Machine milking management and milk nitrogen fractions in primiparous ewes

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ABSTRACT: Little work has been carried out on management techniques to reduce stress of first machine milking in ewes. The aim of this work was to evaluate the effect of milking parlour training before weaning on sheep milk yield and milk protein fractions. One week before weaning, an experimental group (EG) was introduced into the machine milking parlour and hand-milked once a day, to adapt them to the new environment and noise of the milking machine, while a control group (CG) was hand-milked once a day in a traditional fold parlour until weaning. After weaning, both groups were machine milked, separately, twice a day in the milking parlour. Milk yield and nitrogen fractions were recorded for the first 10 days of machine milking. Differences between samplings within group were observed for all parameters considered. Only on the first day of machine milking, differences between groups occurred for total nitrogen, total protein and casein. Higher content of nitrogen fractions in the milk of EG was due to its lower milk production. In fact, daily production of nitrogen fractions was higher in CG than in EG. High variability for most parameters was observed during the first 5 days of machine milking in both groups. A week of training to machine milking parlour was not enough to reduce the negative effects of weaning and machine milking stresses on primiparous ewes. (interaction?)

Key words: Ewes, Milk quality, Welfare, Management.

INTRODUCTION - Machine milking can be associated with stress and a significant reduction in milk yield and quality. Improper milking practise can induce fear in primiparous and pluriparous dairy cows, which then show negative behaviour and lower productivity (Hemsworth *et al*., 1989; Hemsworth, 2003). Dairy cows suckled for several weeks after calving and then separated from their calves and machine milked showed a transient decrease in oxytocin release, and milk yield and flow rates during the first machine milking (Tancin *et al*., 1995). In primiparous ewes machine milked after parturition, oxytocin levels increased on the first 15 days of milking and a positive correlation between its release during milking and milk yield, fat and protein was observed (Negrão and Marnet, 2003). It is known that environmental stress, caused by inadequate ventilation and airspace, affect milk casein content in sheep (Sevi *et al*., 2001, 2003), but little information is available on the effects of training to machine milking on milk quality of dairy ewes. Recently, Rassu *et al*. (2006) found that a week of training to the milking parlour reduced the somatic cell count. The present work deals with the effects of milking parlour training before weaning on milk yield and milk protein fractions in primiparous ewes.

MATERIAL AND METHODS - Twelve Sarda primiparous ewes, lambed on same week, were confined with their lambs in a pen and fed a complete pelleted diet and hay *ad libitum*. During suckling period, ewes were brought to a traditional fold every morning and hand milked to collect milk not removed by lamb. One week before weaning (after 30 days of suckling), ewes were separated in two homogeneous groups for lambing date: the experimental group (**EG**), formed by six ewes with their lambs, was introduced into the machine milking parlour and hand-milked once a day, to adapt the ewes to the new environment and noise of the milking machine; the control group (**CG**), formed by other six ewes, was hand-milked once a day in a traditional fold parlour until weaning. After wean-

ing, both groups were machine milked, separately, twice a day in the milking parlour. For the first 10 days of machine milking, milk yield was recorded and milk samples were collected each day and analyzed for total nitrogen (TN), non protein nitrogen (NPN) and non casein nitrogen (NCN) by Kjeldahl method. Milk casein content (CN) was calculated as (TN - NCN) x 6.38, and total whey protein (WP) as (NCN – NPN) x 6.38.
Data were analysed by PROC MIXED implemented in SAS software, using group, sampling and their interaction as fixed factors and ewes within group as a random factor.

RESULTS AND CONCLUSIONS - Differences between groups were not observed for any of the parameters considered, while sampling and interaction effects were significant (Table 1). Only on first day of machine milking, differences between groups (P<0.05) were observed for TN, TP and CN contents, which were higher in EG than in CG. Milk yield was almost always higher in CG than in EG, and was highly variable in both groups on the first 5 days of machine milking (Figure 1). This could be caused by weaning and machine milking stresses. Nevertheless, EG showed higher, even if not significant, TN, TP, WP and CN content than CG (Table 1). Differences between samplings (P<0.05) within group were observed in both groups.

Table 1. Milk production (g/d) and nitrogen fractions content (%) (lsmeans±se).

	Milk yield	TN [a]	TP [b]	WP [c]	CN [d]	NPN [e]
CG	1987±180	4.50±0.17	4.18±0.16	0.80±0.04	3.38±0.12	0.32±0.01
EG	1755±180	4.74±0.17	4.42±0.16	0.88±0.04	3.54±0.12	0.32±0.01
Group	ns	ns	ns	ns	ns	ns
Sampling	**	*	*	**	*	ns
groupxsampling	*	**	**	ns	**	ns

[a]total nitrogen; [b]total protein; [c]whey protein; [d]casein; [e]non protein nitrogen ; =P<0.05 ; **= P<0.01.*

Figure 1. Daily milk production.
a, b, c, d: differences (P<0.05) between sampling within groups.

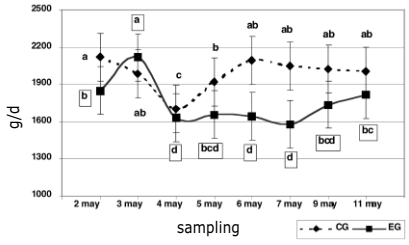
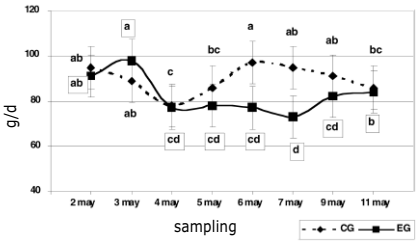


Figure 2. Daily total nitrogen production.
a, b, c, d: differences (P<0.05) between sampling within groups.



The higher nitrogen fraction content in EG could be attributed to its lower milk yield. In fact, daily production of TN, TP, WP CN and NPN was higher in CG than in EG (Table 2). In particular, the shape of TN (Figure 2) and CN daily production curves was similar that of daily milk production. Also in this case, a high variability on first 5 days of machine milking occurred.
The lack of positive effects of training on primiparous ewes can be attributed to two stressful conditions for EG: first, the new environment of the milking parlour and, after a week, weaning and machine milking. In this short period of time, ewes were probably not able to react to multiple stresses. Negrão and Marnet (2003) observed that primiparous ewes adapted to machine milking only15 days after partum.
In conclusion, a week of training is not long enough to reduce the stress effects of weaning and machine milking and to improve milk quality in primiparous ewes. Further studies should be conducted to determine if a longer

Table 2. Daily production of nitrogen fractions (g/d) in sheep milk (lsmeans±se).

	TN [a]	TP [b]	WP [c]	CAS [d]	NPN [e]
CG	90±8.7	83±8.1	16±1.5	67±6.6	6.4±0.6
EG	83±8.7	77±8.1	15±1.5	62±6.6	5.6±0.6
Group	ns	ns	ns	ns	ns
Sampling	**	**	**	**	*
group x sampling	**	**	**	**	**

[a]total nitrogen; [b]total protein; [c]whey protein; [d]casein; [e]non protein nitrogen;
*ns = not significant * =P<0.05; **= P<0.01.*

training period, adapting ewes not only to a new environment and noise of the milking parlour but also to machine milking, could be more beneficial.

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