Comparison of two laboratory-scale ensiling methods to assess effect of reducing sugars

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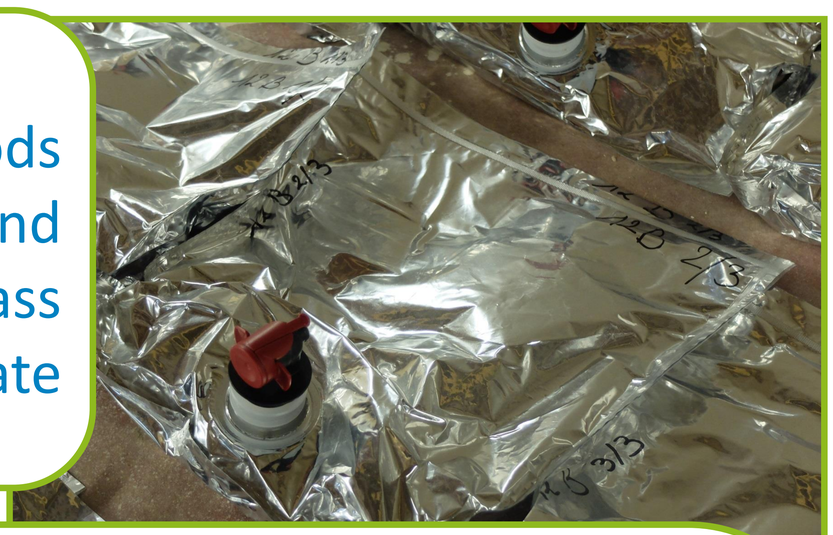
Objective :

To compare the suitability of two micro-silo methods to assess the effects of reducing sugars (erythritol and lignosulfonates) on pH and NH_3 content of grass silage. The goal is to naturally or artificially recreate the heating phase arising from respiration.



Methods

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

Experimental factors:

- N fertilization rate : 0 vs. 180 kg N ha^{-1}
- Silage additive : no additive
  erythritol (6% of dry matter)
  lignosulfonates (2% of dry matter)
- Ensiling methods :

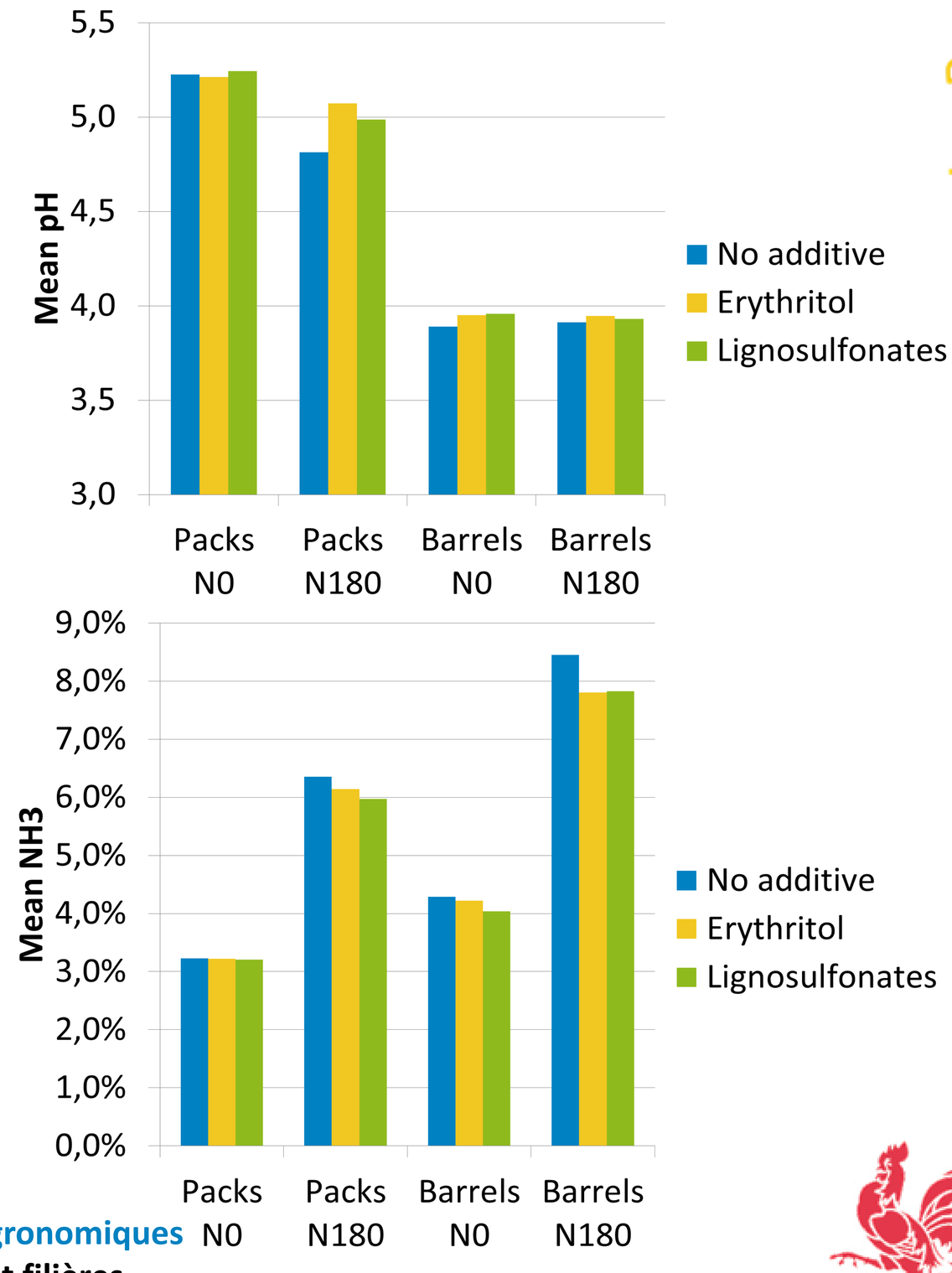
Barrels (self-heating)	*Packs (artificially heated)*
200l capacity -> ±60kg fresh grass	10l capacity -> 1kg fresh grass
Insulated and stored at 25°C	Stored at 40°C
Compaction with 350kg	Under vacuum

Each combination of factors is repeated 3 times

Results (n=36)

All 3 factors have a significant impact on pH and/or NH_3 content (% of total N).

- Barrels showed a lower pH (P<0.001) and higher NH_3 content (P<0.05) than packs;
- Fertilization increased NH_3 content (P<0.001);
- Silages with reducing sugars showed a higher pH than the control silage (P<0.01);
- Lignosulfonates treatment is the only one leading to a drop in NH_3 content (P<0.05);
- We found no interaction between additives and fertilization or ensiling method.



Conclusions

The absence of interaction between ensiling methods and the other factors suggests that trends resulting from additives could be comparable between ensiling methods, although both pH and NH_3 absolute values are different.

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