

## Evaluation of a propionic acid based additive to avoid aerobic degradation of maize silage

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**Introduction** Maize silage is one of the most common preserved forages for livestock. It is important to reduce visible and invisible losses through the ensiling process and during the use of the silage. After silo opening, aerobic degradation phase takes place, in which aerobic microorganisms such as yeasts and bacteria play a major role. Propionic acid is known to reduce yeast population due to its antifungal properties, thus delaying aerobic deterioration (Kung Jr. et al., 1998). Spreading a propionic acid based additive at exposed face of the silo might control aerobic degradation by inhibition of yeasts and molds populations. It would reflect in better chemical compositions and lower mycotoxins contents of silages. The objective of this study was to assess aerobic stability of corn silages from the exposed face of the silo, when treated with a propionic acid based preservative (PA).

**Materials and Methods** Bunker silos of eight farms located in Castro (Paraná, Brazil) were evaluated. Two squares of 1 m<sup>2</sup> were marked on the exposed face of the silo, and treated with PA (30 mL m<sup>-2</sup>) or control treatment (30 mL m<sup>-2</sup> distilled water). Assessments were made 24 hours after applications. This process was repeated for four consecutive days in each silo. Room temperature (rT) and silage internal temperature (sT) were measured by bulb thermometers. For sT assessment, four thermometers were placed at 5 cm depth in each square. Every day, silage was sampled for pH evaluation. Dry matter (DM), neutral detergent fiber (NDF), acid detergent fiber (ADF), crude protein (CP), ether extract (EE), ashes, aflatoxins (AFB1, AFB2, AFG1 and AFG2), zearalenone (ZEA), deoxynivalenol (DON) and fumonisins (FB1 and FB2) contents were quantified in samples taken on the last day of the trial. The means of chemical composition and temperature were compared by analysis of variance (ANOVA) at the significance level of 0.05, in a randomized block design, considering the farm as a block.

**Results and Discussion** No treatment effect was found. Means and coefficients of variation for all variables are shown in Table 1. No detectable concentrations of aflatoxins, DON or fumonisin B2 were found. Zearalenone was detected in 87.5% of the samples. The absence of treatment effect might be partially explained by the utilized dosage. The same dosage of 1 mL kg<sup>-1</sup> fresh matter was tested by Kleinschmit et al. (2005), who did not observe any differences in fermentation pattern, dry matter recovery or aerobic stability. High concentrations of propionic acid (12 to 17 g kg<sup>-1</sup>) added to high dry matter corn silages were tested by Huber and Soejono (1976), who noted decrease of temperature during fermentation and feeding, lower yeasts count at air exposed silages, increase of intake and milk yield. Another explanation for undetected differences is the insufficient time for silage to be spoiled when adequate management conditions are adopted. The 24 hour period was not enough for silage heating, thus avoiding possible PA effects to be noted.

**Table 1** Means<sup>1</sup> and coefficient of variation of maize silages treated with or without propionic acid, for the variables pH, silage temperature, chemical composition and mycotoxins contents

Variable <sup>2</sup>	Treatment		Mean	CV (%)
	Control	Propionic Acid		
pH	3.83	3.83	3.83	3.6
rT, °C	23.6	23.6	23.6	24.9
sT, °C	21.5	21.4	21.4	9.5
DM, g kg <sup>-1</sup>	371.4	361.1	366.3	14.4
NDF, g kg <sup>-1</sup> DM	401.5	400.0	400.8	11.0
ADF, g kg <sup>-1</sup> DM	212.9	218.5	215.7	11.7
CP, g kg <sup>-1</sup> DM	71.6	74.5	73.1	5.6
EE, g kg <sup>-1</sup> DM	36.7	34.1	35.4	12.4
Ashes, g kg <sup>-1</sup> DM	30.9	33.3	32.1	17.2
ZEA, µg kg <sup>-1</sup>	139	124	132	49.2
FB1, µg kg <sup>-1</sup>	-	139	139	13.7

<sup>1</sup>No significant difference was found between treatments for any analyzed variable (P>0.05).

<sup>2</sup>rT – Room temperature; sT – silage temperature.

**Conclusions** Spreading a propionic acid based additive on the exposed face of the silo did not influence maize silage temperature, pH, chemical composition or mycotoxins contents when evaluated 24 hours after application.

## References

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