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Short communication

Once-daily milking of Holstein cows for one-week decreases milk yield by twenty-five percent without any carry-over effect

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Abstract

Short-term (i.e. several days) once-daily milking (ODM) of dairy cows could help to improve work organization or quality of life for dairy farmers. ODM implemented during three periods of one week in the descending phase of lactation led to an average 23.4% decrease in the milk yield of 9 Holstein cows compared to 9 other cows on twice-daily milking (TDM). Short-term ODM significantly increased fat content (by 4.5 g/kg on average) and somatic cell count (by 73,000 cells/mL) and decreased lactose content by 1.9 g/kg. Protein content increased (by 2.1 g/kg) only in the third period. When twice-daily milking was resumed, there were no longer between-group differences in daily yields of milk, fat, protein, and somatic cells.

Keywords: Once-daily milking; Dairy cows; Milk yield; Milk composition; Residual effect

1. Introduction

Once-daily milking (ODM) of dairy cows is relatively common practice in late lactation in New Zealand (see Davis et al., 1999), where calving and drying-off are seasonal. Dairy producers from many countries - mainly those who work alone on their farm - could see short-term (i.e. for several days) ODM as providing two main benefits: i) freeing up more time for other work that is essential to the smooth and successful running of their farm, and ii) making it easier for a neighbouring farmer to cover them for short periods away, i.e. for holidays, during illness, etc. The effects of short-term ODM (up to 2 weeks) on milk secretion have already been studied (see review by Davis et al., 1999), in particular in New Zealand with medium-producing cows in mid-to-late lactation. Milk losses reportedly varied widely (10–40%). Moreover, the carry-over effects of ODM on milk secretion once twice-daily milking (TDM) resumed have been little investigated and data were little consistent, ranging from total lack of recovery (Stelwagen et al, 1997) to complete recovery (Knight and Dewhurst, 1994), probably because of differences in the experimental conditions. Before implementing ODM, dairy producers need to know more precisely, in their conditions of husbandry, the direct and residual effects of this management. In this experiment carried out with Holstein cows in the descending phase lactation, we studied the effect of ODM during one week on milk secretion during the ODM period and after resumption of TDM. The

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experiment involved three sessions of a one-week ODM regime.

2. Material and methods

2.1. Animals and experimental design

The experiment was conducted on the INRA experimental farm at Orcival (1100 m above sea level) between 10 February and 17 August 2003. Eighteen Holstein cows (2 primiparous) were used. At the end of two pre-experimental weeks of identical management (TDM, same feeding), the cows were distributed into two similar groups on the basis of lactation number (3.1 on average), lactation stage (10.9 weeks after calving), milk yield (33.1 kg/d), milk fat and protein contents (37.6 and 29.8 g/kg, respectively), and somatic cell count (SCC: 50,700/mL). One group of cows continued to be milked twice-daily until the end of the experiment (group 2M) whereas the cows in the other group (group 1M) were milked once-daily, in the morning, for three separate 7-day periods: period 1 from 24 February to 2 March, period 2 from 24 to 30 March, and period 3, during the pasture season, from 14 to 20 July. Apart from these weeks, all the cows were milked twice-daily. During the stabling period, the two groups were housed together in the same free stabling with cubicles. They received once-daily, ad libitum, the same mixture of forages (hay and wilted grass silage) and a quantity of a commercial concentrate (5.4 kg DM per cow per day, on average) calculated according to their level of milk production. From 28 April onwards, both groups of cows were turned out to pasture in the same herd and received 3 kg concentrate daily per cow per day. Feed regimen remained identical between the two groups during the 3 periods of ODM. Throughout the experiment, the cows were milked in the same milking parlour fitted with automatic cluster removers and milk meters. During the 3 periods of ODM, the cows of group 1M were separated from cows of group 2M just before the afternoon milking.

2.2. Measurements

Individual milk yield was measured at each milking. For each cow, milk samples were taken at each milking during the three weeks where ODM was implemented and at each milking of two consecutive days in the other weeks. These samples were used for protein, fat and lactose analyses by infrared spectrophotometry (Foss Electric, Hillerod, Denmark) and for somatic cell counts (Fossmatic 5000 automatic counter, Foss Electric, Denmark).

2.3. Statistical analyses

Statistical analysis was carried out using the SAS software package (SAS,1992). Milk yield and composition during the 3 one-week ODM experimental periods (means for days 2 to 7) and the 3 post-experimental periods (means for weeks 2 and 3 following the end of each experimental period) were analyzed according to the following model: Y=Mean+Frequency of milking (1 or 2)+Experimental period (1 to 3)+Frequency of milking * Experimental period interaction+value of the variate measured during the pre-experimental period (covariate). The analysis of somatic cell count was done on logarithmically transformed data.

3. Results

3.1. Milk yield

Milk yield was lower in the 1M group than the 2M group by 8.1 kg/d, 6.7 kg/d and 5.1 kg/d for experimental periods 1, 2 and 3, respectively ($P<0.01$; Fig. 1). When expressed relative to the milk yield of the 2M group, these decreases were similar (24.4%, 22.0% and 23.7%, respectively). Individual decreases in milk yield (kg/d) induced by ODM and calculated for cows of group 1M (daily milk yield in the two weeks preceding the 7-day ODM period — daily milk yield during the 7-day ODM period) were not significantly correlated to the milk yield of the cows for periods 1 ($r=-0.46$) and 3 ($r=-0.11$), and were negatively correlated for period 2 ($r=-0.72$; $n=9$; $P<0.05$). Therefore, the individual relative decreases in milk yield, which varied from 15% to 38% (mean of the 3 periods) between cows, were stronger in lower-producers and weaker in higher-producers ($r=-0.82$, -0.92 and -0.69, for periods 1, 2 and 3, respectively; $P<0.01$ or $P<0.05$). Individual decreases in milk yield

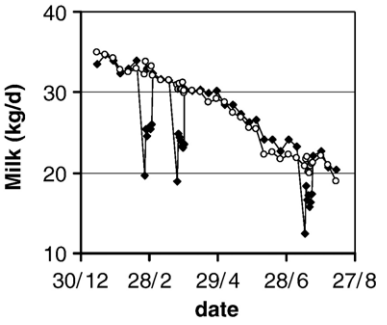

Fig. 1. Milk yield from 1M (♦) and 2M (○) groups during the experiment (daily data for the seven days of each of the three experimental periods, and weekly data for the other weeks).