Table 1 - Least squares means† (±SEM‡) of available forage and performance of early- and normal-weaned calves during three spring seasons.

	Early weaning pastures				
	TN-Syn 2	TN-Syn 2 + clovers	Benchmark	Benchmark + clovers	Normal weaning (control)
Available forage, kg ha^{-1} d^{-1}	44.6 ± 5.1^{b}	50.4 ± 5.1^{c}	37.6 ± 5.1^{a}	43.8 ± 5.1^{b}	—
Initial calf weight, kg	143 ± 6.4	144 ± 6.6	144 ± 6.4	145 ± 6.6	144 ± 5.1
Final calf weight, kg	198 ± 6.4^{a}	222 ± 6.6^{b}	199 ± 6.4^{a}	218 ± 6.6^{b}	247 ± 5.1^{c}
Gain (ADG), g d^{-1}	637 ± 50^{a}	928 ± 51^{b}	641 ± 50^{a}	855 ± 51^{b}	1151 ± 47^{c}

† Numbers within a row followed by a different letter are different at P£0.05.
‡ SEM = standard error of the mean.

(six each) to one of four pasture treatments: (1) TN-Syn-2 orchardgrass, an experimental synthetic developed at The University of Tennessee, grown alone or (2) with 'Regal' ladino white clover and 'Concorde' red clover, both inoculated with *Rhizobium*; (3) 'Benchmark' orchardgrass, grown alone or (4) with the clovers. Orchardgrasses were seeded at 16 kg ha^{-1}, Regal at 2.2 kg ha^{-1}, and Concorde at 4.4 kg ha^{-1}. The six clones that make up TN-Syn-2 were selected at the West Tennessee Experiment Station, Jackson, based on vigor, disease tolerance, synchronized maturity and progeny performance. They originated from a collection made from long-established stands maintained by farmers throughout Tennessee (Fribourg and Burns, 1961). All seedings were successful and resulted in spring stands containing 25 to 35% clover in the grass-clover mixtures. The pastures (0.65 ha each) were replicated twice in a randomized complete block design. Agricultural limestone was applied in March during the first two years at 2.2 Mg ha^{-1}; P and K soil tests indicated medium to high levels. Ammonium nitrate was applied each spring at 66 kg N ha^{-1} on pastures without clovers. Pastures were clipped each May and September to a height of 20 cm to maintain plants in a vegetative stage, to remove seedheads, and to prevent shading out of the clovers. When calves were early-weaned, limited amounts of wheat (*Triticum aestivum*) straw were available on the pastures during the first week to provide alternative feed during this stressful period. Steers on pastures were weighed every 21 d until grazing was terminated in mid-June. Pasture was the only source of feed, with free choice minerals, water and shade available. Forage availability was monitored every 21 d during the grazing season (mean of 85 d) from ten 50 ´ 300 cm strips ha^{-1} cut at a 5-cm stubble height. Calves remaining with their dams could suckle and graze a 'Kentucky 31' tall fescue (*Festuca arundinacea*) pasture. The dams were weighed and rated for condition at calf weaning. At the end of the experiment, all dams and calves were weighed and dams again rated for condition. Data are presented as least squares means ± SEM (standard error of the mean). The Proc Mixed of SAS (1997) was used to compare the effects of treatments for early-weaned calves. Steer, treatment, year and pasture were treated as class variables. The final model for each analysis included treatment, year, treatment X year, and period/year as independent (fixed) variables. Pasture was included in the model as a random effect. Cow weights and condition scores were analyzed also with Proc Mixed, using treatment, year and pasture as class variables.

RESULTS AND DISCUSSION

Forage availability ranged between 37 and 50 kg dry matter ha^{-1} hd^{-1} d^{-1}; thus forage was vegetative throughout the experiment and never limiting (Table 1). The presence of clover substantially increased the productivity of the orchardgrasses. Calves that remained with their dams gained over 1150 g d^{-1} and weighed almost 250 kg at weaning., reflecting their access to both milk and pasture (Table 1). Calves that were weaned early and grazed excellent pastures gained less than those not weaned. However, the gains of the early-weaned calves, which ranged between 640 and 930 g d^{-1}, were acceptable. Calves that grazed orchardgrass without clover gained significantly less than those having access to grass-clover mixtures. There was no significant difference in calf gain due to orchardgrass cultivar. Although cow weights were not significantly affected by the early-weaning treatment, the condition of dams not subject to the nutritional demands for lactation was significantly better than that of cows with calves at their side (Table 2). Although a body condition score of about 5 is acceptable, the higher body condition score of cows from whom the calves were early-weaned may be desirable when summer pastures of low quality are expected to provide feed, since the cow can mobilize her body reserves to meet her nutritional requirements. On the other hand, if summer pastures are of good quality, the cow with a high body condition score may be more prone to heat stress.

