MEAT QUALITY OF ZEBU CROSS-BREEDS: SENSORY AND MECHANICAL EVALUATION.

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The present study is an attempt to estimate the maximal percentage of Zebú, in Zebú cross-breed, that will not produce changes in meat quality and to evaluate the effect of postmortem meat ageing. All steers (n= 70) of known percentage Angus(AA) and Brahman(B) breeding (AA=14; 3/4A:1/4B=14; 5/8A:3/8B; 1/2A:1/2B=14; 3/8A:5/8B=14) were reared in Buenos Aires Argentina, from the weaning up to slaughter with high pasture quality. Steers were slaughtered at equivalent outside fat thickness visually monitored by trained evaluators. After chilling (36 hs) the right carcass muscles **semitendinosus**,**gluteus medius**, **longissimus dorsi**(LD) and **biceps femoris** were sent to INTA-ITC for sensory and mechanical evaluation (Warner Bratzler Shear,WBS) . The same muscles of the left carcass were vacuum packaged and aged seven days at 1°C prior to evaluation. Results showed that the AA meat without ageing was more tender than the meat from other groups. Ageing improved tenderness and juiciness in all of all analyzed cross-breeds. Tenderness of the four analyzed muscles of AA and 3/4A:1/4B cross-breed did not show statistical differences. Measurementes obtained by WBS and sensory panel showed less tender meat as the B percentage was increased.

CONCLUSION : meat quality in steers is not affected from AA to 3/4A:1/4B cross-breed. Postmortem ageing improve meat quality in beef animals with different percentage of Brahman.

Introduction

Numerous researchers have reported advantages from crossing Bos indicus with British cattle to improve efficiency of beef production. This crossbreeding has the advantage of its adaptability in semitropical and tropical climates (Crockett et al,1979). Cundiff et al (1986) showed the performance in temperate climates. Traditionally, indian cattle and indian crossbred have been discriminated in the market by lowering this prices. One of the reason for this discrimination has been atributed to a low meat quality, especially tenderness, as the percentage of Bos indicus inheritance increased. Koch et al (1982) Crouse et al (1987) and Garriz et al (1987) have observed that meat obtained from Bos indicus breed crosses was less tender than meat obtained from Bos taurus cattle. The study of Crouse et al (1989) was on animals of similar age (13 to 15 month) without considering their different growth potential. Johnson et al (1990) ,however, did not take into account constant age or liveweight. They compared palatability traits at similar stages of subcutaneous fat composition from animals with different feeding treatments.

The objective of this study was to estimate the maximal percentage of Zebu in A. Angus and Brahman cross-breed, which would not produce changes in meat quality, on our animals feeding on pastures of a temperated region and slaughtered at similar stages of subcutaneous fat composition.

Material and methods

A total of 70 steers of known percentage A. Angus (AA) and Brahman (B) breeding (AA=14;

