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Effect of Dietary Betaine Supplementation on mRNA Expression and Promoter CpG Methylation of Lipoprotein Lipase Gene in Laying Hens

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In laying hens, dietary betaine supplementation is reported to reduce abdominal fat, however, the mechanism of which remains largely unknown. The present study investigated the effect of dietary betaine supplementation on mRNA expression and the promoter CpG dinucleotide methylation profiles of chicken lipoprotein lipase (LPL) gene. The experiments were carried out with 120 laying hens which were randomly allocated to four diets supplemented with 0, 0.04, 0.06 and 0.08% betaine. The mRNA levels of LPL gene was investigated by using real-time RT-PCR. The CpG methylation profiles at LPL promoter region were analyzed by using bisulfite sequencing method. The results indicated that betaine supplementation at levels of 0.06 and 0.08% tend to decrease LPL mRNA expression in both 165-day-old and 180-day-old hens. In 180-day-old hens, two distinct CpG methylation profiles at the promoter region of chicken LPL gene were revealed: in control and 0.04% betaine groups, in which LPL mRNA expressions in abdominal adipose tissue were higher, CpG methylation occurs mainly at 1^{st} to 8^{th} sites, the remaining sites were less methylated; whereas in 0.06 and 0.08% betaine groups, in which LPL mRNA expressions in abdominal adipose tissue were lower, methylation levels of 1^{st}-8^{th} CpG sites were decreased, while those of the remaining sites increased.

Keywords: betaine, CpG methylation, laying hen, lipoprotein lipase gene, mRNA expression

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