Early-weaning of calves at 4.5 months of age and placing them on high quality pastures was successful. The condition of dams without calves improved going into the summer. Calf performance was the same on either grass alone, and was improved by the addition of clovers in the pastures.

Table 2 - Least squares means† of weight and condition scores of dams from which early- and normal-weaned steer calves were used during three spring grazing seasons.

	Early weaning	Normal weaning	SEM‡
Initial weight, kg	486	474	10.3
Final weight, kg	536	509	10.3
Initial condition §	5.0	5.1	0.12
Final condition §	7.0^{b}	5.7^{a}	0.12

† Numbers within a row followed by a different letter are different at P£0.05.
‡ SEM = standard error of the mean.
§ Condition score scale 1 to 9 (Herd, D.B. and Sprott, L.R. 1986. Body condition, nutrition, and reproduction of beef cows. Texas A&M Univ. Ext. Bull. 1526).

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ID # 22-29

Performance of Nellore cattle under two grazing management systems

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ABSTRACT

The objective of this study was to evaluate the effects of grazing intensification on birth weight (BW), weaning weight (WW, standartized to 205 days), average daily gain from birth to weaning (ADG), and gestation length (GL) of calves, cow weight at calving (CWC) and at weaning (CWW), cow condition score at calving (CCC) and at weaning (CCW), and BW/CWC (BWR), WW/CWC (WWRC) and WW/CWW (WWRW) ratios. One hundred and sixty eight Nellore calves born in 1998 and 1999, out of dams maintained in two grazing management systems were evaluated: an extensive 1.0 animal unity (AU). ha^{-1} system on unfertilized *Brachiaria decumbens* pasture (SR); and an intensive rotational 5.0 AU. ha^{-1} system on fertilized *Brachiaria brizantha* cv. Marandu and cow-calf feed supplementation during dry season (SI). Analyses of variance showed a significant (P<.01) system effect on CWW and CCW, independently of year of birth of calf, a significant (P<.05 and P<.01) year of birth x system interaction effect on WW, ADG, BWR, WWRC and WWRW, and no effect at all on BW, CWC, CCC and GL. Results suggest that benefits of intensification were through improving production per hectare and not per animal.

KEYWORDS: Beef cattle, body weight, grazing intensity, production system, rotational grazing.

INTRODUCTION

Beef production in Brazil has been attained mainly in extensive systems on pasture, where animals are exposed to a seasonal shortage of forage and little health control. Intensive beef production can contribute significantly to Brazilian beef industry, since it favors rational utilization of the production factors and the potential and genetic diversity of plants and animals. However, it is necessary to generate and to adapt suitable technologies, capable of improving the production level in a sustainable manner. The objective of this study was to evaluate performance of Nellore cattle under grazing intensification.

MATERIAL AND METHODS

Data used in this study were from Nellore cattle raised on pasture at the Embrapa - Southeast Cattle Research Center, in São Carlos, São Paulo, Brazil. Two production systems, each one with 60 Nellore cows, were carried out for three years (1997 to 1999). In one system (SR), cows stayed all year-round in a 60-ha unfertilized *Brachiaria decumbens* pasture, divided into three 20-ha paddocks, receiving free choice mineral mixture but no feed supplementation. In the other system (SI), cows were maintained in a 12-ha *B. brizantha* cv. Marandu pasture, divided into thirteen .92-ha paddocks. In this latter system, each paddock was grazed for three days and then rested for 36 days. Each paddock was fertilized with 250 kg. ha^{-1} of the NPK formula 20:05:20, applied four times immediately after each grazing period, during the rainy season. In the winter (dry season), usually from June throughout November, SI cows received feed supplementation, composed of: 1997 – sugar cane, poultry litter silage and urea; 1998 – sugar cane, poultry litter silage, urea, dried citrus pulp and soybean meal; and 1999 – sugar cane, ground corn, urea and soybean meal. Calves of this latter system were creep-fed from 53 to 209 days of age, in 1998 and from 20 to 196 days of age, in 1999. Breeding season started in late May and lasted for 100 days, in 1997 and 1998. Calves of each system were sired by two different bulls each year.

Traits studied were birth weight (BW), weaning weight (WW, standartized to 205 days), average daily gain from birth to weaning (ADG), and gestation length (GL) of calves, cow weight at calving (CWC) and at weaning (CWW), cow condition score (3 = very thin through 8 = extremely fat) at calving (CCC) and at weaning (CCW), and BW/CWC (BWR), WW/CWC (WWRC) and WW/CWW (WWRW) ratios. Analyses of variance were carried out by the least squares method, with a mathematical model which included effects of year (YB; 1998 and 1999) and month of birth (MB; March, April, May and June) of calf, sex of calf (SC), age of cow at calving (AC; 4 through 9 years old), system (SR and SI), and the interactions YB x MB and YB x system, using GLM procedure (SAS, 1996).

