ABSTRACT

Urea-molasses Pre-treatment to Enhance Nitrogen Gain, Digestibility, Intake and Milk Yield from Crop-Residues in Smallholder Dairy Farms in Eastern Africa

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Aim: Crop residues from dual-purpose crops, particularly from coarse cereal and leguminous crops are by far the most important feed source available to smallholder dairy farmers in highlands and lowlands in Eastern Africa. Therefore, this study aimed to (1) determine the effect of urea and molasses pre-treatment on nitrogen gain, digestibility and rumen micro-biota of crop residues by in vitro culture; and (2) validate the effect of feeding pre-treated urea and molasses maize stover on feed intake and milk yield of dairy cows.

Methods: Fresh dry crop residue samples were collected in highlands and lowlands agro-ecological zones of Manyara region, Northern Tanzania and pre-treated with urea and molasses. The in-vitro culture experimental design was completely randomized block with 3 runs (replicates) and 3 crop residue treatments (control, urea, urea + molasses), with duplicates of 2 bottles per each treatment within a run. From the in vitro analysis, only maize stover had significant ($p \leq 0.05$) urea and molasses pre-treatment effect, and was therefore considered for comprehensive in vitro culture. The effect of urea and molasses pre-treatment of maize stover on intake and milk yield was validated in a feeding trial of Friesian cows in Siaya lowlands in Kenya.

Results: Pre-treatment of crop residues with urea and molasses resulted into significant ($p \leq 0.05$) improvements in chemical composition and fermentation products, but not gene copies of selected rumen microbes ($p \geq 0.05$), with exception of methanogens ($p \leq 0.05$). Urea and molasses pre-treated maize stover diet slightly improved milk yield and growth of dairy cows, reduced expenditure on labour with respect to feeding and the cost of producing milk and contributed to an increase in dry matter intake.

Conclusion: Despite the improvements in feeding value of maize stover, and other crop residues in general, with urea and molasses pre-treatment, the efficient utilization to desirable extent is still awaited.

Keyword: crop residues; dairy cattle; milk yield; molasses; nutritive value; dairying; animal feeding