



Christian-Albrechts-Universität zu Kiel

Agrar- und Ernährungswissenschaftliche Fakultät



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

Lizardo, Rona Cathrina<sup>1\*</sup>; Salazar-Cubillas, Khaterine<sup>1</sup>; Arango, Jacobo<sup>2</sup>; Dickhoefer, Uta<sup>1</sup>

<sup>1</sup>Institute of Animal Nutrition and Physiology, Kiel University, Germany <sup>2</sup>The Alliance of Biodiversity and CIAT, Colombia; \*Contact: info@aninut.uni-kiel.de

### Introduction

- Pineapple by-products (i.e., core stalk, peel, crown, and pulp) account for 45 to 65% of pineapple fruit by weight (Upadhyay et al., 2013). They degrade rapidly due to the high moisture and sugar contents.
- Ensiling using absorbents and homofermentative lactic acid bacteria has been shown to preserve the nutritional quality of the by-products (Nkosi et al., 2021).
- However, aerobic stability of pineapple by-product silages has not been researched, and it might be improved using Lactobacillus buchneri.

### Materials and Methods

- Pineappple by-products were freshly collected from a processing plant in Palmira, Valle del Cauca, Colombia.
- Four parts of shredded crown were mixed with 1 part each of peels and pulp.

#### **Objectives**

- To determine the effect of *Lactobacillus buchneri* and its interaction with homofermentative lactic acid bacteria on the chemical composition, fermentation products, and aerobic stability of silages from pineapple by-products.
- To identify the effect of different ensiling lengths on nutrient quality and aerobic stability of pineapple by-product silage.

# Conclusion

Bacterial inoculants do not affect the silage fermentation, but the addition of *L. buchneri* and an enzyme mixture notably improves the aerobic stability of pineapple by-product silage of when ensiled for 75 days.

## Results

Chemical composition of silages did not differ between treatments ullet(p > 0.05), irrespective of the ensiling length.

**Table 1** Effect of ensiling length on the chemical composition (in g/kg dry matter or as stated) of pineapple by-product silage (n=4).





Crown





Pulp

Pineapple by-products were treated with:



1 mg *L.buchneri* + 2 mg Homofermentative lactic acid bacteria with enzymes per kg of fresh matter (Magniva Classic, Lallemand)

Variables	Ensiling length (days)				<b>SEM</b>	<i>p</i> -
	0	30	60	75	SEIVI	value
Dry matter, g/kg FM	179	171	172	174	0.40	<0.01
WSC	40.6	1.06	3.06	2.79	3.12	< 0.01
Crude protein	80.2	72.7	86.4	85.9	0.88	< 0.01
aNDF <sup>1</sup>	503	523	506	502	2.20	0.02
ADF <sup>2</sup>	231	247	240	242	1.10	< 0.01

<sup>1</sup> Neutral detergent fiber assayed with a heat-stable amylase and expressed inclusive of residual ash. <sup>2</sup>Acid detergent fiber inclusive of residual ash. FM = fresh matter; WSC = water-soluble carbohydrates.



**Distilled water** (control)

*buchneri* per kg of fresh matter (Magniva Steel, Lallemand)



Per treatment, 4 bags were prepared each containing 1 kg of pineapple by-products.

- Ensiling length: 30, 60, 75 days.  $\bullet$
- Statistical analysis: ANOVA with repeated measures and significance level of p < 0.05.

60 75 0 7 14 30 Ensiling length (days)

0714 30 60 75 Ensiling length (days)

**Figure 1** Effect of ensiling length and inoculants on pH (a) and acetic acid concentration (b) of pineapple by-product silage (n=4).



Figure 2 Effect of ensiling length and inoculants on the aerobic stability of pineapple byproduct silage (n=4).

"As part of the ATSAF Academy, this research was funded by the Junior Scientists Program project (JSP). JSP, commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ), is being carried out by ATSAF (Council for Tropical and Subtropical Agricultural Research) e.V. on behalf of the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH."

Upadhyay et al. 2013. Journal of Food Science and Technology Nepal, 6, 10–18. Nkosi et al. 2021. Veterinary Medicine and Science (Vol. 8), Chapter 7, 1-18.