Preliminary evaluation of the Sorbial probiotic as additive for dairy goats in grasses grazing

J.J. Reyes[1], E. Hurtado[2], Sara Rey[1], F. Alfonso[1] y Aida Noda[1]
[1]*Instituto de Ciencia Animal, Apartado Postal 24, San José de las Lajas, Mayabeque, Cuba*
[2] *Empresa Agropecuaria "Guaicanamar", Unidad Majana, Jaruco, Mayabeque*
Correo electrónico: jreyes@ica.co.cu

To evaluate the Sorbial probiotic as additive for dairy goats in grasses grazing under tropic conditions, were evaluated 180 dairy goats (90 Saanen and 90 Alpina), with 41.3 ± 0.4 kg of live weight, 23.6 days of lactation and 2.1parturition as average. The study lasted 245 days. Goats pastured grasses (start grass and natural grass mixing) and were supplemented with 0.46 kg of animal concentrate1 d-1. They were randomly distributed in 2 treatments: A.10g of probiotic in post parturition, until 100 days of lactation, and B. 0g of post parturition probiotic. The results of milk production showed that goats that consumed the priobiotic, in both breeds, produced 3.9% more milk ($P < 0.05$) than those that did not consume it. Although, the Saanen goats produced 2.4% more milk ($P < 0.05$) than the Alpinas. With the probiotic usage, milk quality improved ($P < 0.05$) in 6.9 and 7.8% for the fat percentage and non fat solids. The costs of the milk liter, per supplement concepts, decreased ($P < 0.05$) in 0.012 and 0.007 Cuban pesos due to the probiotic inclusion, for Saanen and Alpine breeds, respectively. In this study conditions, the use of the probiotic during the first 100 lactation days, decreased costs per supplement concepts.

Key words: *production, milk quality, cost, breeds.*

The same as it happens with others ruminant species, the production and composition of goat milk is affected by diverse factors, like breed, individual characteristics of the animal, lactation state, handling, climate and food composition (Vega *et al.* 2009).

The use of probiotics has demonstrated its positive effects on the production and health of the animals (Bittar *et al.* 2004, Acosta *et al.* 2007 and Zapata 2011).The properties of the same ones have been demonstrated under the conditions of temperate countries, where food systems are different regarding to the tropical area and supplements carries out an important function. Their benefits have also been evidenced in Cuba conditions (Rodríguez *et al.* 2007 and Vega 2007), in bovine (Soca *et al.*2011) and monogastric species specifically.

Sorbial is a probiotic constituted by the mixture of two lactobacillus (*Lactobacillus rhamnosus* and *Lactobacillus acidophilus*).Due to its benefits, its use in farm animals is very beneficial(Bernardeau *et al.* 2000).

The objective of this study was to evaluate the Sorbial probiotic in the production and milk quality of goats in grazing, under tropical conditions.

Materials and Methods

During 245 days, included in the dry season (January 6 to May 15) and rainy season (May16 to August 30), were evaluated 180 dairy goats with a live weight of 41.3 ± 0.4kg, 23.6 days of lactation and 2.1 average parturition. The goats belonged to two breeds (90 Saanen and 90 Alpina). They were included to the experiment once the parturition was carried out.

Animals were kept in grazing conditions (16 h d^{-1}), distributed in five paddocks (2.4 ha $paddock^{-1}$) with mixture of grasses, improved at 65% of star grass (*Cynodon nlemfluensis*) and 35% of naturalized grass, like (*Paspalum notatum*) and(*Dichanthium caricosum*).

The animals of both breeds were randomly distributed. There were kept in mind the milk production of the previous lactation, number of lactation and the date of possible parturition in the two treatments:

A. 10g of Sorbial probiotic, post parturition until 100 lactation days.

B. 0g of Sorbial probiotic.

In both treatments, during the milking, was given 0.46kg of concentrate and in case of the A treatment,10 g of the probiotic was added .The goats had water and mineral salts *ad libitum*.In the dry season,1.0 kg of hay $animal^{-1}d^{-1}$ was given to compensate the lack availability of grass.

The grass availability was considered by Haydock and Shaw (1975) method.

Milk production was individually measured every fifteen days during lactation, 100 ml of milk were took to determine its chemical composition (fat, protein, lactase, non fatty solids NFS and total solids TS, %), in an equipment of infrared technique from the FOSS (Milko Scan TM Minus 6).

