1 - Title: Meat quality of crossbred Marchigiana x Nelore young bulls and heifers finished in feedlot

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2 - Background:
Crossbreeding of *Bos indicus* cows with *Bos taurus* sires has been a valuable practice to produce cattle for intensive feeding in Brazil. Although the goal is F1, sometimes F2 is also produced by backcrossing F1 cows with sires of the same or another European breed. In general, the males for slaughtering at 24 months or less are not castrated. Crossbreeding of late maturing breeds as Marchigiana has against itself the lack of finishing especially in the entire males fed with a high rough diet. CORTE et al. (1978) reported means for fat thickness at the 12th rib of 2.0 mm Marchigiana x Nelore against 5.2 mm Nelore young bull carcasses of 265 and 254 kg. The Brazilian beef industry discounts 10-20% of the steers' price for females. However, with the increasing number of heifers being produced, a good perspective does exist for a change in this rule, because there are evidences that the meat from high energy fed heifers might have better color and palatability. Recently, two large companies have agreed to pay the same price for young males and heifers whose carcasses weigh at least 240 kg. This could possibly make viable the feeding of F1 or F2 bulls and heifers of late maturing sire breeds with a high concentrate diet.

3 - Objectives:
The objective of this study was to compare some carcass and meat quality trait of Marchigiana x Nelore F1 young bulls and heifers, and F2 heifers.

4 - Material and Methods:
Thirty four crossbred Marchigiana (M) (*Bos taurus*) x Nelore (N) (*Bos indicus*), being 12 young bulls (½ MN), 10 heifers (½ MN) and 12 heifers (¾ MN) were compared.
The animals averaging 17 months old were started on a diet of 0.98 MCal / kg of dry matter and 16 % crude protein composed of oat hay (40%) plus concentrate (59%) and mineral supplement (1%) and slaughtered at predetermined weights of 500-600kg for male and 450-550kg for female. The periods that the animals remained in feeding were between 107 and 182 days, this period varied because of initial weight and individual daily gain.
The animals were weighed within 21 days interval, and slaughtered at their final weight ranges. Before slaughtering their diet was only water for 16 hours. Carcasses were processed according to the standard operating procedures of the commercial plants. After 24 hours of chilling, fat thickness and loin eye area were obtained from the left side carcass, as well as cut-out data (not presented here). Ultimate pH, proximate analysis of moisture and lipids by AOAC (1980), color and shear force in both *Longissimus dorsi* and *Suprapinatus* samples of each carcass, at 3-day and 14-day aging were also measured. During chilling, *Longissimus dorsi* muscle (12th rib, 5cm depth) temperature was recorded. Color and texture samples were 2.5 cm thick. Warner-Bratzler Shear Force (WBSF) tests were performed on 3-day and 14-day aged samples. Procedures for thawing, cooking, coring and WBSF determination followed CORTE et al. (1980) based on the AMSA guidelines. Color measurements were done according to the CIE system. Primary and retail cuts, bones and fat trimmings were weighed. Variance analysis and contrast of mean values between male and female sexes, and between the two female groups were compared at 5% probability level.

5 - Results and Discussion
Animals performance and quantitative carcass trait observed in this study on three groups are reported in table 1 as well as temperature means. The quantity traits in the females were lower ($P<0.05$) than in the males. Dressing percentage and loin eye area were higher ($P<0.05$) for males. Fat thickness were higher for females ($P<0.05$) and could be smaller for Brazilian market. This way, the final predetermined weight for heifers could be smaller. The 10-hour temperature was <10ºC in male carcasses, which may have allowed cold shortening to occur (KOOHMARIE et al. 1988).
In table 2 are shown the means for quality traits. Mean values for intramuscular fat were higher in heifers than in males, but both were lower than reported by PARISI et al. (1994). Concerning lipids the mean values were smaller for males probably due to the fact that they were entire bulls and crossbreeding of late maturing breeds. Then, the final weight might be higher. As for cooking loss, the results were in agreement with GIGLI et al. (1994). Concerning dripping loss, the results were lower ($P<0.05$) for males, which were obtained in the loin. The means for L* (lightness) did not differ ($P<0.05$) between sexes and between the two female groups. These values as well as a* (intensity of red) means are in the ideal range suggested by PURCHAS et al. (1988). There were no differences ($P>0.05$) between sexes, or between female groups for ultimate pH.
Graph 1 shows the WBSF means. Shear force means were lower for the female group in the 14-day *Longissimus dorsi*, probably due to the insulating effect of fat. In the 3-day *Suprapinatus* differences were detected between the two female groups. In both 3-day *Longissimus dorsi* and 14-day aged *Suprapinatus* no significant differences were observed. The WBSF means for *Longissimus dorsi* in males are lower than those reported by CORTE et al. (1978), likely due to the high concentrate diet in our experiment.

6 - Conclusion
In this experiment it was demonstrated that some performance and quantity traits (daily gain, dressing percentage and loin eye area) were worse in the females than in the male groups, but the differences were small and could be compensated by better meat quality traits such as tenderness in heifers fed high concentrate.

