

Relative losses of Pioneiro grass (*Pennisetum purpureum* Schumach) silage with addition of whole plant maize or maize grain during fermentation

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Introduction

Among the forages with potential to be ensiled, tropical forages stand out because of their high yield capacity, being able to produce three times more dry matter than for maize under tropical conditions. Although tropical forages are an interesting alternative for ensilage, their high moisture content may impair the fermentation process, reducing the silage quality. The addition of whole plant maize and maize grain to other grass silages can be an efficient way to reduce the losses involved during the process, specially due to the improvement of the fermentative profile of the silages (Stefanie *et al.* 2000; Anaya-Ortega *et al.* 2009).

This study aimed to analyze the relative losses from the fermentation of Pioneiro grass silages added or not with whole plant maize and grain maize besides the whole plant maize silage

Methods

This research was carried out at the Federal University of Paraná, Palotina Campus, Palotina, Brazil. The materials under study were the Pioneiro grass (*Pennisetum purpureum* Schumach) and Maize. All plants were chopped to 20mm particles and placed into PVC experimental silos under 600 kg of fresh mass/m³. The silos were provided with upper Bunsen valves to escape of gases and bottom valves to effluent drainage. A completely randomized design within a split plot scheme was used, with ensilage processes as main plots and times of evaluation as subplots, with eight replicates. Four ensilage treatments were used (Pioneiro grass 100%; Pioneiro grass 90% + Whole plant maize 10%; Pioneiro grass 98% + Maize grain 2%; Whole plant maize 100%) and twelve periods of fermentation (0, 1, 2, 3, 4, 5, 6, 7, 14, 21, 28 and 35 days). The addition of whole plant maize and maize grain to the treatments was set on the fresh mass basis. In each one of the twelve periods of evaluation, the effluent harvested was discounted from the weight of silos to proper adjustment of losses. Statistical analysis was performed using the GLM procedure, multiple comparison of means (SNK) and Dunnett test (zero time as control) at 5% of

Table 1. Means of relative losses (% fresh mass) of different silages during fermentation (P: Pioneiro grass; PWPM: Pioneiro grass with whole plant maize; PMG: Pioneiro grass with maize grain; M: maize).

Time (days)	Silages			
	P	PWPM	PMG	M
0	0.00 a	0.00 a	0.00 a	0.00 a
1	16.57 b	28.35 b	36.66 b	58.66 a
2	10.73 a	21.10 a	7.18 a	13.32 a
3	23.28 a	26.68 a	26.31a	11.38 a
4	0.26 a	0.09 a	0.11 a	0.06 a
5	4.38 a	5.96 a	5.60 a	2.57 a
6	6.66 a	5.45 a	5.12 a	1.98 a
7	18.96 a	3.51 b	9.91 ab	7.53 ab
14	5.88 a	4.89 a	4.05 a	2.61 a
21	3.73 a	0.83 a	0.50 a	0.55 a
28	3.97 a	1.83 a	3.40 a	0.00 a
35	5.62 a	1.33 b	1.19 b	1.34 b

significance by the SAS software (version 9.0).

Results

There was significant interaction ($P < 0.05$) between different silages and times of fermentation. The values associated to the relative losses of the silages are presented in Table 1. A similar response in terms of relative losses was observed for most silages at each fermentation period. With the exception of the Pioneiro grass silage without maize addition, the other treatments showed significant losses only up to the third day of fermentation (Fig. 1). This response may be due to the more intense fermentation provided by higher carbohydrates present in the silages with whole plant maize or maize grain.

After the first week of fermentation significant differences ($P < 0.05$) were found only to the last day of anaerobiosis (Table 1). In this day it was observed that the whole plant silage and the silages that were added with whole plant maize and maize grain had lower losses than the silage produced only with Pioneiro grass.

