

Introduction

- ✓ Corn silages are widely recognized for their excellent quality;
- ✓ However, exposure to air during the aerobic phase can result in significant nutrient losses;
- ✓ To mitigate these losses, microbial inoculants such as *Lentilactobacillus buchneri* have been extensively studied;
- ✓ Ensiling corn as part of a TMR has additional benefits, such as increasing dry matter (DM) content, diluting the WSC concentration across the diet's ingredients.,

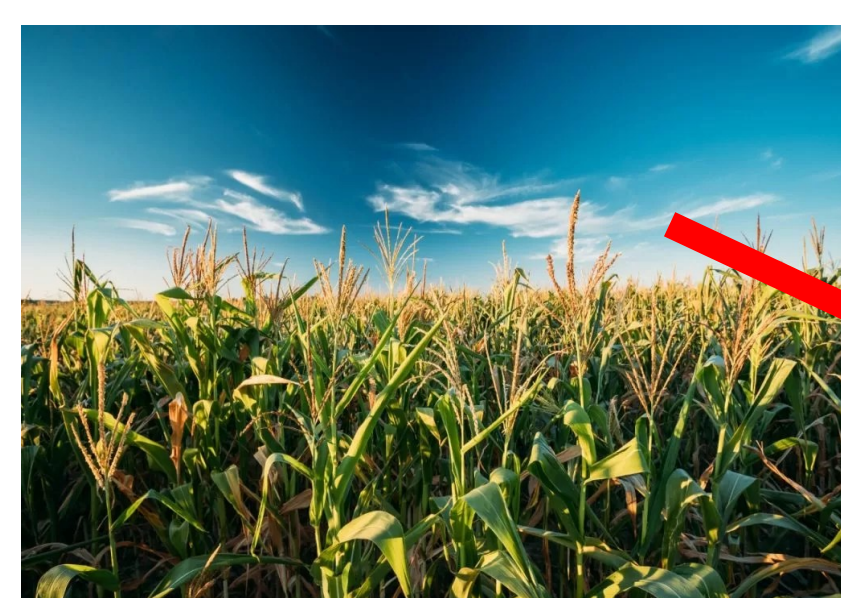
(Arriola et al. 2021)

Objectives

- ✓ Our objective was to evaluate the effects of ensiling corn as TMR, with or without *L. buchneri* inoculation, on the bacterial diversity of the resulting silages.

Materials and Methods

- ✓ The experiment was conducted in the Federal University of Viçosa, Viçosa, Minas Gerais, Brazil;
- ✓ Corn was harvested 120 days after sowing. After, it was chopped into a 1.5 cm particle size, treated with inoculants and packed in 10-L plastic buckets.



Corn crops

Type of silage:
CS; TMRInoculant:
CONT; LB

- ✓ The experimental design was completely randomized, arranged in a 2×2 factorial scheme, with two silage types (S) and the presence or absence of inoculant (I), with five replicates per treatment;
- ✓ The silage types included corn silage (CS) and total mixed ration silage (TMR). The inoculants used were: control without inoculant (CONT) and a commercial inoculant containing *Lentilactobacillus buchneri* (LB) (LalSil AS, CNCM I-4323, Lallemand Animal Nutrition®, Brazil).;
- ✓ The TMR formulation consisted of ground corn, soybean meal, urea, mineral premix, sodium bicarbonate, and magnesium oxide, with a roughage-to-concentrate ratio of 40:60;
- ✓ The formulation was designed for finishing beef cattle.
- ✓ After 90 days of fermentation, the V3-V4 regions of the 16S rRNA gene were amplified;
- ✓ The statistical significance used was declared at $P \leq 0.05$.

Results

- ✓ In corn silages (CONT and CONT+LB), a higher abundance of the genera *Weissella*, *Leuconostoc*, *Klebsiella*, and *Lactococcus* were observed (Figure 1);
- ✓ In contrast, the TMR silages were characterized by greater abundances of the genera *Carnobacterium*, *Klebsiella*, *Lactococcus*, and *Lactiplantibacillus* (Figure 1);
- ✓ No significant difference was observed for the Chao1 alpha diversity index ($P \geq 0.05$) (Figure 2);
- ✓ However, a significant effect ($P \leq 0.05$) of the inoculant application was detected, with higher Chao1 values observed in the inoculated silages (Figure 2);
- ✓ TMR silages exhibited higher ($P \leq 0.05$) bacterial community alpha diversity based on the Shannon index (Figure 2);
- ✓ The beta diversity analysis, based on principal coordinate analysis (PCoA), revealed significant differences ($P \leq 0.05$) among silage types, as well as an interaction effect for inoculant inclusion.

