

**COUNTRY:** BRAZIL

**SESSION:** ANIMAL GROWTH AND DEVELOPMENT

**PERFORMANCE AND FEED EFFICIENCY OF SUCKLING CALVES FROM FOUR DIFFERENT DAM GENOTYPES<sup>1</sup>**

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**ABSTRACT**

Forty cows from four different genetic groups and their respective calves were individually fed from postpartum to weaning (15-210 days). Nellore (NE), Canchim x Nellore (CN), Angus x Nellore (AN), and Simmental x Nellore (SN) were randomized in blocks of 4 animals by calving date. Crossbred cows were bred by Canchim bulls and the Nellore females by Nellore bulls. Milk production estimated by weighting calves before and after suckling. Starting with 40 days of age, calves had access to a pelleted diet (50:50 roughage:concentrate, 15% CP and 64% TDN all on a DM basis). Nellore calves had lower ( $P<0.05$ ) weaning weight than crossbred ones:  $168.2 \pm 11.6$  vs.  $233.9 \pm 11.6$  for  $\frac{1}{4}$ SN,  $222.3 \pm 11.5$  kg for  $\frac{1}{4}$ AN and  $213.3$  kg for  $\frac{3}{4}$ CN. This difference seems to be related to either the lowest ( $P<0.05$ ) milk production of Nellore cows ( $703.4 \pm 105.6$  vs.  $1357.7 \pm 105.6$  for SN,  $1138.8 \pm 104.7$  for AN and intermediary for CN,  $928.7 \pm 97.7$  kg) or the lower Nellore calf growth requirement. The calf efficiency in converting digestible energy to weaning weight (kg gain/Mcal DE) was not different ( $P>0.05$ ) among calves;  $0.149 \pm 0.007$  for NE,  $0.146 \pm 0.006$  for  $\frac{3}{4}$ CN,  $0.140 \pm 0.007$  for  $\frac{1}{4}$ AN, and  $0.134 \pm 0.007$  kg/Mcal DE for  $\frac{1}{4}$ SN. Crossbred cows mated to Canchim bulls produced more milk and weaned heavier calves than Nellore cows bred to Nellore bulls. Despite the fact that Nellore calves consumed less energy both from the milk and from the ration, they were as efficient as the crossbred calves.

**KEY WORDS**

Weaning weight, feed intake, milk production, calf efficiency.

**INTRODUCTION**

Brazil has 53 millions beef cows, however there are very few data on biological efficiency of the different genotypes. There is strong disagreement on how to select animals given the interactions in genetic-environment-production system. These questions must be settled with experimental data.

Current crossbreeding programs for Brazilian conditions have been developed without data describing the efficiency of the cows. Conversion of feed resources into preweaning growth (kg of calf weaned) is of great importance once the pair cow/calf uses around 70% of the feed resources to produce a finished steer. The choice of breeds with greater genetic potential for growth or milk production in a crossbreeding program generally increases the nutrient requirements (input)

(Jenkins et al., 1991). Heavier calves at weaning are positively associated with adult weight of beef cows, with the potential for milk production and with greater dry matter intake (DMI).

Weaning weight is the most important output for cow/calf production (Armstrong et al., 1990). Progeny weight at weaning is dependent on nutritional environment, weaning age, genetic potential, and all the interactions among these factors (Jenkins et al., 1991). However weaning weight is not directly related to feed efficiency.

The objective of this study was to estimate the ratio of calf weight at weaning to the digestible energy consumed by the calves.

## MATERIALS AND METHODS

This study was conducted at Southeast-Cattle Research Center (Embrapa), São Carlos, Brazil, from March to December of 2002. Cows breed were Nellore (NE), Angus x Nellore (AN), Simmental x Nellore (SN) and Canchim x Nellore (CN). The crossbred cows were sired by Canchim bulls and the Nellore females by Nellore bulls. Cows were born in 1998. Forty cows/calves were randomized in blocks by calving date, with 4 pairs of each breed. The trial was conducted from 15-30 days until 200-210 days postpartum.

