Effect of different additives and harvesting date on fermentation characteristics of maize silage

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Introduction

Maize is widely grown in many parts of the world and a major component in silage-based diets for dairy cows due to its stable dry matter (DM) yield, high nutritional value, and good ensiling characteristics. However, maize silage often suffers from aerobic deterioration during feed-out, which leads to considerable losses in DM and feed quality. Therefore, the use of inoculants, such as *Lactobacillus buchneri*, or chemical additives are common methods to improve the aerobic stability of silages.

Caused by the fermentation pathway of *Lactobacillus buchneri* the silage quality might get improved in addition by forming 1,2 propanediol. That might be affected by the ripening stage.

The objective of this study was to examine the effects of different additives and DM-levels on fermentation characteristics, such as acetic acid (AA) and 1,2-propanediol (1,2PD), during fermentation under varying ensiling conditions.

Material & Methods

Chopped maize (Zea maize cv. Benidiktio) was ensiled with two different DM-levels (DML) of 350 (D1) and 385 g/kg (D2), respectively configured by different harvest dates (16./23.09.2020) Beside the control, the plant material of each DML was treated with a chemical additive (SALT) containing sodium benzoate (889 g/kg) and potassium sorbate (111g/kg) and an inoculant containing *Lactobacillus buchneri* $1.0*10^{11}$ CFU/g; *Enterococcus faecium* $2.0*10^{10}$ CFU/g (LBEF, KOFASIL S 1.2). The additive was applied at 0.5 kg/t of fresh matter (FM) (diluted in 2 l of water) and the inoculant at a rate of 1 g/t FM (dissolved in 1 l of water). Both additives were sprayed manually on the forage. Subsequently, treated plant material was compacted in 1.5 l jars and stored for 90 days at 25 °C. All treatments were ensiled in triplicate. Samples were taken to analyse chemical composition as well as fermentation characteristics lactic acid (LA), acetic acid (AA), 1,2-propanediol (1,2PD) and pH using standard laboratory methods. The statistical analysis was performed with the GLM procedure of SAS version 9.4, considering the effects of additive treatment, harvesting date and their interaction. When calculated differences were significant ($P<0.05$), REGWQ test was used for pairwise comparisons between means.

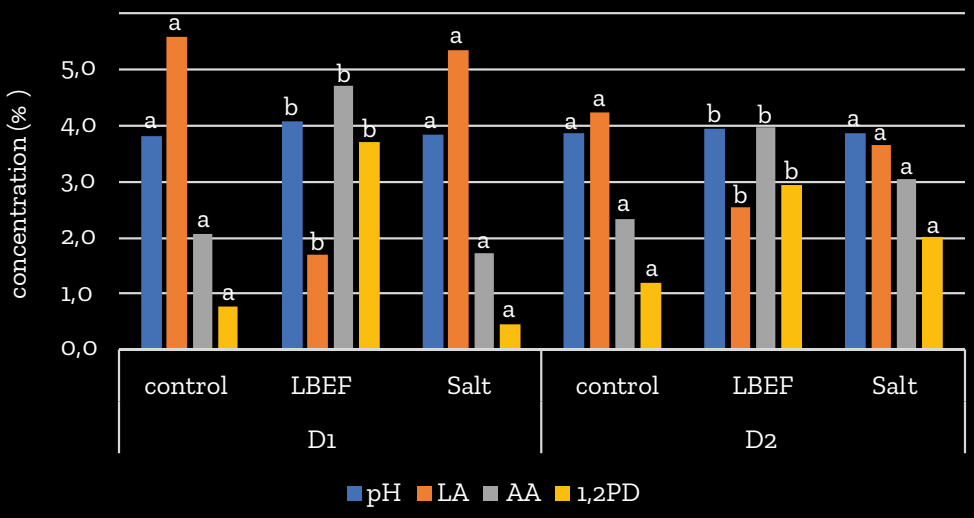

Figure 1: Effect of different DM-levels (D1, D2) of a maize silage and different additives onto fermentation acids and 1,2-propanediol.

Different letters indicate significant differences between treatments for each parameter, $p<0.05$.

Conclusion

The application of LBEF resulted in a conversion of LA to AA and 12PD in comparison to SALT and the control. Thus, it can be concluded that LBEF treated silage showed an enhanced nutritive value because of the elevated 12PD content in the silage. This finding we had at both different harvest dates, DML.