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Assessing the impact of dietary variation on milk production, composition, and fatty acid profile in dairy cows from Bangladesh

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Abstract

In tropical countries, the cultivation of various high-yielding grasses for cattle feeding has become increasingly prevalent. In Bangladesh, grass types such as Napier Packchong, German, Jumbo, Oat, Khesari Kalai, Mati Kalai and Maize are commonly cultivated for dairy cow feeding. However, the impact of these grasses on the quality of cow's milk remains unclear. Therefore, this study investigates the effects of the most commonly used Napier Packchong, German, and Maize fodder on milk production and quality, focusing on milk composition and fatty acid (FA) profile. The feeding trial was conducted at the Bangladesh Agricultural University Dairy Farm, Mymensingh-2202 from Dec 2021 to March 2022 involving 12 lactating cows (mean body weight: 304.5 ± 21.0 kg, daily dry matter intake: 9.9 ± 0.6, R:C 3:2 (DM basis), body condition score: 3.2 ± 0.1) in three groups viz. Napier Packchong, German, and Maize group. A total of 48 pooled milk samples were collected at 7-day intervals and subjected to analyses. Fatty acid analyses were conducted by Gas Chromatography – Flame Ionisation Detector. One Way analysis of variance was done to elucidate the fodders impact and a redundancy analysis between feed and FA was also performed in statistical software R. Milk yield (6.9 ± 1.6 kg cow^{-1} day^{-1}), fat (5.0 %), and protein (3.0 %) percentages did not vary significantly among the groups. The saturated, monounsaturated, and polyunsaturated fatty acid content also did not vary significantly. The redundancy analysis indicated that milk from maize-fed cows positively correlated with saturated FAs ($p = 0.001$), whereas, the same was found negative for milk from German-fed cows. Regarding individual FAs, milk from maize-fed cows exhibited positive correlations with butyric, myristic, and palmitic acids ($p = 0.002$). The same correlations were found reverse for milk from German-fed cows. In conclusion, although there were no discernible compositional differences among the treatments, the positive correlation with unsaturated FAs in milk from German grass-fed cows indicating superior milk quality.

Keywords: Diet, fatty acids, milk purity

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