SANITARY QUALITY OF GOAT MILK PRODUCED IN INTENSIVE SYSTEMS IN MEXICO

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Introduction

Sanitary quality of milk is associated to the absence of mastitis, and somatic cell count (SCC) is the main parameter to quantify the presence of this pathology. Somatic cells are defensive cells located in the goat's udder, mostly leukocytes from the circulatory system that increase in numbers in the presence of an infectious process. Somatic cells are eliminated with the milk and their quantification allows determining the presence of mastitis and the degree of infection of the mammary glands (Sánchez *et al*., 1998).

SCC is widely accepted as an indicator of the health status of the lactating mammary gland (Rota *et al*., 1993). Its use is completely standardized in bovine cattle, but the caprine cattle possesses physiological and productive peculiarities that hinder extrapolation of data from bovine to caprine cattle (Wooding *et al*., 1970), as the latter depicts physiologically higher counts. The mean of cells in cow milk without intramammary infection ranges between 40 to 80 × 10^3 cells/ml (Paape and Contreras, 2000), whereas in the goat ranges can go from 165 × 10^3 (Dulin *et al*., 1983) to 1.92 × 10^6 cells/ml (Rota et al., 1993), and even higher. This wide physiological variation is due to factors, such as: breed (Sung *et al*., 1999), exploitation type and conditions (Delgado-Pertiñez *et al*., 2003), stage of lactation (Dulin *et al*., 1983; Rota *et al*., 1993), or duration of the productive period. Regarding this last factor, existing data describe lactations going from 105 to 240 days, but no data have been found referring 305 days of lactation, which is the production period in the studied caprine exploitation systems.

Mexico is the country of the American Continent with the highest goat milk production (FAO, 2004), and although quantitatively its relevance is discrete as it only corresponds to 1.5% of the bovine milk production in Mexico, qualitatively it plays an important social and economical role (Arbiza and De Lucas, 2001), and constitutes an

exportation alternative within the North American Free Trade Agreement (NAFTA). Despite the aforementioned, no standards for goat milk have been developed in Mexico, and no studies on the subject exist.

This work aims at being a starting point for the assessment of goat milk in Mexico, on which there are practically no data. For this, we determined in Saanen goats, with a lactation period of 305 days and free of clinical mastitis, the number of somatic cells and their relation with the stage of lactation, milk production, and the farm from where samples were taken.

Material and methods

The work was performed in the state of Guanajuato (Central Mexico), specifically in Apaseo el Grande, a locality located at 1,767 m above see level, with a temperate climate and a mean annual precipitation of 606.1 mm, mainly from June to September.

Six farms and 12 Saanen goats from each farm were randomly chosen, goats were in their 1st to 6th lactation, 2 goats for each lactation, free of clinical mastitis.

These farms commercialize the milk, brucellosis-free, in an intensive exploitation system, with a mechanical milking room, milking is performed twice a day, and a production period of 305 days.

Once a month, and always from the same goats, individual samples of the whole morning and afternoon milking were taken. The produced milk (in liters) from each milking was recorded and samples were kept at a temperature never higher than 4ºC. On the next day (Kroger, 1985; Gonzalo *et al*., 1998) the number of somatic cells/ml was determined in the milk by means of a microscope (Fossomatic^{TM} Minor).

Data were analyzed using the GLM (General Linear Model) of the statistical package SAS (SAS, 1982).

Results and discussion

The mean number of somatic cells/ml of milk (SCC/ml) oscillated between 230,000 and 1,560,000, these results indicate that the goat milk produced in these farms is of good sanitary quality that would comply with the standards established by countries that do count upon the respective legislation, as the USA, which enforces goat milk production in liquid state and to contain less than 1,000,000 cells/ml (Paape and Contreras, 2000).

Based on variance analysis (Table 1), neither the amount of produced milk nor the farm factor were significant (P>0.05), but, in contrast, the stage of lactation and the interaction with the farm resulted significant, indicating that the farm and the stage of lactation must be considered in the model. That is, production does not seem to impact SCC but does impact the stage of lactation. No differences were revealed among farms but differences were found in the interaction between the farm and lactation, meaning that the SCC depended on the combination of stage of lactation and farm. The latter could be associated to the still small sample number.

As the stages of lactation advance, animals have a larger cellular component. This increment could be due to a concentration effect caused by the decrease in milk production (Dulin *et al.*, 1983; Rota *et al*., 1993). Data show that at a smaller cellular component the higher is the milk production; however, the variance analysis (Table 1) indicates that the amount of produced milk does not seem to affect the SCC, but seems to be impacted by the stage of lactation. In goats, the increase in somatic cell counts is not always associated to a reduction in milk production. The low milk production together with a high SCC can be due rather to the effects of advanced lactations than the high SCC. (Wilson *et al*., 1994).

Table 1: Variance Analysis Results. SCC as a function of milk production, farm, and number of lactation

		d. f.	Type III SS	F	P
SCC	Production	1	87149.40	0.29	0.5929
	Farm	5	2977205.89	2.00	0.1097
	Lactation	5	3946739.80	2.65	0.0440
	Farm*Lactation	23	13530151.98	1.97	0.0437

R^2=0.74; d. f., degree of freedom

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