Effects of the Newly Selected Strain *Lentilactobacillus buchneri* DSM 34586 on Fermentation Enhancement and Aerobic Stability Across Different Forage Crops

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Introduction

Lactic acid bacteria (LAB) inoculants are commonly used to improve fermentation efficiency and inhibit the growth of yeasts and molds during both the fermentation and feed-out phases. This helps reduce nutrient losses and maintain high aerobic stability. Among the LAB used to enhance silage aerobic stability, heterofermentative strains of *Lentilactobacillus buchneri* are considered the most effective.

Objective: In this study, we evaluated the ability of the *L. buchneri* DSM 34586 strain to modify the fermentation characteristics of whole-plant maize, grass, and alfalfa silages, with a focus on its effects on aerobic stability.

Test materials: A randomized complete block design, with 5 replicates per treatment. Silages were stored for 90 d, thereafter, sampled and analysed. Each mini silo served as the experimental unit for statistical analysis, with significance defined at $P \leq 0.05$.

1. Whole-plant maize with a dry matter (DM) content of 344 g kg^{-1},
2. Ryegrass wilted to a DM content of 294 g kg^{-1}
3. Alfalfa wilted to a DM content of 297 g kg^{-1}

Ensiled as traditionally chopped crop in 3-litre laboratory mini-silos with either inoculant *Lentilactobacillus buchneri* DSM 34586 (T2) or without any additives (T1).

Treatment	Bacterial strains	Application (cfu/g forage)
T1	No additives	0.00, 4 ml chlorine free water
T2	*Lentilactobacillus buchneri* DSM 34586	100 000, with 4ml suspension

Analyses

1. Fresh forage:

DM, CP, WSC, initial stock of LAB, Yeasts and Molds

2. Silages at day 90 of fermentation:

i) DM, CP, WSC, Weight and DM loss, pH-value, VFA and lactic acid, ammonia-N and alcohols, Lactate reducing yeasts, Molds and LAB;

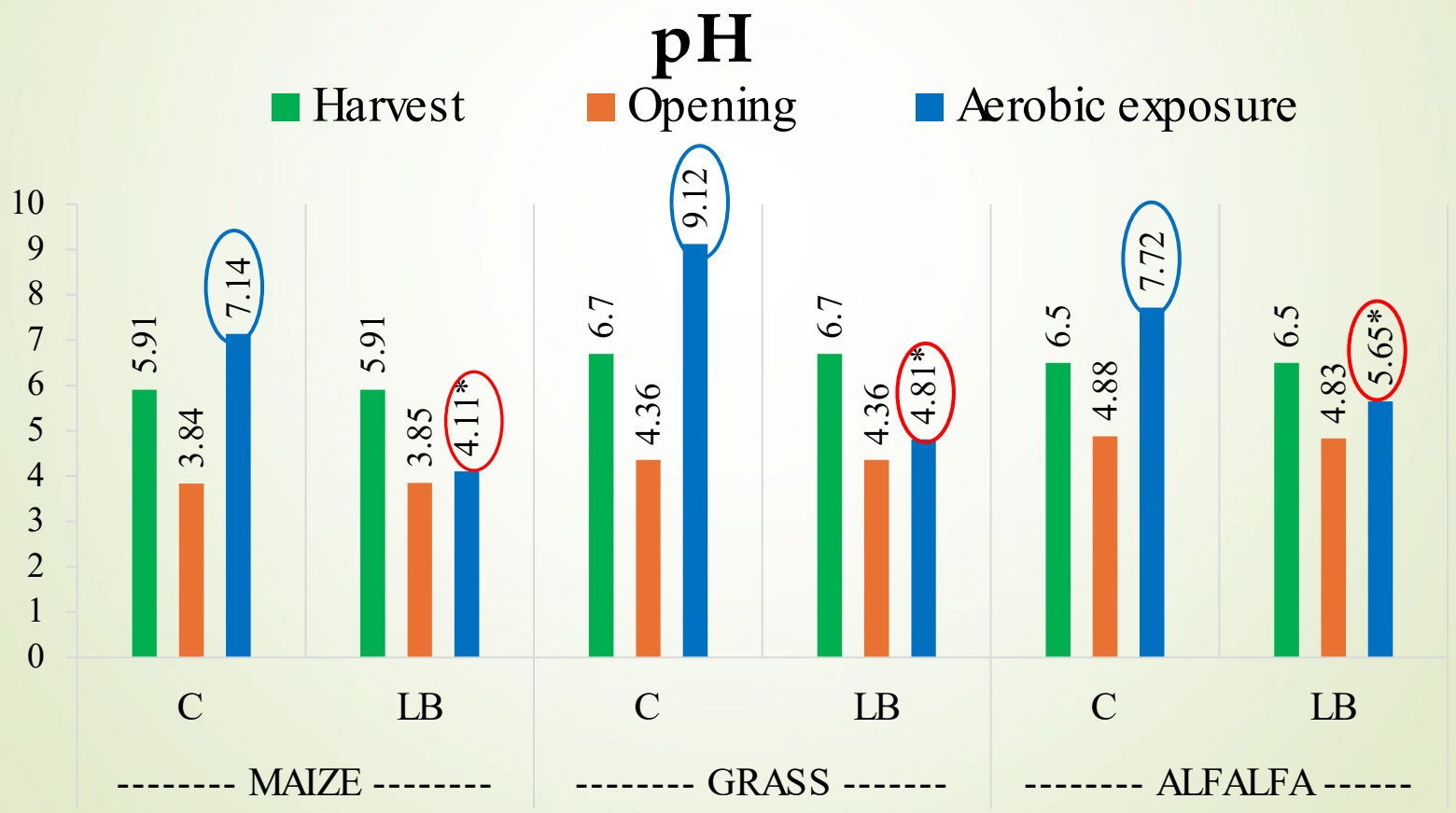
ii) Aerobic stabilty test (AST): temperature dynamic during aerobic exposure;

