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Effect of day length and inhibition of prolactin on the mammary epithelial cell exfoliation process.

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In dairy cows, a long-day photoperiod (LDP) is known to increase milk yield. This increased milk yield is associated with greater concentrations of prolactin (PRL). In contrast, short-day photoperiod (SDP) was shown to increase the rate of mammary epithelial cell (MEC) exfoliation as also observed after an experimentally-induced inhibition of PRL. The aim of this study was to investigate if PRL mediates, at least in part, the effect of photoperiod on the MEC exfoliation process. Eight Holstein dairy cows producing 42 ± 3.7 kg of milk per day were submitted to 4 treatments according to a 4×4 latin square design: 2 day lengths (8 h of light/d for SDP or 16 h of light/d for LDP) for 20 d and to a pharmacological treatment (a single i.m. administration of 5.6 mg of cabergoline, an inhibitor of PRL secretion, or vehicle) on d10. Blood samples were collected before, during, and after milking to measure plasma concentration of PRL. Milk samples were collected for milk MEC purification using an immunomagnetic method. Milk protein mRNA levels were analysed in milk purified MEC by qRT-PCR to evaluate MEC metabolic activity. Data were analysed by analysis of variance using SAS and the effect of photoperiod, cabergoline treatment, and the interaction between photoperiod and cabergoline treatment were tested. Photoperiod had no effect ($P > 0.05$) on PRL secretion, milk yield, MEC exfoliation rate and metabolic activity. It was therefore impossible to draw conclusion regarding the potential role of PRL as a mediator of the effect of photoperiod. Cabergoline induced a decrease in PRL secretion, by decreasing both basal concentration and the surge at milking, and induced a decrease in milk yield ($P < 0.01$). This decrease in milk yield in response to cabergoline was associated with a decrease in the metabolic activity of MEC associated with a down-regulation of the expression of K casein and α -lactalbumin gene. ($P < 0.01$). Cabergoline had no effect on MEC exfoliation rate showing that in the present study, the MEC exfoliation process did not participate in the decrease in milk yield in response to the inhibition of PRL by cabergoline.