In feedlot, cows from each pen were fed a pelleted diet (table 1) of approximately 50% hay (15% alfalfa and 35% coast cross) and 50% supplement (concentrate feed plus minerals, vitamins and ionophores). Metabolizable energy (ME) content of the ration was approximately 2.3 Mcal/kg and 15% CP on a DM basis, formulated according to NRC (1996). Creep feed ad libitum was available to calves at 40 days of age with the same ration of the cows. Feed intake was recorded by pens, and individually by cow and calf. Calves growth was monitored by their weights taken at the same intervals (14 days) at which the cows weight were measured.

Milk yields at 52, 66, 94, 122, 178 and 206 days postpartum were measured by weighting calves before and after suckling. Before each sampling, the cow/calf pairs were separated for approximately 16 h; calves were weighed, allowed to suckle until it was observed it finished, and then reweighed. This was repeated after the pairs were separated again for 8 h. Daily milk yield was estimated adding the 16 and 8 h weight change. The cows were milked twice daily at 80 and 150 d postpartum, after cow/calf pair was separated during the same intervals, 16 and 8 h. To help milking, 2 ml oxytocin/cow were administered. The samples were analyzed for fat, protein, and lactose. Milk energy content was estimated using values of 9.40, 5.65 and 4.15 Mcal/kg for fat, protein and lactose, respectively. The digestible energy (DE) from milk (Mcal DE/kg DM) was estimated by assuming 5.59 Mcal of DE per dry matter kilogram of milk (NRC, 2001).

The production efficiency or calf efficiency was measured as progeny weight gain/Mcal DE consumed by calves during lactation.

Statistical analysis: Data were analyzed using GLM procedure of SAS (1996), and values reported here are least square means derived from SAS analyses.

## RESULTS AND DISCUSSION

Means for calves measurements are given by breed of dam (table 2). Calves from NE and AN dams had lower ( $P < 0.05$ ) birth weights than calves from SN and CN dams. As previously characterized, cattle breeds with higher genetic potential for

growth showed higher outputs (weaning weight). These results are consistent with the ranking observed with *Bos taurus* and *Bos taurus* crosses by Jenkins and Ferrell (1993). It was observed differences on weaning weight of the progeny (table 2). Nellore had lower ( $P<0.05$ ) weaning weight than the crossbreed calves. Calf growth during the suckling period was consistent with the ranking for milk yield by cow group. The milk composition was different ( $P<0.10$ ) among breeds, with NE cows showing higher fat and protein contents. Fat and protein percentages were 4.8, 4.4, 4.0, and 3.8 %fat, and 3.8, 3.5, 3.2, and 3.1 %protein for NE, CN, AN and SN cows, respectively.

Digestible energy intake from pelleted ration was different among calves and lower ( $P=0.12$ ) for NE (table 3). The lowest feed intake of NE calves is consistent with their lower maintenance requirements (Lanna et al., 1996 in NRC, 1996). Despite the fact that Nellore cows produced less milk, their calves had also lower ration intake. In a opposite way, Armstrong et al. (1990) reported that feed intake could be higher for calves of the same breed with inadequate milk supply. It cannot be said that the lowest performance of NE calves was caused by the lowest milk production of the dams. Probably it was due to these calves having a lower growth potential and thus decreased energy requirements in comparison to other breeds.

Calf efficiency measured as the ratio of preweaning gain to calf DE intake from both milk and ration was not different ( $P>0.05$ ) among breeds (table 3), although a numerical advantage for NE calves was detected. Nellore calves, despite their lower intakes and gains had comparable efficiency which may be explained by their lower maintenance requirements. The data on progeny weaning weights (output) and feed intakes among *Bos indicus* and its crosses, suggest small differences in feed efficiency. It is possible that crossbred cows may have benefited from heterosis for milk production and calf growth (Green et al. 1991), so these results must be evaluated with caution. It is also likely that the greater output was possible given greater input (feed intake). In this experiment, cows that weaned heavier calves produced higher milk and had higher feed intakes than Nellore cows (+8% for CN, +17% for AN and +22% for SN). Thus the increased performance may not be attained under challenging environments. Neither feed intake nor weaning weight was a good indicator of efficiency. The choice of breeds or crosses should be regard all inputs, outputs and environmental constraints under which cattle will be produced. It is also important to evaluate different energy availabilities as well as reproductive performance to define the most efficient genotype.

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