iii) At the end of AST:
pH value, Lactate reducing yeasts, Moulds, Weight loss.

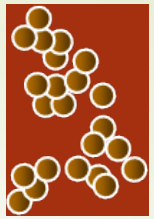
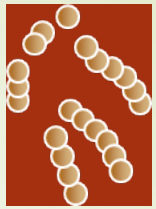
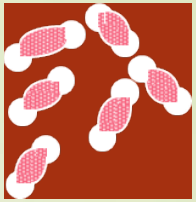
Mean chemical composition prior to ensiling (n=5)

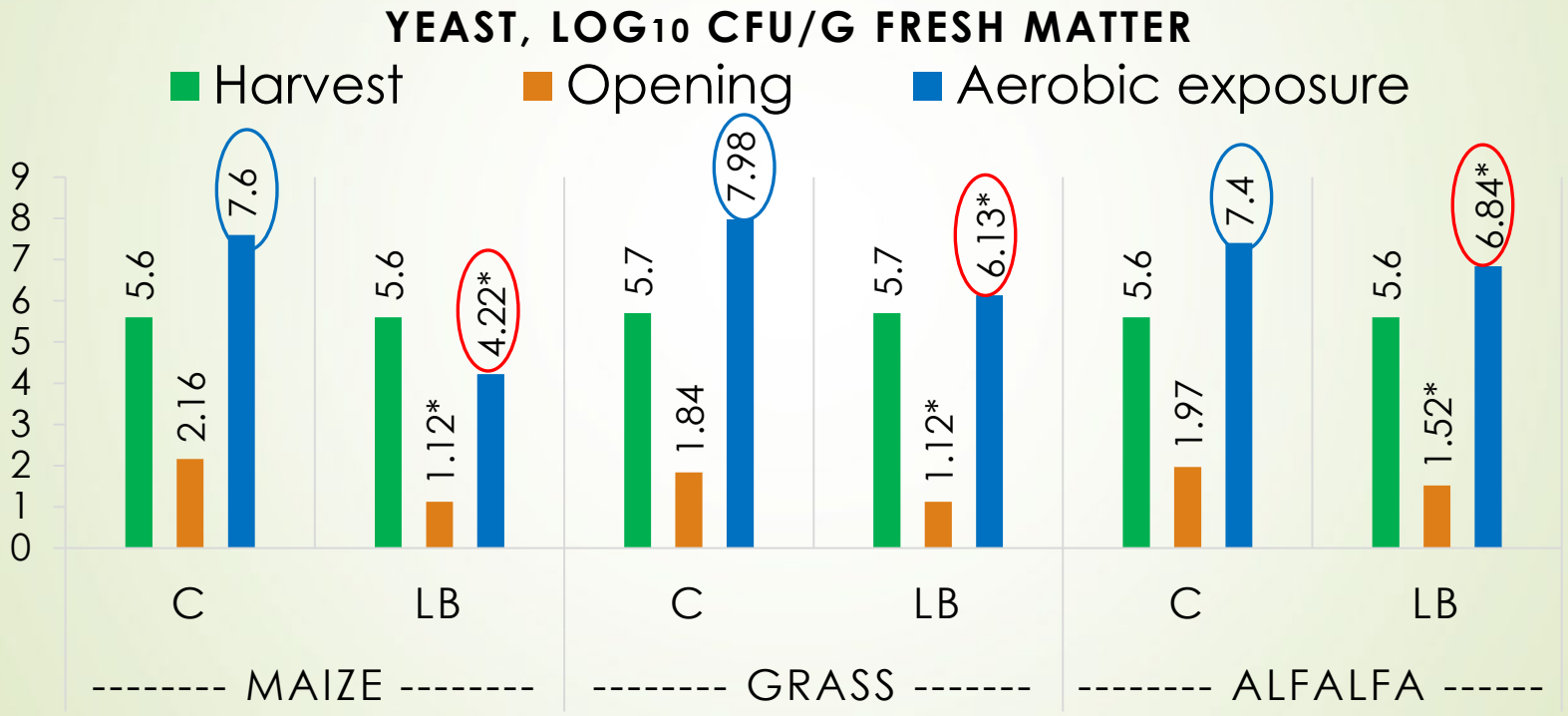
		GRASS	MAIZE	ALFALFA
Dry matter, g/kg DM	5	294.0	340.3	297.0
Crude protein, g/kg DM	5	197.1	88.1	246.0
WSC, g/kg DM	5	51.5	89.3	28.8
BC, mequiv100g/DM	5	28.14	26.52	55.50
Nitrate, mg/kg	5	570.6	245.2	485.80

