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Effect of tropical Plants containing condensed Tannins on Fermentation, Digestibility and Methane Production in Sheep

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Tannins can have adverse or positive effects on ruminants depending on their source and concentration in the diet. *Glyricidia sepium*, *Leucaena leucocephala* and *Manihot esculenta* are tannin-rich plants abundant in humid tropics. In this work a) the effect of increasing doses of *Glyricidia*, *Leucaena* and *Manihot* on fermentation was tested *in vitro* and b) digestibility and methane production were tested in sheep receiving diets rich in *Glyricidia*, *Leucaena* and *Manihot* which contained 39, 75 and 92 g/kg condensed tannins, respectively.

In vitro, these substrates were incubated in fermentors for 24 h alone or mixed with *Dichanthium* spp, a tannin-free forage, so that proportions of tannin-rich forage were 0:100, 25:75, 50:50, 75:25 and 100:0.

All tannin-rich plants reduced methane emissions in a dose-dependent way but volatile fatty acids (VFA) production and thus fermented organic matter decreased too, especially for *Manihot*. In contrast, VFA composition was unchanged. The effect of tannin was more pronounced for *Leucaena* and *Manihot* than for *Glyricidia*, because of a lower tannin concentration in this latter forage, without significant interactions between dose and forage type. The response to increasing doses of tannin-rich plants was linear for most variables. For low to medium tannin doses, the extent of methane decrease was more pronounced than that of VFA, suggesting that moderate abatement in emissions might be achieved with minor negative effects on feed fermentation.

The *in vivo* trial was performed on eight wethers from two breeds (Texel and Blackbelly) in two 4 X 4 Latin square designs. Animals received four diets *ad libitum*: *Dichanthium* hay alone (Con) or combined with pellets made from leaves of *Glyricidia*, *Leucaena* or *Manihot* with on average 44% pellets in the diet. Dry matter intake increased in mixed diets ($P < 0.01$) and was lower ($P = 0.04$) with Texel than with Blackbelly.

Organic matter digestibility did not change among diets and genotypes. Methane production per kg DM intake was higher with Con than with tannin-rich diets ($P < 0.01$) and in Texel than in Blackbelly ($P = 0.03$). As for *in vitro*, effect of *Glyricidia* was lower than that of *Leucaena* and *Manihot*, certainly due to a lower tannin content. Methanogens and protozoal numbers were unchanged. Decreased retention time of feed in the rumen with pelleted diets may partially explain reduction in methane production.

Condensed tannins showed *in vitro* and *in vivo* potential to mitigate CH₄ production in ruminants, without noticeable adverse effects on ruminal fermentation and digestibility.

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