

Chemical composition of forage sorghum silage treated with *Lentilactobacillus buchneri* or organic acids

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Introduction

- ✓ Sorghum silage is the second most widely used silage in Brazil, following corn silage;
- ✓ The availability of substrates for spoilage microorganisms, combined with limited production of inhibitory compounds, worsens this issue;
- ✓ Chemical and microbial additives have proven effective in improving fermentation, and enhancing aerobic stability in sorghum silage;
- ✓ We hypothesize that combining chemical and microbial additives can enhance organic acid production and improve nutrient preservation in sorghum silage.

(Arriola et al. 2021)

Objectives

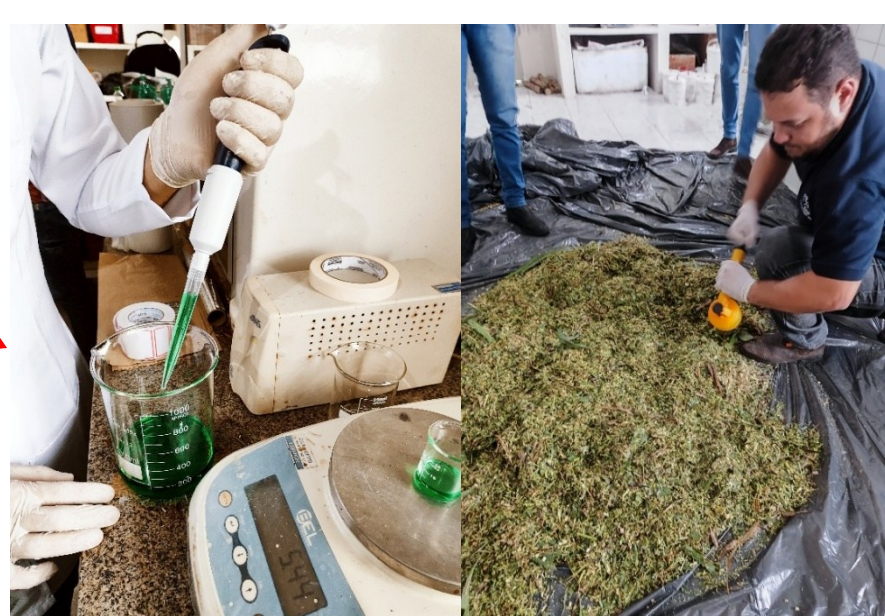
- ✓ This study aimed to evaluate the effects of these additives, either individually and in combination, on nutrient composition of forage sorghum silage.

Materials and Methods

- ✓ The experiment was conducted in the Federal University of Paraíba, Areia, Paraíba, Brazil;
- ✓ Sorghum BRS Ponta Negra was harvested 100 days after sowing. After, it was chopped into a 1.5 cm particle size, treated with chemical and inoculant additives, and packed in 7.5-L plastic buckets.



Sorghum crops:
BRS Ponta Negra



Additives:
CTRL; LB; FCUT; LB+FCUT;
FCUT1



Storage lengths:
15d; 30d; 90d

- ✓ A completely randomized design was adopted in a 3 × 5 factorial arrangement, with three storage lengths (SL): 15, 30, and 90 days, and five additives (AD), with five replicates per treatment;
- ✓ Control (CTRL), *Lentilactobacillus buchneri* (LB), the chemical additive FreshCUT Plus at a dose of 0.5 kg/t of fresh matter (FCUT), a combination of LB and FCUT (LB+FCUT), and FCUT at a dose of 1 kg/t of fresh matter (FCUT1);
- ✓ The samples were partially dried in a forced-air oven (55°C for 72 h), ground in a knife mill with a 1 mm sieve and analyzed for dry matter (DM), organic matter (OM), crude protein (CP), and neutral detergent fiber (NDF);
- ✓ Data were analyzed using ANOVA based on the 3 × 5 factorial arrangement (three SL, five AD, and five replicates). When significant effects of SL, AD, or SL × AD interaction were detected, means were compared by Tukey's test ($\alpha = 0.05$).

