

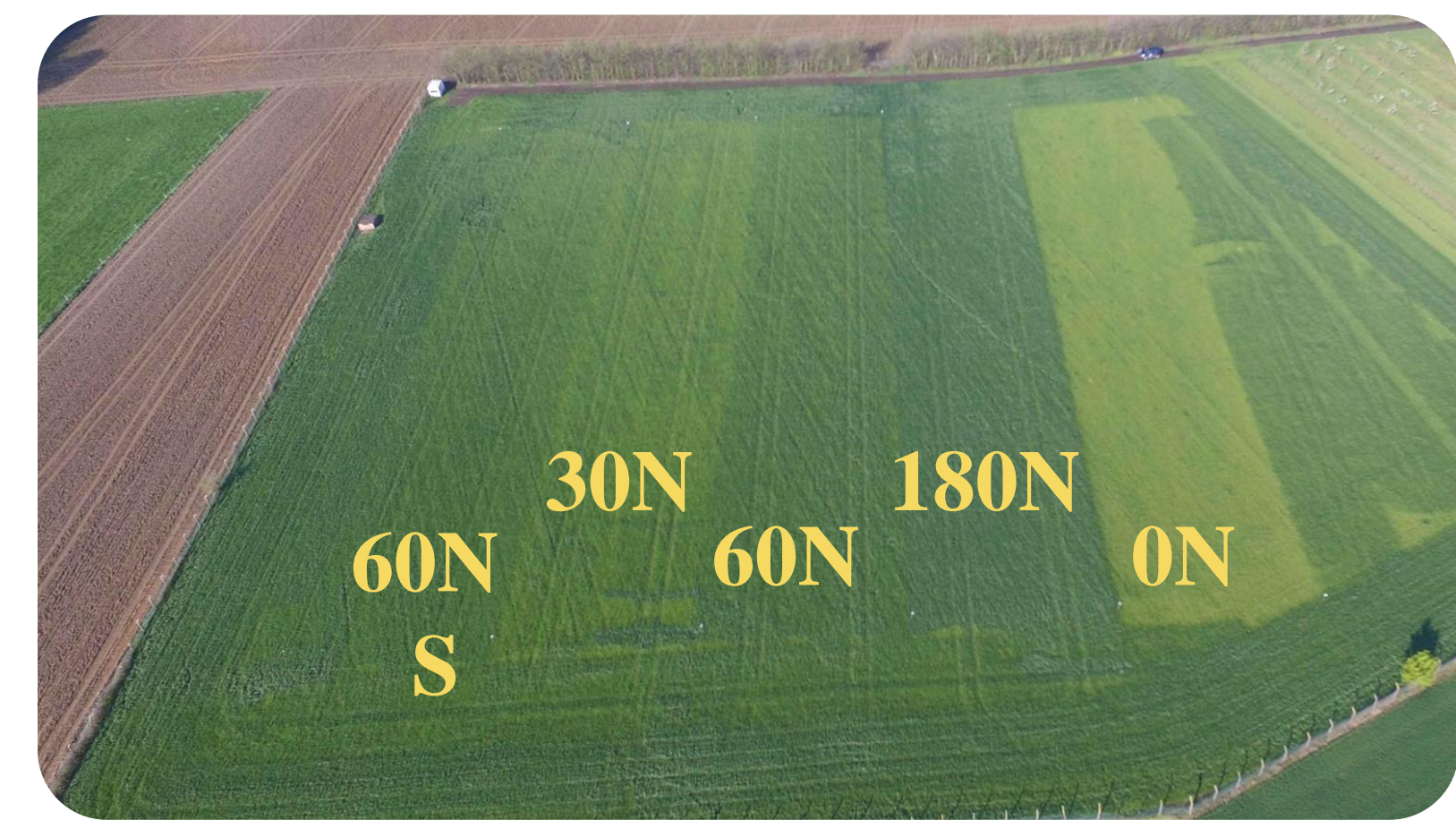
Innovative silage additives to reduce proteolysis in the silo

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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