Results

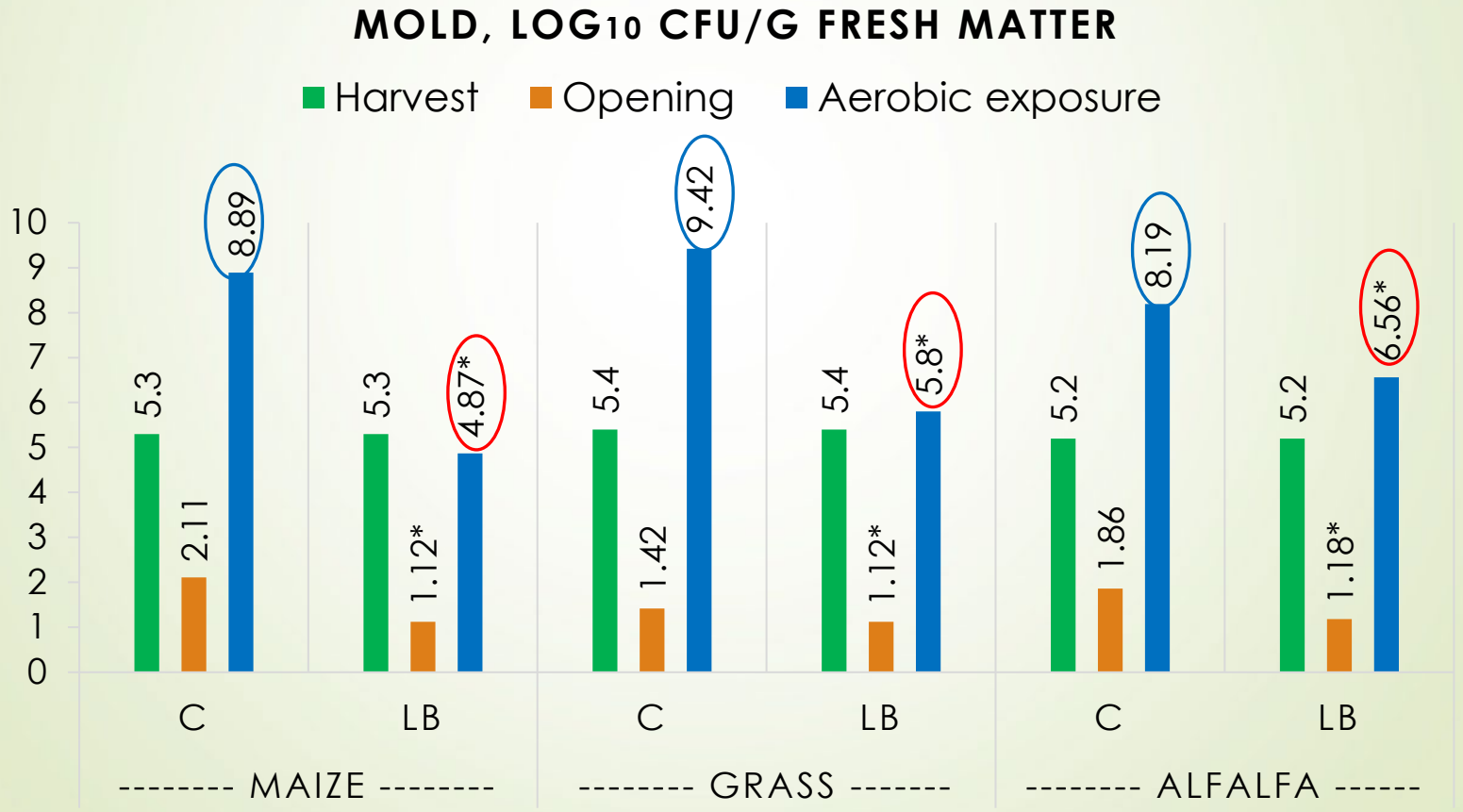

pH
Harvest
Opening
Aerobic exposure
10
9
8
7
6
5
4
3
2
1
0
5.91
3.84
7.14
5.91
3.85
4.11*
6.7
4.36
9.12
6.7
4.36
4.81*
6.5
4.88
7.72
6.5
4.83
5.65*
C
LB
C
LB
C
LB
-------- MAIZE --------
-------- GRASS -------
-------- ALFALFA ------

