CHANGES IN THE CARCASS CHARACTERISTICS OF ZEBU COWS UNDER DIFFERENT FEEDING MANAGEMENT SYSTEMS

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Abstract – The aim of this study was to evaluate the changes in the carcass characteristics of Zebu cows under different feeding management systems. The animals used in the experiment were cull Nellore cows, belonging to the EMBRAPA/CNPGC. The animals were subjected to two feeding management during the dry season: MAN – maintenance; COMP – low forage availability (weight loss) followed by high forage availability to promote weight gain of cows with low body score. Four serially slaughter occurred during the period of restoration of weight and body condition score of the COMP. Carcasses of 38 females, aged 4-12 years were evaluated. In MAN, only hot carcass weight, and weight of the wholesale cuts were affected by the moment of slaughter (P <0.05). Beside those characteristics, in the COMP the slaughter time was correlated to ribeye area, carcass yield (P <0.05). There was an expected increase of the ribeye area as the animals were slaughtered at heavier body weights during compensatory gain period. However, there were also increases in subcutaneous fat thickness, percentage of fat and the relationship between fat and muscling on those cows. Therefore changes in the tissue occurred in cull cows from compensatory gain highlighting the increased adiposity in the carcass composition.

Key Words – Cull cows, Correlation, Compensatory growth, Yield of carcass

I. INTRODUCTION

Historically, a considerable part of the annual slaughter of cattle in Brazil is comprised of females, which can reach over 50% in some years. The uses of available technologies to optimize the quality of beef and reduce slaughter age are important strategies. However, in the Brazilian market there are still cows after serving their reproductive function are slaughtered and market as *in natura* beef cuts. The disposal of these females usually occurs in periods of low forage production [1]. Differences between growth rate and nutrient management have been extensively studied in order to evaluate the impact of these changes in tissue components in the carcass and meat. The study aim to assess the changes in the carcass characteristics of Zebu cows under different feeding management systems.

II. MATERIALS AND METHODS

The experiment was performed at the Brazilian Beef Cattle Research Center/EMBRAPA with 38 Nellore females, aged 4-12 years. The average live weight (LW) of cows at the beginning of the trial was 447.9 ± 37.3kg. The experiment was randomly assigned to two different groups of the feeding strategies during the dry season: MAN: Maintenance – high forage availability to promote weight maintenance of cows with high body condition score; COMP: Compensatory gain – low forage availability (weight loss) followed by high forage availability to promote weight gain of cows with low body score. The experiment was divided into two phases. The first phase was the period of food restriction for the animals in order to cause weight loss and decreased body condition. The weighting occurred at 1, 36, 78, 129 days from the beginning of the experiment. The second stage, defined as compensatory gain period initiated on day 129 and lasted 174 days. At this stage, body weight measurements occurred on days 1, 36, 77, 107, 139 and 174. The animals were slaughtered in the Brazilian Beef Cattle Research Center/EMBRAPA. The first slaughter (n = 10) occurred after the period of feed restriction. The other slaughters occurred with 41 (n = 10) 103 (n = 10) and 137 (n = 8) days after the first slaughter. The time between slaughters was defined in terms

of animal performance and to generate curves on tissue deposition during weight recovery. Statistical analysis were performed using the statistical program SAS [2].

III. RESULTS AND DISCUSSION

The interaction between feeding management and days of evaluation was significant ($P < 0.05$) for body weight gain (BWG) and those variables highly correlated to BWG, indicating that feeding management provided different responses in terms of weight gain in both experimental phases. As a result, these variables were assessed by regression analysis within each treatment. The equations for weight changes (loss/gain) to MAN were significant ($P < 0.05$). The equation for weight change during phase 1 was $Y = 469.95 + 0.42X - 0.002X^2$ ($P < 0.001$, $r^2 = 0.94$). In phase 2 it was $Y = 489.35 + 0.89X - 0.01X^2 + 0.00004X^3$ ($P < 0.001$, $r^2 = 0.84$). The equations for animal weight changes in COMP were significant in both experimental phases. In the first phase the animals from COMP showed weight loss describe by the equation $Y = 426.74 + 0{,}44X - 0.004X^2$ ($P < 0.0001$, $r^2 = 0.90$). In phase 2, which corresponded to the period of refeeding, the equation was $Y = 410.6 + 0.68X - 0.02X^2$ ($P < 0.0001$, $r^2 = 0.82$). On the other hand, carcass traits correlated with body weight in COMP were affected by time of slaughter ($P < 0.05$; Table1). Fat deposition increased steadily while the proportion of bone showed a negative linear response (Table 1). The average carcass fat thickness of the COMP was within limits considered appropriate by slaughterhouse (3 – 6 mm) and increased with the slaughter weight increment during refeeding. The opposite occurred with the percentage of bone in the carcass which decreased with time to slaughter, reflecting the increased contribution of adipose tissue. The increased deposition of subcutaneous fat of cull cows has been reported by other authors, varying in intensity, mainly due to the energy level of diet and genetic group [3; 4; 5]. An increase of fat thickness to ribeye area ratio during the period of refeeding was observed (Table 1). These results reflect the drive to deposit adipose tissue when the animal already reached its mature size. The distribution of fat cover on the carcass is important to protect it against excessive shortening of the sarcomere by cold ("cold shortening") and moisture loss during cooling. However a correlation between fat distribution and slaughter point was not verified ($r = 0.093$; $P > 0.05$).

Table 1 Regression equations for carcass attributes and live weight gain with time of slaughter for Zebu cows subjected to compensatory gain

Characteristics	Average	Intercept	Linear coefficient	*R^2	#P<
LW[a] (Kg)	429.8	411.2	0.28	0.80	0.01
HCW[b] (Kg)	241.7	224.8	0.25	0.81	0.01
FW[c] (Kg)	18.6	17.6	0.01	0.61	0.01
SHW[d] (Kg)	57.19	52.83	0.06	0.72	0.01
HQW[e] (Kg)	75.8	70.4	0.08	0.74	0.01
RC[f] (%)	56.0	54.7	0.02	0.44	0.01
SFT[g] (mm)	4.2	2.4	0.03	0.45	0.01
REA[h] (cm^2)	58.3	54.2	0.06	0.36	0.03
SFT/ REA[i] (cm^2)	7.2	4.7	0.04	0.35	0.03
Bone[j] (%)	19.3	20.5	-0.02	0.25	0.03
Fat[k] (%)	4.4	3.5	0.01	0.69	0.01

*coefficient of determination #P<: probability LW[a]: Live weight; HCW[b]: hot carcass weight; FW[c]: flank weight; SHW[d] (Kg): special hindquarter weight ; HQW[e] (Kg): hindquarter weight; RC[f] (%): carcass yield; SFT[g] (mm): subcutaneous fat thickness; REA[h](cm2): ribeye area; SFT / REA[i] (cm^2): millimeter of SFT per cm^2 ribeye area; Bone[j] (%): proportion of bone; Fat[k] (%): proportion of fat.

IV. CONCLUSION

The compensatory gain in adult animals grazing with supplementation will promote muscle gain but there will be a more pronounced adipose tissue deposition.

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