

PHYSICAL, CHEMICAL, MICROBIOLOGICAL AND SENSORY CHARACTERISTICS OF ADULT AND YOUNG BULL AGED CAP OF RUMP

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**ABSTRACT.** The effect of ageing process at low temperature (0°C to 2°C) for 14 days in the vacuum packed cap of rump from adult and young bull, was investigated. The left and right cuts of both aged and non aged, were analysed at the same time. There were no significant differences in moisture, protein, ash and collagen content, and the pH value between adult and young bull. On the other hand, total fat content were significantly lower (averaging 9.65%) in the young bull (averaging 12.28%) than in the adult. Weight cooking loss of aged young bull cap of rump meat, averaging 31.90% were significantly lower than 39.34% in the aged adult. Aged adult cap of rump was significantly tougher, concerning either shear force and sensory tenderness in comparison to aged young bull cap of rump. The young bull flavour was significantly more intense for non aged young bull cap of rump than for non aged adult cap of rump.

**KEYWORDS:** Beef, young bull, meat, ageing, tenderness.

**INTRODUCTION:** There is a tendency to reduce the calorie intake from fat. Thus efforts have been made in the production of young bulls which carcasses have less subcutaneous fat, resulting in leaner cuts than the castrates and females (8). Economically it is interesting for the animal-raising's sector, not castrating males to increase productivity (9). Of all the attributes of eating quality, texture and tenderness are presently rated most important by the average consumer and appear to be sought to the expense of flavour or colour (2).

The present investigation proposed to evaluate the benefits of the current ageing technology of cap of rump, which is very popular in Brazil and usually its market price is high. In particular, the texture in its parameters of tenderness and juiciness were assessed. In addition, other related meat characteristics, such as moisture, fat, protein, ash and collagen contents, pH, objective colour and microbial counts were evaluated.

**MATERIAL AND METHODS:** Cap of rumps (dorsal portion of the muscle Biceps femoris) averaging 1.2 kg from four young bull (15 months old, that have been in intensive feeding with corn meal, corn silage, sugar cane grounding, poultry litter during 8 months) and four adult (grass-feed, 48 months old) of Nelore breed were taken 24h post mortem, trimmed of excess fat and vacuum packed. The cuts of the right side (individual control) were cryogenically frozen and stored at -18°C, and the left side was aged at 0°C to 2°C for 14 days. After the ageing period, they were also frozen and stored. The aged and non aged cuts from the same animal were analysed at the same time.

**Chemical and physical analysis** -The cuts were thawed at 8°C during 48h, a slice of approximately 250g was taken, and its lean part was analysed for moisture, protein, fat, ash (5) and collagen content (6). The pH values were determined with Ingold combination electrode Lot 406-M6-S7 and L\*, a\* and b\* colour values with Minolta Chroma Meter CR-200b. The water retention capacity was determined (1). The remaining pieces were roasted in a conventional oven heated to 165±25°C until internal temperature reached 72°C. After cooling to room temperature cylinders of 0.5 inch diameter with muscle fibres oriented parallel or transversely to the axes were taken to measure shear and adhesion forces, respectively, using the INSTRON instrument with WARNER-BRATZLER accessories. **Sensorial analysis**—Quantitative Descriptive Analysis (7) oriented the evaluation of firmness, juiciness, young bull flavour and overall quality that was carried out on samples served to the panellist in the same cylinder form as those used for shear force determination. The samples were submitted to 5 to 8 subjects trained panel and COMPUSENSE 4.2. system was used. The data were analysed at 5% level using ANOVA/MANOVA STATISTICA for Windows v.5.0 program (10). **Microbiological analysis**- Psychrotrophics, Enterobacteriaceae and lactic acid bacteria counts were carried out (3).

#### RESULTS AND DISCUSSION.

The physical and chemical characteristics of cap of rump are shown in Table 1.

Table 1: Physical and chemical characteristics of cap of rump

	Young bull Mean (±stand. error)	Adult Mean (±stand. error)
pH	5.59 (±0.006)	5.58 (±0.010)
Moisture (%)	66.64 (±1.412)	66.10 (±0.335)
Fat (%)	9.65 <sup>a</sup> (±0.467)	12.28 <sup>b</sup> (±0.584)
Protein (%)	20.59 (±0.460)	20.29 (±0.333)
Ash (%)	1.16 (±0.041)	1.21 (±0.115)
Collagen (%)	1.18 (±0.345)	1.42 (±0.234)
Shear force (kgf)- not aged	2.08 (±0.297)	2.96 (±0.364)
Shear force (kgf)- aged	2.10 <sup>a</sup> (±0.178)	3.07 <sup>b</sup> (±0.312)
Adhesion force (kgf)- not aged	1.67 (±0.206)	2.62 (±0.405)
Adhesion force (kgf)- aged	1.68 <sup>a</sup> (±0.160)	2.41 <sup>b</sup> (±0.162)
L*-not aged	37.83 <sup>a</sup> (±1.690)	33.01 <sup>b</sup> (±0.751)
L*- aged	37.86 (±1.194)	36.50 (±1.099)
a*-not aged	20.65 (±0.828)	22.16 (±0.617)
a*-aged	20.77 (±0.678)	20.64 (±1.364)
b*- not aged	10.00 (±0.318)	9.99 (±0.461)
b*-aged	10.22 (±0.378)	9.45 (±0.487)
Cooking loss-not aged(%)	31.04 (±1.164)	35.39 (±1.907)
Cooking loss-aged(%)	31.90 <sup>a</sup> (±1.931)	39.34 <sup>b</sup> (±1.593)
Water retention capacity-not aged (G)	0.36 <sup>a</sup> (±0.022)	0.44 <sup>b</sup> (±0.487)
Water retention capacity-aged (G)	0.36 <sup>a</sup> (±0.022)	0.45 <sup>b</sup> (±0.022)

