Cabergoline accelerated and enhanced the mammary involution during drying-off in dairy cows

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The early phase of drying-off is a period of intense bovine mammary gland involution that is due, in part, to dramatic decline prolactin (PRL) release. The speed at which the bovine mammary gland involutes following the abrupt cessation of lactation is also directly related to the risk of new intramammary infections. Thus, strategies to hasten involution following dry-off could have implications in preventing mastitis and optimizing mammary tissue regenerative processes.

To assess the effect of PRL inhibition on mammary involution speed and rate, 14 Holstein dairy 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 drying-off. Mammary biopsy samples were collected one week before drying-off (D-6), at D1 and D8 and used for zymography analyses to detect the activity of enzymes such as MMP, matrix metalloproteinases involved in the remodelling of mammary tissue during involution. 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 SCC, lactose and zymography analyses. Mammary epithelial cells (MEC) were purified from mammary secretions after centrifugation and immunocytochemical binding.

As expected, SCC 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 ($P < 0.01$). At D1, lactose content was lower in cabergoline treated cows than in control cows ($P < 0.05$). MEC concentration in mammary secretions increased after drying-off ($P < 0.01$). Cabergoline induced an increase in MEC concentration ($P = 0.04$). The activity of MMP9 increased after drying-off in mammary secretions ($P < 0.001$). Cabergoline increased the activity of MMP9 (1.7 fold, $P < 0.05$) in mammary secretions and MMP-2 in mammary tissue after drying-off (1.4 fold, $P \leq 0.01$).

These changes in lactose, SCC, MEC content and MMP activities indicate that cabergoline treatment is efficient to hasten and enhance the mammary gland involution and therefore facilitates the drying-off.

Key word: cows, drying-off, prolactin, cabergoline, mammary involution