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 NH₃ 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**
- S70 (commercial acid, 3.5g kg⁻¹ FM) = 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
- bentonite (10g kg⁻¹ FM)
- erythritol (60g kg⁻¹ DM)
- lignosulfonates (20g kg⁻¹ DM)

**Exp 2**

**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 NH₃ content as we could expect (P<0.001). Both tannins resulted in less NH₃ than negative control and NH₃ content of oak tannin silage is even lower than positive control (P<0.001). Significant interaction (P<0.01).

**Conclusions**
Two additives (chestnut and oak tannins) appeared promising for reducing NH₃ 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.

- In Exp 2, nitrogen fertilization increased NH₃ content (P<0.001). However, reducing sugars were not effective at reducing %NH₃ of silages (P=0.524). No interaction.