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Fermentation products, nutritive value, and aerobic stability of pineapple by-product silage prepared using *Lactobacillus buchneri*

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Abstract

Due to high moisture content (> 80% fresh matter), pineapple by-products were commonly ensiled with absorbents and homofermentative lactic acid bacteria (LAB) to preserve the nutrients and prevent mal-fermentation. Nevertheless, aerobic stability remains an issue, which could be addressed by introducing heterofermentative LAB, such as *Lactobacillus buchneri*. Thus, the current study was conducted 1) to determine the effect of *L. buchneri* on the chemical composition, energy value, digestibility, fermentation products, and aerobic stability and 2) to identify the correct ensiling time for pineapple by-product silage. A proportion of 4 crowns : 1 peel and pulp was mixed, and applied with distilled water (T1; control); inoculated with *L. buchneri* (Magniva Steel, Lallemand; T2); and inoculated with *L. buchneri* and homofermentative bacteria with enzymes (Magniva Classic, Lallemand; T3). Four replicates per treatment were prepared using vacuum-sealed bags and ensiled for 30, 60, and 75 days. After opening the silage, chemical composition, energy value, digestibility, fermentation products, and aerobic stability were determined. The addition of inoculants did not affect the chemical compositions, energy value, and digestibility ($p > 0.05$), but a significant effect was observed with the ensiling length ($p < 0.01$). A significant decline in the pH level from 4.53 to a range between 3.42 and 3.46 after 7 days of ensiling was observed in the control and inoculated silages ($p < 0.01$), while an increase in the ammonia-nitrogen concentration was found in the inoculated silages from 0.21 to 0.32 g kg⁻¹ nitrogen at the end of the ensiling. A greater concentration of acetic (4.56 to 5.13 g kg⁻¹ DM) and propionic acid (3.09 to 3.97 g kg⁻¹) was detected in inoculated silages after 30 days of ensiling ($p < 0.01$), resulting in a lower lactic-to-acetic acid ratio (2.93 to 3.21), and improved aerobic stability ($p < 0.01$). Hence, inoculants may be unnecessary for preserving the nutritional components of pineapple by-products during ensiling. However, they notably improve the aerobic stability of silage (T1: 18–22 hours), especially with ensiling periods of at least 75 days (T2 and T3: 26–74 hours).

Keywords: Acetic acid, ensiling, epiphytic LAB, lactic-to-acetic acid ratio