Results

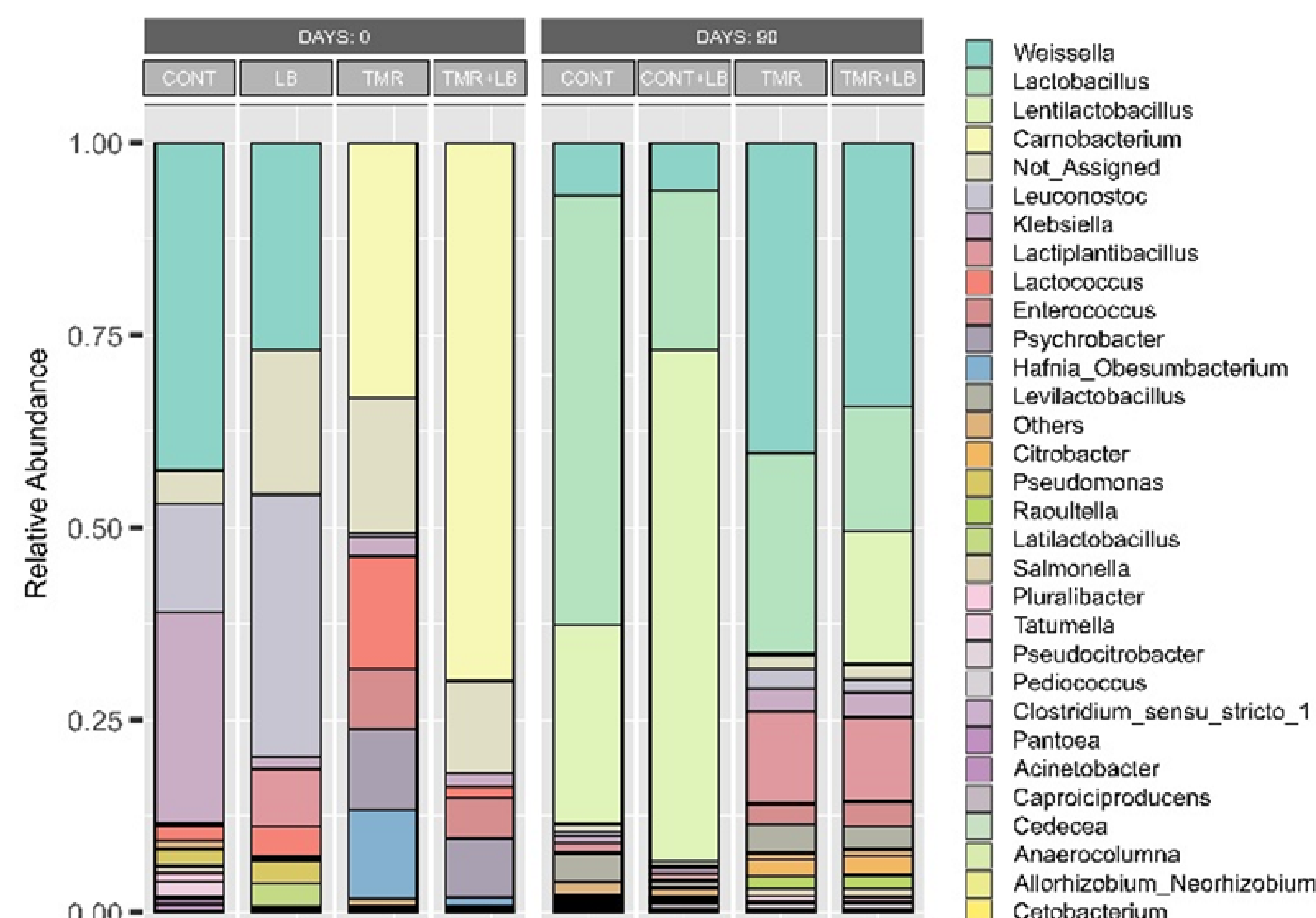


Figure 1. Relative abundance of microbial community (top 30) at genus level revealed by high-throughput 16S rRNA gene amplification before (Day 0, plant) and after ensiling. Silages were evaluated after 90 days of fermentation under control conditions (CONT), total mixed ration (TMR), and treatments with *Lentilactobacillus buchneri* CNCM I-4323 inoculant (Lallemand Animal Nutrition), referred to as CONT+LB and TMR+LB.

