Cabergoline hastened lactoferrin immunoprotection in the mammary tissue during drying-off in dairy cows

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The early dry period is the time of the highest incidence of new intramammary infection. Lactoferrin is a bacteriostatic protein with the capacity to sequester iron in the secretions of involuting bovine mammary glands. However, the antimicrobial role of lactoferrin is negatively correlated with citrate concentrations in mammary gland secretions. Thus, assessing the citrate to lactoferrin molar ratios throughout the early dry period can indicate the relative immune capabilities of the involuting mammary gland.

The ability of cabergoline treatment at drying-off to accelerate lactoferrin immunoprotection during mammary involution was assessed using 14 late-lactation Holstein dairy cows. Cows were injected with a single i.m. administration of 5.6 mg cabergoline (Velactis®, Ceva Sante Animale, Libourne , France) (n = 7) or placebo (n = 7), just after the last milking before the drying off (D0). Mammary secretion samples, collected during lactation (D-6) and at D1, D2, D3, D4, D8 and D14 after the drying-off, were used for lactoferrin and citrate analysis. Mammary biopsy samples, also were collected at D-6, D1 and D8 and used for lactoferrin immunostaining and localization within the different mammary structures (lumen, epithelium, stroma).

Lactoferrin content progressively increased in mammary secretions during involution. The rise of lactoferrin content in mammary secretions was significant starting at D4 in the cabergoline treated cows ($P \leq 0.05$) whereas it only happened at D8 in controls ($P < 0.05$). Overall, cabergoline treatment increased lactoferrin content of mammary secretions ($P = 0.10$). No effect of cabergoline was observed on citrate concentration ($P = 0.85$). However, the citrate:lactoferrin ratio was lower in cabergoline treated group than in control group on D1 ($P < 0.01$). The total lactoferrin immunostaining in the mammary tissue increased after drying-off ($P < 0.05$). Compared with during lactation, this increase is observed at D1 and D8, respectively for cabergoline treated cows and control cows ($P < 0.05$). The increase in lactoferrin immunostaining is essentially due to an increase in lactoferrin content in the stroma and in the lumen without significant modification in the epithelium.

Our results indicate that cabergoline treatment was efficient to hasten the udder immunoprotection by lactoferrin and therefore facilitates the drying-off.

Key words: cows, drying-off, lactoferrin, cabergoline, mammary defense