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The Effect of Tannin Supplementation on Lamb Ruminal Biohydrogenation

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Abstract

Several feeding resources used for livestock farming in the tropical and sub-tropical areas contain tannins. Tannins are polyphenolics compounds able to bind with proteins and to interfere with ruminal fermentations. Polyunsaturated fatty acids (PUFA) ingested by ruminants are biohydrogenated in the rumen to form saturated fatty acids (SFA). The biohydrogenation of C18:2 n-6 leads to the formation of trans-11 C18:1 and of cis-9 trans-11 C18:2 (CLA) which exert nutraceutical properties in humans. In a preceding in vitro experiment we have found that tannins reduced the activity of ruminal microorganisms and the complete development of biohydrogenation. However, disputes arised whether or not tannins could affect the biohydrogenation in vivo. To assess this hypothesis, 28 lambs (age 45 d) were divided into two groups: 14 lambs received an herbage while the other 14 lambs were fed a barley based concentrate. Within each group, 7 lambs were supplemented with quebracho tannins (6% of diet DM). At slaughter (age 105 d) the ruminal fluid was sampled for fatty acid analysis. Tannins reduced ($p < 0.05$) the production of total iso BCFA (-24%) and increased ($p < 0.05$) the percentages of C18:2 cis-9 trans-11 and of total PUFA (+45% and +29%). There was an interaction diet x tanin supplementation. In particular, Trans-11 C18:1 and the total trans C18:1 were increased by two-folds ($p < 0.01$) and C18:0 and the total SFA were decreased (-50% and -22%, respectively; $p < 0.05$) when tanins were included in the concentrate. This effect was not observed when tanins were added to the herbage. This study shows that tannins reduce the biohydrogenation of PUFA in lamb. According to these results, it is likely that the inclusion of tannins into ruminant feeds could be a useful strategy to improve the healthy properties of meat and milk.

Keywords: Biohydrogenation, fatty acids, in vivo, rumen, tannins