

Nutritional value of Pioneiro grass silages in association with maize as grain or whole plant after aerobic stability

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Introduction The success in ruminant production has been strongly dependent of a regular forage allowance. However, forage production is not constant over the year, especially due to the huge climatic variations along the seasons. Silage making has been an important option to balance these deficits in farm management decisions.

Maize is a well-established forage crop with proved fermentative and nutritional quality, but quite sensitive to climate changes (Farré and Faci, 2006). On the other hand, some forage cultivars of *Pennisetum purpureum*, like Pioneiro grass, can yield up to three times more dry matter than maize plants (Morais et al., 2009) with better tolerance to the Brazilian climatic variations. The association of the yield potential of Pioneiro grass to the nutritional and fermentative quality of maize could be regarded in the silage production to increase the production of high quality silage. The maintenance of silage quality involves its proper management after silo opening. The aerobic stability breakdown is usually related to the reduction in the nutritional value with the silage mass exposure to oxygen. This loss of quality can be minimized depending on the association of feeds used for silage making.

The present study was carried out with the aim to evaluate the nutritional changes in silages of Pioneiro grass associated to maize as grain or whole plant during the aerobic stability.

Materials and Methods The research was carried out at the Federal University of Paraná, Palotina Campus, Palotina, Brazil. The materials under study were the Pioneiro grass 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. In this study it was used a completely randomized design within a split plot scheme, with ensilage processes as main plots and times of aerobic exposure as subplots, with eight replicates. It were tested four ensilages (Pioneiro grass 100%; Pioneiro grass 90% + Whole plant maize 10%; Pioneiro grass 98% + Maize grain 2%; Whole plant maize 100%) and three periods of aerobic exposure (0, 7 and 14 days after silo opening). The addition of whole plant maize and maize grain to the treatments was set on the fresh mass basis. The nutritional value of the silages were analyzed to crude protein (CP), neutral detergent fiber (NDF), acid detergent fiber (ADF) and dry matter (DM) content.

The statistical analysis was performed using the GLM procedure and multiple comparisons of means (SNK) by the SAS software (version 9.0) at a level of 5% significance.

Results and Discussion The association of maize to Pioneiro grass improved ($P < 0.05$) the nutritional value of the silages, but the aerobic exposure impaired ($P < 0.05$) these values. It was not found significant interaction between time of aerobic exposure and silage types. All silage types presented the same pattern in response to oxygen reducing the dry matter and protein content and increasing the fiber compounds of the silage mass (Table 1).

Although many research points out to the highest carbohydrate substrate to fermentation in maize feeds at the time of ensilage compared to warm season grasses, it was not found difference between silages in other nutritional patterns along the aerobic exposure. An intense consumption of non-structural carbohydrates during this period may explain the relative increase in protein and fiber components. In average, the addition of maize as grain at 2% of the fresh mass allowed better improvement in the nutritional value of the Pioneiro grass silage than the addition of 10% of whole plant maize. The association of maize as grain or whole plant to improve the nutritional value of the silage must still consider the stability of the silage mass and the costs of both maize feeds to reach the same nutritional profiles.

Conclusion The addition of maize is effective in improving the nutritional value of the silages. The better nutritional profile of the silage with maize grain must be compared with silages with whole plant maize under other parameters of quality after aerobic stability, like by the temperature changes into the silage mass.

Table 1 Dry matter (DM), neutral detergent fiber (NDF), acid detergent fiber (ADF) and crude protein (CP) levels during silo aerobic exposure of Pioneiro grass and maize silages in mixtures. (P: Pioneiro grass; PWPM: Pioneiro grass with whole plant maize; PMG: Pioneiro grass with maize grain; M: Maize).

Silage	DM (%)	NDF (%)	ADF (%)	CP (%)
P	23.10D	70.75A	46.02A	5.50C
PWMP	24.24C	67.11B	42.22B	6.11B
PMG	24.89B	65.23C	40.34C	6.27AB
M	32.84A	45.77D	22.86D	6.50A
Time of aerobic exposure (days)	DM (%)	NDF (%)	ADF (%)	CP (%)
0	26.31A	60.93B	36.41B	5.75B
7	26.65A	62.93A	38.13A	6.21A
14	25.83B	62.79A	39.04A	6.32A
CV (%)	15.11	16.30	24.84	11.36

Means with same letter in columns are not different ($P > 0.05$) by SNK test.

References

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