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Attenuated mRNA expression of lipid metabolism genes in primary hepatocytes following lipopolysaccharide treatment in dairy cows

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ABSTRACT. The influence of ruminal acidosis on ruminal microbiology and metabolite production has received considerable attention, but little is known regarding the systemic manifestations that arise from ruminal acidosis. Lipopolysaccharide (LPS) is released in the gastrointestinal tract upon ingestion of high-grain or high-fat diets, and it has been implicated in the etiology of multiple energy- and lipid-related metabolic disturbances in ruminants. The liver plays a crucial role in the acute phase response to intruding pathogens. The effect of blood LPS in subacute ruminal acidosis on lipid metabolism in the liver has not been established. In this study, cell cultures were photographed using an inverted microscope. We observed that hepatocytes changed their morphologies from irregular triangle to circular (contraction) shapes; the number of contracted cells increased with the increasing LPS doses. This suggests that LPS can

promote cell contraction and take off the wall, ultimately leading to cell apoptosis. With changes in LPS exposure, hepatocyte number also changes. We explored lipid metabolism in the liver using quantitative reverse transcription-polymerase chain reaction to detect the expression of key lipid metabolism enzymes in hepatocytes. We found that Toll-like receptor 4 signaling pathway mediated by LPS could attenuate mRNA expression of fatty acid synthesis genes and increase the expression of fatty acid transport genes in primary hepatocytes following LPS treatment in dairy cows.

Key words: Dairy cow; Lipid metabolism genes; Lipopolysaccharide; Primary hepatocyte; Toll-like receptor 4 signaling pathway

