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Fermentation and aerobic stability of grass and grass-legume silages ensiled for 14 days

G. Copani, N. Milora, K.A. Bryan, N. G. Nielsen, K. L. Witt
Chr. Hansen - Boege Alle 10/12 - 2970 Hoersholm - Denmark, dkgico@chr-hansen.com

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INTRODUCTION

During the silage making process, air present in the forage is undesirable. Specifically, oxygen facilitates the growth of aerobic spoilage organisms such as yeast and mold that may compromise preservation and hygienic quality of the silage. Additionally, when the silo bunker is opened and exposed to air, it needs to remain stable in order to preserve its nutritive quality and to minimize negative effects when fed to livestock. Silage inoculants can help to reduce levels of yeast and mold and further suppress their growth, thereby enhancing aerobic stability of silage when exposed to air (Kung et al., 2003).

“ The objective of this study was to evaluate the **effectiveness** of using a **silage inoculant** on **microbial composition** and **aerobic stability** of two different crops after only **two weeks of fermentation**. ”

MATERIAL AND METHODS

<p>Control (CRT)</p> <p>SiloSolve® FC (FC) 150,000 cfu/g of forage <i>Lactobacillus buchneri</i> LB1819 (DSMZ22501/1K20738) <i>Lactococcus lactis</i> LL O224 (DSMZ11037/1K2081)</p>	}	<p>Fermented 14 days</p> <p>Exp.1 pure grass 120 kg DM/m³ (46.5% DM)</p> <p>Exp.2 grass/legume mixture 190 kg DM/m³ (28.9% DM)</p>	 <p>n=3 n=3</p>
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n=3

- Microbiological status:
 - Total count log cfu/g of lactic acid bacteria (LAB), yeast and mold before and after aerobic exposure (AS),
 - Silage characteristics: pH and DM measurement



n=3 Data logger

- Aerobic stability test (7 days) after 14 days of fermentation (AS)

DISCUSSION

These results clearly indicate that hetero-fermentative *L. buchneri* LB 1819 in combination with homo-fermentative *L. lactis* LL O224 was able to control yeast and mold growth after a short period of fermentation in two different crops. Further, the present results are in agreement with several previous studies that reported improvement in aerobic stability of different silages treated with the same combination of hetero- and homo-fermentative bacteria (Jatkauskas et al., 2013; Witt et al., 2015; Copani et al., 2017). König et al. (2012) showed that using pure *L. buchneri* as inoculant in a crop with low dry matter content did not result in an increase in aerobic stability. Yet, despite FC not yielding enhanced aerobic stability in Exp. 2, pH was numerically lower than CTR, and yeast and mold counts significantly lower, suggesting that the combination of *L. buchneri* and *L. lactis* may have another mode of action.

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RESULTS

Table 1. Silage characteristics (pH and DM) before and after aerobic exposure (AS), on grass (Exp.1) or grass/legume mixture (Exp.2) inoculated with SiloSolve® FC (FC) or without additive (Control, CRT) after two weeks of fermentation.

Items	Exp. 1				Exp. 2			
	Treatment		s.e.m	P-value	Treatment		s.e.m	P-value
	CTR	FC			CTR	FC		
Before AS								
DM, %	46.3	46.8	0.21	0.212	29.19	28.39	0.24	0.0784
pH	4.60	4.45	0.047	0.086	4.1	4.1	0.02	0.3331
After AS								
DM, %	47.5	46.8	0.83	0.589	26.03	26.89	0.45	0.2506
pH	8.03	7.09	0.474	0.233	5.4	4.7	0.347	0.2082

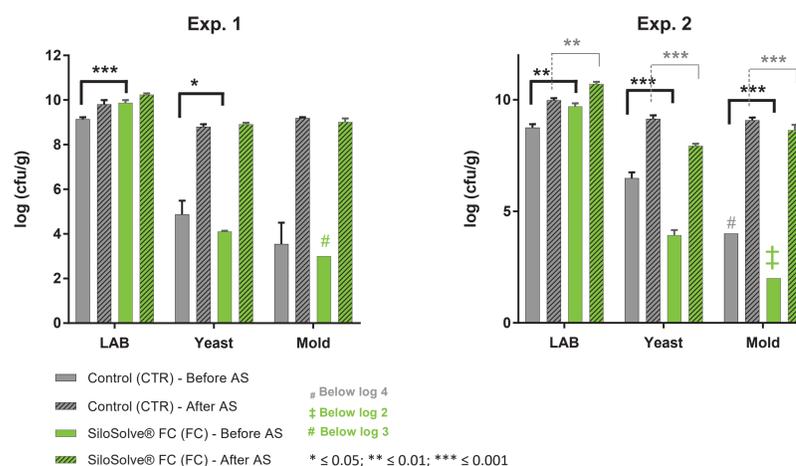


Figure 1. Microbiological status (Total count log cfu/g of lactic acid bacteria (LAB), yeast and mold) before and after aerobic exposure (AS), on grass (Exp.1) or grass/legume mixture (Exp.2) inoculated with SiloSolve® FC (FC) or without additive (Control, CRT) after two weeks of fermentation.

Using a FC inoculant resulted in an increase of lactic acid bacteria present in the treated silages after two weeks of fermentation, and before and after AS (Exp. 1 and 2). FC significantly reduced the level of yeast after two weeks of fermentation and was more effective in Exp.2 (P=0.0002). Reduction of yeast (P=0.003) and mold (P=0.04) growth was observed after aerobic challenge in Exp.2. The stability of the silage face was enhanced by three days when using the silage inoculant only in Exp.1 (data not shown) despite no clear reduction of yeast and mold in this experiment (Figure 1).

CONCLUSION

“ The present studies further confirm the **efficacy** of combining specific strains of *L. buchneri* and *L. lactis* as a silage inoculant to **control yeast** and **mold growth** after a **short period of fermentation**. ”

Additionally, the use of FC could provide more flexibility in silage face management due to its ability to mitigate growth of spoilage microorganisms and maintain enhanced silage stability.

