Journal of Animal and Feed Sciences, 13, Suppl. 1, 2004, 511–514

Milk fat composition in supplemented *B. taurus* x *B. indicus* cattle*

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ABSTRACT

Eight cows grazing star grass (*Cynodon nlemfluensis*) were divided into four supplement treatments: Control 3 kg/day soyabean meal/sorghum supplement (16% CP), HP: high protein (2 kg soyabean meal, 1 kg sorghum, 31.5% CP), HE: high energy (1 kg sorghum, 2 kg Ca-soap) and HPE: high protein-high energy (2 kg Ca-soap, 1 kg soyabean meal). Treatments were balanced in two 4 × 4 Latin squares groups as cows received or not supplement during the dry period (3 kg 18% CP). None of the dietary treatment had an effect on the milk fat composition (P>0.05). Further research is needed to evaluate the magnitude of the influence of the genetic dairy potential of type of cows on the observed results.

KEY WORDS: milk fatty acids, tropical cattle, supplementation

INTRODUCTION

Bos taurus x *B. indicus* cows are commonly used in tropical dairy systems based mainly on grazing tropical pastures and variable amounts of supplements. Cross breed cattle in the tropics presents variable udder volume, and this might influence milk production. However, limited reports were found in relation to this subject (Magaña Sevilla and Sandoval Castro, 2003). The objective of the present work was to obtain biological indicators of milk production and udder efficiency in tropical dairy systems.

* H. Magaña PhD. work supported by a CONACYT-México scholarship
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MATERIAL AND METHODS

Eight multiparous cows, calved within a 1.5 week interval, grazing star grass (*Cynodon nlemfluensis*), were divided into four supplement treatments: Control 3 kg/day soyabean meal/sorghum supplement (16% CP), HP: high protein (2 kg soyabean meal, 1 kg sorghum, 31.5% CP), HE: high energy (1 kg sorghum, 2 kg Ca-soap) and HPE: high protein-high energy (2 kg Ca-soap, 1 kg soyabean meal). At the beginning of the experiment, ~45 days of lactation, cows had an average milk yield of 16±4 kg/d. Treatments were designed to cover in excess their nutrient requirements. Treatments were balanced in two 4 × 4 Latin squares groups as cows received or not supplement (3 kg 18% CP) during the last two months of the dry period. Experimental periods were 2-weeks long. During the second week milk yield was recorded with a flow meter (Waikato, Inc.) and samples were taken for protein, fat and lactose analysis. Oxytocin was used to achieve complete udder emptiness in both current and previous milking. Fat was extracted, derivatized and analyzed via gas chromatography. Data was analysed according to the experimental design using the GLM procedure of Minitab 12 (Minitab, 1997).

RESULTS AND DISCUSSION

Cows used in the present experiment are those from Magaña Sevilla and Sandoval Castro (2004). However, due to space constraints limited data is presented in this report.

Table 1. Fatty acid (C4 to C14) composition of milk fat from cows fed four different supplements, %

Treatment		C4	C6	C8	C10	C12	C14
Control	Mean	1.5786	1.6704	1.5368	2.7429	6.7713	19.6337
	SEM	0.2459	0.381	0.2786	0.3553	1.6377	4.549
HP	Mean	1.4202	1.9762	1.6886	3.3168	6.5505	17.7111
	SEM	0.2395	0.6677	0.356	0.5531	1.6589	4.133
HE	Mean	2.1423	1.4116	1.3952	2.6962	6.3014	16.5288
	SEM	0.1596	0.1424	0.2727	0.2889	1.5536	3.5073
HPE	Mean	2.682	2.0321	1.4282	2.6679	5.054	14.7026
	SEM	0.8292	0.5925	0.2392	0.3064	1.1528	3.2086
Average	Mean	1.9722	1.7598	1.5055	2.8419	6.1636	17.1172
	SEM	0.2315	0.2301	0.1391	0.1864	0.7367	1.8834
		NS	NS	NS	NS	NS	NS

