Effects of Extended Lactation on Milk Production and Milk Cortisol in the First Production Cycle

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Traditionally dairy herds in south-east Australia are managed to calve in spring each year, coinciding with the availability of lush spring pastures. However, fertility problems, which result in problems maintaining a 12-month calving interval, is one of the reasons why less dairy farmers rely only on spring calving. Extended lactation beyond 300 days is already practiced in the dairy industry and may be promoted more widely in the future. This study examines the impact of extended lactation on animal welfare over a 2-year period. Several measures indicative of animal welfare were taken during this time, including behaviour observations (lying, standing and walking), milk cortisol, lameness, white cell count, body condition, as well as traditional production and health records. This paper reports the effects on milk production and milk cortisol in the autumn of the first lactation.

Observations were taken on 'Extended Lactation' cows and 'Control' cows in autumn of the first lactation in 2007. At this time the main difference between the two treatments was that the Control cows were in calf and about 6 months into pregnancy, while the Extended Lactation cows were not in calf. Both groups were part of the same milking herd, receiving the same supplemental feed during milking. Milk samples for cortisol and milk production data were collected for one morning and one afternoon milking during herd testing in autumn of the first lactation.

For both morning and afternoon milking the logarithm of the milk cortisol concentrations of the Extended Lactation cows was compared with the corresponding values of the Control cows using an un-paired t-test. As milk production was more variable in control cows, milk production data were compared using an independent samples un-paired t-test with the Satterthwaite approximation for degrees of freedom. Twenty-five Extended Lactation cows and 25 Control cows were included in each analysis.

Table 1. Milk cortisol concentrations (am and pm) and milk production of Control and Extended Lactation cows in the autumn of the first production cycle

	Transformed			Back-transformed		P value
	Control	Ext. Lactation	sed	Control	Ext. Lactation	
Milk cortisol (am) (ng/ml)	-0.17	-0.30	0.042	0.68	0.50	0.013
Milk cortisol (pm) (ng/ml)	-0.16	-0.30	0.036	0.69	0.49	0.00023
Milk Production (L/day)	10.1	11.9	0.68	-	-	0.012

Milk cortisol concentrations of the Extended Lactation cows were lower than the Control cows for both morning ($P<0.05$) and afternoon ($P<0.001$) milking in the autumn of 2007. Milk production was lower ($P<0.05$) in Control cows compared with the Extended Lactation cows. As the Control cows were 6 months pregnant, competing energy requirements for both milk production and nutrients to the calf may have resulted in a reduction in milk production, despite energy requirements for pregnancy previously being considered negligible before day 190 of pregnancy (Bell et al., 1995). While increased salivary cortisol concentration associated with pregnancy has been reported in humans in the last semester of pregnancy (Nierop et al., 2006), it is not know if a similar effect in cattle is associated with pregnancy in mid-gestation. Another interpretation is that cows from the sixth month of gestation may suffer from mild metabolic stress related to increased energy requirements to sustain both lactation and pregnancy.

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