The supplement and probiotic intake was measured daily. A sample of 200g from the food offered to the animals was taken to determine its bromatological composition. To calculate the dry matter percentage a Binder forced air oven at 60°C was used until reach constant weight. The determination of protein and crude fiber content was determined according to AOAC (1995).

To calculate cost per supplementation, the methodology offered by Zabala and Perez (1999) was used.

The multiplicative model (Menchaca 1978) was used for the applied statistical analysis to the milk production, fat and protein percentage. The effects treatment,

breed, season, and number of lactation were controlled. Datas was transformed according Ln .To the remainder measurements variance analysis was applied, according a completely randomized design. The treatment breed and season was controlled.

The Infostat program, Version12.0 (Balzarini *et al.*2012) and (Duncan 1995) test was used, to establish differences among means.

Results and Discussion

The availability and composition of foods offered to the animals show that the quality is lower, mainly in the dry season, season in which the crude protein percent decreased ($P < 0.01$) at 20.5 % and crude fiber increased($P < 0.05$) at 7.9 %.

The total availability, 1.78kg DM animal^{-1} d^{-1}, of voluminous food (grass and hay) did not limit the intake; this allowed an appropriate selection and intake of the most nutritious parts of the grass. It also facilitated, higher quality of the ingested material regarding the results of the total availability (Vega *et al.*2009).This effect was marked during rainy season .In this season, the studied variables were higher($P < 0.01$) (table 1).

With the use of the probiotic, the results in the milky production (table 2) showed that there was not interaction among the studied effects. The number of lactation did not differ. However, goats produced 7.1% more than ($P < 0.01$) of milk in the rainy season. The animals that intake the probiotic, in any of the two breeds, produced 3.9% more of milk ($P < 0.05$) regarding those that did not consume it .Saanen goats produced 2.4% more of milk ($P < 0.05$) than the Alpina breed.

The higher milk productions in the rainy period response to the quality of the base food (Roca- Fernandez *et al.* 2012), regardless that in the dry season the goats had as average 69d less of lactation. This factor influenced in that the differences between seasons were only 7.1%.

Frau *et al.* (2013) reported higher milky productions in Saanen goats than in Alpina, although the productive levels of both were lower at 1.45 and 2.1 times, regarding to that is stated in this study. The Saanen goats are typical animals, with dairy purpose, they show higher milk production but with a lower fat content, while the

Table 1. Bromatological quality and availability of used foods

Foods	Seasons	Rainy		Dry		Sign
		Mean	±SE	Mean	±SE	
Pasture	Availability (kg DM animal^{-1} day^{-1})	2.34	0.28	0.93	0.32	**
	DM (%)	27.8	0.31	31.2	0.34	**
	Crude protein (%)	7.02	0.24	5.58	0.25	**
	Crude fiber (%)	29.09	0.54	31.38	0.63	*
Hay	Availability (kg DM animal^{-1} día^{-1})	-	-	0.85	0.15	-
	DM (%)	-	-	84.6	0.21	-
	Crude protein (%)	-	-	5.41	0.18	-
	Crude fiber (%)	-	-	32.65	0.35	-
Concentrate	Availability (kg DM animal^{-1} day^{-1})	0.46	0.11	0.44	0.09	-
	DM (%)	85.6	0.23	86.2	0.25	-
	Crude protein (%)	14.92	0.42	15.56	0.65	-
	Crude fiber (%)	10.75	0.33	11.23	0.36	-

* P<0.05 ** P<0.01

Table 2. Effect of Sorbial supplementation on milk production of goats in grazing

Factors			Sign.
No. lactation	First	0.74 ± 0.0104 (2.10)	NS
	Second	0.73 ± 0.0104 (2.09)	
	Third or more	0.74 ± 0.0112 (2.12)	
Season	Dry	0.73 ± 0.082 (2.12)	**
	Rainy	0.75 ± 0.087 (2.27)	
Treatments	With Sorbial	0.75 ± 0.085 (2.13)	*
	Without Sorbial	0.72 ± 0.088 (2.07)	
Breed	Alpina	0.72 ± 0.0091 (2.08)	*
	Saanen	0.75 ± 0.0083 (2.13)	

( ) Means of data without transforming. * P < 0.05

animals from Anglo Nubia breed, showed higher fat percentage in its milk (Salvador and Martínez, 2007).