Means followed by different characters in the same line are different at p<0.05.

There were no significant differences in moisture, protein, ash and collagen content, and the pH value between adult and young bull. On the other hand, the total fat content was significantly lower (averaging 9.65%) in the young bull than in the adult (averaging 12.28%). The shear force was significantly lower, averaging 2.10kgf in the aged young bull compared to 3.07kgf in the adult. The obtained Warner-Bratzler shear score of 5.4kg in a 1.27cm diameter meat core cylinder is considered the limit above which the meat is considered tough (4). Thus the tenderness of meats in the present study produced acceptable values, even in the case of the non aged controls. The comparison of the colour between non aged young bull and the adult resulted that only the brightness value (L\*) was significantly higher in non aged young bull than in the adult. Cooking loss of aged young bull cap of rump meat, averaging 31.90% were significantly lower when compared to 39.34% in the adult. The water retention capacity was significantly lower either in aged or non aged young bull than in the adult. Aged adult cap of rump was significantly tougher than in the aged young bull, averaging 5.43 and 7.21 respectively in the sensorial analysis. There were no significant differences in sensorial juiciness between adult and young bull, either for aged or non aged cap of rump. The young bull flavour was significantly more intense for non aged young bull (averaging 7.19) than for non aged adult (averaging 3.91). Although the overall quality of aged young bull meats scored consistently higher (averaging 7.54), compared to aged adult (averaging 6.69), the differences were of no statistical significance ( $p=0.07$ ) (Figures 2,3,4). The psychrotrophics, Enterobacteriaceae and lactic acid bacteria counts (Figure 1) were similar in the non aged and aged adult group, but the psychrotrophics and lactic acid bacteria counts in aged young bull were higher than in non aged young bull. The results obtained in this work for adult was similar to which one obtained in Arima,1998.

### CONCLUSIONS

1. Total fat content was significantly lower in the young bull than in the adult cap of rump.
2. Aged adult cap of rump were significantly tougher, either shear force and sensory tenderness in comparison to aged young bull cap of rump.
3. The young bull flavour was significantly more intense for non aged young bull than for adult cap of rump.

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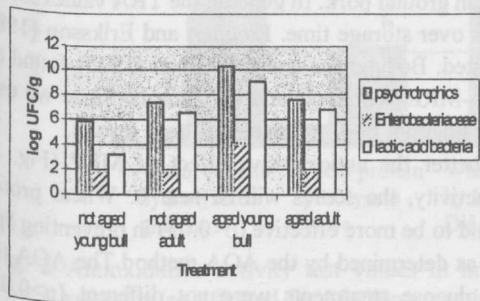
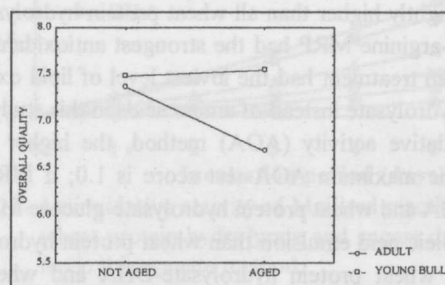
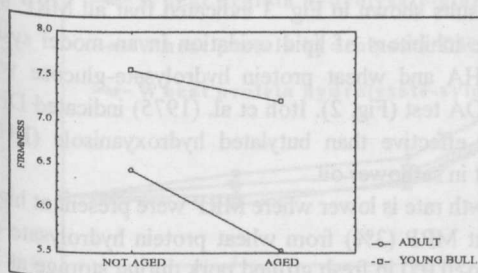


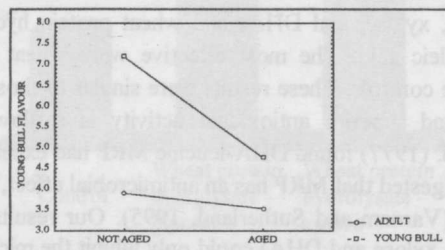
Figure 1: Microbiological counts of cap of rump of adult and young bull.



\*(Score 0=none; 10=high)  
Figure 2: Sensorial overall quality of adult and young bull cap of rump.



\*(Score 0=very tough; 5=tender; 10=very tender)  
Figure 3: Sensorial tenderness of adults and young bull cap of rump.



\*(Score 0=none; 10=intense)  
Figure 4: Sensorial young bull flavour of adult and young bull cap of rump.