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The effect of feeding extruded flaxseed as omega-3 source on gene expression in apoptosis pathway in primiparous Saanen goat

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Abstract

In this study, effect of using flaxseed as a source of omega-3 fatty acid on the pattern of expression of genes effective on apoptosis of cells and histological parameters in mammary gland of Saanen primiparous goats was investigated. For this purpose, 30 young female goats, which were in the second half of their first pregnancy, were divided into three groups. One group received a negative control diet without any source of supplemental fat; the second group received saturated supplemental fat (positive control) and the third group received extruded flaxseed as a source of omega-3. Mammary tissue samples were taken from all three groups during 24 to 36 hours after parturition, two months and four months after parturition (two samples, each time for every goat). One sample kept in formalin for histological studies and another one used for gene expression studies after RNA isolation and cDNA preparation. Then, primers were designed for real-time PCR. Histological results indicated that omega-3 supplement can increase the percentage and area of epithelial cells as milk production units of mammary glands. According to the results obtained from gene expression studies, at the time of the first sampling, the gene expression ratio of BCL-2/BAX as an antiapoptotic index, in omega-3 group was higher than the positive control group. In the second sampling, there was no statistically significant difference between the experimental groups. In the third sampling, the expression of BCL-2 gene as an antiapoptotic gene was significantly decreased in the positive control group. These results showed that the use of extruded flaxseed can decrease and saturated supplemental fat can increase apoptosis of mammary gland cells. These results were confirmed by histological observations of mammary glands in this study. In conclusion, to decrease apoptosis of mammary cells and improve milk production potential, using omega-3 sources in late pregnancy and lactation diets of dairy goats is recommended.

Keywords: dairy goat, mammary gland, apoptosis, Omega-3, gene expression