[1] control 3 kg/day soyabean meal/sorghum supplement (16% CP), HP: high protein (2 kg soyabean meal, 1 kg sorghum, 31.5% CP), HE: high energy (1 kg sorghum, 2 kg Ca-soap) and HPE: High protein-High energy (2 kg Ca-soap, 1 kg soyabean meal)

The use of dietary fat supplement in order to change the fatty acid composition of milk is a common trend of modern dairy practices. However, none of the supplement caused a change in the fatty acid composition of the milk fat (Tables 1 and 2), a result not expected when using high proportions fat in the supplements as the HE diet (Reklewska et al., 2002). The dietary fat source (soyabean lecithin Ca-soap) might help to explain the results.

Table 2. Fatty acid (C16 to C22) composition of milk fat from cows fed four different supplements

Treatment		C16	C18	C18:1	C18:2	C18:3	C20	C22
Control	Mean	30.4017	9.444	22.1103	2.029	1.0424	0.7236	0.2302
	SEM	7.6679	1.386	1.0618	0.2611	0.2314	0.225	0.07708
HP	Mean	31.1269	11.2828	21.8467	1.8938	0.6499	0.362	0.1745
	SEM	7.3217	0.7956	1.4704	0.1826	0.1759	0.1635	0.06836
HE	Mean	29.6708	11.753	22.068	3.1504	1.6474	0.9866	0.2487
	SEM	6.3797	0.7629	1.8671	0.4776	0.4744	0.2196	0.08472
HPE	Mean	29.4428	12.4921	24.5489	2.4896	1.3541	0.9335	0.1725
	SEM	6.271	0.942	1.6996	0.2055	0.355	0.3456	0.09679
Average	Mean	30.1274	11.2536	22.6485	2.4192	1.1961	0.7656	0.2076
	SEM	3.3323	0.5134	0.7796	0.1723	0.1754	0.126	0.04064
		NS	NS	NS	NS	NS	NS	NS

[1] control: 3 kg/day soyabean meal/sorghum supplement (16% CP), HP: high protein (2 kg soyabean meal, 1 kg sorghum, 31.5% CP), HE: high energy (1 kg sorghum, 2 kg Ca-soap) and HPE: high protein-high energy (2 kg Ca-soap, 1 kg soyabean meal)

The use of Ca in the diets to improve fat utilization in dairy diets is related with rumen pH (Palmquist et al., 1986). The use of dietary fat tend to reduce the acetate:propionate proportion a trend which is reverted by the addition of Ca (Rogers et al., 1982). As the dietary fat source was prepared at the farm it is possible that the Ca-soap and the residual Ca (quick slake lime) has an influence in this effect.

The rumen microbial populations have a different response when long chaín fatty acids are presented in their free form, Ca-salts or triglycerides (Chalupa et al., 1986). Although, the lecithin Ca-soap is not totally inert, it provides a buffer which helps to maintain the rumen pH stable, which in turn help to avoid the Ca-soap salts dissociation. This dissociation might potentially change the rumen pH inducing the changes in the acetate:propionate ratios. However, as mentioned above, the residues of Ca in the Ca-soap mixtures helped to maintain the pH. The increased supply of fat will also alter the absorption of long chain fatty acids at intestinal level (Bauchart et al., 1987), but, it is also possible that the inclusion level, appr. 10% of total diet, was not high enough to induce changes in the milk fat composition (Sukhija and Palmquist, 1990).

The influence of the genetic make up of crossbred on their responses to nutrients supply for milk production has not been fully studied and it is an additional factor which was not investigated in the present work.

CONCLUSIONS

Milk fat composition of crossbred cows was not affected by fat (soyabean lecithin Ca-soap) or protein rich supplements maybe because the treatments periods were too short for the effect of feeding to take action. Additionally, more research is needed to clarify how much the genetic dairy potential of the cows is influencing the results.

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