Tropical Grasslands – Forrajes Tropicales (2014) Volume 2, 48−50

Alternatives for intensification of beef production under grazing

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Keywords: Cattle breeds, genetic group, feed supplementation, savanna, *Brachiaria*, *Panicum*.

Introduction

Sustainable technological alternatives, which will maintain a constant uniform beef supply year round, are needed, if Brazil is to maintain its position, as one of the most important players in the world beef market. One approach is to more intensively use the alternatives available for pasture management and feed supplementation. However, the responses obtained could be enhanced by using animals with superior genetic makeup, to make better use of the resources provided. Thus, a grazing experiment was designed to evaluate combinations of pasture grasses (*Brachiaria* and *Panicum*), pasture management (feed supplementation and rotational grazing) and animal genetic groups.

Methods

This trial was carried out on an Oxisol at Embrapa Beef Cattle, Campo Grande, MS, Brazil, from May 2006 to October 2007. Sixteen weaned calves of each of the following genetic groups: F1 Nellore-Angus (AN); ½ Braford - ¼ Angus - ¼ Nellore (BfAN); ½ Brahman - ¼ Angus - ¼ Nellore (BhAN); and ⅝ Charolais - ⅜ Nellore (Canchim) were evaluated.

The pastures utilized during both dry periods were 8 *Brachiaria brizantha* cv. Marandu (palisade grass) paddocks (3 ha each). These paddocks were fertilized with 50 kg N/ha in February and were continuously stocked during the dry periods. In May 2006, 64 calves, approximately 8 months of age and with an average initial weight of 220 kg, were distributed in the 8 paddocks as follows: two from each of the 4 genetic groups in each paddock, allocated on weight basis within each genetic group. During the first dry period (FDP, May–September 2006), animals in each paddock were supplemented with 1 of the following 2 mixtures: a concentrate mix (CS) with 43% corn, 40% soybean, 11% urea, 4% mineral mixture and 3% calcium carbonate (4 paddocks); and a multiple mineral mixture (MM) with 33% corn, 35% soybean hulls, 12% urea, 15% NaCl and 5% of other essential minerals (4 paddocks). These supplements were provided in quantities representing 0.8% and 0.2% of live weight, respectively, for 142 days.

During the subsequent rainy period (RP, October 2006−April 2007) all animals were transferred to *Panicum maximum* cv. Tanzânia (guinea grass) pastures. The total area (13.5 ha) was divided into 8 modules of 6 paddocks for rotational stocking. Two animals of each genetic group were allocated to each module: one animal that was supplemented with MM and the other with SC. The grazing process was monitored carefully to achieve the targets for post-grazing sward height of 40 cm and pre-grazing height of 90 cm, corresponding to 95% light interception by the canopy (Barbosa et al. 2007; Difante et al. 2010). The pastures were fertilized in October 2007 with (kg/ha): 80 P_2O_5, 80 K_2O and 200 N; the latter was split in 3 applications, namely, October, December and February.

During the second dry period (SDP, May−September 2007) animals were allocated, according to supplementation type and genetic group, to the same 8 *Brachiaria* paddocks used in the previous dry season and pasture management was the same as described above. All steers had their diet supplemented with CS at 0.8% of LW. The animals were weighed each 28 days and checked with respect to the end point (minimal 3 mm of fat cover). Animals considered finished were slaughtered. Palisade grass samples were taken at 28-day intervals, and guinea grass samples pre- and post-grazing. Data were grouped according to periods (FDP, RP and SDP) and subjected to analysis of variance using SAS Mixed Procedure. The applied model included the random effect of the blocks, the fixed effects of the supplement and genetic group, and the interactions between them. The means were compared with a Tukey test at the 5% significance level.

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Results and Discussion

The herbage mass of the deferred *B. brizantha* pastures was sufficient to support the animals during both dry periods. Despite low percentage of leaf, CP and IVOMD (Table 1), as shown previously by Euclides et al. (2007), with the aid of supplementation, animals were able to make weight gains of at least 0.5 kg/d. The correct management of *P. maximum* pastures in the rainy season resulted in greater herbage mass of high quality (Table 1), producing ADGs in excess of 0.6 kg/d.

