

## A novel liner design for use in light milking clusters

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### Introduction

Wide bore tapered liners are widely used in Ireland and are fitted in heavy 3-kg clusters. This weight is required in order to minimize penetration of the teats into the liners and maximize milk yield (O'Callaghan and Harrington, 2000). Low levels of liner slips are obtained with these clusters. Light clusters are used with narrow bore liners particularly in the USA. Gleeson and O'Callaghan (2000) have shown that milk yield is reduced with light clusters. In large parlours a light cluster is desirable from an ergonomic standpoint. The objective of the present test was to quantify the effects of a new design of light cluster on milking characteristics compared to those obtained with a conventional heavy 3-kg cluster fitted with wide bore tapered liners.

### Materials and Methods

Twenty cows per treatment were milked in a 2x2 Latin square design with two clusters (3.16 kg and 2.0 kg) and two periods (2 days per period). Cows were randomized across treatments based on milk yield. The liner (Dairymaster 916SL, E.P Harty, Causeway, Co Kerry) that was used in the light cluster was modified mainly at the upper mouthpiece area and the total cluster weight including the stainless shells was 2.0 kg. The claw volume was 150 ml with both clusters and the internal dimensions of the liners used were typical of conventional wide bore tapered liners. In Experiment 1 the milking characteristics of the light cluster without pre-milking preparation were compared to those obtained with the 3.16 kg standard Dairymaster cluster fitted with Dairymaster 916s liners with complete pre-milk preparation. This preparation included pre-milking, washing with warm running water and drying with individual paper towels. In Experiment 2 the comparison was made with both treatments receiving complete pre-milking preparation. The duration of both experiments was four days, each group of cows were milked for two days with each of the two treatments. The system vacuum level for the mid-level milking

plant was set at 49 kPa. Simultaneous pulsation pattern was used for both experiments. Clusters were removed automatically at a milk flow-rate of 0.2 kg/min. Milking time was computed as the time interval from cluster application to when the milk flow reached 0.2kg /min. The milk let-down time was defined as the interval from cluster application to when a milk yield of 1.0 kg was recorded. The data on each element of the milking characteristics was the mean for two morning and mean of two evening recordings. This data were analyzed by analysis of variance with using Genstat (Genstat 5 Release 3.2, 1993).

### Results and Discussion

In Experiment 1 (Table 1) the light cluster gave similar milk yields at AM and PM milkings compared to the standard cluster. The milking time, maximum milk flow rate and both average flow rate and time to 1 kg was significantly longer ( $P<0.001$ ) at AM and PM milkings with the light cluster. These effects are probably due to the differences in pre-milking preparation practices for the two clusters. In Experiment 2 the light cluster gave similar milk yields, average and maximum milk flow rate and milking time to a yield of 1kg at AM and PM milkings compared to the standard 3.16 kg cluster. The fact that the differences in milk yield at AM, PM or for daily milk yield for both experiments is similar indicates that the performance of the light cluster is satisfactory.

### Conclusions

These data suggest that modification in liner shape and characteristics of a wide-bore tapered liner can eliminate the requirement for a heavy cluster when adequate pre-milking preparation is practiced. The milking time was longer with the light cluster when pre-milking preparation was omitted.

### References

- Genstat 5 Committee. 1993. 'Genstat 5 Release 3.2 Reference Manual', Clarendon Press, Oxford, England.  
O'Callaghan, E. J. and Harrington, D. (2000). *Irish Journal of Agricultural and Food Research*. **39**: 383-399.  
Gleeson, D.E and O'Callaghan, E.J. (2000) *Irish Journal of Agricultural and Food Research*. **39**: 3 482.

**Table 1.** Effect of liner design on milking characteristics

		Experiment 1			Experiment 2		
		Cluster weight (kg)		s.e.d	Cluster weight (kg)		s.e.d
		2.0	3.16		2.0	3.16	
Milk yield (kg)	AM	21.1 <sup>a</sup>	20.4 <sup>a</sup>	0.55	19.8 <sup>a</sup>	19.9 <sup>a</sup>	0.2
	PM	12.1 <sup>a</sup>	12.5 <sup>a</sup>	0.17	11.5 <sup>a</sup>	11.6 <sup>a</sup>	0.11
	AM + PM	33.1 <sup>a</sup>	32.9 <sup>a</sup>	0.54	31.3 <sup>a</sup>	31.5 <sup>a</sup>	0.54
Milking time (sec)	AM	540 <sup>a</sup>	516 <sup>b</sup>	7.85	517.5 <sup>a</sup>	487.5 <sup>a</sup>	13.8
	PM	376 <sup>a</sup>	351 <sup>b</sup>	15.1	317.8 <sup>a</sup>	333.2 <sup>b</sup>	3.1
Maximum flow rate (kg/min)	AM	4.3 <sup>a</sup>	4.4 <sup>b</sup>	0.15	4.4 <sup>a</sup>	4.3 <sup>a</sup>	0.03
	PM	4.1 <sup>a</sup>	4.4 <sup>b</sup>	0.12	4.3 <sup>a</sup>	4.2 <sup>a</sup>	0.05
Average flow rate (kg/min)	AM	2.4 <sup>a</sup>	2.5 <sup>b</sup>	0.02	2.4 <sup>a</sup>	2.4 <sup>a</sup>	0.07
	PM	2.0 <sup>a</sup>	2.2 <sup>b</sup>	0.07	2.4 <sup>a</sup>	2.4 <sup>a</sup>	0.01
Time to 1 kg (sec)	AM	44.3 <sup>a</sup>	37.6 <sup>b</sup>	1.18	38.5 <sup>a</sup>	39.1 <sup>a</sup>	0.34
	PM	53.5 <sup>a</sup>	42.9 <sup>b</sup>	1.49	35.9 <sup>a</sup>	38.1 <sup>a</sup>	1.24

<sup>ab</sup> Means, within rows, with a superscript in common do not differ significantly