RESULTS AND DISCUSSION

Analyses of variance showed that YB and YB x MB had no effect (P>0.05) on traits studied. Month of birth affected (P<0.05) WW, ADG and WWRW. Sex of calf affected (P<0.01) BW, WW, ADG, BWR, WWRC and WWRW, and male calves were usually heavier and gained more weight than the females. Age of cow affected (P<0.05 and P<0.01) only CWC, CWW, BWR, WWRW and GL.

The YB x system interaction affected WW, ADG and WWRC (P<.01) and BWR and WWRW (P<.05), while system affected (P<0.01) CWW and CCW independently of year of calving. System and YB x system had no effect (P>.05) on BW, CWC, CCC and GL.

The least squares means of the traits studied are presented in Table 1. At calving (end of the rainy season), in both years, cow weight (CWC) and condition score (CCC) were similar for both systems. During the rainy season, total dry matter (TDM) availability was 4,500 kg for system SR, while for system SI there was accumulation of 2,500 to 3,500 kg of green blade dry matter (GBDM) every 36 days. During this season, stocking rate was kept at 1.0 AU. ha^{-1} for system SR and varied from 5,0 to 8,0 AU. ha^{-1} for system SI. The similar performance of the cows in the two systems may be due to the low stocking rate in system SR, allowing selective grazing and consumption of good quality forage (8 to 9% crude protein), above the critical level (6 to 7%) reported by Minson and Milford (1967). However, at weaning (very end of the dry season and very beginning of the rainy season), in both years, cow weight (CWW) and condition score (CCW) were higher for system SI, in which paddocks were fertilized in summer and animals received feed supplementation in winter. During the dry season, DM availability was 2,500 kg for system SR, while for system SI there was accumulation of 500 kg of GBDM every 48 days. When the changes in weight and in condition score from calving to weaning were analyzed, it was shown that SR cows lost more weight (83 ± 4 kg vs. 31 ± 4 kg) and condition (1.5 ± 0.1 points vs. 0.5 ± 0.1 points) than SI cows. As the nursing period occurs during the dry season, it is normal that animals loose weight and condition, specially if they do not receive supplementation.

Table 1 - Least squares means (± standard error) for birth weight (BW, kg), weaning weight (WW, kg), average daily gain from birth to weaning (ADG, kg/day), cow weight at calving (CWC, kg) and at weaning (CWW, kg), cow condition score at calving (CCC) and at weaning (CCW), BW/CWC (BWR, g/kg), WW/CWC (WWRC, g/kg), WW/CWW (WWRW, g/kg) and gestation length (GL, days), according to year of birth of calf and grazing management system.

	Year/System[a]					
	1998		1999		1998 and 1999	
Trait	SR	SI	SR	SI	SR	SI
BW	29.8 ± .9	30.0 ± .9	30.0 ± .6	31.6 ± .5	29.9 ± .5	30.8 ± .5
WW[1,2]	173.2 ± 4.8	169.1 ± 5.0	162.2 ± 3.2	183.0 ± 3.1	167.7 ± 2.9	176.1 ± 2.9
ADG[1,2]	.70 ± .02	.68 ± .02	.64 ± .01	.74 ± .01	.67 ± .01	.71 ± .01
CWC	467 ± 10	482 ± 11	475 ± 7	472 ± 7	471 ± 6	477 ± 6
CWW[2]	389 ± 10	440 ± 11	382 ± 7	453 ± 7	385 ± 6	447 ± 6
CCC	5.42 ± .16	5.52 ± .17	5.28 ± .11	5.18 ± .10	5.35 ± .09	5.35 ± .10
CCW[2]	3.76 ± .19	4.59 ± .19	3.98 ± .12	5.07 ± .12	3.87 ± .11	4.83 ± .11
BWR[1]	64 ± 2	62 ± 2	63 ± 1	67 ± 1	63 ± 1	65 ± 1
WWRC[1]	370 ± 11	353 ± 11	345 ± 7	389 ± 7	358 ± 7	371 ± 7
WWRW[1,2]	452 ± 14	391 ± 15	429 ± 10	408 ± 9	441 ± 9	400 ± 9
GL	297 ± 3	293 ± 3	290 ± 2	292 ± 2	294 ± 2	293 ± 2

[a] SR and SI = extensive and intensive systems, respectively.
[1] significant year of birth of calf x system interaction. [2] significant system effect.

It can be concluded that, for the traits studied and for the condition of this work, the benefits of intensification were obtained through improving production per hectare and not per animal.

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Animal production from tropical pastures renovated by subsoiling and fertilization in the cerrados of Brazil

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ABSTRACT

A grazing trial was conducted, to study the effects of fertilization on the maintenance of the productivity of four tropical grasses. The paddocks were subsoiled, and dived into halves: one (LF1) received 400 kg/ha of a fertilizer formula 0-20-20.and the other (LF2) 800 kg/ha of the same fertilizers, in january 1995. Annually, 50 kg/ha of N was applied. The productivity on LF2 pastures was greater than that on FL1