Title: *(Use Normal style (Times New Roman 12). Only capitalise the first letter of the first word. No full stop at the end of the title)*

Influence of chestnut tannins on in vitro crude protein rumen degradability kinetics of red clover silage

Summary: *(Your summary (Times New Roman 10) must use Body text style and must not be longer than this box)*

Take home Message Chestnut tannins in red clover silage reduce rumen dry matter and crude protein degradation. Adding tannins to silage could lead to better nitrogen use efficiency in ruminants.

Introduction In a context of environmental concern and feed cost reduction, the efficiency of inputs (especially feed) is a key point of farmers' strategies. In Western Europe's dairy sector, protein is one of the most expensive nutrients and therefore essential in the pursuit of efficiency. A way to improve nitrogen use efficiency may be a reduction of proteolysis in the rumen and an increased ratio of undegraded bypass proteins. This study aims at assessing the capacity of chestnut tannins to reduce nitrogen degradation in the rumen in vitro.

Material and methods Our experiment compared degradation of dry matter (DM) and crude protein (CP) from red clover laboratory-scale silages made without additive, with commercial acid (Sil70, Timac Agro) or chestnut tannins (0,08% MS, Silva Team). Oven-dried and ground silages were put in nylon bags (porosity 50µm; 3 to 6g per bag according to incubation time) immerged in jars containing rumen juice mixed with buffer and artificial saliva (Daisy I system, Ankom). For each time step (0; 0,5; 1; 3; 6; 12; 24; 72h) and additive, three replicates were immersed in rumen juice then washed in cold water after incubation time and wringed out. Sample at t0 was just washed and wringed out without incubation. Nylon bags were then oven-dried at 60°C and the residue was weighted before to be analyzed for CP content by NIR spectroscopy. Relative loss results are expressed as a ratio of remaining quantity in the bag after t0 wash. Results were then processed through the equation of Orskov & McDonald (1979). A general linear model was used to compare relative losses and degradation rates.

Results & Discussion Regarding in vitro DM disappearance, both additives reduced silage DM degradability from 0.5 to 72h of incubation compared to the control silage (Figure 1; $P < 0,05$). After 72h, acid and tannin silages were respectively 20 and 25% less degraded than control. Tannin was even more efficient than acid for the first 12h ($P < 0,05$). CP degradation was slower and reached a plateau later for the tannin silage than for the other silages (Figure 2 ; $P < 0,05$ from 3 to 48h). Chestnut tannin was the only additive to reduce CP degradation rate ($P < 0,05$). Contrary to acid, tannins were thus able to reduce both DM and CP degradation in the rumen from the beginning and until at least 48h. According to several authors (Piluzza et al., 2014), tannins form complexes with proteins making them less susceptible to lysis. This complex is thought to dissociate at low or high pH (Jones & Mangan, 1977), which can occur in the abomasum or in the duodenum and allow a higher absorption of proteins in the intestine.

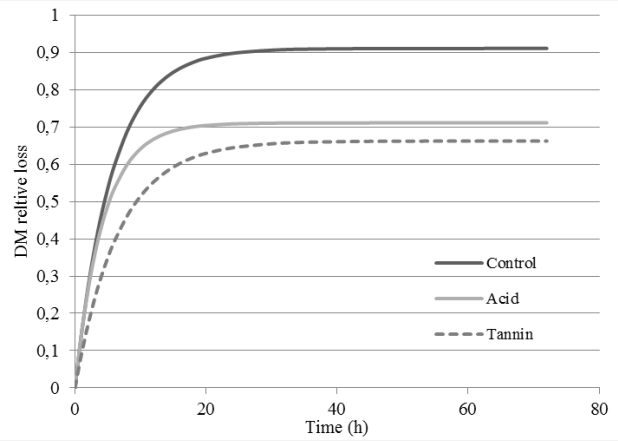

Figure 1 Dry matter relative loss from 0 to 72h

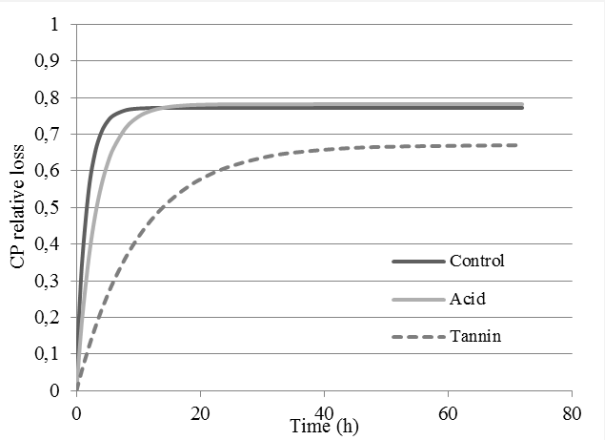

Figure 2 Crude protein relative loss from 0 to 72h

Conclusion

Our experiment showed the potential of chestnut tannins to decrease CP degradation in the rumen probably because tannin-protein complexes protected these molecules from lysis. By allowing more proteins to reach the intestine, chestnut tannins could improve feed nitrogen use efficiency in ruminants.

References

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Piluzza, G., Sulas, L., Bullitta, S., 2014. Grass and Forage Science, 69, 32–48.

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