Variations in microbial composition

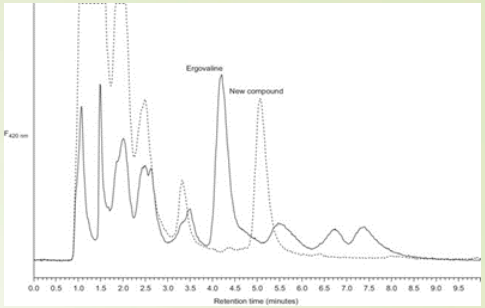




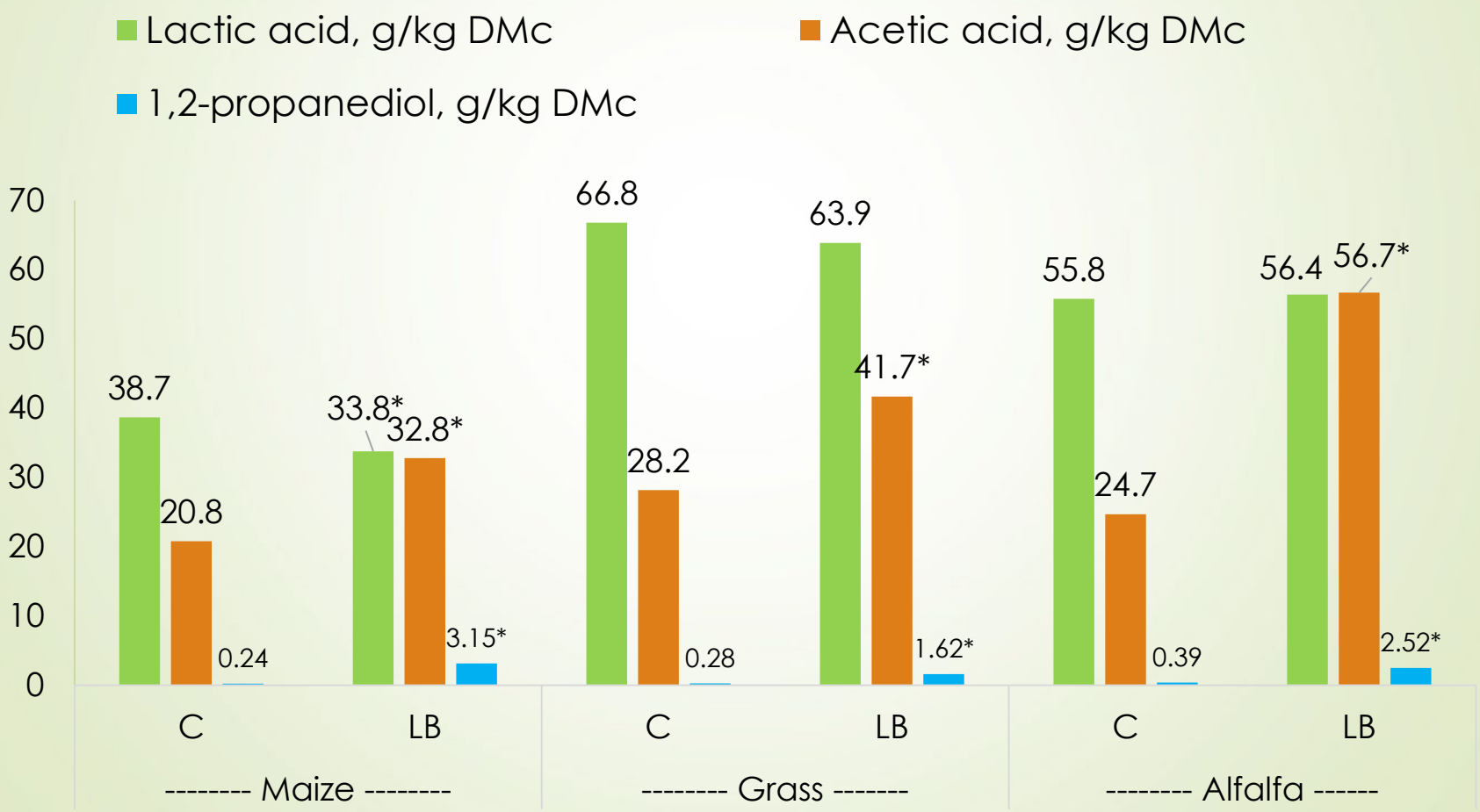


Variations in microbial composition

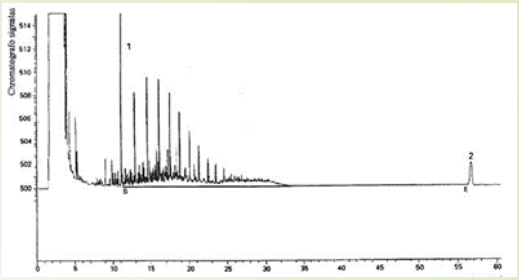


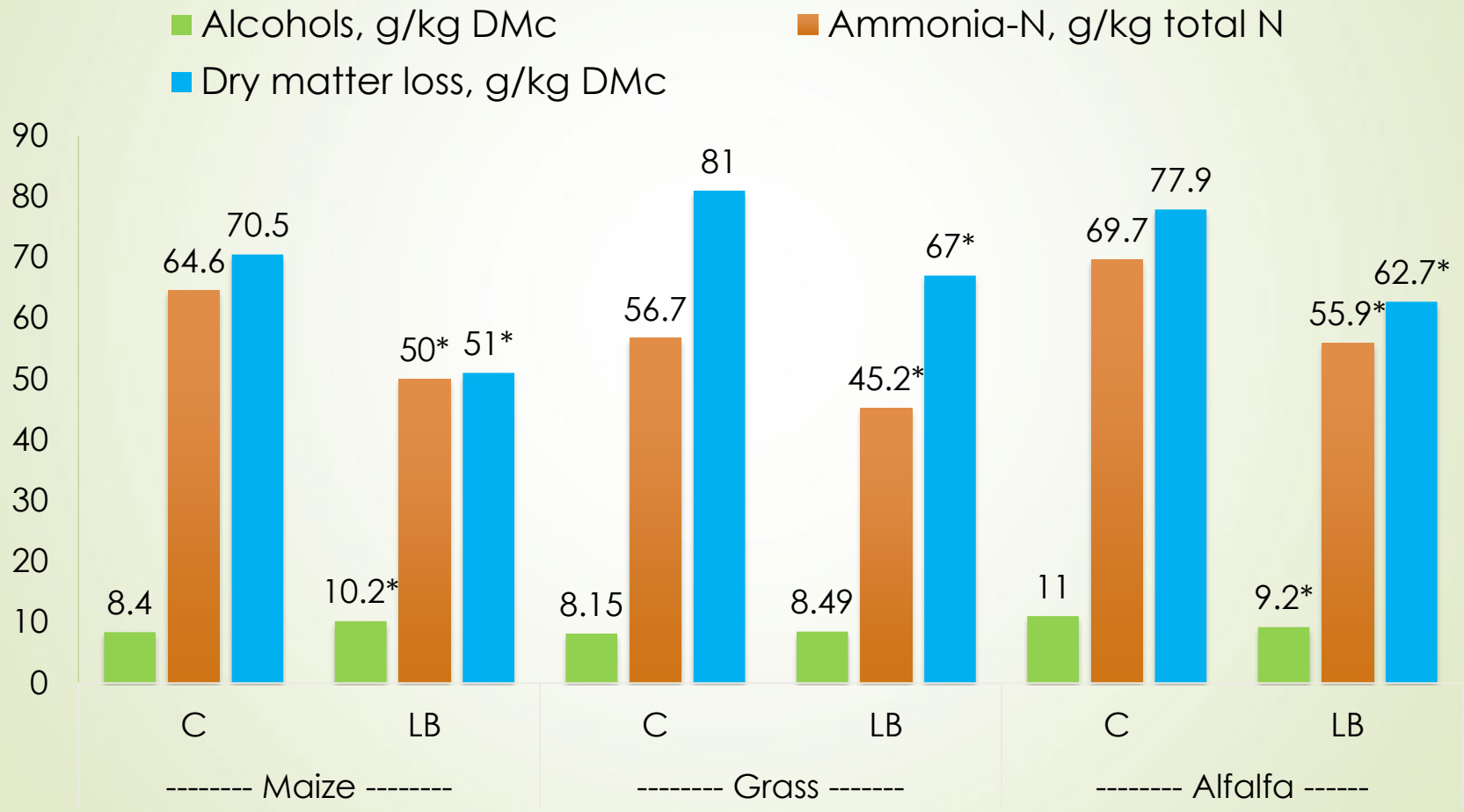
Fermentation variables





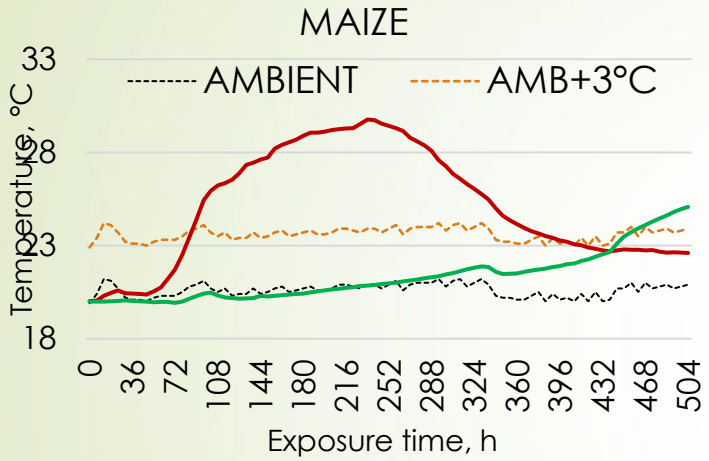
