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SG 07 (P32) - Condensed tannins in lamb diets: effect on the proteome of muscle, hepatic and adipose tissues

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Abstract

Cistus ladanifer L. is a common shrub endemic to the Mediterranean that is highly concentrated in condensed tannins (CT). When present in ruminant diets, these CT can form complexes with dietary protein that resist microbial degradation in the rumen, are dissociated in the abomasum and small intestine where released protein is digested and absorbed. The objective of this study was to evaluate the utilization of CT in the diet of lambs on the proteomes of muscle, hepatic and adipose tissues.

A total of 24 white merino ram lambs were divided in three groups (n=8) fed on different diets: control (16% crude protein - CP), reduced protein (12% CP) and reduced protein (12% CP) treated with CT extract from *Cistus ladanifer L.* (15 g/kd dry matter). They were fed 4% of their live weight during 7 days of adaptation and 5 weeks of experimental period, after which lambs were slaughtered and samples of *longissimus dorsi* muscle, hepatic and peri-renal fatty tissues were taken. A two-way approach was used for tissue proteome characterization: Gel-based and Label-Free. Proteins were extracted and quantified. 2D-electrophoresis was performed for 2D-DIGE (gel-based) approach. Gels were analysed using SameSpots and spot-picked. After tryptic digestion, proteins were identified using MALDI-TOF/TOF and ProteinPilot using MASCOT search engine. For label-free, samples were digested in-gel, peptides extracted and analysed using nanoHPLC-TripleTOF. Protein identification was carried out using Progenesis QIP with MASCOT as search engine. Taxonomy was restricted to *Mammalia*.

A total of 78, 25 and 17 proteins were identified with significant differential abundance for muscle, hepatic and adipose tissues using Label-Free. Gel-based approach resulted in the single identification of 2, 16 and 20 proteins with differential abundance, for the same tissues. Control lambs had greater abundance of structural proteins, such as tropomyosin, normal in animals of greater muscle deposition. These lambs had lower abundance of phosphoglycerate mutase compared to both other groups, which takes part in the breakdown of carbohydrates into pyruvate in the glycolysis pathway. With dietary 12 % CP, including with CT, lambs had greater abundance of iron (Fe) metabolism proteins in the hepatic tissue, such as transferrin, responsible for Fe storage. Lambs with dietary CT had greater abundance of hepatic flavin reductase, which partakes in heme catabolism. In the fatty tissue, control lambs had lower abundance of fatty-acid synthase and higher abundance of aconitate hydratase which participate in long chain fatty-acid and isocitrate synthesis, respectively. Finally, lambs fed with CT inclusion had higher abundance of apoliprotein A1, which is involved in lipid metabolism. In conclusion, dietary protein is the main influencing factor with differences often observed between control and the remaining groups. Moreover, CT inclusion seems to influence specific pathways in lamb tissues, namely in lipid metabolism in fat, mineral metabolism in the liver and carbohydrate metabolism in the muscle.

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