Results

- ✓ An interaction between SL × AD ($P = 0.001$) was observed for DM concentration;
- ✓ At 15 and 30 days after ensiling, silage treated with LB had greater DM concentration compared to the other treatments;
- ✓ However, silage treated with LB+FCUT had greater DM content than LB and FCUT1 at 90 d (Table 1).
- ✓ An interaction was observed for OM concentration ($P = 0.001$);
- ✓ An interaction was observed for CP concentration ($P = 0.001$), were at 15d was greater for LB than CTRL, FCUT, LB+FCUT;
- ✓ Regarding the interaction observed for NDF concentration ($P = 0.001$), no differences were observed at 15 and 90 d, regardless of the additive used;
- ✓ However, at 30 d, the CTRL had greater NDF concentration compared to the other treatments.

Results

Table 1. Interaction effect between storage length (SL) and additive (AD) on the nutrient composition of forage sorghum silage treated with chemical or microbial additives, alone or in combination at three storage lengths (15d, 30d, and 90d).

SL	Additive ¹					<i>P</i> -value ³
	CTRL	LB	FCUT	LB+FCUT	FCUT1	
Dry matter (g/kg, as fed)						0.001
15d	225.7 Cb	254.2 Ab	237.3 BCa	242.7 ABa	234.0 BCb	
30d	243.4 Ca	254.2 Aa	247.2 BCa	248.1 BCa	261.9 ABa	
90d	238.6 ABCab	224.1 Cc	241.4 ABa	244.9 Aa	229.1 Bcb	
Organic matter (g/kg DM ²)						0.004
15d	949.2 Aa	949.8 Aab	949.6 Aa	944.6 Ba	949.2 Aab	
30d	945.0 Cb	952.2 Aa	949.6 ABa	946.1 BCa	950.9 Aa	
90d	948.8 Aa	948.0 Ab	939.4 Bb	948.0 Aa	946.3 Ab	
Crude protein (g/kg DM)						0.001
15d	57.1 Da	71.2 Aa	57.3 CDa	62.8 BCb	67.7 ABa	
30d	56.3 Ba	72.1 Aa	58.1 Ba	69.5 Aa	68.4 Aa	
90d	58.7 BCa	59.2 BCb	55.4 Ca	65.1 Aab	64.1 ABa	
Neutral detergent fiber (g/kg DM)						0.001
15d	629.4 Ab	606.6 Ab	636.6 Aa	621.0 Aa	645.0 Aa	
30d	713.4 Aa	628.4 Bab	630.3 Ba	614.7 Ba	590.5 Ba	
90d	640.2 Ab	674.9 Aa	633.5 Aa	622.3 Aa	645.7 Aa	

¹CTRL: control (no additive); LB: Magniva Steel™ (*Lentilactobacillus buchneri* NCIMB 40788-Lallemand®, Brazil); FCUT: 0.5 kg Fresh Cut Plus™ (Kemin®, Brazil) per ton of fresh matter; LB+FCUT: combination of LB and FCUT; FCUT1: 1 kg Fresh Cut Plus™ per ton of fresh matter; ²DM: dry matter; ³Different letters within a row with uppercase and within a column with lowercase are significantly different (Tukey test, $\alpha = 0.05$).

Conclusions

- ✓ The use of chemical or microbial additives, either individually or in combination, improves the quality of forage sorghum silage and contributes to optimizing nutrient preservation.

Acknowledgements

- ✓ The authors acknowledge to CNPq, CAPES, FAPESQ, and INCT-CA for financial support.

References

- ✓ Arriola, K. G., Oliveira, A. S., Jiang, Y., Kim, D., Silva, H. M., Kim, S. C., & Adesogan, A. T. (2021). Meta-analysis of effects of inoculation with *Lactobacillus buchneri*, with or without other bacteria, on silage fermentation, aerobic stability, and performance of dairy cows. *Journal of Dairy Science*, 104(7), 7653-7670.