

Effects of Condensed Tannins and Saponins on Ruminal Biohydrogenation of α -linolenic Acid

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The goal of the present study was to determine whether ruminal biohydrogenation (BH) of α -linolenic acid (ALA) is affected by the addition of plant secondary compounds, i.e. tannin and saponin. A Rumen Simulation Technique (Rusitec) experiment with four dietary treatments was conducted including i) grass-clover hay (control); ii) sainfoin (*Onobrychis viciifolia*; a legume containing 8.1 % condensed tannins (CT) in plant dry matter (DM)); iii) control hay supplemented either with CT from *Acacia mearnsii* extract providing the same CT dose, and iv) with *Yucca schidigera* saponin extract equivalent to 1.2 % pure saponins in plant DM. Three percent of linseed oil in diet DM was supplemented. The experimental diets were incubated in four replicates with ruminal fluid/buffer mixture (i.e. incubation fluid) for 10 days. From the last 5 days of incubation the incubation fluid and its effluent as well as feed residues were taken to be analysed for their fatty acid composition and the extent of ALA BH was calculated. After 48 h of incubation, ALA had been biohydrogenated to 65-70 % in all diets, except in the sainfoin diet where the BH proportion reached only 54 % ($P < 0.05$). This was accompanied by a lower nutrient degradation, especially of ether extract, of the sainfoin diet compared with the grass clover diets ($P < 0.05$). Only the CT extract diet affected the fatty acid profile in the fluid effluent. The penultimate BH product, *cis*, and *trans* 18:1, especially vaccenic acid (*trans*-11 18:1), was clearly higher for the CT extract diet than for the other diets ($P < 0.05$) while stearic acid (18:0) as the product of complete BH was lower when supplementing the CT extract. Other intermediates (trienes and dienes) were not significantly different among the treatments. In the feed residues, the dietary treatments showed similar effects as in fluid effluent but less pronounced. In conclusion, certain CT may affect ruminal BH of ALA, although the ways of protection may differ. It is unclear if the lower BH in sainfoin was the result of a protective action of its CT or of a lower digestibility in general. The type of extract used inhibited the terminal step of BH resulting in an increase of vaccenic acid, the substrate for conjugated linoleic acid synthesis in mammary gland and tissue.