PRODUCTION TRAITS IN NELORE CATTLE CLASSIFIED BY RESIDUAL FEED INTAKE AND DEGREE OF DAILY FLUCTUATION IN DRY MATTER INTAKE

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I. INTRODUCTION

Herds classified as efficient by residual feed intake (RFI) can reach productive indices similar to those obtained for the non-efficient ones, with lesser feed intake. This fact reflects the lower demand for environmental resources and provides greater profitability to the beef production system [1,2]. However, the continuous feed supply for “free choice” intake of confined beef cattle in Brazil may result in daily variations in dry matter intake (DMI). According to Pereira et al. [3], daily fluctuation in DMI in cattle can increase ruminitis scores, leading to metabolic disorders that can negatively affect animal development. Therefore, the present study seeks to determine whether animals classified by RFI present different degrees of daily fluctuation in DMI, causing changes in performance traits and organ size in Nelore cattle.

II. MATERIALS AND METHODS

A total of 107 non-castrated 15-month-old Nellore males were confined for 92 days, following the distribution of a completely randomized design, in 2 x 2 factorial arrangement: two groups of DMI fluctuation (GF of DMI: high or low fluctuation) and two RFI groups (negative: RFI<0; or positive: RFI>0). The fluctuation was calculated by the difference between DMI of the previous and the current day [%F-DMI = ((DMIPrevious - DMICurrent) *100)/ DMIPrevious], expressed as percentage. Then, animals were classified as high (H: 1.89%) or low (L: 0.90%) DMI fluctuation (P=0.001). The RFI was calculated using regression equations as a function of metabolic body weight, DMI, and daily weight gain (ADG). Then, animals were classified as negative or positive RFI. The production traits, hot carcass weights (HCW), carcass yield (CY), liver, kidneys, and kidney, pelvic and heart (KPH) fat weights were analyzed by PROC MIXED of SAS considering the fixed effects (GF and RFI), covariate (age at slaughter), and the random effect (year). The differences between means were compared using the Tukey test (P<0.05), and trends were verified when P<0.10.

III. RESULTS AND DISCUSSION

No differences were detected for initial and final body weight (IBW; FBW), ADG, HCW, liver, and KPH between GF or RFI groups. Animals classified as negative RFI had lower kidneys weight compared to the ones classified as positive RFI (P=0.034). There was a tendency towards lower feed efficiency ratio (FER: relationship between DMI and ADG) when comparing negative RFI animals to the positive RFI ones (P=0.088). As expected, low-DMI fluctuation animals differed from high-DMI fluctuation animals (P=0.001).

Significant interactions were detected between GF and RFI groups for DMI, CY, and RFI (Table 1). In high and low DMI fluctuation groups, the lowest dry matter intakes were detected for negative RFI animals. Animals classified as low-DMI fluctuation and negative RFI and animals classified as high-DMI fluctuation and positive RFI had the highest CY. As expected, animals classified as negative RFI were more efficient than animals classified as positive RFI. Animals

classified as high-DMI fluctuation and positive RFI were less efficient than animals classified as low-DMI fluctuation and positive RFI. This determines the effect of fluctuation in DMI in the animals' efficiency indexes.

Table 1. Productive characteristics of Nelore cattle classified by groups of DMI fluctuations and RFI

	GF		RFI		P-value		
	Low	**High**	**Positive**	**Negative**	**GF**	**RFI**	**GFxRFI**
DMI fluctuation, %	0.90a	1.89b	1.37	1.43	0.001	0.494	0.290
RFI, kg/d	-0.005	0.051	0.666	-0.619	0.626	0.001	0.017
IBW, kg	344	342	344	341	0.759	0.689	0.449
FBW, kg	486	472	478	480	0.136	0.791	0.867
DMI, kg/d	9.45	9.59	10.1	8.96	0.624	0.001	0.066
ADG, kg/d	1.49	1.52	1.54	1.47	0.472	0.228	0.710
FER, kg/kg	0.16	0.16	0.16b	0.17a	0.920	0.088	0.954
HCW, kg	285	275	280	281	0.103	0.824	0.578
CY, %	58.3	58.2	58.3	58.3	0.737	0.785	0.002
Liver, kg	5.34	5.25	5.36	5.23	0.440	0.282	0.673
Kidneys, kg	0.85	0.82	0.86a	0.81b	0.376	0.034	0.768
KPH, kg	10.84	10.52	11.05	10.31	0.495	0.194	0.301

Significant interactions

	RFI	**GF**	
		Low	High
RFI, kg/d	Positive	0.50bA	0.83aA
	Negative	-0.51aB	-0.73aB
DMI, kg/d	Positive	9.87Aa	10.28Aa
	Negative	9.04Ba	8.89Ba
CY, %	Positive	58.05Bb	58.60Aa
	Negative	58.64Aa	57.85Bb

Means followed by different letters in each row or columns differ by Tukey test (P<0.05 or trend P<0.10);
GF: DMI fluctuation groups; RFI: residual feed intake; IBW: initial body weight; FBW: final body weight; DMI: dry matter intake; ADG: average daily gain; FER: feed efficiency ratio; HCW: hot carcass weight; CY: carcass yield; KPH: kidney, pelvic and heart fat.

IV. CONCLUSION

Nelore cattle classified as efficient based on RFI consume less food do not negatively impact other traits of economic importance for beef cattle production system. Furthermore, there is an association between negative RFI animals and low DMI fluctuation animal, which provides high CY with lower DMI.

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