

# QUALITY OF MEAT FROM NON-CASTRATED NELLORE CATTLE WITH HIGH AND LOW RESIDUAL FEED INTAKE

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**Abstract** – The residual feed intake (RFI) is an animal efficiency trait that has been used to identify more efficient cattle. Some studies indicate that genetic selection for RFI could decrease body fat deposition and negatively affect meat quality. This study was developed to evaluate carcass and meat quality traits of high and low RFI animals. Ninety-six non castrated Nellore males were feedlot finished for 90 days for RFI determination. During this period, ultrasound images were collected to evaluate *Longissimus* muscle area (LMA), backfat thickness (BFT) and rump fat (RFT). Thereafter, animals of high (n=16) and low (n=19) RFI were slaughtered and carcass pH and temperature were measured 1h and 24 h after slaughter. Samples of *Longissimus* muscle were collected between 12/13<sup>th</sup> ribs for color (L\*,a\*,b\*), cooking losses and Warner-Bratzler shear force determinations of samples aged for zero or 7 days. High RFI animals showed greater BFT (P=0.002) and RFT (P=0.001) at the end of feeding period but there was no difference in LMA. Low RFI animals showed smaller carcass pH (P=0.0006) and temperature (P=0.061) 1h after slaughter but they did not differ after 24h. RFI group did not affect meat quality traits at any ageing period.

**Key words:** Feedlot, feed efficiency, bovine

## I. INTRODUCTION

The feed cost could reach 70-80 % of the total feedlot costs. Therefore, the improvement in feed efficiency could have a great impact on feedlot profitability and decrease environmental impact.

There are many ways of measuring feed efficiency, but many of the proposed methods could have an indirect impact in others performance, and carcass and meat

quality traits. The residual feed intake (RFI) trait proposed by Koch *et al.* [1] is supposed to be adequate to identify more efficient animals without negatively affect animal performance and meat quality. However, some previous studies [2] and [3] have indicated that low RFI animal (more efficient) could have a lower body fat than those of high RFI.

This fact is very important, especially in Brazil, where the majority of herd consists of Zebu cattle, that normally have low levels of fat in carcasses and selection for RFI could negatively impact carcass and meat quality traits.

For these reasons, the objective of this study is to investigate the effect of RFI on meat quality of feedlot cattle that have high and low RFI.

## II. MATERIALS AND METHODS

Ninety-six non-castrated Nellore males (350 ± 50 kg LW; 20 mo old) were feedlot fed during 90 days a common diet containing 73% concentrate and 27% roughage (corn silage). Animal feed intake was individually controlled daily. Every 21 days animals were weighed and ultrasound scanned for determination of *Longissimus* muscle area (LMA) and backfat thickness (BFT) between 12/13<sup>th</sup> ribs, and rump fat thickness (RFT).

At the end of feeding period, the RFI was calculated [1] and low (n=19) and high (n=16) RFI animals were identified.

Thereafter, animals were slaughter and carcass pH and temperature were measured

1h and 24 h after slaughter. After 24h of chilling, carcasses were ribbed between 12/13<sup>th</sup> ribs and two samples of *Longissimus* muscle were taken, vacuum packed and aged for 0 or 7 days for color (L\*, a\*, b\*), cooking losses (CL) and Warner-Bratzler shear force (WBSF) evaluations.

After removed from the packages, samples allowed to blow for 20 minutes and then the L\*, a\*, and b\* values were measured using a Minolta spectrofotometer (CM2500d, Konica Minolta Sensing Inc., Osaka, Japan) in the CIELAB space. The light source was set to D65 with observation angle set to 10° and aperture size of 30 mm. The instrument was previously calibrated according to the manufacturer's specifications. Measurements were replicated in different portions of LM and the average of three measurements was considered as the color value. The WBSF was analyzed according to AMSA [4]. The CL was calculated by difference of weight of samples before and after cooking and is expressed in percentage.

### III. RESULTS AND DISCUSSION

There was no difference in carcass traits evaluated by ultrasound in the beginning of feeding period (Table 1). High RFI animals showed greater BFT (P=0.002) and RFT (P=0.001) at the end of feeding period but there was no difference in LMA.

The highest values of BFT and RFT found in low RFI group are in agreement with previous studies [4] and [2], supporting the hypothesis that high-RFI animals have more difficulty of depositing fat compared with low-RFI animals.

Table 1 - Means, standard error of mean (SEM) and probability of ultrasound carcass traits of low and high residual feed intake (RFI) Nellore cattle.

Traits <sup>1</sup>	RFI		SEM	Pr>F
	Low	High		

LMA initial, cm <sup>2</sup>	67.4	65.7	1.26	0.356
LMA final, cm <sup>2</sup>	83.9	84.0	1.34	0.965
BFT initial, mm	1.2	1.6	0.27	0.340
BFT final, mm	3.9	5.9	0.42	0.002
RFT initial, mm	2.7	3.8	0.40	0.074
RFT final, mm	5.5	8.3	0.55	0.001

<sup>1</sup> LMA – Longissimus muscle area; BFT – backfat thickness; RFT – rump fat thickness.

According to several authors ([5], [4], [2]) there is a negative relationship between high values CAR and body composition, where more efficient animals have a tendency of greater accumulation of protein in weight gain, and lower fat accumulation in the abdominal cavity, subcutaneous and intramuscular.

Low RFI animals showed smaller carcass pH (P=0.0006) and temperature (P=0.061) 1h after slaughter but they did not differ after 24h (Table 2).

Table 2 - Means, standard error of mean (SEM) and probability of carcass pH and temperature (T) of low and high residual feed intake (RFI) Nellore cattle.

Traits <sup>1</sup>	RFI		SEM	Pr>F
	Low	High		
pH 1h	6.5	5.9	0.14	0.006
T 1h, °C	35.5	33.5	0.73	0.061
pH 24h	5.2	5.4	0.28	0.294
T 24h, °C	8.3	8.4	0.28	0.294

The lowest pH values 1h in high-RFI group are in contrast with the results found by Neto *et al.* [6] that evaluated the carcass pH of Nellore bulls of high and low RFI in different ageing times. The author found no significant differences between groups. The smallest pH observed for carcasses of high RFI group could be an indicative that these animals are more susceptible to stress in the pre-slaughter management.

There was no effect of RFI group on meat color (L\*, a\*, b\*), CL or WBSF at any period meat quality traits at any ageing period (Table 3). Similar results were reported by Chaves [7] who found no significant differences in L \*, a \* and b\* in

Nellore steers classified into high and low RFI, denoting that such features have no correlation with RFI

Table 3 - Means, standard error of mean (SEM) and probability of meat quality traits of low and high residual feed intake (RFI) Nellore cattle.

Traits <sup>1</sup>	RFI		SEM	Pr>F
	Low	High		
Ageing period – 0 day				
L*	29,5	30.9	0.92	0.274
a*	24.1	23.0	2.23	0.735
b*	13.6	13.7	0.64	0.941
CL	22.1	21.8	0.88	0.835
WBSF	8.2	8.2	0.49	0.928
Ageing period – 7 days				
L*	33.5	43.8	1.43	0.538
a*	14.5	14.4	0.45	0.841
b*	14.7	14.2	0.84	0.673
CL	21.5	21.5	0.92	0.797
WBSF	7.0	6.5	0.37	0.367

#### IV. CONCLUSION

Animals selected for low RFI could decrease fat deposition but it does not affect meat quality attributes of *Bos indicus* cattle.

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