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Fermentation Quality and Aerobic Stability of Maize Stover – Banana Pseudostem Mixed Silages in Ethiopia

ASHENAFI MITIKU^{1,3}, DRIES VANDEWEYER^{1,3}, BART LIEVENS^{2,3}, SOFIE BOSSAERT^{3,2}, SAM
CRAUWELS^{2,3}, BEN AERNOOTS⁴, YISEHAK KECHERO⁵, LEEN VAN CAMPENHOUT^{1,3}

¹*KU Leuven, Dept. of Microbial and Molecular Systems, Belgium*

²*KU Leuven, Laboratory for Process Microbial Ecology and Bioinspirational Management, Belgium*

³*KU Leuven, Leuven Food Science and Nutrition Research Centre, Belgium*

⁴*KU Leuven, Dept. of Biosystems, Belgium*

⁵*Arba Minch University, Animal Sciences, Ethiopia*

Abstract

In Ethiopia, conservation of hay and crop residues are typically practised in an open space, where the sunlight, rainfall and deterioration might cause leaching of nutrients. This study was conducted to evaluate the fermentation and microbial quality of dry and fresh maize stovers mixed with banana pseudostem in different proportions. The dry maize stover was collected after full maturation of the maize plant for grain harvest and fresh maize stover at two-thirds of milking stage. The two agricultural byproducts were chopped (in 2–4 cm) separately using a chopper and mixed into six treatments based on their fresh weight basis. The banana pseudostems were ensiled with two levels (20, 30 %) of dry maize stover, two levels of (60, 80 %) fresh maize stovers. In addition, there was one level (100 %) of fresh maize stovers and one treatment of 95 % banana pseudostem with 5 % of molasses. The treatments are further referred to as T1, T2 T3, T4, T5 and T6 respectively. Samples were taken on 0, 7, 14, 30, 60 and 90 days for physicochemical and microbial analysis. The results showed there was significant ($p = 0.001$) reduction in pH for all treatments. However, in T1 and T2, the pH failed to drop below 4.5 throughout the entire fermentation period of 90 day, while there was no significant ($p = 1.000$) difference between these two treatments. The lactic acid bacteria counts reached a maximum while the Enterobacteriaceae counts decreased below the detection limit (2 log g/cfu) in the first 14 days. Although in all treatments the *Clostridium* spore counts were above the maximum level of 2 log g/cfu, this was not accompanied by a higher pH, except in T1 and T2. Surprisingly, the aerobic stability was higher in T1 and T2, while the well fermented (pH < 4.5) byproducts (T3, T4, T5 and T6) showed a lower aerobic stability after 60 and 90 days fermentation. This suggests that mixed silages improve the fermentation quality, but not always the aerobic stability of the byproducts.

Keywords: Aerobic stability, banana pseudostem, maize stover, microbial profile, mixed silages