



EFFECT OF DIFFERENT SILAGE INOCULANTS ON FERMENTATION AND PROTEIN QUALITY IN GRASS SILAGE

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BACKGROUND & OBJECTIVE

- Improving the efficiency of nitrogen utilization is important to enable sustainable dairy farming in the future
- A main cause of lower degree of nitrogen utilization in feed production is the extensive protein degradation during ensiling
- Study results indicate a reduction of protein degradation by using silage inoculants based on homo- and heterofermentative lactic acid bacteria (LAB)

Aim: to assess whether silage inoculants based on LAB improve the fermentation and protein quality of grass silage

RESULTS

- pH values of the treated silages (INO1 and INO2) were significantly lower in contrast to CON at all opening days (Figure 1a and b)
- Significant higher lactic acid, acetic acid and 1,2-propanediol for INO1 and INO2 compared to CON at day 14 and 90 (Table 1)
- Significant reduced NH₃-N % of Total-N at day 14 and 90 for the treated silages compared to CON (Table 1)

MATERIAL & METHODS

- Forage (Tall fescue: 30.8% DM; 13.4% WSC % DM; 13.7% CP % DM) was harvested at the beginning of September (3rd cut)
- Two experiments with different treatments against an untreated control (CON) were carried out
 - INO1: Mixture of homo- and heterofermentative LAB (Bonsilage Speed G: *L. buchneri*, *L. diolivorans*, *L. plantarum*, application rate 2.5 x 10⁵ cfu/g FM)
 - INO2: Mixture of homo- and heterofermentative LAB (Bonsilage Fit G: *L. buchneri*, *L. plantarum*, *L. rhamnosus*, application rate 3.0 x 10⁵ cfu/g FM)
- For each treatment, three laboratory silo glasses (1.5 L) were filled and stored in a temperature-controlled room (20 +/- 2°C)
- Glasses were opened on day 1, 3, 5, 7, 14 and 90 and the pH value and NH₃-N (via NH₃ electrode) were measured. At day 0, 14 and 90 the dry matter, crude protein and fermentation pattern (via HPLC) were analyzed
- Statistical evaluation: medians were calculated, and the Mann Whitney U-Test was performed to test differences between the control and the treated silages; the significance level was 5 %

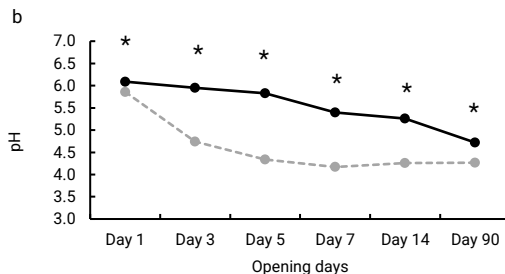
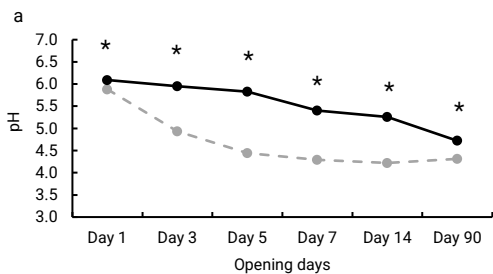


Figure 1a and b. pH patterns in control (black) and a) INO1: Bonsilage Speed G (gray) and b) INO2: Bonsilage Fit G (gray) at different opening days. *: significant differences between the groups (P < 0.05)

Table 1. Medians of grass silage parameters after day 14 and day 90 of storage for control (CON), the *Bonsilage Speed G* (INO1) and the *Bonsilage Fit G* (INO2) treated silage.

Parameter		Day 14			Day 90		
		CON	INO1	INO2	CON	INO1	INO2
DM _c	%	30.4	30.5	30.9	29.7	30.1	29.9
CP	% DM	15.0	15.2	15.6	14.9	15.1	15.1
pH		5.26	4.26*	4.22*	4.72	4.27*	4.31*
NH ₃ -N	% Total-N	10.9	6.67*	6.43*	14.1	9.47*	9.54*
LA	% DM	0.86	3.53*	2.97*	2.36	4.28*	4.02*
AA	% DM	0.26	1.58*	1.03*	1.75	2.65*	2.81*
BA	% DM	0.00	0.00*	0.00*	0.74	0.03*	0.00*
1,2PD	% DM	0.00	0.23*	1.33*	0.10	0.50*	2.31*

DM_c = DM corrected; CP = Crude protein; NH₃-N = Ammonia nitrogen; LA = Lactic acid; AA = Acetic acid; BA = Butyric acid; 1, 2-propanediol; *: symbolize significant differences to control (P < 0.05)

CONCLUSION

The study demonstrates that the inoculants containing homo- and heterofermentative LAB can be used to minimize protein degradation in grass silage and thus increase N-efficiency at farm level. Therefore, they have the potential to be part of an ammonia reduction strategy.