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Public perception of livestock production

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Session 4 Theatre 1

Feed stress-induced transcriptomic changes in the liver of Krškopolje pigs reared in the outdoor system

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The study investigated the impact of a low-protein (LP) diet on the liver transcriptome of Krškopolje pigs raised in the outdoor system. The pigs were fed either a standard diet (n=10; 15%, 12.5%, and 10% crude protein (CP) from 20–80, 80–100, and 100 kg to slaughter, respectively) or LP diet (n=10; 15% CP from 20–60, and 10% CP from 60 kg to slaughter) on ad libitum basis. When animals reached 166±13.2 kg, they were slaughtered, RNA was extracted from the liver and sequenced by Illumina NovaSeq generating 150 bp paired-end reads. Differential gene expression analysis highlighted 643 upregulated and 41 downregulated genes. Several upregulated genes in LP group were involved in the regulation of glucose/energy homeostasis and lipid metabolism (e.g., PRKAG3 – an energy sensor protein kinase, PPAR – key regulator of adipocyte differentiation and glucose homeostasis, CPT1B – rate-controlling enzyme of the fatty acid beta-oxidation pathway, FITM1 – binding to triglyceride and diacylglycerol, and hydrolysis of fatty acyl-CoA, APOO – fatty acid transport, PPP1R1A – hormonal regulation of glycogen metabolism, GYS1 – glycogen synthesis), and lipolysis (e.g., LIPE, PNPLA2, LPL, CEL, GPIHBP1). Among the upregulated genes, heat shock proteins (e.g., CRYAB, HSPB1, HSP70.2, DNAJB5) were detected. Analysis of KEGG signaling pathways revealed enrichment of genes involved in glucagon signaling (ssc04922), non-alcoholic fatty liver disease (ssc04932) and thermogenesis (ssc04714). The present study reveals that protein restriction affects the expression of genes involved in adipogenesis, fatty acid oxidation and transport, metabolic syndrome and regulation of energy homeostasis, and suggests potential risks of low protein diets to Krškopolje pig. Acknowledgements: Funding by Developmental Funding Pillar of Agricultural Institute of Slovenia, Slovenian Research and Innovation Agency (P4-0133, P4-0053, J4-3094 and Z4-60178) and project GEroNIMO (EU H2020 GA no. 101000236) are acknowledged. Key words: Krškopolje pig, liver, transcriptome, dietary protein