7 - Pertinent literature

CORTE, O. O. et al.. Meat quality and quantity of Nelore, Chianina x Nelore and Marchigiana x Nelore. 24th European Meeting of Meat Research Workers, A1: 3-6, 1978.

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PARISI, G.; et al. Lipidi, colesterolo e composizione acidica del Longissimus thoracis di bovini Chianini, Marchigiani e Romagnoli del circuito commerciale. IN: ITALIAN BEEF CATTLE CONTEST, Perugia, 1994, *Anais*. p.259-264.

8 - Tables and Figures

Table 1. Performance and carcass trait.

Items	Bulls ½ MN	Heifers ½ MN	Heifers ¾ MN	SE
Initial Weight (kg)	413.06 A	268.73 Ba	366.64 Bb	51.11
Final Weight (kg)	545.50 A	464.00 Ba	499.75 Bb	18.02
Average daily gain (kg)	1.44 A	1.18 B	1.12 B	0.16
Dressing percentage (DP,%)	58.94 A	56.82 B	57.94 B	1.50
Loin eye area (LEA,cm^2)	79.07 A	72.04 B	72.99 B	7.38
Fat thickness (FT, mm)	4.50 A	8.60 B	7.33 B	3.39
Temperature (10th hs, 12th rib, 5 cm deep. ^{o}C)	8.5 B	13.1 A	12.2 A	1.05

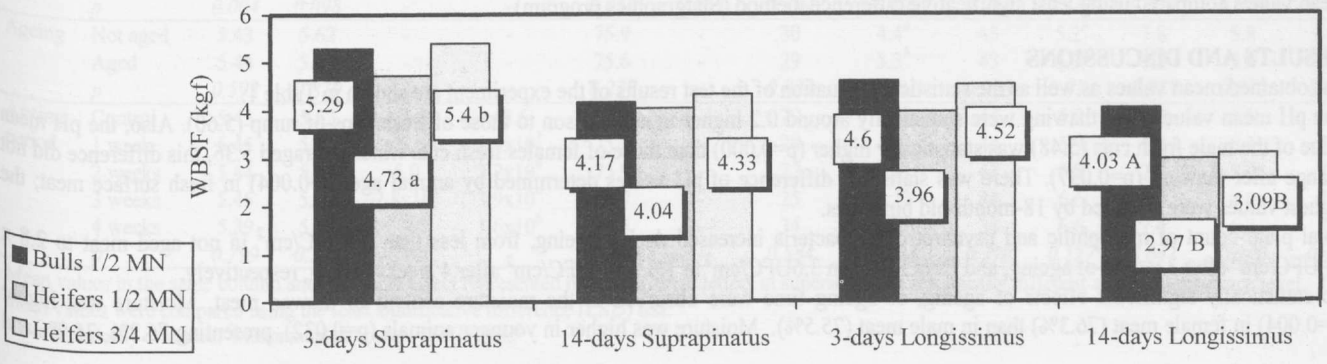
^{AB} Different capital letters, indicate difference (P<0.05) between sexes.
^{ab} Different small letters, indicate difference (P<0.05) between two female groups.

Table 2. *Suprapinatus* (Ss) and *Longissimus* (Ld): Color (Lab*), pH, moisture and cooking loss.

		L*	a*	b*	pH	Lipids (%)	Moisture (%)	Cooking losses (%)		
								Dripping	Evaporation	Total
Ss	Bulls ½ MN	36.36 A	20.61 B	8.42 B	5.62	1.86 B	76.81 A	3.71	26.62	30.33
	Heifers ½ MN	35.21 B	20.61 Ab	8.05 A	5.64	3.26 A	75.60 B	3.73a	28.56	32.29
	Heifers ¾ MN	36.47 B	22.57 Aa	9.41 A	5.60	2.81 A	75.86 B	2.74 b	28.89	31.63
	SE	2.57	2.05	2.42	0.08	0.69	0.76	1.11	2.94	2.66
Ld	Bulls ½ MN	38.08 A	18.13 B	7.45 B	5.50	1.69 B	75.56 A	3.66	18.93	22.59 B
	Heifers ½ MN	37.09 B	20.00 Aa	7.82 A	5.52	3.66 A	73.60 B	5.04 A	20.07	25.11 A
	Heifers ¾ MN	36.93 B	18.40 Ab	6.95 A	5.52	4.00 A	73.29 B	5.14 A	19.47	24.71 A
	SE	1.94	1.63	2.70	0.08	1.04	1.10	0.96	2.66	3.00

^{AB} Different capital letters, indicate difference (P<0.05) between sexes.
^{ab} Different small letters, indicate difference (P<0.05) between two female groups.

Figure 1. *Longissimus dorsi* and *Suprapinatus* muscles: Warner Bratzler Shear Force values.



^{AB} Different capital letters, indicate difference (P<0.05) between sexes.
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