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Effects of fasting period duration before slaughtering on the physiology of fatty liver in overfed ducks: proteomics and transcriptomics analyses

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The liver is the main organ involved in the regulation of energy balance because of its central role in the control of glycidic and lipidic metabolisms. In birds, the liver is the site of lipid synthesis. In some waterfowl species, it can accumulate a big amount of lipids. The ration intake causes a glycemic increase. The free glucose can be stored as lipids in the liver. On the contrary, during fasting periods, the glucide intake decreases, the energetic balance is drastically modified. The lipogenesis is inhibited. If the fasting period extends lipid oxidation and lipolysis may occur. In overfed waterfowl, a long fasting period causes a decrease in the fatty liver weight and modifies the biochemical characteristics of the liver. The aim of this study is to analyze the effects of the duration of the fasting period on the hepatic metabolism in mule duck. Proteomics analyses with bi-dimensional electrophoresis on soluble proteins and transcriptomics analyses with RT-qPCR on 70 genes were performed on the liver samples to analyze the cell metabolism. Two batches of male mule ducks were bred and over-fed in standard conditions of the production. Two durations between the last meal and the slaughtering were tested: 9h and 15h. The post-genomic analyses performed on the liver samples showed that 9 proteins and 11 genes were over-expressed after 9h of fasting period and that 12 proteins and 8 genes were over-expressed after 15h of fasting period. The results evidenced modifications of hepatic metabolism. At 15h of fasting period, the energy production came from free glucose from the diet whereas at 9h of fasting period the hepatic metabolism corresponded to energy storage into triglycerides with the activation of the lipogenesis. After a long fasting period the oxidative stress and cell protection against apoptosis in hepatocytes are enhanced.

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