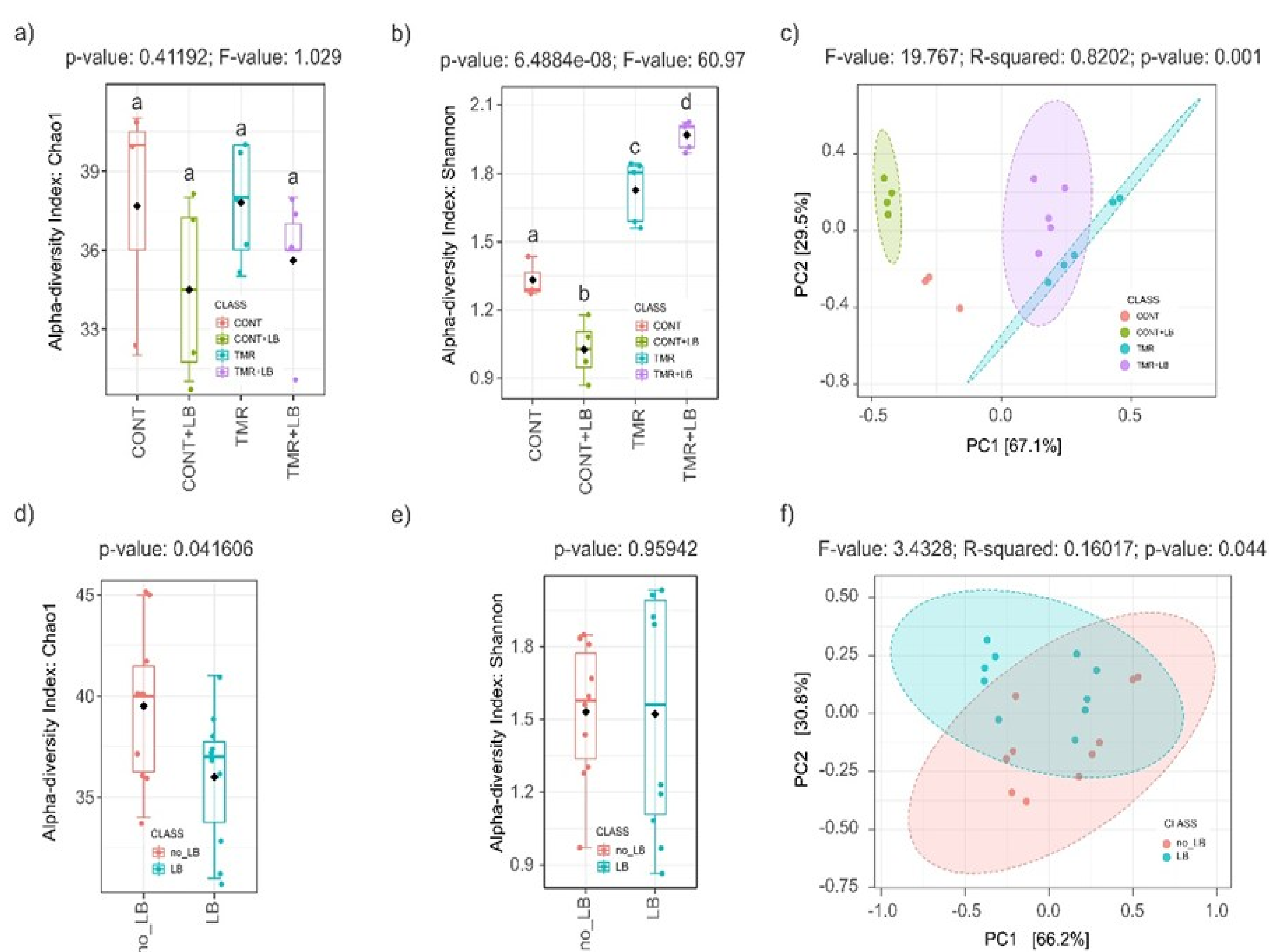


Figure 2. Alpha diversity based on the Chao1 index (a, d), Shannon index (b, e), and beta diversity (c, f). P-values for comparisons are indicated above each graph and were obtained using ANOVA with Tukey's test (a, b), F-test (d, e), and PERMANOVA (c, f). Silages were evaluated after 90 days of fermentation under control conditions (CONT), total mixed ration (TMR), and treatments with *Lentilactobacillus buchneri* CNCM I-4323 inoculant (Lallemand Animal Nutrition), referred to as CONT+LB and TMR+LB.

Conclusions

- ✓ The total mixed ration silage exhibited a higher relative abundance of the genera *Weissella* and *Lactiplantibacillus* compared to exclusive corn silage. Additionally, the inclusion of *L. buchneri* increased the relative abundance of the family Lactobacillaceae. These findings support the use of TMR silage based on whole-plant corn with the addition of a microbial inoculant.

Acknowledgements

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References

- ✓ Arriola, K. G., Oliveira, A. S., Jiang, Y., Kim, D., Silva, H. M., Kim, S. C., & Adesogan, A. T. (2021). Meta-analysis of effects of inoculation with *Lactobacillus buchneri*, with or without other bacteria, on silage fermentation, aerobic stability, and performance of dairy cows. *Journal of Dairy Science*, 104(7), 7653-7670.