Effect of nutrient restriction on mammary cell turnover in lactating dairy cows

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Summary :

The aim of the study was to investigate the effects of nutrient restriction on mammary cell turnover in lactating dairy cows. We used 15 Holstein x Normande crossbred dairy cows, divided into 2 groups submitted to 2 feeding levels. From calving to wk 11 postpartum, the cows were fed a total mixed ration composed either of 55 % maize silage, 15 % alfalfa hay and 30 % concentrate (High-group, N=7) or of 60 % grass silage and 40 % hay (Low-group, N=8). Cows were milked twice daily. Milk yield (MY) and composition were measured. After 11 wk of lactation, cows were slaughtered and mammary glands were removed and weighed. The mammary DNA concentration was measured in order to measure the total amount of DNA in the mammary gland and to estimate the total number of mammary cells. Expression of proteins involved in proliferation and cell death were evaluated on mammary tissue by real-time qPCR, Western Blotting and immunohistochemical staining. Low-group cows had lower 11-week average daily MY from calving to slaughter than High-group cows (20.5 kg/d vs. 34.5, $P<0.001$). At the mammary tissue level, the total number of mammary cells and the size of the mammary acini were lower (-20% $P<0.002$, and – 55 % $P<0.05$, respectively) in the Low- group compared to the High-group. Mammary cell proliferation or apoptosis didn't seem to be modified at the time of slaughtering but a remodelling of the extracellular matrix was observed.

Key Words: mammary cell, nutrient restriction, lactation, dairy cow

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