

Effects of Incorporating Protected Fat into the Ration on Milk Yield and Quality in Silo-Sarde Dairy Ewes

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Abstract: The effects of incorporating an energetic additive (Myristic acid, palmitic acid, stearic acid and oleic acid) into the ration during late gestation and the suckling period on milk yield and quality were studied in dairy Sicilo-Sarde ewes. Forty ewes were divided into two pens homogenous for age (51 ± 4.5 kg) and the rank of lactation (4.5 ± 1.3). Both control and experimental ewes received oat hay at will in addition to 500 g of concentrate per ewe per day during an 11 week period (the last 6 weeks of gestation and the first 5 weeks of the suckling period). The experimental group of ewes received additionally 50 g per ewe per day of the energetic supplement known commercially as Magnapac+. Milk yield and quality were recorded once a week. Mean milk yield was 0.54 and 0.64 l/ewe/day for control and experimental ewes, respectively. Nevertheless, experimental ewes' milk had higher ($p < 0.05$) fat but lower ($p < 0.05$) contents in protein, lactose and mineral matter than that of control ewes. On the other hand, there were no significant differences ($p > 0.05$) between density, pH and the freezing point of milk produced by both ewe groups.

Key words: Ewes • Sicilo-Sarde • Magnapac+ • Milk yield • Milk quality

INTRODUCTION

Feeding supply is one of the most important factors that affect animal production [1]. These effects may be noticed on yield as well as the quality of animal products. The milk of dairy ewes is mainly produced for the cheese market [2, 3]. That is, the control of milk content in fat and protein is crucial for the cheese yield [4]. The use of protected fatty acids in dairy ewes' rations is becoming frequent [5]. The rationale from the incorporation of these fatty acids into rations is to meet ewes energetic requirements in critical physiological phases, increase cheese yield and favourably affect the sensory quality of cheese [6, 7].

The objective of this study was to assess the impact of supplementing Sicilo –Sarde ewes by Magnapac+ during late gestation and the early suckling period on milk production.

MATERIALS AND METHODS

Animals and Diets: Forty Sicilo- Sarde ewes were allotted into two pens of 20 ewes each. Ewe groups were homogeneous for age (51 ± 4.5) and the rank of lactation (4.5 ± 1.3). Animals were lodged in the farm of the School

of Higher Education in Agriculture of Mateur “ESA Mateur” in the sub humid region in the north Tunisia. Both ewe groups received the same base ration that included oat hay at will and 500g/ewe/day of concentrate. Ration was distributed in two times at 8h: 30 min and at 15h. The experimental group of ewes received 50g/ewe/day of an energetic additive (incorporated in the concentrate) commercially known as Magnapac+ over the whole trial period. This additive is a mixture of fatty acids. It included Myristic acid, Palmitic acid, Stearic acid and Oleic acid. The experiment was carried out during 11 weeks (the last 6 weeks of gestation and the first 5 weeks of the suckling period). The chemical composition of aliments [8] is given in Table 1.

Milk Recording: Each ewe was hand milked every Monday of each week. Lambs were separated from ewes and the udder was fully emptied at 9 h. Two hours thereafter, ewes were milked again. Milk yield (MY) was recorded and the total milk yield produced during 24 h was obtained by multiplying the two hours milk yield by 12. Each test- day, milk samples were taken from bulk milk of each group of ewes. These milk samples were used to measure pH, density and the freezing point and milk contents in fat (FY), protein (PY), lactose and solids non

Table 1: Chemical composition of aliments (% DM)

Nutriments	Concentrate	Concentrate Magnapac ⁺	Oat hay
DM (%)	88.0	89.7	83.0
CP (%)	11.4	12.2	5.6
CF (%)	4.5	1.8	33.6
OM (%)	94.3	93.8	93.9

Dm : Dry matter, CP : Crude protein, CF : Crude fibre, OM : Organic matter.

fat (SNF)., Analysis of milk samples was carried out by an ultra sonic milk analyser, a LactoScan (Milkotronic LTD, serial n°4696, Hungary) in the laboratory at the ESA Mateur. Mean cheese yield (CY) was estimated by $CY = 1.733 PY + 1.2257 FY$ (g/100g) following Pirisi *et al.* [9].

Statistical Analysis: Means of MY, FY PY, lactose and SNF compared by the Student test « T » following a one way analysis of variance [10].

