

EFFECTS OF PASTURE GRAZING VS FEEDLOT FEEDING ON MEAT QUALITY OF YOUNG STEERS

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Introduction

For years, Argentina has been defined as a grass-fed beef producer country. Rearing and fattening cattle on grass and in their natural habitat is well appreciated by premium markets. Product and environment health attributes are often related to animal husbandry on pastures. It has also shown to be relevant from the animal welfare concern. On the other hand, other markets demand carcass weights difficult to reach by pasture finished argentine cattle. Additional concerns for some markets include fat colour, tenderness consistency and shelf life. Numerous diets have been extensively studied over the years trying to determine diet impact on beef quality attributes, relating to consumer appreciations with variable conclusions. In most cases, performance on pasture has differed notoriously from performance on full-feed in pens. Little work has been conducted on comparisons when individual performance on grass has been maintained high.

Objectives of this study were to characterize performance, carcass colour attributes and sensory characteristics of young Angus steers grown and finished on pasture, compared to high and medium grain feedlot diets.

Materials and Methods

Seventy two Angus steers with an average live weight of 203 kg were used. The animals were assigned into 3 treatments: T1 = growing and finishing on 100% grazing on a sequence of small-grain winter annual pastures, T2 = full confinement pen-feeding of a high-grain, 10% hay diet and T3 = full confinement medium-grain, 40%-hay diet. Animals were re-grouped in 3 groups by weight (blocks), within each treatment. To sustain best quality forage in dryland conditions, a sequence of small-grain winter annual was planted (cereal oats, cereal rye, triticale and annual ryegrass). Forage supply was calculated to provide near twice the daily intake leaving 40% or residual. The pasture was rotationally grazed with a 2-day rotation program, based on afternoon shifts. Quality of pasture always exceeded 65% “in vitro” dry matter digestibility. Confinement diets were formulated for 14% crude protein and were based on whole shelled corn and medium-quality alfalfa hay. Sunflower meal was the protein source for adjustment of protein level.

After a 104-day period, animals were considered finished (overall cover and ultrasound back fat thickness greater than 6 mm), shipped 30 km to a European Union-inspected commercial abattoir and slaughtered by conventional procedures. Carcasses were refrigerated (4°C) for 48h. After that period, transversal blocks between 9th and 12th rib of the *Longissimus dorsi* muscle from the left carcasses were removed. Samples were vacuum packaged (Cryovac BB4L, Sealed air Co., Buenos Aires, Argentina) and frozen until analysis (-20°C ± 0.5°C). Fat thickness, large, wide and rib eye area (REA) were determined by chalcography and planimetry. Marbling was determined by comparison (USDA standards-key set). Water holding capacity (WHC) was determined by filter-paper press methodology (Zamorano and Gambarutto, 1997). Briefly, this technique implies pressing the sample against a reticular filter paper and determining the liquid impregnation area. The procedure assumes that the ring of juice absorbed by the filter paper is related to the amount of free water in the meat.

Colour was measured using a ByK Gardner Colour View Spectrophotometer (model 9000, USA), according to AMSA (1991) recommendations. Determinations were performed on 2.5-cm thick steaks (CIELab system). Instrumental settings were large area aperture (5cm diameter), D65-artificial and 10° standard angle observer. Each sample was allowed to bloom for 45 minutes and four scans from each steak were averaged for statistical analysis. Warner-Bratzler shear force (WBSF) was determined following AMSA (1995) guidelines based on eight cores (2.0-cm in height; 1.27-cm in diameter) obtained from a 2.0-cm-thick stick at the medial portion of the muscle, using a Warner-Bratzler meat shearing machine (model 3000; G-R Manufacturing CO., Manhattan, Kansas, USA). After the samples were thawed and de-boned, they were weighed and cooked in a Philips electric grill until a final internal temperature of 71.5 ± 0.5°C. Cooking loss was determined by dividing the weight loss during cooking e fixed pre-cooked weight. Statistical analysis was performed by ANOVA (SAS,

2004). Differences among treatment mean values were assessed by Duncan test ($p < 0.05$; SAS, 2004).

Results and Discussion

Animals from T2 treatment showed greater ($P < 0.05$) average daily gain (ADG). Gain on pasture denoted high performance on grass. Differences between treatments were observed ($P < 0.05$) in colour parameters. L^* values were higher in T1 and T3 while a^* and b^* were lower ($P < 0.05$) for these treatments compared with T2. Fat thickness and marbling were slightly different ($P < 0.05$). Previous research (Bennet et al., 1995; Camfield et al., 1999) has reported similar findings. These studies have also reported that marbling could be lower in grass finished cattle compared with grain finished. No significant differences in other parameters were detected. In agreement with studies of French, O’Riordan, Caffrey, Mooney et al. (2000, 2001), this study found no differences ($P > 0.10$) in WBSF and muscle depth or width.

Table 1. Feeding effect on ADG and meat quality parameters

	T1	T2	T3	SE
Live weight (kg)				
0 days	202a	204b	202a	3,3
104 days	306a	335b	312a	4,3
AGD (kg/d)	1,01a	1,26b	1,06a	0,03
LM depth (cm)	11,5	11,5	11,1	0,18
LM width (cm)	6,3	6,0	5,7	0,19
REA (cm ²)	54,5	52,5	50,6	1,68
Fat thickness (mm)	8,6a	13,0b	9,7a	0,99
Marbling	1,5a	1,84b	1,67b	0,14
pH	5,71	5,64	5,78	0,06
WHC (%)	28,5	28,8	29,7	0,05
WBSF (lb/cm ²)	7,28	7,36	6,94	0,27
L^*	34,9b	33,1a	36,6b	0,06
a^*	16,6a	18,8b	15,8a	0,04
b^*	12,9a	16,8b	14,7ab	0,05

SE: standard error

Different letter within the same row differ significantly ($P < 0.05$)

Conclusions

Results from this study showed that meat from young steers grazed on small-grain winter annual or pen-fed in confinement would differ in colour, fat thickness and marbling. Full-feeding in confinement resulted in carcasses with slightly more fat cover compared with steers finished on forage only. Evidence from this study implies, however, that no differences in muscle development and tenderness should be expected if performance on pasture is similar to the level reported here.

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