass quality, and tenderness^{4,6-8}. Economically, temperament can have a large impact in the feedlot industry, 1% increase in the efficiency of feedlot cattle would translate to an estimated \$23 million dollars a year to the feedlot industry⁹. Many researchers have found that cattle with excitable temperaments have decreased average daily gains, decreased carcass weights, and higher incidence of dark cutters^{4,6,10-12}. Subjective chute scoring systems have been used by many researchers. Due to the subjectivity and associated variability among researchers, chute scores have been questioned for repeatability and consistency. Currently, exit velocity defined as speed at which an animal exits a chute, is recognized as the most practical objective measure for assessing temperament¹³⁻¹⁵. However, a physiologic response to temperament is increased systemic lactate concentrations. Blood lactate as a measure, is not significantly correlated to chute score but is significantly correlated to exit velocity^{7,16}. **The first objective of this study was to compare the temperament defined by exit velocity between feedlot steers and heifers. The second objective of this study was to evaluate physiological measures taken chute side as potential markers for defining an animal’s temperament.**

Materials and Methods

- Feedlot cattle (n = 197) were evaluated for temperament at Chappell Feedlot in Chappell, NE
- Temperament was evaluated using the following methods:
 - Docility Score – 1 - 6 1 = docile 2 = restless 3 = nervous 4 = flighty 5 = aggressive 6 = very aggressive¹⁷
 - Exit Velocity (m/s) – photo-transmitters placed 1.82 m apart with the first photo-transmitter placed 1.82m in front of chute
 - Blood lactate concentration (mmol/L) – jugular venipuncture with Lactate Pro meter
 - Temperature – digital veterinary rectal thermometer
 - Pulse and Blood Oxygen Saturation – rectal probe connected to Mediavid pulse oximeter (BPM = beats per minute)
- Statistics were run using a GLM procedure and Pearson Correlation (SAS version 9.2)

Results and Discussion

- Steers had significantly lower chute scores, blood lactate, and exit velocity indicating lower perceived stress response.
- Pulse rate, O₂ saturation were not different between steers & heifers.
- As expected chute score, exit velocity and blood lactate were correlated, however, correlations were higher between measures for steers than heifers suggesting temperament classifications for heifers would be different .
- Rectal temperatures for steers was significantly correlated to chute score, exit velocity and blood lactate but there was no relationship between the measures for heifers.
- A negative correlation was found between pulse rate and both blood lactate and exit velocity. The relationships were significant in heifers but not steers.



Table 1. Effect of gender on weight, chute score, pulse, O₂ saturation, temperature, blood lactate, and exit velocity

	STEERS	HEIFERS	P-Value
Weight (kg)	426.85	425.33	0.90
Chute Score	2.94	3.24	0.0005
Pulse (BPM)	62.28	64.20	0.48
O ₂ Saturation (%)	78.75	77.94	0.64
Temperature (C°)	39.78	39.47	0.54
Blood Lactate (mM)	3.45	4.35	0.02
Exit Velocity (m/s)	4.45	5.59	0.002

Values are Least Square Means. Significantly different P< 0.05.

Acknowledgement

I would like to thank Tom Williams, owner and operator of Chappell Feedlot, for his support and willingness to contribute cattle and employees for the purpose of this study. Also, for the help of fellow graduate and undergraduate students: Rashelle Herrygers, Alyson Hicks-Lynch.

Table 2: Pearson correlations coefficients (P-value) between temperament measures of feedlot steers and heifers

	Chute SC	Pulse	O ₂ Sat.	Temp.	Blood Lact.	Exit Veloc.
STEERS						
Chute SC	1	-0.05 (0.63)	-0.04 (0.73)	0.50 (<.0001)	0.57 (<.0001)	0.47 (<.0001)
Pulse(BPM)		1	0.08 (0.48)	0.07 (0.51)	-0.11 (0.33)	-0.11 (0.33)
O ₂ Sat. (%)			1	-0.15 (0.18)	0.01 (0.91)	0.10 (0.35)
Temp. (C°)				1	0.50 (<.0001)	0.44 (<.0001)
Blood Lact (mM)					1	0.63 (<.0001)
Exit Veloc.(m/s)						1
HEIFERS						
Chute SC	1	-0.002 (0.98)	-0.10 (0.31)	0.15 (0.11)	0.27 (0.004)	0.37 (<.0001)
Pulse(BPM)		1	-0.07 (0.47)	0.04 (0.70)	-0.19 (0.05)	-0.21 (0.04)
O ₂ Sat. (%)			1	-0.06 (0.57)	-0.04 (0.67)	-0.02 (0.84)
Temp. (C°)				1	0.13 (0.18)	0.11 (0.25)
Blood Lact (mM)					1	0.53 (<.0001)
Exit Veloc.(m/s)						1

Conclusion

- Accepted temperament measures are not as accurate for heifers
- Exit velocity and blood lactate are two objective measures that can predict temperament of both steers and heifers.
- Analysis of blood parameters, hormones and metabolites is necessary to further our understanding of these differences between steers and heifers

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