RESULTS AND DISCUSSION

Milk Yield: Milk yield over the every week 5 test- days is illustrated in Figure 1. Milk production was important in the first test-day. Mean yields were 1.13 l/ewe/day and 0.98 l/ewe/day for the experimental and control ewes, respectively. Milk production substantially decreased thereafter to only 0.36 and 0.33 l/ewe/day for the experimental and control ewes, respectively, in the fifth test- day. The analysis of variance showed no significant differences ($p > 0.05$) between test-day milk yields of both ewe groups. This result is in agreement with findings by Pérez-Hernandez *et al.* [11], but production levels were lower than those reported by [6]. Mean yields across the 5 test- days were 0.64 and 0.54 l/ewe/day for the experimental and control ewe groups, respectively. That is, ewes receiving the energetic additive tended to produce milk more than the control ewes but the difference was not significant ($p > 0.05$). The addition of only 50 g/ewe/day of Magnapac+ in the ration and on a daily basis seemed not to affect milk yield in Sicilo- Sarde ewes. Schmidely and Sauvant [12] reported that milk yield may vary with the level of this energetic additive in the ration. On the other hand, Gargouri [5] found that the addition of fatty acid additives in the ration of dairy ewes on milk yield was not important.

Milk Quality: Means of milk physico-Chemical parameters of Sicilo- Sarde ewes are given in Table 2. The incorporation of Magnapac+ in the concentrate increased ($p < 0.05$) milk fat content. This result is in

Table 2: Quality of milk of Sicilo- Sarde ewes fed concentrate and concentrate and Magnapac +

Regimen ¹				
Parameter	Concentrate	Concentrate and Magnapac ⁺	Coefficient of determination	Pr
FAT (%)	6.94 ^a	8.00 ^b	0.76	0.001
Protein (%)	5.76 ^a	5.53 ^b	0.52	0.018
SNF ² (%)	10.53 ^a	9.98 ^b	0.57	0.011
Lactose (%)	3.76 ^a	3.50 ^b	0.51	0.015
Density	1.034 ^a	1.031 ^a	0.29	0.181
pH	6.58 ^a	6.49 ^a	0.08	0.407

¹Means in the same row with different superscripts are significantly different at $p=0.05$ ²SNF: Solids non fat.

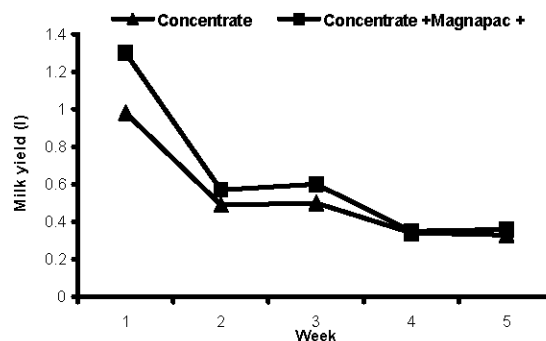


Fig. 1: Weekly milk yield of Sicilo- Sarde ewes by diet

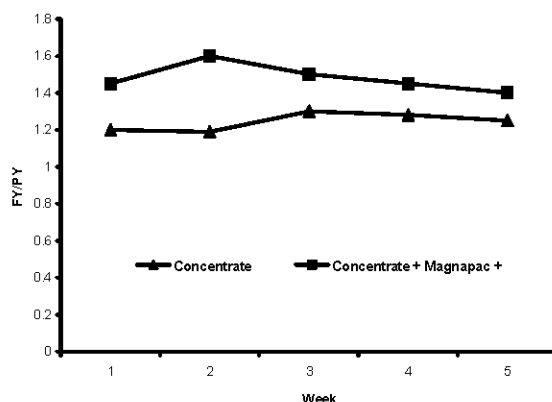


Fig. 2: Evolution of FY/PY in the milk of Sicilo- Sarde ewes by diet

agreement with that reported by Casals *et al.* [6] and Jarrige [13]. Mean fat level in milk of ewes receiving Magnapac+ was more than 1% greater than that in milk of control ewes. However, control ewes' contents in protein, SNF and lactose were higher ($p < 0.05$) than those in experimental ewes. Reduced protein content in the milk of experimental ewes may probably be explained by the depressing effects of methionine (found in Magnapac+)

on milk secretion and protein synthesis when added to ration based on hay [4]. Density and pH of milk of both groups of ewes were comparable ($p > 0.05$) although SNF varied with the incorporation of fatty acids in the ration (Table 2).

The ration FY/PY, which is determinant of the organoleptic quality of cheese, was in favor of the experimental group of ewes (Figure 2) in agreement with results advanced by [4]. Likewise, mean cheese yield was 19.58 ± 3.26 g/100g for the experimental ewes, higher than that for the control ewes (18.70 ± 2.63 g/100g). The addition of Magnapac⁺ in the ration of the dairy Sicilo- Sarde ewes did not affect milk yield but increased milk fat content and the ration FY/PY important for an increased cheese yield.

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