IMMUNOCASTRATED BULLS MEAT QUALITIES. LIPID FRACTION AND SENSORY ANALYSIS

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Background

The use of castration is an important tool in beef cattle management to produce better quality meat particularly for older animals. Surgical castration is not only painful but causes them lesser weight gain and might promote losses by infectious diseases (Zweiacher et al., 1979). To avoid this stress and losses, farmers sometimes do not castrated these animals and intact bulls are more difficult to handle presenting carcasses with lower quality (Gregory and Ford, 1983). As a whole, zebu breed (*Bos indicus*) is more stressful than *Bos taurus* being raised in open pastures, with little management. Immunocastration animals have shown to present similar growth and carcass characteristics in relation to steers (Aissat et al., 2002) and we used in this experiment, a recombinant Luteinizing Hormone Releasing Hormone (LHRH) fusion proteins and we evaluated *Bos indicus* meat characteristics.

Objectives

This experiment was conducted in order to observe the effects of immunological castration against Luteinizing Hormone-Releasing Hormone- fusion proteins on meat characteristics of zebu, *Bos indicus*, by means of intramuscularly lipid fraction and sensorial preference.

Methods

LHRH was engineered prepared at Department of Animal Sciences, Washington University, Pullman, USA (Aissat et al., 2002). Seventy Nellore-cross bulls were randomly divided into three groups: T1 – immunization against LHRH fusion proteins; T2 – surgical castration and T3 – intact bulls kept in a *Brachiaria brizantha* pasture in a farm located in the state of Mato Grosso, Brazil. Animals were at the age of 24 mo old at the initiation of the study. T1 group received three booster injections, being the first on May 14, 2001, the second on October 2, 2001, and the last on February 25, 2002. The surgical castration was carried out by knife on October 2, 2001. *Longissimus dorsi* m. (LD) was collected and kept frozen for further analysis. Moisture, ash and protein contents were determined as described in AOAC methods (Cunniff, 1998). Lipids were extracted from muscle tissue using Folch et al. method (1957). Cholesterol quantitation was determined by Rowe et al. method (1999) and fatty acids by technique described in Pedrão et al (2001) both using Shimadzu 14A GLC. Collagen concentration was determined by Woessner technique (1961). Flavor, juiciness and tenderness of roasted samples were evaluated by seven trained panelists (Stone & Sidel, 1993; AMSA, 1978). Experimental data shown as mean ± standard deviations were statistically compared by Tukey test at 5% with ANOVA as described by Montgomery (1997). Data were processed in the Statistica 5.1 Software (Statistica, 1996).

Results and discussion

Table 1 shows proximate chemical composition and collagen contents of LD from immunocastrated, surgically castrated and intact bulls. Although significant difference is observed in the moisture, protein and fat fractions in relation to intact bulls other parameters including cholesterol and collagen contents, are not significantly different in all samples analyzed ($p \leq 0.05$). Table 2 shows LD from immunized animals presented a significantly higher PUFA/SFA ratio (0.14) in relation to those surgically castrated (0.10) ($P \leq 0.05$) and not significantly different comparing to intact bull (0.13) ($P \leq 0.05$). Conversely, meat from intact bulls presented lower protein and fat contents and higher moisture compared to castrated and immunized animals. Cholesterol content is similar in relation to meat samples from those three animal groups. Finally, all samples were not statistically different in relation to texture measured by Warner- Bratzler neither in relation to taste panel taking into consideration flavor, juiciness and tenderness ($P \leq 0.05$). These data support the idea of immunization against LHRH fusion proteins is a potential technique as noninvasive alternative to avoid surgical castration in livestock management.

Conclusions

Immunocastration was effective in producing meat characteristics similar to that of surgically castrated animals thus this vaccine appears to have practical application in the management and castration of grazing bulls.

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TABLE 1. Proximate chemical composition and collagen content in *L. dorsi m.* of pasture fed LHRH immunocastrated, surgical castrated and intact bulls.

	Treatment		
	Immunocastrated	Surgical castrated	Intact bull
Moisture (g)	75.24[a] (± 1.44)	74.36[a] (± 0.93)	76.16[b] ±(1.66)
Ash (g)	0.94[a] (± 0.05)	0.95[a] (± 0.09)	0.95[a] ± (0.08)
Protein (g)	20.75[a] (± 1.62)	19.76[a] ±(1.57)	19.00[b] ± (1.81)
Fat (g)	1.62[a] (± 0.50)	1.87[a] ± (0.53)	1.20[b]± (0.56)
Cholesterol (mg)	51.84[a] (± 1.63)	48.96[a] ± (1.35)	50.00[a] ± (1.48)
Collagen (g)	0.8510[a] (±0.06)	0.60[a] (±0.08)	0.77[a] (±0.09)

[a,b] – Means on the same line followed by different letters are different by Tukey test at 5%.

TABLE 2. Fatty acid profile in meat of pasture fed LHRH immunocastrated, castrated and intact bulls.

Fatty acid	Treatment		
	Immunocastrated	Surgical castrated	Intact bull
PUFA[1]	6.93 [a] (± 0.99)	5.00 [b] (± 0.57)	7.07 [c] (±1.27)
MUFA[2]	43.38[a] (±2.44)	43.05[a] (± 3.16)	42.29[a] (± 2.78)
SFA[3]	49.61[a] (± 1.62)	51.06[ab] (± 2.90)	52.60[b] (± 3.60)
n-6[4]	3.00[a] (± 0.18)	2.81[b] (± 0.18)	3.02[a] (± 0.15)
n-3[5]	1.90[a] (± 0.17)	1.80[b] (± 0.16)	1.82[b] (± 0.17)
PUFA/SFA[6]	0.14[a] (± 0.02)	0.10[b] (± 0.01)	0.13[a] (± 0.01)
n-6/ n-3[7]	1.59[a] (± 0.14)	1.61[a] (± 0,09)	1.67[b] (± 0.11)

[a, b, c] – Means on the same line followed by different letters are different by Tukey test at 5%. [1]Polyunsaturated fatty acids. [2]Monounsaturated fatty acids. [3]Saturated fatty acids. [4]omega-6 fatty acids. [4]omega-3 fatty acids. [6]Ratio of polyunsaturated fatty acids and saturated fatty acids. [7]Ratio of omega-6 and omega-3 fatty acids.

TABLE 3. Shear value and sensorial analysis (flavor, juiciness and tenderness) of L. dorsi m. of pasture fed LHRH immunocastrated, castrated and intact bulls.

Treatment	Shear value (N)	Flavor*	Juiciness*	Tenderness*
Surgical	115.98[a] (±7.07)	7.55[a] (±0.07)	6.78[a] (±0.11)	5.91[a] (±0.19)
Immunization	123.41[a] (±6.33)	7.66[a] (±0.07)	7.05[a] (±0.11)	6.01[a] (±0.20)
Intact bull	141.89[a] (±9.21)	7.58[a] (±0.09)	6.84[a] (±0.16)	5.40[a] (±0.29)

Non-structured scale of 9.0cm from weak to intense.
[a,b] – Means on the same column are significantly equals by Tukey test at 5%.