BRIEF COMMUNICATION

Effects of milking frequency and machine stripping on milk yields of Dorset ewes

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INTRODUCTION

Milking twice-a-day is a major cost in New Zealand dairy sheep enterprises. This cost could be reduced by less frequent milking (eg. once-a-day milking or missing an afternoon milking in the weekends), and by the elimination of machine stripping, which involves massaging the udder and pulling down on the cups at the end of milking. However these savings could be offset by decreases in the duration of lactation, milk yield and milk composition. Knight *et al.* (1993) found once-a-day milking over the whole lactation reduced total milk yields by 48%, but when once-a-day milking commenced in the 6th week of lactation, milk yields were only reduced by 14% and there was no effect on the duration of lactation (Geenty and Davison 1982). Machine stripping can increase daily milk yields by 4-12%, decrease residual milk by 67%, and increase the duration of lactation (Geenty and Davison 1982; Bencini and Knight 1994).

The results presented are from two experiments with Dorset ewes at the Flock House Agricultural Centre. The aim of Expt 1 was to determine the effect of missing an afternoon milking every 7 days on milk yields and composition, and the aims of Expt 2 were to determine the effects of once-a-day milking and machine stripping on milk yields and composition.

MATERIALS AND METHODS

Experiment 1

Eight weeks after the start of lactation, 40 mixed age Dorset ewes which had been milked twice-a-day were randomly allocated to two groups. The control group (C) continued to be milked twice-a-day while the missed milking group (MM) missed one afternoon milking every 7 days. Daily milk yields were measured on the day of the missed milking and on the subsequent 3 days for the 5 week experimental period,and milk composition was measured on each of the 4 days in weeks 1, 3 and 5.

Experiment 2

Eight weeks after the start of lactation, 60 mixed age Dorset ewes which had been milked twice-a-day were randomly allocated to the four groups in a 2 x 2 factorial designed experiment ($n = 15$, $N = 60$). The treatments compared were: twice-a-day milking (TAD), vs once-a-day milking (OAD), and machine stripping (MS), vs no machine stripping (NOMS). Daily milk yields and milk composition were measured once a week for 12 weeks.

Dorset ewes in the Flock House commercial sheep milking flock had lambs removed 5-7 days after birth and each ewe was milked twice-a-day, starting at 06.30h and 15.00h. Machine stripping at the end of milking was carried out. Daily (24 hour) dairy milk yields were obtained by measuring the evening and morning milk volumes using Tru Test milk meters (Tru Test Distributors Ltd, Auckland). Milk composition (ie. % fat, % protein, % lactose and % solids) was measured on pooled morning and afternoon milk samples. Samples were sent to the Hillcrest Test Centre of the Livestock Improvement Corporation, Hamilton where composition was analysed using a Milko Scan 605 (Foss Electric, Denmark).

Statistical analysis: Repeated measures analysis (SAS 1987) was used for changes in milk yields and composition over time, while analysis of variance was used for total milk yields and duration of lactation. Pre-experiment values for milk yield and milk composition were used as covariates in the respective analyses.

RESULTS

Experiment 1

MM and C ewes had similar durations of lactation and total milk yields over the 5 weeks of the experiment (Table 1). Mean milk composition, averaged over the 4 days and for the 3 weeks of sampling, was similar for MM and C ewes. The exception was the % protein, which was higher ($P<0.05$) for MM (6.4 ± 0.1%) than C (6.1 ± 0.1%) ewes.

TABLE 1: Mean (± SEM) duration of lactation, and mean (± SEM) milk yields and milk composition over the 5 weeks of Expt 1, for control (C) ewes and ewes missing an afternoon milking every 7 days (MM).

	C ewes	MM ewes
Duration of lactation (days)	93.9 ± 1.9	95.4 ± 1.5
Total milk yield for 5 weeks (l/ewe)	22.8 ± 0.9	21.3 ± 0.9
Milk composition (%)		
Fat	8.8 ± 0.2	8.7 ± 0.2
Protein	6.1 ± 0.1	6.4 ± 0.1*
Lactose	5.6 ± 0.1	5.5 ± 0.1
Solids	20.7 ± 0.2	20.7 ± 0.2

* $P<0.05$

Experiment 2

Over the 12 weeks of treatment OAD ewes had significantly (P<0.001) lower daily milk yields and total milk yields compared with TAD ewes, but there were no differences between MS and NOMS ewes, and no interactions between treatments. The 19.4% lower total milk yield for OAD ewes over the experimental period was reduced to a difference of 7.3% (P = 0.098) when compared over the whole lactation (Table 2). The treatments had no effect on duration of lactation.

TABLE 2: Mean (± SEM) duration of lactation and total milk yields, and mean (± SEM) milk composition over the 12 week experimental period for ewes milked once-a-day (OAD) and twice-a-day (TAD) in Exp 2.

	Frequency of milking	
	OAD	TAD
Duration of lactation (days)	125.0 ± 2.8	131.4 ± 2.8
Total milk yields (l)		
Treatment period	38.7 ± 0.2	48.1 ± 0.2***
Total lactation	100.6 ± 3.3	108.1 ± 3.3+
Mean milk composition (%)		
Fat	7.5 ± 0.1	7.5 ± 0.1
Protein	6.4 ± 0.1	6.1 ± 0.1**
Lactose	4.4 ± 0.03	4.5 ± 0.03**
Solids	19.0 ± 0.2	18.9 ± 0.2

+ P<0.1; ** P<0.01; *** P<0.001

Analysis of mean milk composition for the 12 weeks indicated that OAD ewes had higher (P<0.01) % protein and lower (P<0.001) % lactose than TAD ewes (Table 2). The % lactose was higher (P<0.05) in MS (4.50 ± 0.03%) than NOMS (4.40 ± 0.03%) ewes, but machine stripping had no significant effect on other components of the milk.

DISCUSSION

Reducing the frequency of milking ewes after the 8th week of lactation only slightly reduced milk yield. The 7% lower milk yield from missing one afternoon milking every 7 days represents only 1.5 l of milk per ewe, while the 19.4% reduction in milk yield from once-a-day milking represents 7.5 l of milk per ewe. The cost savings from reduced frequency of milking would, in most sheep milking enterprises, be much greater than the reduced returns from this small decrease in total milk yield. The increased % protein could offset some of this reduced revenue if payment for milk was based on milk quality.

The 19.4% reduction in milk yield from once-a-day milking starting after the 8th week of lactation was similar to the 14% reduction found by Geenty and Davison (1982) when once-a-day milking started after the 6th week of lactation, but much lower than the 48% reduction in milk yield found by Knight et al (1993) when the ewes were milked once-a-day for the whole lactation. In this latter work the duration of lactation was reduced by 15-16 days but there was no such reduction in the present experiment where the treatment started after the 8th week of lactation.

The failure of machine stripping to increase milk yields was surprising given the positive effects of machine stripping found by Bencini and Knight (1994) using the same flock of Dorset ewes and the same milking routine. The difference in response may be because their experiments were designed as Latin squares with treatments being imposed for one day on each group of ewes, whereas in the present experiment the long term effects were being evaluated. Also the ewes used by Bencini and Knight (1994) when they obtained increases in daily milk yields were at the peak of their lactation, which was not the case in the present experiment.

In conclusion the results from the two experiments indicate milking costs can be reduced by reducing milking frequency and eliminating machine stripping.

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