

Inhibition of biogenic amines in silage by *L. plantarum* and *E. faecium*

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Introduction Occurrence of biogenic amines in silage is an indicator of poor silage quality. Putrescine, cadaverine, tyramine and histamine belong to the most prevalent amines found in silage (Křížek, 1993; Olt et al., 2005). These compounds can be produced by contaminants like Enterobacteria and Clostridia (Oude Elferink et al., 1999) and have been found to cause feed intake depression and impair digestive functions (Phuntsok et al., 1998). This is why a trial was conducted to find out about the influence of biological silage inoculants on the formation or inhibition of biogenic amines in laboratory scale silage trials.

Materials and Methods A lab scale silage trial in wilted alfalfa (~43% dry matter (DM)) was conducted over three months. Silages were either untreated (control) or inoculated with one of three strains of lactic acid bacteria (*Lactobacillus amylovorus*, *Lactobacillus plantarum*, *Enterococcus faecium*) at a dosage of 5×10^4 cfu/g silage. Sample silos were prepared in triplicate for each day of analysis. Silages were sampled 3, 7, 44 and 90 days after ensiling. In addition to various in-house investigations including DM loss, organic acids and carbohydrates (HPLC), aerobic stability (according to Honig, 1990), microbial counts and the content of biogenic amines were analysed via HPLC at the University of Natural Resources and Life Sciences, Vienna. Statistics were carried out in SPSS 10.0 using ANOVA and post-hoc Tukey HSD or Tamhane T2 test preceded by tests for normal distribution and homogeneity of variances.

Results and Discussion The prevalence of the four biogenic amines measured decreased from histamine > tyramine > cadaverine > putrescine. Levels of cadaverine were lowered to a certain extent by all lactic acid bacteria (Figure 1), while putrescine and tyramine levels were lowered most effectively in trial groups with *L. plantarum* treatment (Figure 2 and 3). Histamine levels were rather high in all groups (1500 mg/kg DM and above) with only small reductions in the treated groups vs. Control (Figure 4). Amine levels remained essentially unchanged during an 8 days aerobic exposure phase, with the exception for histamine, where levels were partly visibly lowered.

References

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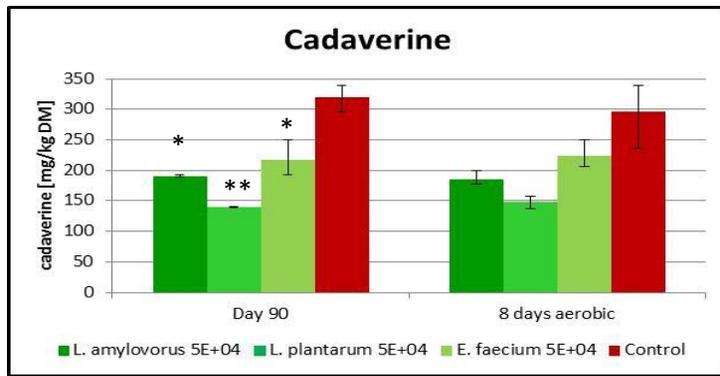


Figure 1 – Cadaverine levels in alfalfa silage (n=3)⁽¹⁾

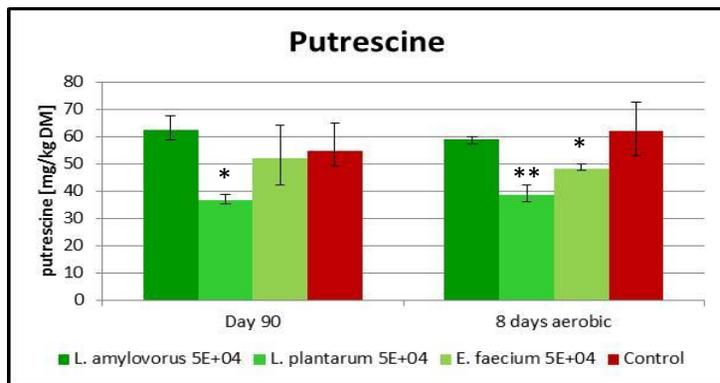


Figure 2 – Putrescine levels in alfalfa silage (n=3)⁽¹⁾

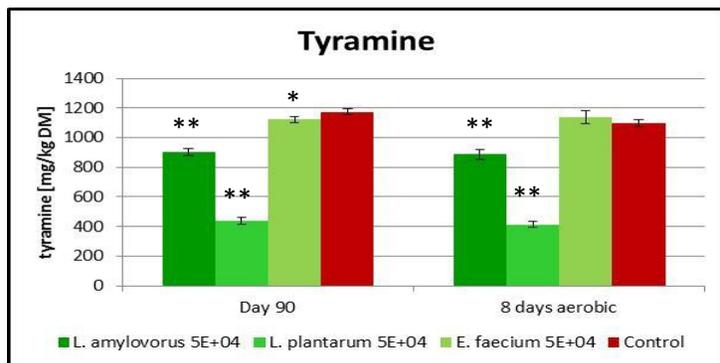


Figure 3 – Tyramine levels in alfalfa silage (n=3)⁽¹⁾

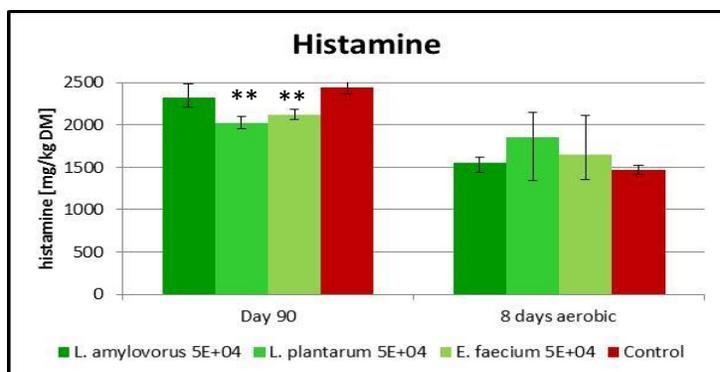


Figure 4 – Histamine levels in alfalfa silage (n=3)⁽¹⁾

⁽¹⁾ *P<0.1 **P<0.05