

Evaluation of the Nutritive Value of Enset (*Ensete Ventricosum*) as Livestock Feed in Southern Ethiopia

Summary

Enset (*Ensete ventricosum*), also known as 'false banana', is a perennial herbaceous monocarpic plant, which is grown in southern and south-western parts of Ethiopia for human consumption and animal feed. Apart from some studies conducted to determine the chemical composition and degradability on 3 enset varieties and intake study, there were no comprehensive studies conducted to evaluate the nutritive value of enset. Therefore, the main objectives of this study were to investigate the chemical composition and degradability of different morphological fractions of enset and the nutritive value of enset fractions fed as sole diets or supplemented to the basal diet of wheat straw.

Samples of enset were collected from 5-to 6-year-old 10 selected enset varieties and fractionated into leaf lamina, leaf midrib, pseudostem and corm. Samples were analysed for chemical composition (including minerals) and in sacco degradability studies were performed. Fractions of enset (leaf, pseudostem, corm and their mixture), urea-and-calcium oxide (CaO or lime)-treated wheat straw and *Desmodium introtum* (*Desmodium*) hay were fed as sole diet to evaluate the intake, digestibility and nitrogen utilization. We have evaluated also the supplementary value of enset fractions to the basal diet of wheat straw and *Desmodium* hay. In another experiment, three levels of enset leaf: low (215) medium (417) and high (594 g DM per day), were supplemented to the basal diet of untreated or urea-and CaO-treated wheat straw in sheep feeding.

Significant variation was observed in the content of dry matter (DM), ash, neutral detergent fiber (NDF), in sacco degradability, macro and trace mineral content among morphological fractions and varieties of enset. The DM content of leaf midrib and pseudostem was low compared with other fractions. The NDF content was higher in leaf lamina and pseudostem relative to other fractions. Leaf midrib had the highest ADF content and the lowest was in corm. The DM degradability and ME content ranked in the following order: corm > pseudostem > leaf midrib > leaf lamina.

Most enset fractions were rich sources of major minerals such as phosphorus, potassium, magnesium and calcium (Ca) except corm which is poor in Ca. The sodium content was very low in all fractions. Most fractions were rich in iron and manganese, but deficient in copper, except leaf lamina. The zinc content was high in corm, but low in other fractions.

When fed as sole diet, daily DM and CP intake was higher in sheep fed *Desmodium* hay than those fed pseudostem. The DM intake of enset fractions ranks in the following order for enset fractions: whole enset \geq leaf > corm > pseudostem. Organic matter (OM) digestibility was highest for corm and whole enset and lowest for *Desmodium* hay and untreated wheat straw. The CP digestibility ranged from 0.636 in *Desmodium* hay to 0.408 in corm. The nitrogen (N) balance was highest for *Desmodium* hay and lowest for corm.

In an experiment where ensiled fractions were supplemented to the basal diet of wheat straw and Desmodium hay, no differences were found in total DM or OM intake between diets supplemented with pseudostem, corn and ensiled mixture. The N intake in sheep supplemented with ensiled mixture was higher than in those supplemented with corn and pseudostem. The apparent digestibility of DM was highest for sheep supplemented with pseudostem followed by corn and ensiled mixture. Organic matter digestibility was highest for pseudostem and corn supplemented sheep than for those supplemented with ensiled mixture. There was no difference in N digestibility between treatments. The digestibility of NDF was higher for pseudostem and corn supplemented sheep than for those supplemented with ensiled mixture. The N retention was higher for sheep fed pseudostem and corn than for those fed ensiled mixture. There was no difference in gain per day between sheep fed pseudostem, corn or ensiled mixture.

When different levels of ensiled leaf were supplemented to the basal diet of untreated or calcium oxide treated straw, the mean DM and OM intake was higher ($P < 0.001$) at medium and high levels of supplementation than at low level. Intake of total DM, OM and N was higher ($p < 0.05$) for treated than for untreated straw. Sheep fed medium and high levels of ensiled leaf supplementation had similar weight gain but higher than those supplemented at low level. The digestibility of DM, OM and NDF was highest at medium level of supplementation and the digestibility values declined as the level of supplementation increased to high level. The digestibility of N was lower ($p < 0.05$) for treated than untreated straw. The N retention was similar between treated and untreated straw. The highest mean N retention was at medium level of supplementation. The rumen ammonia N declined ($P < 0.001$) with increasing levels of ensiled leaf to both untreated and treated straw. Sheep fed untreated straw had higher ($P < 0.05$) total purine derivatives excretion, absorbed microbial purines and microbial N supply than those fed treated straw. It can be concluded that there is no major beneficial effect above medium level of ensiled leaf supplementation to both treated and untreated straw.