3/4AA:1/4B=14; 5/8AA:3/8B=14; 1/2AA:1/2B=14; 3/8AA:5/8B=14) were purchased at weaning from different herds. They were rared at the Experimental Station of the National Institute of Agricultural Technology (INTA), Pergamino, Province of. Buenos Aires, Argentine. They were fed with high pasture quality from the weaning up to slaughter. Steers were slaughtered at 4 mm equivalent outside fat thickness, visually monitored by three trained evaluators. Groups of animals were slaughtered from february to october at a slaughterhouse according to standard procedures. After chilling (36hs) the right carcass muscles: **Semitendinosus** (ST), **Gluteus medius** (GM), **Longissimus dorsi** (LD) and **Biceps femoris** (BF), were sent to Meat Technology Institute of INTA for sensory and mechanical evaluation. The same muscles of the left carcass were vacuum packaged an aged 7 days at 1°C prior to evaluation. The intramuscular fat content was determined in LD, GM, BF and ST muscles using the Official Method of British Standards Institution (1958). Cubes of 5 by 5 by 5 cm from fresh and aged muscles were taken out and packaged in polyethylene bags. The rest of samples were kept frozen at 25°C up to the moment of the sensory evaluation. The cubes were cooked in a 70°C water bath to an internal temperature of 70°C monitored by thermometers inserted in the center of the cubes. Samples were cooled at room teperature and 5 cores (1.27cm diameter) were removed paralell to fiber orientation and sheared twice on a Warner Bratzler (WB) shearing device. Samples of LD and GM with and without aging, were used for sensory evaluation. Slices were cut 2.5 cm thick from both frozen muscles. They were tempered 24 h in a 5-7°C environment and then they were cooked in a pan-broiler. Internal temperature was monitored with digital puncture thermometer. Steaks were turned at 40°C and removed from the pan-broiler when they reached 70°C. 6 to 8 member descriptive attribute sensory panel were trained and tested according to methods described by Cross et al (1978) and AMSA (1978). Panelists, in individuals booths evaluated three 1.27cm cubed samples for flavor intensity, juiciness, overall tenderness (8=extremely intense, juicy,tender respectively to 1=extremely bland and tough respectively) and amount of connective tissue (8=none to 1=abundant). Data from WB were analyzed by variance analysis using a model that included fixed effect for the 5 groups. When the genotype factor was significative ($p \leq 0.05$) Duncan test was used to compare means. Data from sensorial evaluation were analyzed by analysis of variance too as the same that WB but Tukey test to compare means when the genotype factor was significative was employed.

Results and discussion.

The statistical analysis showed differences in ST and LD intramuscular fat content ($p \leq$ between A. Angus and the other crosses. Means values of WB from A. Angus muscles were similar than (more tender) WB values from the other crosses, except for GM which were significantly all muscles studied except BF, WB values from A. Angus carcasses were significantly different ($p \leq 0.05$) of WB values from 3/8B. This genotipe showed higher values (less tender) than those that we could have expected to obtain taking into account its percentage of indicus inheritance. (Table 1). Aging produced lower WB values (more tender) almost in all cases, there was no difference between WB values from A. Angus and 1/4B except in BF muscle

ing treatments produced better results in LD and GM than in the other two muscles.(Table
). Johnson (1990) showed that shear values from loin steaks decreased with 10 days ageing,
t WB values of loin steaks from A.Angus and 1/4B had a greater response than WB values
rom 1/2 and 3/4B crosses. Our results showed similar decreasing in percentage of shear
alues between A.Angus and bos indicus breed cattle in LD muscle, except in 3/8B. This
minishing however was less for the other muscles involved and in some cases there were not
re tender values than in non aged samples. As the percentage of bos indicus inheritance
creased the within-breed-group variation in shear values increased in aging and no-aging
roups. The greatest variation was the within-3/8B group. Nevertheless aging treatment
moted a decrease in that variability. Similar results had Crouse et al (1989). Sensory
nel evaluation of LD and GM muscles, revealed higher (p≤0.05) tenderness scores for A.
gus and 1/4B than the muscles from 3/8B carcasses.(Table 2). Johnson et al (1990)
termined that A. Angus and 1/4B were similar in tenderness and Warner Bratzler, and
fferent of 1/2 and 3/4B carcasses when this characteristics was determined in loin steak
om cattle slaughtered at compositionally equivalent slaughter end points. However Crouse
al (1989) reported that tenderness from steaks and roasts from 1/4 B and cattle without
s indicus breeding were different. Amount of connective tissue did not show variation
tween crossess in LD and GM muscles. The same results have been reported by Johnson et al
990) and Crouse et al (1989). Juiciness in the same muscles did not differ significantly
≤0.05) between crosses but the values corresponding to A. Angus carcasses were better
uicier) than the others genotypes. No breed group effects were noted in flavor
terminations. Koch et al (1982) did not found breed type effects on sensory panel
uiciness or flavor scores; but Crouse et al (1989) reported that juiciness decreased as the
rcentage of Bos indicus inheritance increased. Johnson et al (1990) determined that
nsory scores for juiciness were better for loin steaks from A.A.and 1/4B than loin steaks
om 1/2 and 3/4B carcasses. Neither Johnson et al (1990) nor Crouse et al (1989) found
fferences in flavor between groups with different percentage of Bos indicus inheritance.
e obtained great values in sensory tenderness (p≤0.05) in aged muscles from all genotypes.
he best values corresponded to A.A. and 1/4B carcasses(more tender) while 3/8B showed
gnificantly (p≤0.05) less tender values. Juiciness values in aged muscles did not revealed
fference between groups but flavor showed higher values (p≤o.o5) in 5/8B than
.A.carcasses in LD muscle. Amount of connective tissue (sensory evaluation) reported higher
lues(p≤0.05) in 5/8B than A.A. and 1/4B in LD also. Enzimes studies involved in ageing
d their mode of action that could explain this variation are currently under way at our
th. The fragmentation index and integrity of the conective tissue component of muscle
issue,investigated at this time, would explain also tenderness differences due to breed
roup and perhaps the different behavior of the muscles analyzed in this report.