Fermentation variables

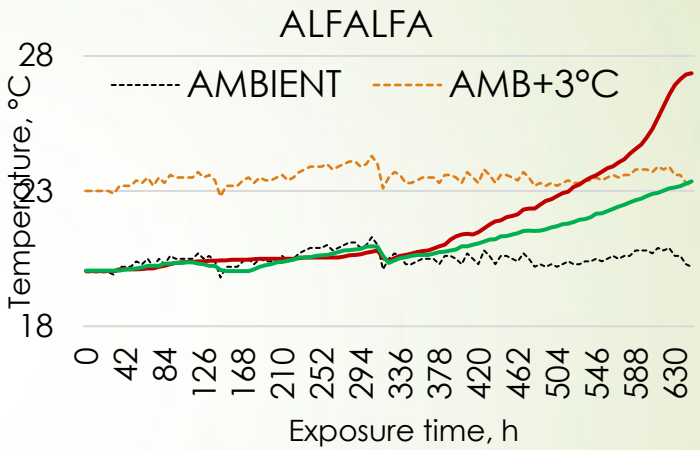


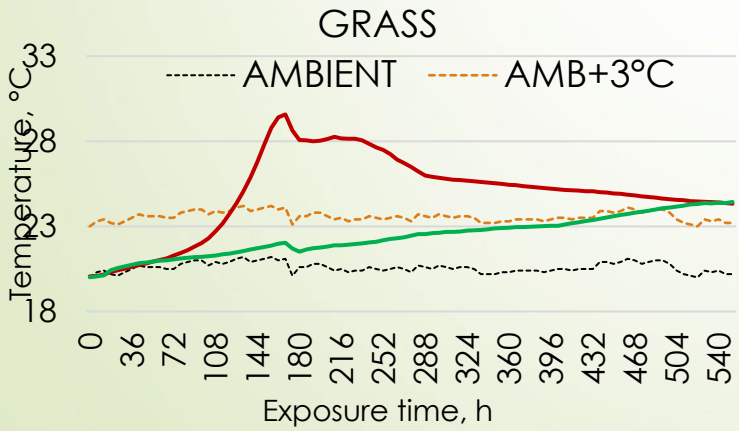


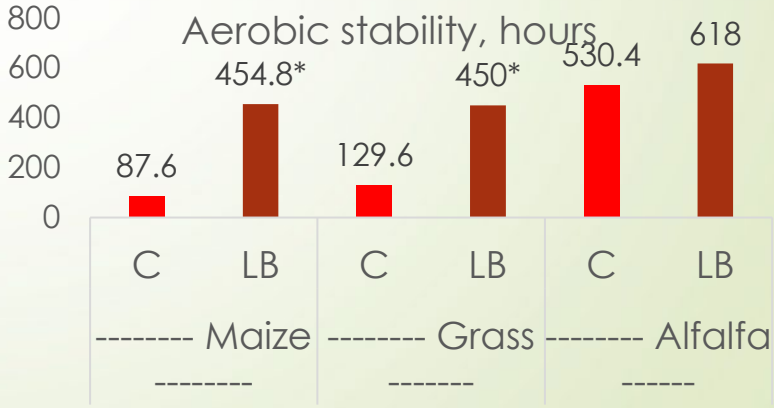
Aerobic stability test











Conclusions:

The tested inoculant effectively shifted fermentation towards increased production of acetic acid and 1,2-propanediol. Due to the high resistance of alfalfa silage to aerobic spoilage, the application of *Lentilactobacillus buchneri* DSM 34586 was less effective in enhancing its aerobic stability, but by inhibiting the growth of yeasts and fungi, contributed to improving the sanitary quality of the feed.

Thank you