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Cabergoline treatment at dry-off accelerated mammary involution as indicated by mammary secretion composition changes in dairy cows.

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In ruminants, the early phase of drying-off is a period of mammary gland involution that is marked by the cessation of prolactin (PRL) release. The speed at which the bovine mammary gland involutes following the abrupt cessation of lactation is directly related to the risk of new intramammary infections.

Objectives

Our aim was to assess the effect of PRL inhibition by cabergoline on the speed of the mammary gland involution, through analysis of the changes of mammary secretion composition.

Materials and methods

Fourteen Holstein dairy cows were injected with a single i.m. administration of 5.6 mg cabergoline (n=7) (Velactis®, Ceva Sante Animale) or placebo (n=7) at the first day of drying-off (D0). Mammary secretion samples were collected using a teat-cannula once during lactation (D-6) and at D1, D2, D3, D4, D8 and D14 after the drying-off. The mammary secretion samples were used for milk fat, lactose, true protein, alpha-lactalbumin and SCC analysis. Mammary biopsy samples were collected one week before drying-off (D-6), at D1 and at D8 and used for RNA extraction and RT-PCR analyses.

Results

As expected, SCC progressively increased whereas lactose content decreased in mammary secretions after drying-off ($P < 0.001$). The increase in SCC was 2.4 fold higher in cabergoline treated cows than in control cows ($P < 0.01$). The decrease of lactose content in mammary secretions progressively decreased during involution and was associated with paralleled change in GLUT-1 mRNA level coding the main glucose transporter in the udder. These decreases were faster in cabergoline treated cows compared to controls with lower lactose content in cabergoline treated cows already by D1 than in controls ($P < 0.05$) and significant decrease in GLUT-1 mRNA levels at D1 and D8 respectively for cabergoline and control treatments compared to D-6 ($P \leq 0.05$). Cabergoline treatment tended to increase fat content at D3 after drying-off ($P < 0.10$). No significant effects of cabergoline treatment were observed both in true protein and in alpha-lactalbumin contents in mammary secretions or in alpha-lactalbumin and kappa-casein mRNA levels in mammary tissues.

Conclusions

The changes in lactose, SCC and fat in mammary secretions and GLUT-1 mRNA level in the udder, indicate that cabergoline treatment was efficient to hasten the mammary gland involution without affecting milk protein synthesis in the mammary tissue. Cabergoline could facilitate dairy management at the time of dry-off.