Abstract

Ensiling Unsalable Vegetables with Crop Sorghum to Produce High Quality Feed †

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Abstract: Vegetables regarded as unsalable at processing often undergo disposal into landfill, threatening food security and increasing emissions through decomposition. Ensiling vegetables with forage crops is a suggested method of waste reduction that could also double as a livestock feed. Carrot or pumpkin, ensiled at 0%, 20% or 40% DM with crop sorghum, and with or without a second-generation silage inoculant were assessed for nutritive composition, organic acid profiles, aerobic stability and in vitro rumen fermentation characteristics. Silage was sampled after 70-days ensiling for nutrient composition, 14-day aerobic stability, organic acid profiles and microbial diversity. Sorghum ensiled with carrot or pumpkin at 20% or 40% DM increased crude fat (P ≤ 0.01) and decreased (P ≤ 0.01) silage surface temperature upon aerobic exposure compared to the control. Bacterial communities analyzed through 16S rRNA gene sequencing linearly increased (P ≤ 0.01) in diversity as vegetable proportion increased in the silage; dominated by Lactobacillus species. Upon assessment in vitro, there was an increase (P ≤ 0.04) in in vitro digestibility and some CH4 parameters (% CH4, and mg CH4/g DM), with no effect (P ≥ 0.17) on remaining CH4 parameters (mL CH4/g DM, mg CH4/g DMD), gas production or pH. However, increasing vegetable proportion decreased acetic and increased propionic acid concentrations respectively, decreasing A:P ratio and total VFA as a result (P ≤ 0.01). Results from this study indicate including carrot or pumpkin at 20% or 40% DM in a sorghum silage can produce a highly digestible, microbially diverse and energy-rich livestock feed whilst acting as a method of waste diversion of considerable environmental benefit.

Keywords: unsalable vegetables; silage production; microbial profiling


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