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FERMENTATION QUALITY AND SENSORY CHARACTERISTICS OF ENSILED TOMATO POMACE AND CORN COB MIXTURES

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ABSTRACT

This study evaluated the fermentation quality and sensory characteristics of ensiled tomato pomace and corn cob mixtures at varying ratios. Tomato pomace and corn cobs were collected, processed, and ensiled in four proportions (80:20, 70:30, 60:40, 50:50) for 21 days. Physical attributes including observation, colour, aroma, and texture, alongside pH values, were assessed. Results showed notable improvements in sensory quality as corn cob inclusion increased. The 80:20 mixture had the highest pH (4.63) and lower sensory ratings, while the 60:40 and 50:50 mixtures exhibited lower pH values (4.22) and superior sensory attributes, including very pleasant aroma and excellent observation scores. A balanced combination of tomato pomace and corn cob provided optimal moisture and fermentable substrates for efficient lactic acid fermentation. Findings highlight the potential of tomato pomace–corn cob silage as a sustainable feed resource for ruminants, with 50:50 and 60:40 mixtures offering the most desirable fermentation and palatability outcomes.

Keywords: Ensiled, Ruminant, Tomato pomace, Corn-cob, Feeding

Description of Problem

Feed scarcity and high costs are persistent challenges in livestock production, particularly in sub-Saharan Africa where conventional feed ingredients are expensive and often compete with human consumption (1). Agro-industrial by-products such as tomato pomace and corn cobs provide a valuable alternative, offering cost-effective and sustainable feed resources while reducing waste and environmental pressure (2). Tomato pomace, a residue from tomato processing, is rich in fibre, fermentable carbohydrates, and bioactive compounds such as lycopene, but its high moisture content can limit preservation and utilisation if not properly processed (3). Corn cobs, on the other hand, are abundant, dry, and fibrous, with good potential to balance the excess moisture in tomato pomace during ensiling (4).

Ensiling is an effective method of preserving high-moisture feedstuffs through lactic acid fermentation, which reduces pH and improves storage stability (5). The success of ensiling depends on the chemical and physical properties of the feed mixture, including moisture balance, carbohydrate availability, and compaction (6). A balanced ratio of wet and dry by-products enhances microbial fermentation, producing silage with desirable physical attributes such as pleasant aroma, firm texture, and stable colour (7). Previous studies have demonstrated that combining tomato pomace with fibrous materials improves fermentation quality and animal acceptability (8). However, research remains limited on the optimal proportions of tomato pomace and corn cob for ensiling. This study therefore investigates the sensory characteristics and fermentation quality of ensiled tomato pomace–corn cob mixtures at different ratios.

Material and methods

Experimental Site

The study was carried out at the Department of Animal Science, Ahmadu Bello University, Zaria. The study area falls within latitudes11° 8’ 19.56’’ N and longitudes 7° 45’ 51.22’’ E, with altitude of 640m above the sea level (Google Earth, 2022). Shika is located within the Northern Guinea Savannah ecological zone with an average annual rainfall of 1,100mm which start from late April/early May and ends mid-humidity

during the harmattan and wet season are 21-72% respectively (9).

Source of experimental feedstuff

The experimental feedstuff was tomato pomace and corncob. The tomato pomace was collected from tomato after grinding the tomato. The corncob was collected from farmland of Field Practical Training (FPT) of the undergraduate B. Agriculture student practical after crop harvest, shelled and was ground using hammer mill and stored before ensiling.

Ensiling procedure and evaluation

Each treatment containing the proportions specified ratios of TP to CC was thoroughly mixed, put in a plastic bag compressed to remove air and closed. Then the bags were stored for 21 days away from sun light to ferment. At the end of the ensiling period, samples of ensiled materials were taken from each plastic bag after 21days for physical characteristics, pH and chemical composition evaluation.

Results and Discussion

Physical characteristics and pH of ensiled TPCC

Table 1 shows variations in sensory attributes and pH across the four mixtures. The 80:20 ratio had higher pH (4.63) and moderate sensory ratings, while increasing corn cob content (70:30, 60:40, 50:50) improved aroma, observation scores, and reduced pH (4.26–4.22). These differences highlight the role of corn cob in balancing moisture, supporting lactic acid bacteria activity, and enhancing silage quality. Tomato pomace's high fermentable carbohydrate content contributed to acidity, while corn cob's fibre and lignin improved structure and reduced effluent loss (10, 11). The lower pH values achieved fall within the ideal silage range of 4.0–4.5 (12), confirming successful fermentation.

Table 1: Physical characteristics and pH of ensiled TPCC

Ensiled diet	80:20	70:30	60:40	50:50
Observation	Moderate	Good	Excellent	Excellent
Colour	Brown	Brown	Brown	Light Brown
Aroma	Fairly Pleasant	Pleasant	Very Pleasant	Very Pleasant
Texture	Firm	Firm	Firm	Firm
P^H	4.63	4.26	4.22	4.22

Ensiled TPCC score (0-5 scale) based on physical characteristics and pH value

As presented in Table 2, sensory scores decreased progressively from D1 to D4. The 50:50 mixture (D1) achieved the highest observation (5.00) and aroma (5.00) scores, while the 80:20 mixture (D4) recorded the lowest. Higher tomato pomace levels likely increased moisture and reduced fermentation efficiency, while balanced mixtures improved colour, aroma, and texture (13,14). These findings are consistent with reports that optimal silage quality is achieved when moisture and carbohydrate levels are well balanced (15).

Table 2: Ensiled TPCC score (0-5 scale) based on physical characteristics and P^H value

Ensiled diet	D1	D2	D3	D4
Observation	5.00	4.60	4.00	3.40
Colour	4.80	4.20	4.00	3.20
Smell	5.00	5.00	4.00	3.40
Texture	4.60	4.20	4.00	3.60

Conclusion and Application

This ratio exhibited excellent sensory scores, a low pH (4.22) and the highest dry matter intake (0.80 kg/DM), coefficient of preference (1.63) and percentage preference (40.67%), indicating superior palatability and fermentation quality.

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