

Digital gene-expression profiling analysis of the cholesterol-lowering effect of alfalfa saponin extract on laying hens

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Background

To avoid cardiovascular disease, people are recommended to have dietary cholesterol intake of less than 300 mg/day. Egg consumption has been seriously reduced because of the high level of cholesterol. Our study is to explore the cholesterol-lowering effect of alfalfa saponin extract (ASE) in yolk and the underlying molecular mechanisms by digital gene-expression profiling analysis. Liver and ovary tissues were isolated from laying hens fed with ASE for RNA sequencing.

Results

The content of cholesterol in yolk derived from 120 mg/kg ASE group obviously declined at day 60. Other groups (60, 240, 480 mg/kg ASE group) also had a decrease, but they didn't get a significant level. Then, digital gene expression generated over nine million reads each sample, producing expression data at least 12,384 genes. Among these genes, 110 genes in liver and 107 genes in ovary showed differential expression. Cholesterol 7 alpha-hydroxylase (*Cyp7a1*) and apolipoprotein H (*ApoH*) in synthesis of bile acid and cholesterol efflux were enhanced in liver with dietary ASE supplementation. Very low density lipoprotein receptor (*Vldlr*), apolipoprotein B (*ApoB*), apovitellenin 1 (*ApovdIII*) and vitellogenin (*VtgI*, *VtgII* and *VtgIII*) in ovary were decreased with dietary ASE supplementation.

Conclusion

The transcriptome analysis revealed that the underlying molecular mechanisms of cholesterol-lowering effect of ASE were partly mediated by enhancement of cholesterol efflux in liver and reduction of cholesterol deposition in ovary.