INOCULANT IMPROVES FERMENTATION AND INHIBITS CLOSTRIDIA IN DIFFICULT-TO-ENSILE FORAGE WITH AND WITHOUT CLOSTRIDIA CHALLENGE

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INTRODUCTION

The aim of this study was to evaluate the effect of the unique homo- and heterofermentative inoculant commercialized as **BioStabil Plus** on fermentation quality and the prevention of Clostridia proliferation in difficult-to-ensile grass-clover forage. The study was conducted both with and without a Clostridia challenge.

CONCLUSION

BioStabil Plus enhanced silage quality by promoting better fermentation, inhibiting Clostridia, preserving dry matter, and increasing aerobic stability in challenging ensiling conditions. These results highlight the dual benefits of improved nutritional quality for productivity and enhanced hygienic conditions for animal welfare.

RESULTS

BioStabil Plus significantly improved silage fermentation by increasing lactic and acetic acid, while reducing ammonia-N, butyric acid, ethanol, 2,3-butanediol (Table 1). Silage pH was reduced by 33% at Day 14 compared to Control. No Clostridia growth was detected in treated silage, even under challenged conditions.

BioStabil Plus significantly reduced DM losses by 48-54% during normal ensiling. In the Clostridia-challenged silage, DM losses were reduced by 57% compared to the Control.

Silage treated with **BioStabil Plus** remained stable from the first opening (Day 14) to the last opening (Day 90) during the 10-day aerobic stability test (Figure 1).

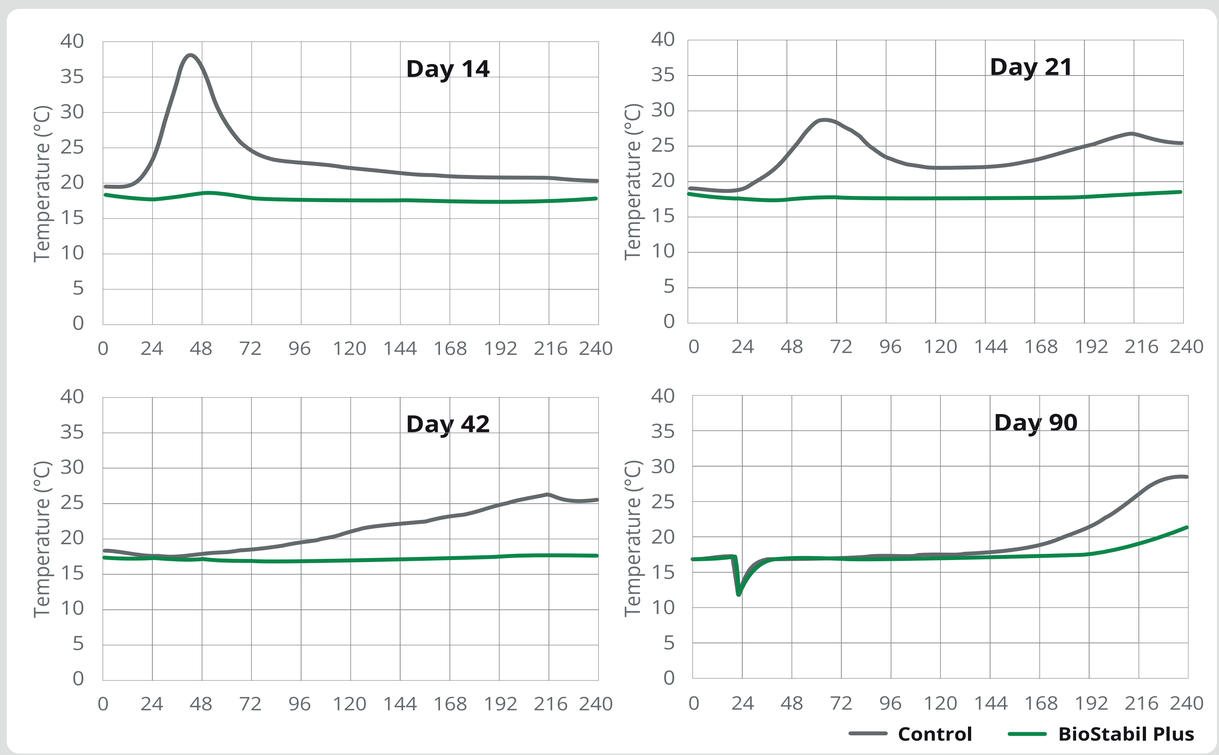

Figure 1. Longer aerobic stability in silage inoculated with BioStabil Plus at different opening days (Days 14, 21, 42 and 90)

Table 1. Fermentation profile (% of DM) of 28% DM grass-clover silage with and without silage inoculant and Clostridia challenge, opened on Day 90

Parameter	Without Clostridia Challenge				With Clostridia Challenge			
	Control	BSP	SEM	P-value	Control	BSP	SEM	P-value
DM loss	1.27^{a}	0.58^{b}	0.031	<0.001	2.37^{a}	1.01^{b}	0.017	<0.001
Ammonia-N*	1778^{a}	738^{b}	24.10	<0.001	1988^{a}	755^{b}	5.400	<0.001
pH	5.31^{a}	4.16^{b}	0.026	<0.001	5.48^{a}	4.19^{b}	0.016	<0.001
Lactic acid	1.74^{a}	4.17^{b}	0.055	<0.001	2.59^{a}	6.01^{b}	0.049	<0.001
Acetic acid	0.50^{a}	0.72^{a}	0.015	<0.001	0.98^{a}	1.10^{b}	0.013	<0.001
Propionic acid	0.66^{a}	0.06^{a}	0.011	<0.001	1.02^{a}	0.15^{b}	0.011	<0.001
Butyric acid	0.02	0.01	0.018	0.067	2.29^{a}	0.31^{b}	0.028	<0.001
Ethanol	0.74^{a}	0.42^{b}	0.010	<0.001	1.15^{a}	0.65^{b}	0.007	<0.001
2,3-butanediol	1.24^{a}	0.13^{b}	0.039	<0.001	2.29^{a}	0.31^{b}	0.028	<0.001
1,2-propanediol	0.10^{a}	0.16^{ab}	0.004	<0.001	0.10^{a}	0.16^{b}	0.003	<0.001
Clostridia spores (log_{10} MPN/g)					3.38	0		

a, b for each experiment (without or with Clostridia), different superscripts indicate mean values within a row differ significantly (P<0.001)
* mg/L

MATERIALS AND METHODS

First-cut grass-clover forage (73% grass DM) was wilted to 28% DM and chopped to 30 mm, resulting in a forage classified as difficult to ensile with a fermentation coefficient of 28.7. Treatments included an untreated (Control) and **BioStabil Plus** –BSP (*Lactiplantibacillus plantarum* DSM 19457, *Levilactobacillus brevis* DSM 23231, *Lentilactobacillus buchneri* DSM 19455) applied at $2x10^5$ cfu/g FM. A Clostridia challenge (10^4 spores/g of *C. tyrobutyricum*) was included, and all forages were ensiled in 1.75-L glass jars (153 kg DM/m^3). The fermentation profile and aerobic stability were tested after 14, 21, 42, and 90 days. The Clostridia-challenged silage was tested on Day 90. Data was analyzed using Proc GLM and Wilcoxon Scores (Proc Npar1way, SAS).

NOTE: The experiment was carried out according to the German DLG guidelines for certification of silage additives (DLG 2017).

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