Dose-response effect of prairie acacia condensed tannins on ruminal methanogenesis: Structure-activity relationships

Plant Sciences

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Background

Interactions between rumen microbes and the ruminant host are mediated in part by chemical constituents of the host diet.

Understanding how phytochemicals affect ruminant-microbe interactions may result in the use of **novel** forages to improve productivity and reduce production of the greenhouse gas methane.

Prairie acacia (PA) is a rangeland forage legume that produces a moderate amount of biologically active proanthocyanidins.

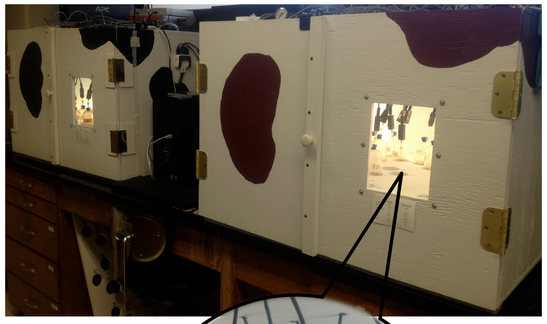
Objectives

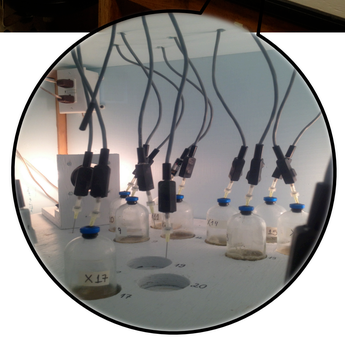
1. Evaluate the dose-response effect of replacing alfalfa hay with PA at levels of 0, 25, 50 and 100% on ruminal CH_4 suppression.
2. Identify the subunit composition of PA proanthocyanidins and elucidate the structure-activity relationship between PA proanthocyanidins and ruminal CH_4 suppression.

Materials & Methods

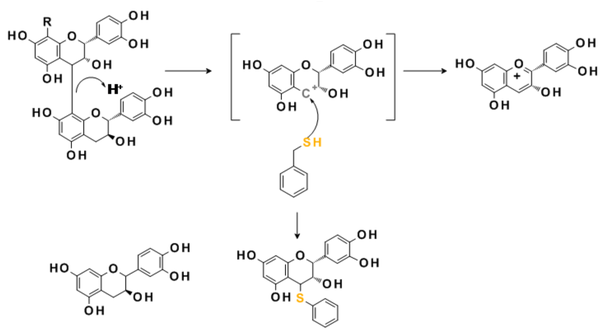
Acacia angustissima* var. *hirta

***In vitro* Gas Production**



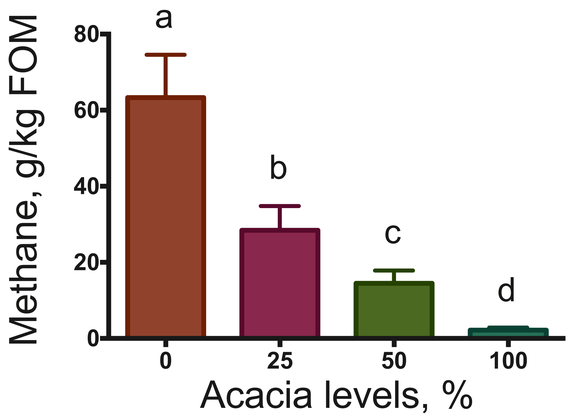


Thiolysis

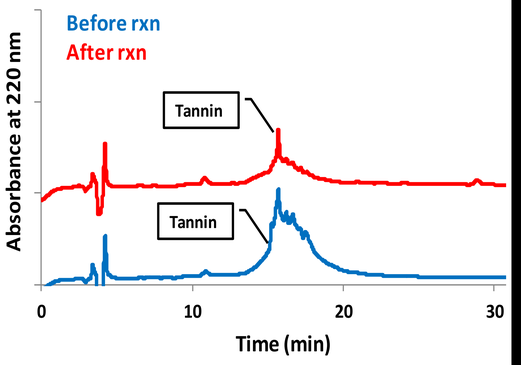


Results

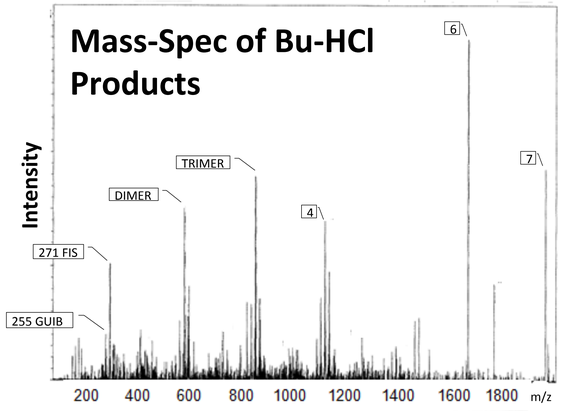
Dose-response effect of PA on CH_4



Thiolysis Products

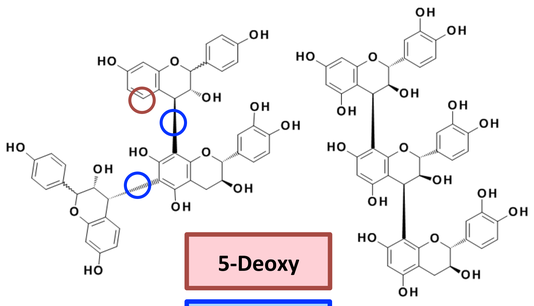


Mass-Spec of Bu-HCl Products



GUIBOURTINIDIN = 5-deoxy proanthocyanidin

Structural Features



Conclusions

1. There is a negative linear relationship between PA inclusion in the diet and *in vitro* ruminal CH_4.
2. PA produces 5-deoxy proanthocyanidins.
3. 5-deoxy proanthocyanidins demonstrate reduced interflavan bond reactivity and increased resistance to degradation, which may lead to prolonged activity in the ruminant gastrointestinal tract and inhibition of CH_4 producing microbes.