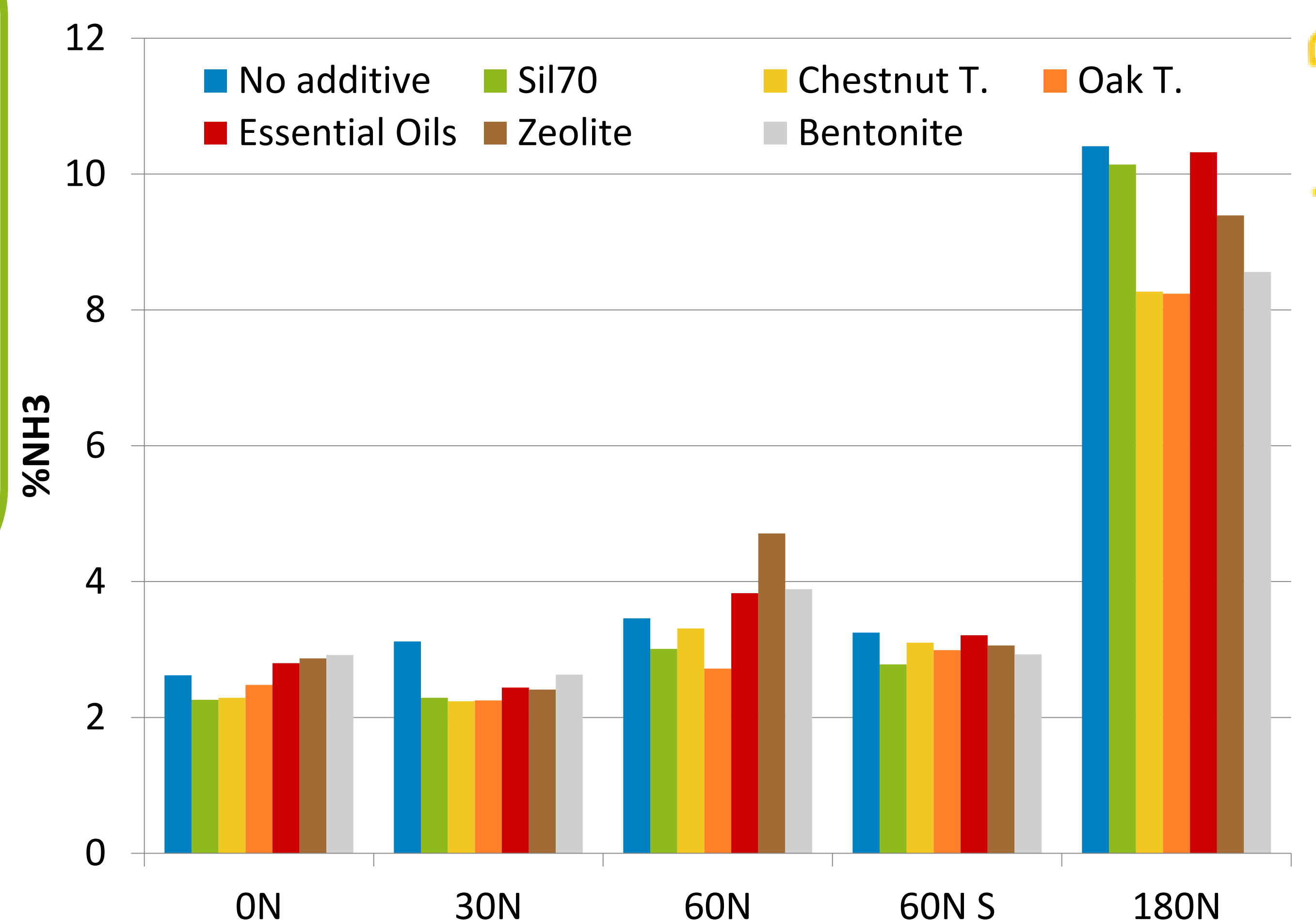
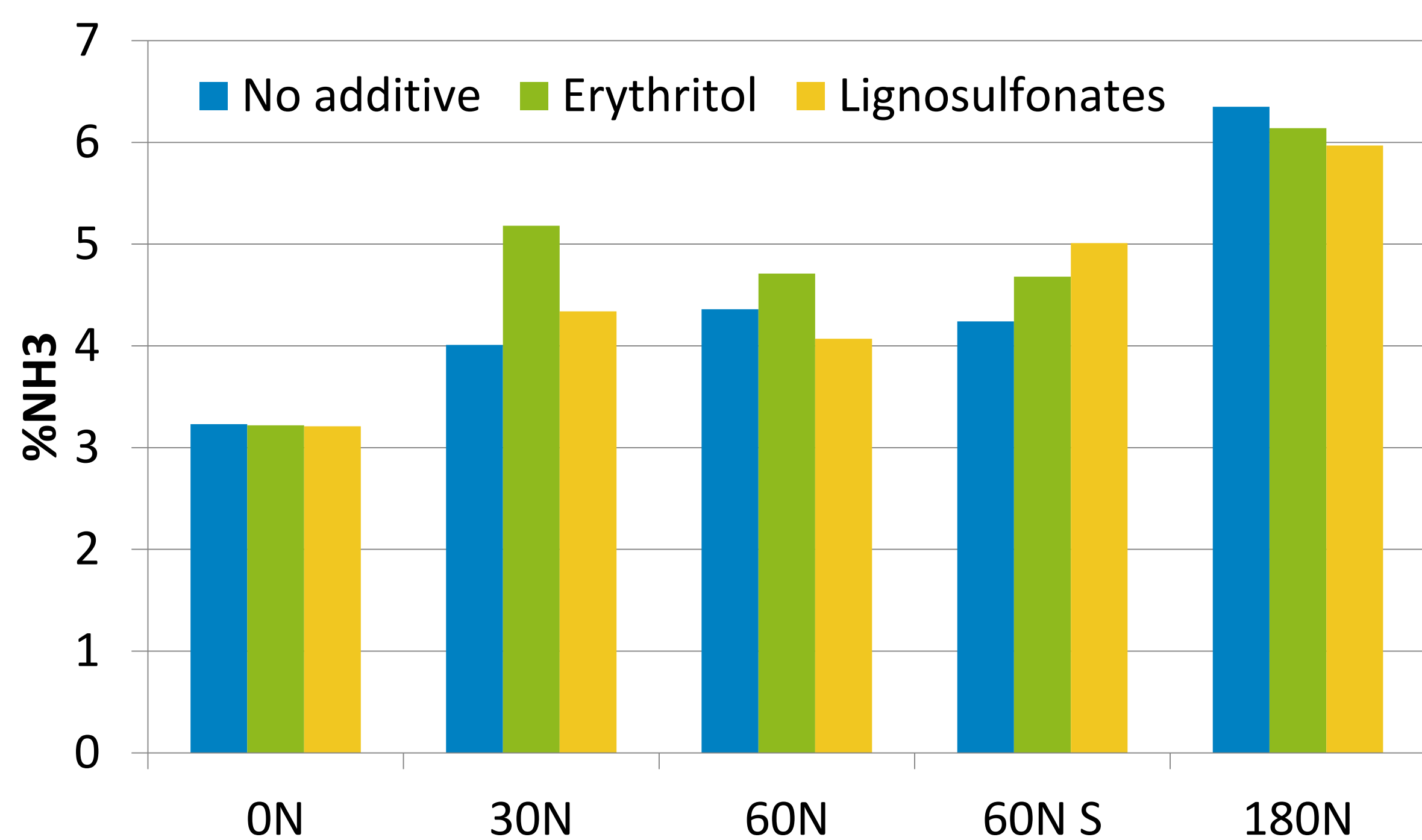
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|--------------|---|---|
| Exp 1 | } | Sil70 (commercial acid, 3.5g kg ⁻¹ FM) = positive control |
| | | chestnut tannin (0.8g kg ⁻¹ DM) |
| | | oak tannin (10g kg ⁻¹ DM) |
| | | thymol and carvacrol (26 and 21mg kg ⁻¹ FM) = essential oils |
| | | zeolite (20g kg ⁻¹ FM) |
| 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 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 ($P < 0.01$).



- 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.

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.