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"Solidarity in a competing world — fair use of resources"

Effects of Feeding Tropical Forage Legumes on Nutrients Digestibility and Performance of Dairy Cows

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Abstract

In El Salvador, most dairy farms rely on sorghum or maize silage as basal diet. These forages are low in protein, so that cattle are commonly supplemented with expensive human-edible protein feeds such as imported soybean. Hence, in this study two legumes, jackbean (*Cannavalia ensiformis*) silage and cowpea (*Vigna unguiculata*) hay, were studied as alternative protein sources for dairy cows to reduce farmers' dependency on imported protein sources.

Eight crossbred cows (451 ± 50.7 kg body weight; 9.4 ± 2.60 kg milk d^{-1}; 125 ± 50.6 days in milk) were used in a replicated 4×4 latin square design with four periods (14 days adaptation + 7 days sampling).

Four sorghum silage-based diets differing in their main Nitrogen source were tested: Soybean meal (control), jackbean silage, cowpea hay, or urea. A concentrate mixture was supplemented to create iso-proteic (125 g crude protein kg^{-1}dry matter (DM)) and iso-energetic (8.7 MJ metabolisable energy kg^{-1} DM) diets with a forage to concentrate ratio of 70:30 (DM basis). Feed intake, apparent total tract nutrients digestibility, energy corrected milk yield (ECM) and composition, and cost-benefit ratio were studied.

Dry matter intake increased when feeding jackbean (14.8 kg d^{-1}) and cowpea (14.6 kg d^{-1}) compared with the control diet (13.6 kg d^{-1}) without affecting ECM (ranging from 8.8. to 9.2 kg d^{-1}). There were no differences in apparent DM and nitrogen digestibility (ranging from 0.52 to 0.58) across all diets. Legumes did not change fat, protein, or lactose contents of milk ($P > 0.10$). Even though not statistically different, cost-benefit ratio was 0.18 US$ higher with the jackbean diet compared with the Control, which might still be an incentive for farmers. Furthermore, ECM relative to human-edible protein intake (*i.e.* from cereals and soybean) was higher when legumes were fed compared with the Control diet; however, compared with the diet containing urea, only the cowpea diet showed a higher ratio of ECM to human-edible protein intake. The results suggest that these legume forages, as alternative protein sources, may also reduce competition in resource use for feed or food production.

Keywords: Legume silage, milk, protein, tropical dairy

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