PROXIMAL AND MINERAL COMPOSITION OF BEEF DERIVED FROM WATER BUFFALO (*BUBALUS BUBALIS*) AND ZEBU-TYPE CATTLE

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Keywords: beef, *longissimus dorsi*, buffalo, nutritive value

Introduction

The Asiatic water buffalo (*Bubalus bubalis*) has been poorly utilized for meat production in the tropical Latin American regions. The interest in evaluating domestic buffalo as meat animals in Venezuela has grown due to the increase of buffalo herds and the breeders' organisation (Huerta-Leidenz, 2001). Little information exists about the nutrient composition of grass-fed red meats, particularly those derived from water buffalo and *Bos indicus*-influenced cattle (Zebu-types). This research focuses on the evaluation of proximal and mineral composition of *longissimus dorsi* muscle of buffalo and zebu-type cattle produced under extensive savannah conditions at two comparable ages (19 and 24 months of age), and different gender (bulls and steers).

Materials and Methods

Two groups, conformed by 32 buffaloes and 34 zebu-type cattle each, were randomly selected, and slaughtered at 19 and 24 months of age. At weaning (7 months), half of each group (16 buffalo and 17 cattle) was castrated. Details of the cow; calf operation and animal handling were previously described by Giuffrida de Mendoza *et al* (2005). Steaks (2.54 cm thick) were removed from the *L. dorsi thoracis* muscle and trimmed of surrounding fat. Proximate composition (g/100g fresh tissue) was determined according to official methods of the AOAC (1990), except for total lipids which were determined according to Folch *et al.* (1957). Mineral contents (mg/100 g fresh tissue) were determined by atomic absorption and/or atomic emission spectrophotometry (Perkin-Elmer, 1994), except for phosphorus, which was performed by using UV-VIS spectrophotometry (AOAC, 1990). Experimental data was subjected to analysis of variance (ANOVA) and least square means separation ($P < 0.05$) by using the Statistical Analysis System (SAS, 1996).

Results and Discussion

The species x age interaction affected dry matter and protein contents ($P < 0.05$) both decreased with age in samples derived from zebu-type cattle while, those from buffalo remained unchanged. Meat samples from the oldest animals (24 months) accumulated more intramuscular lipids (1.86 ± 0.05 vs. 1.43 ± 0.05 g/100g of fresh tissue). As observed by Ruiz *et al.* (2005), samples derived from the steers showed the highest intramuscular lipids content (1.73 ± 0.05 vs. 1.56 ± 0.06 g/100 fresh tissues). Except for Fe, species and gender did not affect the mineral composition of the analyzed samples. Age affected ($P < 0.05$) all minerals except P and Mg (Table 1). Phosphorus was not affected by any of the independent variables under study.

Table 1: Effect of age on mineral content in *longissimus dorsi* muscle.

Minerals (mg/100 g fresh meat)	Age (Least squares means ± SE[a])		*P* Value
	19 months (n=33)	24 months (n=33)	
Na	61.52 ± 1.05	72.07 ± 1.07	0.0001
K	353.21 ± 7.17	391.74 ± 7.17	0.0003
Ca	9.22 ± 0,25	8.98 ± 0.26	0.0001
Mg	24.38 ± 0.58	24.34 ± 0.49	NS
P	205.36 ± 2.47	198.79 ± 2.47	NS
Mn	0.02 ± 0.00	0.01 ± 0.00	0.0036
Fe	2.34 ± 0.05	2.15 ± 0.04	0.0029
Zn	3.71 ± 0.09	4.16 ± 0.10	0.0053
Cu	0.16 ± 0.01	0.09 ± 0.01	0.0001

[a]SE = Standard error

NS=Non significant ($P > 0.05$)

Variation in the individual mineral contents did not show a common tendency when comparing animals of 24 months to those of 19 months; among the minerals considered herein only Na, K and Zn concentrations increased with animals' age. These results differ from those reported by Kotula *et al.* (1982). Iron content varied with species x age interaction.

In buffalo meat, there were no differences ($P > 0,05$) in Fe content at the considered ages; in contrast, a decrease ($P < 0,05$) was observed in beef at 24 months (Figure 1). Also, Fe content varied with age x gender interaction. Although Fe content increased in bulls' meat samples at 24 months, those from steers had the highest content of Fe at the two ages considered (Figure 2).

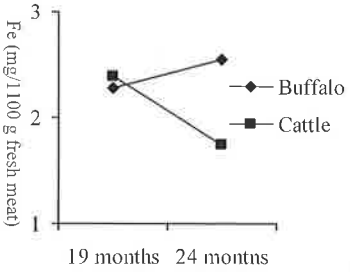

Figure 1: Effect of specie x age interaction on Fe content.

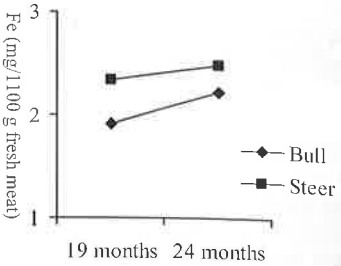

Figure 2: Effect of age x gender interaction on Fe content.

The fluctuations in the mineral content observed, could be due to the confounded effect of the diet produced by the environmental changes observed during the stocking and fattening phase of the post-weaned animal groups, described by Giuffrida de Mendoza *et al.*, (2005). This phenomenon could have produced changes in the intramuscular accumulation of some nutritional constituents like minerals. Some authors support the suggestion that pre-slaughter factors like a poor plane of nutrition during the drought period and high temperature, reduce the quality of meat (Kakkar and Pavanpreet, 2000).

Conclusions

The results showed that meat from both species have similar nutritional characteristics; the magnitude of the differences in proximate and mineral composition among age and gender groups, was not very large. The low lipid content found in the samples showed an apparent advantage of both species from a nutritional standpoint. Except for Zn, age of slaughter did not favour the accumulation of important minerals like Fe, Ca, Mg and P; however, a 100g-portion of fresh meat from both species provides nearly 25% of Fe, P, Zn and K required in the human diet.

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