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Nutritional Strategies to Modulate the Ruminal Biohydrogenation and Improve the Fatty Acid Profile of Ruminant Fat – Use of *Cistus ladanifer*

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The consumption of ruminant fat has been associated to detrimental effect on human health, due to their high levels of saturated fatty acids (SFA) and low content of polyunsaturated fatty acids. Which results from lipid metabolism in the rumen, where the dietary lipids are biohydrogenated, producing high amounts of SFA. Ruminal biohydrogenation (RBH) modulation has been target on numerous works to increase the healthy PUFA, such as conjugated linoleic acid isomers (CLA) and vaccenic acid (*t*11-18:1) in ruminant fat. Vaccenic acid is the precursor for endogenous synthesis of the major CLA isomer found in ruminant fat, the rumenic acid (*c*9,*t*11-18:2). Diet supplementation with plants or plant extracts rich in secondary compounds as condensed tannins (CT) has been explored as modulators of RBH. *Cistus ladanifer* L. (rockrose) is a Mediterranean shrub that contain high levels of CT. To explore the *C. ladanifer* use as a way to modify the RBH, two trials were developed. In order to clarify which *C. ladanifer* fraction might modulate the RBH an *in vitro* study was performed, where five *C. ladanifer* fractions – essential oil, dichloromethane extract, total phenolics, non-tannin phenols and CT, were incubated with ruminal fluid for 6 h. Fraction of CT was the most effective on RBH modulation, leading to highest *t*11-18:1 accumulation. The second trial was designed to explore the effect the levels of *C. ladanifer* CT (0, 1.25 and 2.5%) and two ways of CT supply (aerial part vs. CT extract from *C. ladanifer*) on fatty acid profile of lamb meat. Basal diet was composed of dehydrated lucerne with soybean oil (6%). Inclusion of *C. ladanifer* CT extract in diet at level of 1.25% CT led to the highest *t*11-18:1 content in intramuscular fat. However, the increase of *c*9,*t*11-18:2 content in intramuscular fat failed in this diet, which may be due to downregulation of stearoyl-CoA desaturase activity, the enzyme that convert *t*11-18:1 to *c*9,*t*11-18:2. *Cistus ladanifer* CT extract seems to be a promising approach to enhance the nutritional value of ruminant fat, but is essential to ensure the endogenous synthesis of *c*9,*t*11-18:2.

Keywords Ruminal biohydrogenation, *Cistus ladanifer*, condensed tannins, ruminants, fatty acids.

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