Innovative silage additives to reduce proteolysis in the silo

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Objective :

To compare the effects of seven silage additives on pH and NH_3 content of grass silage. The goal is to identify additives able to reduce N losses in silo and potentially effective at improving N efficiency in the rumen.

Methods

Vegetal material: Italian ryegrass first cut, pre-wilted 2 days

Experimental factors:

- N fertilization rate : 0 – 30 – 60 – 60 Sulfammo – 180 kg $N.ha^{-1}$
- Silage additives : + negative control in both experiments

Exp 1
- Sil70 (commercial acid, 3.5g kg^{-1} FM) = positive control
- chestnut tannin (0.8g kg^{-1} DM)
- oak tannin (10g kg^{-1} DM)
- thymol and carvacrol (26 and 21mg kg^{-1} FM) = essential oils
- zeolite (20g kg^{-1} FM)
- bentonite (10g kg^{-1} FM)

Exp 2
- erythritol (60g kg^{-1} DM)
- lignosulfonates (20g kg^{-1} DM)

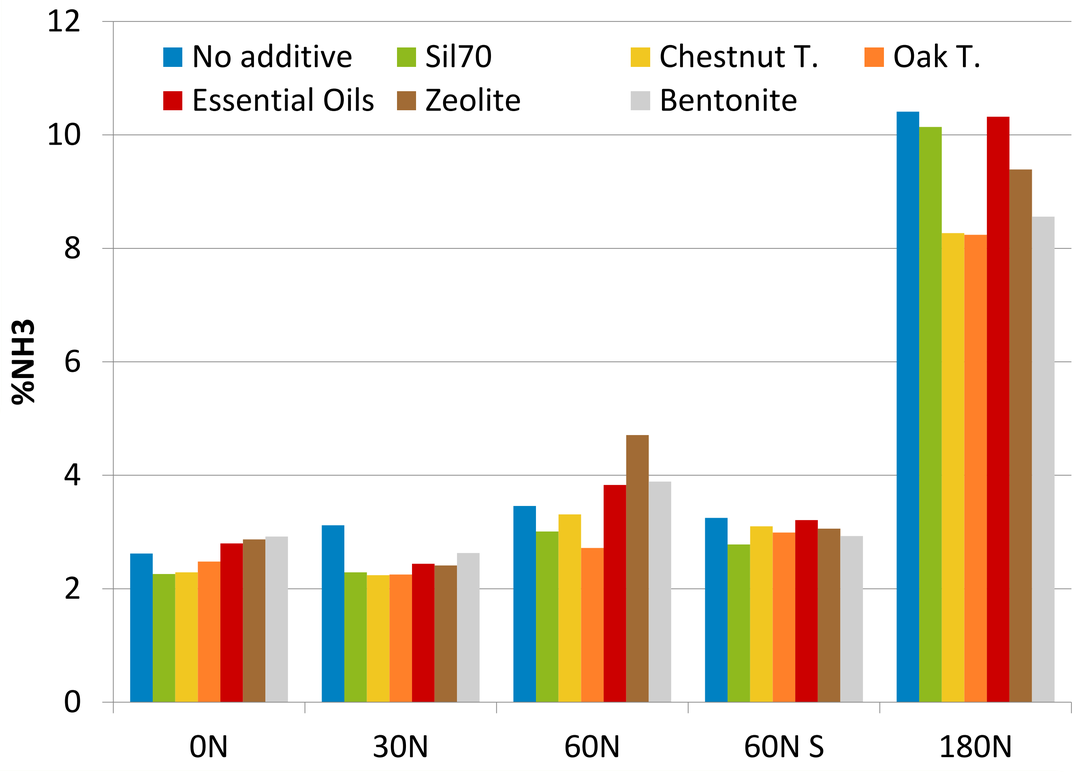
] = reducing sugars

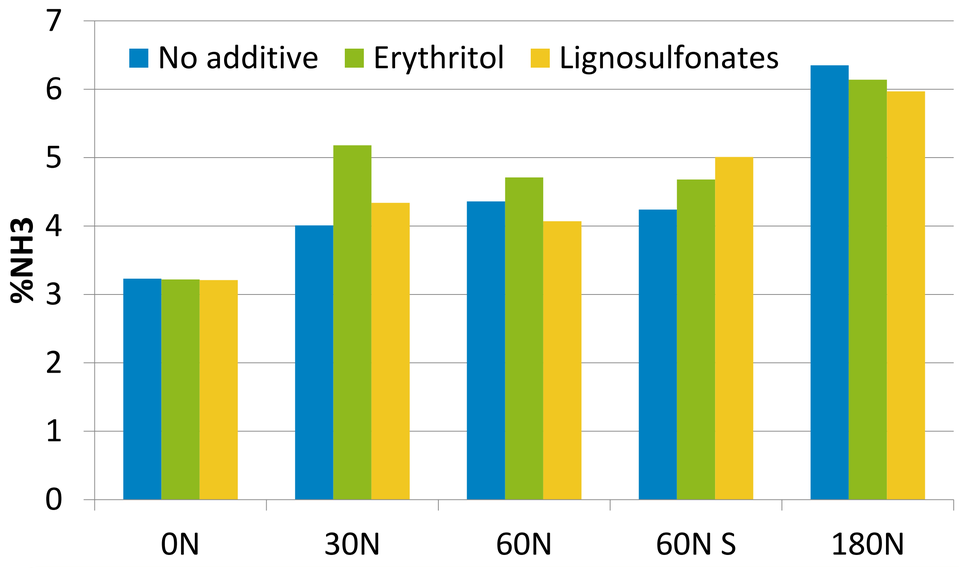
Ensiling method: Vacuum-sealed bags filled with 1kg fresh grass, stored at room temperature (Exp 1) or 40°C (Exp 2).

Each combination of factors was repeated 3 times.

Results

- In both experiments, no effect of fertilization or additives on pH (4.52±0.16 (1) and 4.64±0.48 (2)).
- In Exp 1, fertilization increased NH_3 content as we could expect (*P<0.001*). Both tannins resulted in less NH_3 than negative control and NH_3 content of oak tannin silage is even lower than positive control (*P<0.001*). Significant interaction (*P<0.01*).





- In Exp 2, nitrogen fertilization increased NH_3 content (*P<0.001*). However, reducing sugars were not effective at reducing $\%NH_3$ of silages *(P=0.524).* No interaction.

Conclusions

Two additives (chestnut and oak tannins) appeared promising for reducing NH_3 content in silage suggesting a reduction of proteolysis during fermentation. This could be explained by the formation of tannin-protein complexes protecting proteins from enzymes but soluble in low pH.

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