

Effects of rearrangement of the cows in production groups on milk cortisol concentrations

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Under challenging situations, several systems mainly the hypothalamic-pituitary-adrenal axis (HPA), the autonomic nervous system, and the immune system are recruited to reestablish homeostasis. Whether the measurement of cortisol in dairy cows can be used as a biomarker of adverse environmental or pathophysiological conditions is still under of scientific debate. Cortisol and its metabolites can be measured in integuments and fluids, as hair, urine, feces, and milk, each site of sampling presenting advantages and limitations. For lactating cows, milk can be viewed as the sampling site of first choice, since it could be measured without manipulation of animals; hence, it is completely compatible with animal welfare recommendations. A first aim of the present study was to evaluate physiological variations of milk cortisol and its pulsatility in dairy cows, whilst a second study investigated the effects of rearrangement of the cows in production groups, on milk cortisol concentrations. For the first study, 10 Norwegian Red (NR) cows and 10 Holstein Friesian (HR) cows, lactating and pregnant, were used. Milk was sampled at the morning (6:00 am) and at the afternoon (6:00 pm) milking for 3 consecutive days. In the second study, a total of 35 animals were used: 5 NR and 13 HF cows which were moved from “post partum” group to “high production” group and 10 NR and 7 HF cows which were moved from “high production” group to “low production” group. Milk was sampled at the evening milking (6:00 pm) for 5 consecutive days starting from 2 days before the relocation (day 3). No significant effects in milk cortisol concentrations were observed in trial 1 for time of sampling, day of sampling and breed. In trial 2, for NR cows, the estimated marginal means of milk cortisol were significantly higher in comparison to HF cows ($P < 0.001$). Moreover, milk cortisol concentration increased at days 3, 4 and 5 ($P < 0.05$), showing estimated marginal means significantly higher after the reallocation of the cows. These results, although promising, deserve further investigations to pinpoint that milk can be used in dairy cows to point out short-term stimulation of the HPA axis.

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