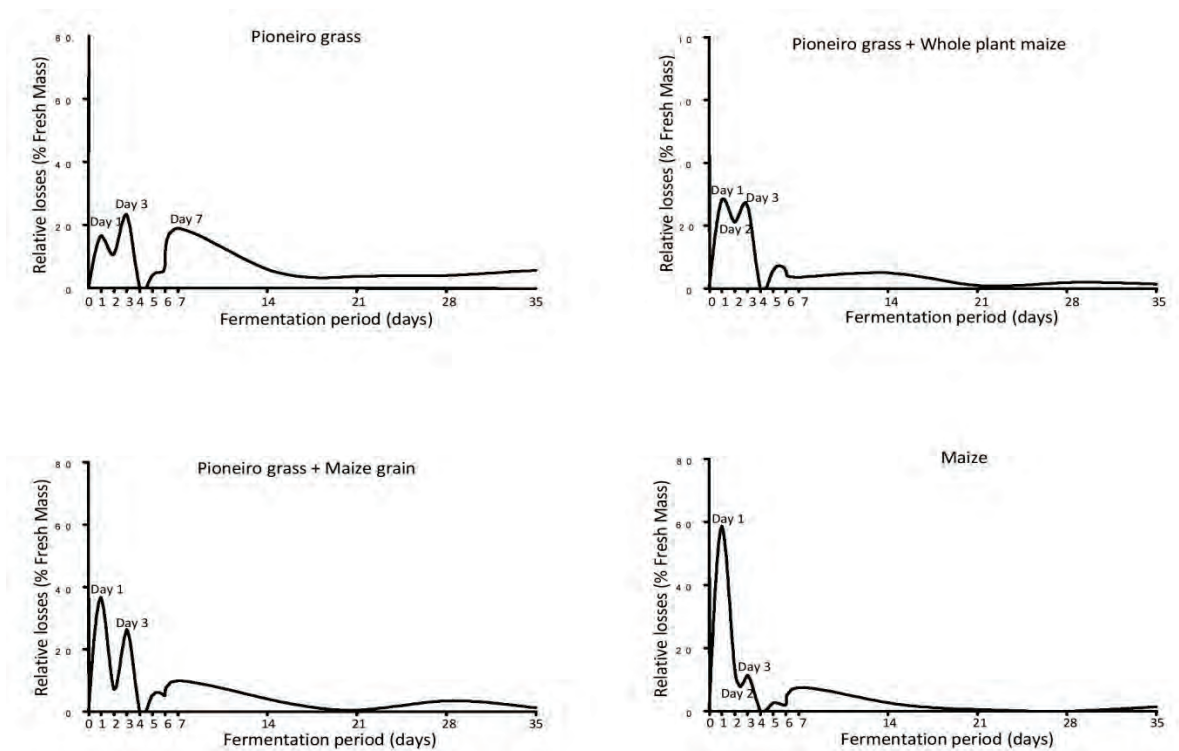


Figure 1. Relative losses (% fresh matter) of different silages in response to fermentation periods. Days showed in the graphs indicate significance at 5% probability.

It's likely that at this stage the Pioneiro grass silage still maintains conditions undesirable for fermentation, making the relative losses extend for a longer period of anaerobiosis.

Conclusion

The addition of whole plant maize or maize grain during ensilage is an alternative that increases the efficiency of Pioneiro grass silage production due to the reduction of losses during the fermentation, although the relative losses are higher for these silages at the beginning of the fermentation.

References

- Anaya-Ortega JP, Garduño-Castro G, Espinoza-Ortega A, et al. (2009) Silage from maize (*Zea mays*), annual ryegrass (*Lolium multiflorum*) or their mixture in the dry season feeding of grazing dairy cows in small-scale dairy production systems in the highlands of Mexico. *Tropical Animal Health and Production* **41**, 607-616.
- Stefanie JWH, Elfeink O, Driehuis F (2000) Silage fermentation process and their manipulation. Proceedings of the FAO Electronic Conference on Tropical Silage. Rome. Italy.