With the use of the Sorbial probiotic similar results in the increase of milky productivity in dairy cows (Bernardeau and Guillier, 2003) have been informed, that showed increases between 404-960 kg of total milk in the lactation, by the use of the probiotic concept; this effect is associated to the improvements in the use of consumed foods and, therefore, to the higher nutrients absorption.

In table 3, is showed that there was not interaction treatment/breed in the indicators of milk quality. The fat percentage, lactose and total solids did not differ among treatments. The fat average determined in the research coincide with the informed in others studies (Borges *et al.* 2004, Torres 2004, Vegas *et al.* 2007 and Frau *et al.* 2012),in those that have been indicated that the originally breeds from Europe, like Alpina and Saanen, produced milk ,under normal conditions, with 4.0% of fat approximately.

The content of milky fat of the two studied breeds was higher regarding to the 2.4% of reports, according to tables of food composition from the National Nutrition Institute of Mexico (Anon 2005); in turn, this value is lower to the one referred by Frau *et al.* (2013), who informed 5.32%, what is show the variability of this milky component, according to food conditions and breed.

The protein content in the caprine milk was 4.9% more ($P < 0.05$) in the supplemented animals with the probiotic, regarding to non supplemented. This can be explain by the possible improvements of ruminal conditions and therefore, by the increase of the protein passing to the animal low tract (Vaca *et al.* 2004).

Milk protein varies less than the fat during the lactation (Haenlein 1996), for these two breeds, the values informed by Soryal *et al.* (2004 and 2005) were 2.88 and 3.08% respectively, lower to those of this research.

This increase in the protein percentage in the milk of the supplemented goats with the probiotic favored increase of 7.8 %($P < 0.05$) in NFS. In same way, this milky component, in both treatments, was in the ranges informed by Soryal *et al.* (2005) and Frau *et al.* (2013).

The average lactose levels of goats milk did not differ among treatments and were in the spans informed by other researches (Soryal *et al.* 2004 and 2004 and Keskin *et al.* 2004).The same happened with the TS (Keskin *et al.* 2004 and Vega *et al.* 2007).However, TS percentages higher at 14.9% in the milk of Saanen goats ¾, regarding to other European breeds crossings were informed by Frau *et al.* (2013).

The costs of the produced milk liter (table 4), per supplement concept (concentrate and probiotic), decreased ($P < 0.05$) at 0.012 and 0.007 Cuban pesos in Alpina and Saanen breeds respectively, when were supplemented with the Sorbial; In same way the production costs of Saanen goats, decreased ($P < 0.05$) at 0.009 and 0.014 Cuban pesos, related to Alpinas goats, supplemented or not, respectively.

The results of this research showed the feasibility of giving, during the first 100d of lactation, 10 of goat^{-1} d^{-1} Sorbial.With the used of this probiotic the milky productions were increased, in total lactation specifically, and improved the chemical composition of the milk. Besides, the production costs per supplement decreased

Table 3 Milk quality of goats in grazing consuming probiotic

Calidad	g 100 ml of milk^{-1}				
Tratamientos	fat	protein	lactose	NFS	TS
10 g de probiótico±EE	1.62	1.35	1.58	2.15	2.45
	0.062	0.047	0.006	0.058	0.063
	(3.89)	(3.26)	(4.19)	(8.75)	(11.88)
0 g de probiótico±EE	1.630.	1.29	1.59	2.12	2.44
	0.068	0.051	0.005	0.061	0.069
	(3.92)	(3.05)	(4.12)	(8.12)	(11.73)
Sign.	-	*	-	*	-

( ) means of data without transforming. *P<0.05

Table 4. Effect of the Sorbial supplementation on the liter cost per supplementation concept.

Breeds Treatments	Alpina	Sanee	Sig.
10 g of Sorbial ±SE	0.263^{b}	0.254^{a}	*
	0.084	0.071	
0 g of Sorbial ±SE	0.275^{c}	0.261^{b}	
	0.081	0.078	

$^{a, b, c}$ Means with different superscripts differ at P<0.05 (Duncan 1955).
* P<0.05

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