

# PHYSIOLOGICAL RESPONSES AND FEEDLOT PERFORMANCE ASSOCIATED WITH TEMPERAMENT IN NELORE STEERS

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**Abstract** – This study aimed to evaluate the effects of temperament on serum hormone concentrations and feedlot performance in forty-four Nelore (*Bos indicus*) steers. Steers were evaluated for shrunk body weight (BW) and temperament at feedlot entry (d 0). Temperament was assessed by chute score and exit velocity. Further, individual exit score was calculated by dividing exit velocity results into quintiles and assigning steers with a score from 1 to 5 (exit score: 1=slowest steers; 5=fastest steers). Temperament scores were calculated by averaging chute score and exit score. Steers also classified for temperament type according to temperament score [ $< 3$  = adequate temperament (ADQ) or  $> 3$  = aggressive temperament (AGR)]. Shrunk BW was recorded again on d 109, whereas blood samples were collected on d 0, 67, and 109 for analysis of serum cortisol and insulin. Individual DMI was recorded daily (d 0 to 109). Serum cortisol was greater ( $P = 0.04$ ) whereas serum insulin tended to be reduced ( $P = 0.06$ ) in AGR vs. ADQ steers (19.6 vs. 16.7 ng/mL of cortisol, and 12.7 vs. 19.4 IU/mL of insulin). Feedlot ADG was reduced ( $P = 0.02$ ) in AGR vs. ADQ steers (1.05 vs. 1.30 kg/d). Total DMI tended to be reduced ( $P = 0.14$ ) whereas G:F was reduced ( $P = 0.03$ ) in AGR vs. ADQ steers (8.8 vs. 9.4 kg/d of DMI, and 119 vs. 138 g/kg of G:F). In conclusion, aggressive steers had greater plasma cortisol during handling and decreased feedlot performance compared to cohorts with adequate temperament.

**Key Words** – cortisol, chute score, feed efficiency

## I. INTRODUCTION

Cattle with aggressive temperament are undesirable in beef herd because they can influence not only the safety of animal handlers, but also the production efficiency parameters.

Studies have shown that females with aggressive temperament have reduced reproductive performance, independently of breed type [1, 2]. Similarly, aggressive cattle often experience reduced growth rates within feedlot and pasture scenarios [3, 4]. Thus, selection for is expected to improve safety factors as well as the production efficiency in beef operations, however, the effects of temperament in Nelore cattle has not yet been determine, whereas this breed is the main component of beef operations in Brazil. Hence, we hypothesized that Nelore cattle with aggressive temperament have altered hormone levels and decreased feedlot performance compared to cohorts with adequate temperament. Therefore, the objective of this study was to evaluate the physiological responses and feedlot performance associated with Nelore cattle temperament.

## II. MATERIALS AND METHODS

The experiment was conducted at the Agencia Paulista de Tecnologia dos Agronegocios – APTA – Colina, Sao Paulo, Brazil, from January to May 2011. Animals were cared for in accordance with acceptable practices and experimental protocols (139/2010-CEUA) reviewed and approved by the Ethics Animal Use Committee of the Universidade Estadual Paulista.

### *Animals and measurements*

Forty-four (44) steers were used in the study and evaluated for shrunk body weight (BW) and temperament at feedlot entry (d 0). Shrunk BW was recorded on d 0 and 109 for calculation of steer ADG during the study. Individual DMI was recorded daily in this period (d 0 to 109). Feed

efficiency (G:F) was calculated dividing total BW gain and total DMI from d 0 to 109. Chute score was assessed based on a 5-point scale according to the method described by Arthington et al. [5]. Exit velocity was assessed by determining the speed of the steer exiting the squeeze chute by measuring rate of travel over a 2.0-m distance with an infrared sensor (FarmTek Inc., North Wylie, TX). Steers were divided in quintiles according to their exit velocity, and assigned a score from 1 to 5 (exit score; 1=slowest steers; 5= fastest steers). Individual temperament scores were calculated by averaging steer chute score and exit score. Steers were also classified according to the final temperament score (temperament type) as adequate temperament (temperament score  $\leq 3$ ) or aggressive temperament (temperament score  $> 3$ ) [6]. Steers were slaughtered on d 109.

#### Blood samples

Blood samples were collected on d 0, 67, and 109 for analysis of serum cortisol and insulin via jugular venipuncture into commercial blood collection tubes (Vacutainer, 10 mL; Becton Dickinson, Franklin Lakes, NJ) placed on ice and centrifuged at  $2,500 \times g$  for 20 min at  $5^{\circ}\text{C}$  for serum collection. Serum was frozen at  $-20^{\circ}\text{C}$  on the same day of collection. Concentrations of cortisol and insulin were determined using Coat-A-Count kits for RIA (Coat-a-Count®, Siemens Healthcare Diagnostics Inc., Los Angeles, CA).

#### Statistical Analysis

All data were analyzed using the MIXED procedure (SAS Inst. Inc., Cary, NC) and the Satterthwaite approximation to determine the denominator degrees of freedom for the tests of fixed effects. The model statement used for cortisol and insulin measurements contained the effects of temperament, day, and the resultant interactions. The specified term for repeated statements was day and steer (temperament) as subject. The model statement used for ADG, DMI and G:F contained the effects of temperament. All data were analyzed using steer(temperament) as random variable. Results are reported as least square means. Significance was set at  $P \leq 0.05$ , and tendencies were determined if  $P > 0.05$  and  $\leq 0.15$ .

### III. RESULTS AND DISCUSSION

No treatment  $\times$  day interactions were detected ( $P > 0.15$ ) for the analysis of serum measurements on d 0, 67 and 109, therefore, results are presented (Table 1) among all samples collected during the experiment.

Table 1 Concentrations of cortisol and insulin of Nelore steers with aggressive (AGR) or adequate (ADQ) temperament

Item	AGR	ADQ	P-value
Cortisol, ng/mL	19.6	16.7	0.04
Insulin, IU/mL	12.7	19.4	0.06

Significant if  $P \leq 0.05$ .

Animals with aggressive temperament had increased cortisol ( $P = 0.04$ ) and reduced insulin ( $P = 0.06$ ) concentrations compared to animals with adequate temperament. Furthermore, aggressive steers tended ( $P = 0.14$ ) to have reduced DMI, and had reduced ADG ( $P = 0.02$ ) and G:F ( $P = 0.03$ ) compared to animals with adequate temperament (Table 2). As expected, aggressive cattle had greater cortisol concentrations [7], as well as reduced DMI and G:F parameters, which likely resulted in reduced insulin concentrations and ADG compared to cohorts with adequate temperament.

Table 2 Average daily gain (ADG), dry matter intake (DMI) and feed efficiency (G:F) of Nelore steers with aggressive (AGR) or adequate (ADQ) temperament

Item	AGR	ADQ	P-value
ADG, kg/d	1.05	1.30	0.02
DMI, kg/d	8.85	9.36	0.14
G:F, g/kg	7.53	7.33	0.03

Significant if  $P \leq 0.05$ , and tendencies if  $P > 0.05$  and  $\leq 0.15$

### IV. CONCLUSION

Aggressive temperament impacts metabolic hormones and reduce feedlot performance of Nelore cattle. Hence, cattle temperament should be taken into account in efforts to increase overall production efficiency of beef operations.

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