No genetic group x feed supplement interaction (P>0.05) was detected for any variable studied (Table 2). However, independently of genetic group, animals receiving CS feed supplementation in the first dry period gained more weight than those receiving MM diet supplementation (Table 2) and could be slaughtered at a younger age than those receiving MM during the dry period, in spite of gaining a little less during the rainy period (Table 2). During the rainy period, animals receiving MM during the dry season displayed compensatory growth and gained more weight than those receiving CS. However, at the end of the rainy season, the animals supplemented with CS were still heavier (P=0.0001, 447 vs. 413 kg). On the other hand, during the second dry period ADGs were similar for all groups. Slaughter age was affected by supplementation during the first dry period (Table 2).

As far as genetic groups were concerned, AN gained more weight and reached slaughter condition at a younger age than all other groups. This result might be a consequence of the combined effects of heterosis and breed, since Angus is an early fattening/maturing breed.

Conclusion

The amount and type of concentrate used as a supplement for calves grazing pasture following weaning is important in increasing growth rates of animals. Use of genetic groups, which are early maturing, provides a mechanism for capitalizing on the diet improvement provided by supplementation and integrated pasture management systems by further reducing time to slaughter.

Table 1. Means for herbage mass, percentage of leaf lamina, crude protein (CP) concentration and in vitro organic matter digestibility (IVOMD) of *Brachiaria brizantha* pastures utilized during first and second (FDP and SDP) dry seasons, and *Panicum maximum* utilized during the rainy period (RP)**.**

	Brachiaria brizantha FDP	*Panicum maximum* RP	*Brachiaria brizantha* SDP
Herbage mass (t DM/ha)	3.8	4.6	3.0
Leaf lamina (%)	23.6	70.4	17.9
CP (%)	7.2	14.5	6.1
IVOMD (%)	49.4	66.2	46.1

Table 2. Means for average daily gain (ADG; kg/hd/d) for the first and second dry periods and for the rainy period, live weight (LW) at slaughter, carcass weight, fat cover and slaughter age, according to genetic groups and type of supplement in the first dry season. Means followed by the same letter in the same row do not differ (P>0.05).

	Genetic group effect					Supplement effect		
	AN	Canchim	BfAN	BhAN	P	MM	CS	P
ADG (first dry period)	0.65 a	0.61 a	0.50 b	0.52 b	0.0001	0.40	0.75	0.0001
ADG (rainy period)	0.73 a	0.63 b	0.69 ab	0.67 ab	0.0470	0.72	0.65	0.0058
ADG (second dry period)	0.62 a	0.49 b	0.57 a	0.55 ab	0.0277	0.57	0.55	0.5366
LW at slaughter (kg)	475	495	493	490	0.0002	487	492	0.0050
Fat cover (mm)	4.1	3.6	3.9	3.8	0.3895	3.7	4.0	0.2516
Carcass weight (kg)	256b	265a	263a	255b	0.0001	259	261	0.1753
Slaughter age (no. of months)	19.2 c	23.3 a	22.2 b	22.7 ab	0.0001	23	21	0.0001

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Euclides VPB; Euclides Filho K; Montagner DB; Figueiredo GR; Lopes FC. 2014. Alternatives for intensification of beef production under grazing. Tropical Grasslands – Forrajes Tropicales 2:48–50.
DOI: 10.17138/TGFT(2)48-50

This paper was presented at the 22nd International Grassland Congress, Sydney, Australia, 15−19 September 2013. Its publication in *Tropical Grasslands – Forrajes Tropicales* is the result of a co-publication agreement with the IGC Continuing Committee. Except for adjustments to the journal's style and format, the text is essentially the same as that published in: **Michalk LD; Millar GD; Badgery WB; Broadfoot KM, eds. 2013. Revitalising Grasslands to Sustain our Communities. Proceedings of the 22nd International Grassland Congress, Sydney, Australia, 2013. New South Wales Department of Primary Industries, Orange, NSW, Australia. p. 846–847.**