Lactational effects of once- versus twice-daily milkings throughout lactation in two breeds of dairy ewes

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INTRODUCTION

In Europe, during last two decades it has been proposed to simplify milking systems to reduce the workload and improve the quality of life of farmers without the help of other persons because of the high cost of manpower.

The activity of milking (twice daily throughout the lactation period) approximately represents a half of the daily work. Once- instead of twice- daily milking reduced milk yield by 10 to 50% in dairy cows, 20 to 60% in dairy ewes and 6 to 35% in goats. Furthermore, it has been shown in dairy cows with large mammary cisterns that production losses caused by once daily milking are minimal.

MATERIAL & METHODS

Animals & Experimental Design:

The effects of once- (1X) vs. twice-daily (2X) milkings throughout lactation on milk yield, milk composition, SCC, cisternal size and milk fractioning were studied in 2 breeds of dairy ewes differing in milk yield, udder compartments and milk ability (Manchega, MN, n = 29; Lacaune LC, n = 37). After the weaning of lambs (wk 5), ewes were machine milked 2X and divided into 2 groups, to which milking treatments were assigned: 1X (MN, n = 15; LC, n = 18) and 2X (MN, n = 14; LC, n = 19).

Procedures & Analyses:

Individual recordings were conducted weekly (wk 5 to 25) for milk yield, biweekly for milk composition, monthly for SCC, and twice (wk 5 and 14) for lactose. Cisternal area and udder compartments were measured using an oxytocin receptors blocking agent (wk 5 and 14).

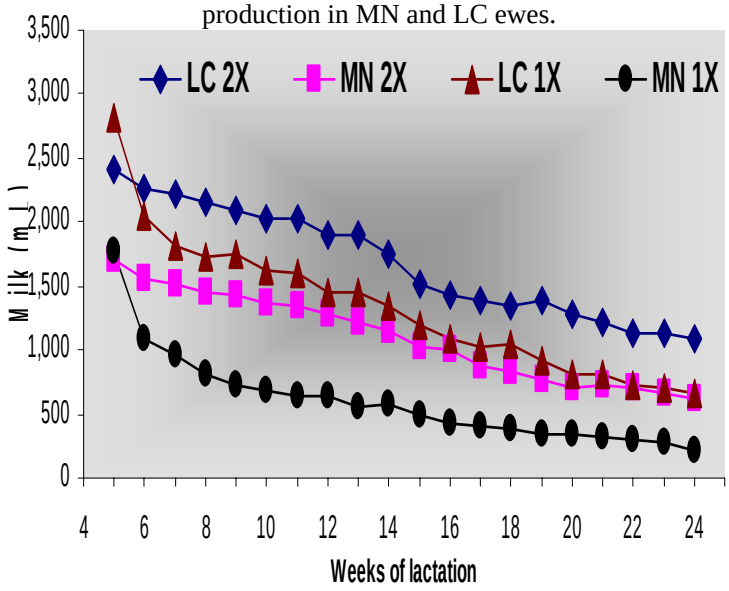
Data were analyzed by the PROC GLM and MIXED for repeated measurements of SAS (version 9.1, SAS Institute Inc., Cary, NC). The model included fixed and random effects, appropriate interactions, and the residual error.

RESULTS & DISCUSSION

Milking frequency did not affect ($P > 0.05$) percentages of major milk components (fat, protein, total solids and casein); the milk of MN ewes being richer in components than LC.

Reducing milk frequency throughout lactation impaired milk yield, especially in Manchega (MN, −46%; LC, −25%; $P < 0.01$). A dramatic fall in milk yield was observed between wk 5 and 6 of lactation for the ewes changing from 2X to 1X **(Figure 1)**.

Figure 1. Effect of milking frequency (2x vs 1X) on milk production in MN and LC ewes.



Effects of milking frequency on lactose concentration in blood are shown in Table 1. At wk 5, serum lactose in both breeds milked 1X was higher, but only significant in MN ($P < 0.05$). By wk 14, blood lactose levels stabilized with no effect of milking frequency.

Table 1. Effect of milking frequency (2x vs 1X) on lactose in the blood in ewes Manchega (MN) and Lacaune (LC)

Item	LC2X	LC1X	SE	MN2X	MN1X	SE
Lactose (µmol/L						
Week 5	**32.45^{a}**	**40.72^{a}**	**6.73**	**15.49^{b}**	**31.15^{a}**	**6.06**
Week 14	**32.28^{a}**	**33.99^{a}**	**7.40**	**23.17^{b}**	**23.35^{b}**	**6.06**

A,-b Means with different letters in the same row are statistically different (P <0.05)

The SCC was not affected ($P > 0.05$) by milking frequency, but LC ewes had greater values than MN ($P < 0.01$), and for both breeds a linear increase ($P < 0.01$) in SCC from the 1st to the 3rd parity was observed (5.01, 5.02, 5.62 log10 cells/mL). Cisternal and alveolar milk decreased ($P < 0.05$) throughout lactation (wk 4 to 14, 503 to 270 mL; 450 to 164 mL, respectively). Area of the cistern decreased (44.5 to 34.6 cm^2) as lactation progressed, with a significant difference ($P < 0.01$) between small- and large-cisterned ewes in cisternal milk volume (small, 282 mL; large, 476 mL). The LC Ewes showed greater ($P < 0.05$) cisternal area and cisternal milk than MN (46.9 vs. 30.3 cm^2, 483 vs. 267 mL, respectively), which was related to the ability of each breed to adapt to 1× milking frequency.

CONCLUSIONS

Both breeds suffered considerable milk yield losses when milked 1X throughout lactation, but these losses were more pronounced in MN ewes. The ewes with small cistern and low storage capacity in the udder (i.e. breed MN) had greater serum level of lactose during 1X, indicating the permeability of the tight junctions. This may explain the greater losses of milk production in MN ewes compared with LC.