Conclusion

eat quality in steers is not affected from AA to 1/4B cross-breed. Aging improve
eat quality in beef animals with different percentage of Brahman.

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TABLE N°1: MEANS FOR WBS OF COOKED SAMPLES AGING AND NO-AGING FROM BREED GROUPS DIFFERING **BOS INDICUS** AND **BOS TAURUS** INHERITANCE.

	LD		GM		BF		ST	
BREED	W/A	A	W/A	A	W/A	A	W/A	A
AA	6.85a	5.06a	5.79a	5.04a	7.34a	7.83ab	8.44a	7.87a
1/4B	8.13ab	5.62ab	5.76a	5.83a	7.82ab	7.01b	9.11ab	8.29ab
3/8B	11.08c	9.08c	8.15b	9.39b	8.89ab	7.48ab	10.57ab	9.14ab
1/2B	8.84ab	6.34ab	7.27ab	6.38a	9.00ab	7.75ab	9.11b	8.85b
5/8B	9.81bc	7.06b	7.39ab	6.61a	9.73b	8.39a	9.97ab	9.14b

W/A :Samples without ageing. A: Samples aged.
a,b,c : Means in the same column with different letter differ (p≤0.05).

TABLE 2:MEANS FOR SENSORY PANEL SCORES OF COOKED MEAT SAMPLES AGING AND NO-AGING FROM GROUPS DIFFERING IN **BOS INDICUS** AND **BOS TAURUS** INHERITANCE.

CROSSES	FLAVOR				TENDERNESS				JUICINESS				CONECTIVE TISSU			
	W/A		A		W/A		A		W/A		A		W/A		A	
	LD	GM	LD	GM	LD	GM	LD	GM	LD	GM	LD	GM	LD	GM	LD	GM
A.A	5.5	5.5	4.8a	5.4a	6.3a	6.7a	6.3ab	6.6a	5.4	5.8	5.5	5.9	6.3	6.8	7.1a	7.2a
1/4B	5.6	5.2	5.3ab	5.5ab	6.1ab	6.2ab	6.6a	6.5b	4.8	5.4	6.0	5.6	6.8	6.5	6.7ab	6.9ab
3/8B	5.1	5.1	5.2ab	5.2b	5.7b	5.8b	6.2ab	5.8b	5.0	5.4	5.4	5.5	6.5	6.9	6.9ab	6.3b
1/2B	5.5	5.5	5.4ab	5.3ab	6.1ab	6.2ab	6.4ab	6.2c	5.1	5.2	5.5	5.6	6.9	6.8	6.7ab	6.8ab
5/8B	5.5	5.1	5.5b	5.5ab	5.9ab	6.3ab	6.2b	6.0bc	5.1	5.3	5.5	5.3	6.7			

W/A: Samples without ageing; A: Samples aged.
a,b,c Means in the same column with different letter differ (p≤0.05).