Silage of sweet sorghum residues for animal production

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Introduction

- Sweet sorghum (e.g. *Sorghum bicolor* ICRISAT 615, Fig. 1) is demanded by the Colombian industry for paper production.
- Leaves and panicles are left over and can be used for animal feeding.
- Ensiling might present a suitable conservation option.

Fig. 1 Sweet sorghum

Objective

The objective of this study was to assess silage quality sweet sorghum residues under controlled and simulated field conditions using molasses and lactic acid bacteria inoculum as silage additives.

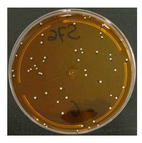

Fig. 2 Colonies of *Lactobacillus sp.*

Material and methods

- **Field**: Sorghum was harvested at milk-ripe stage (90 d). Leaves and panicles were mixed.
- **Ensiling**: Four treatments were applied to the chopped forage, including 2 additives and 2 types of packaging (Table 1, Fig. 3, 4). Silages were stored for 30 d at ambient temperature.

Table 1: Ensiling treatments

Package / Additive	Vacuum sealer bags	Plastic bags closed with rubber strap
Molasses (3.3 % of FM)	T1 Co	T1 Fi
Molasses + L. plantarum	T2 Co	T2 Fi

Fig. 3 Vacuum sealer bags

Fig. 4 Plastic bags in double layer

- **Analysis**: Silages were evaluated for their smell, colour and texture, and analysed for dry matter, pH (Fig. 5), NH_3-N of total N, butyric, acetic and lactic acid, and for aerobic stability, exposing them to air for 7 d (Fig. 7, 8).
- **Cattle:** To get a first idea of the spontaneous acceptance of the silages by animals, they were offered to 6 cattle for 20 min each.

Fig. 5 pH determination

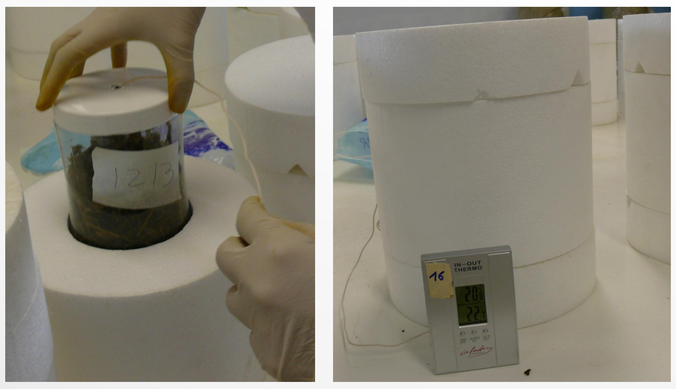

Fig. 7 & 8 Assessing aerobic stability by monitoring temperature

Results and discussion

- At opening, the silages appeared well preserved. Silage dry matter (DM) ranged between 320 and 350 g/kg FM.
- The pH was significantly lower in the Co than in the Fi silages (pH 3.7 vs. 4.2).
- Same applied for acetic acid contents (Fig. 9), explained by oxygen favoring the facultatively heterolactic pathway in Fi.
- Although there was no butyric acid smell detected by sensory evaluation, the content was relatively high by HPLC analysis.
- Proteolysis as indicated by ammonia nitrogen remained within an acceptable range. Treatments did not differ (P≥0.05).

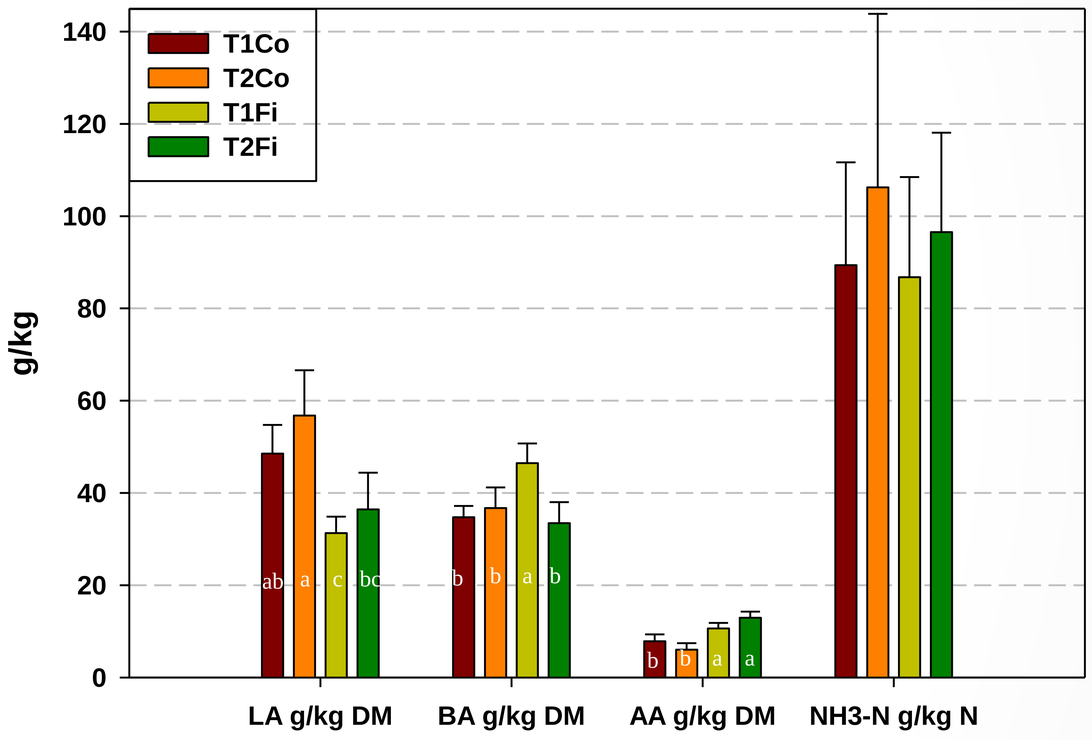

Fig. 9 Fermentation products in different silage treatments
LA lactic acid; BA butyric acid; AA acetic acid

- After 7 d of aerobic conditions, all silages had temperatures > 3 ºC above ambient temperature indicating spoiling. Except for T2Fi, all treatments showed traces of yeasts, but no mould growth. The pH had augmented in all treatments, yet least in T2Fi.
- Cattle showed a spontaneous favour for the Fi packed silages.

Fig. 10 Cattle feeding on sorghum residue silage

Conclusions

- Although the wet chemistry data indicated a clostridia contamination (butyric acid), this was not obvious to the human or animal.
- No clear recommendation towards the single or combined silage additive could be concluded.
- In awareness of rapid aerobic deterioration of sorghum silages, silo size should be carefully dimensioned according to daily feed needs.