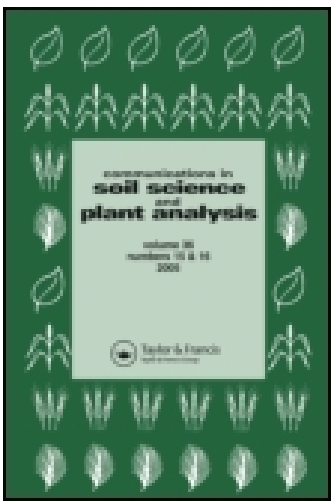


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# Evaluation of nutritive value of Aspilia africana: Preliminary studies

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# EVALUATION OF NUTRITIVE VALUE OF *ASPILIA AFRICANA:* PRELIMINARY STUDIES

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*ABSTRACT*: Digestibility trials were conducted by total collection method on *Aspilia africana* hay as complete feed for castrated goats. The goats had average weight of 22.5±0.58 kg and age of 18.0±0.57 months, respectively. The prepared *Aspilia africana* hay had a chemical composition of 10.56% crude protein, 28.3% acid detergent fibre, 31.8% neutral detergent fibre, and digestible energy of 3.45 kcal/g DM. The digestibility coefficients for feed dry matter, crude protein, acid detergent fibre, neutral detergent fibre, and gross energy were 62.5±4.7, 78.85±4.59, 59.44±2.17, 63.3±1.44, and 66.47±2.54, respectively. The implications of these finding with regard to small ruminant production in West Africa are discussed.

## INTRODUCTION

Lack of adequate dry season feed has been identified as the major drawback in ruminant livestock production in most sub-Saharan African countries (ILCA, 1980). Whilst there exists excess forage during the rainy season, this cannot be preserved for use during the drier periods of the year due to logistic and technical problems. Most ruminant livestock farmers, therefore, depend on herbs, forbs, and crop residues to sustain their stock during the periods of scarcity.

Among the forbs is *Aspilia* species. It is made up of *A. africana* and *A. brussei.* In a normal grassland agriculture and crop farming in Ghana, these are regarded as weeds. They are, however, grazed and zero grazed by cattle, sheep, goats, and rabbits. Irrespective of the fact that *Aspilia* species has been used as feed by ruminant livestock, information on its nutritive value is not available.

The objective of this study was to investigate the usefulness of *Aspilia africana* when fed to ruminant livestock with the view to make suggestions as to optimise its use. This could make a major inpact on livestock output, especially small ruminants in areas where it is readily available.

## MATERIALS AND METHODS

The material for this investigation, *Aspilia africana*, was obtained from the pasturage of the Teaching and Research Farm, University of Cape Coast, Cape Coast. *Aspilia africana* plants which had just flowered for 3-5 days were harvested and sun-cured into *Aspilia* hay.

The hay was fed to castrated goats, aged 17 to 19 months, and weighing 21 to 22.5 kg in metabolic cages. Fourteen days adjustment period was allowed and faecal and feed sampling carried out over the subsequent seven days. All the experimental animals were subjected to the same routine management practices.

Faeces, ort, and feed were analysed for dry matter (DM), crude protein (CP) and total ash were determined by AOAC (1970) methods. Lignin, acid and neutral detergent fibres were determined using the analytical procedures of Van Soest (1963). Gross energy of feeds, faeces, and orts were determined from a Gallemkamp ballistics bomb calorimeter. With respect to minerals, the samples were dry ashed in a muffle furnace and dissolved in HCl. Calcuim (Ca), magnesuim (Mg), zinc (Zn), copper (Cu), and iron (Fe) contents in the prepared digests were determined using a Perkin Elmer Model 403 Atomic Absorption Spectrophotometer. Sodium (Na) and potassium were determined by flame photometry, and phosphorus (P) by colorimetry using an AutoAnalyser®.

## RESULTS AND DISCUSSION

The chemical composition of just flowered *Aspilia africana* used in the study is shown in Tbale 1. The crude protein countent of 10.5% is above the recommend- ed minimum crude protein level of 6-7% for effective functioning of the rumen microbes (Preston and Leng, 1987). This suggests that the *A. africana* hay could be fed without further protein supplementation to ruminant livestock, and there should be no deleterious effect in the functioning of rumen microflora due to lack of crude protein.

The high energy level (Calculated ME, Table 1) obtained from the *A. africana* hay made it comparable to any good quality ruminant feedstuff, such as turnip

TABLE I. Chemical composition of just flowered *Aspilia africana* hay (on dry matter basis).

| Component | Average Value |
|---|---|
| % | |
| Crude protein | 10.56 |
| Acid detergent fibre | 28.30 |
| Neutral detergent fibre | 34.10 |
| Lignin 0.50 | |
| Digestible Energy (Kj/gDM) | 14.49 |
| Metabolizable Energy (kj/gDM) | 11.88 |
| **mg/kg** | |
| Calcium | 11600 |
| Phosphorus | 1920 |
| Magnesium | 4130 |
| Potassium | 30500 |
| Sodium | 133 |
| Manganese | 96.7 |
| Iron | 450 |
| Copper | 12 |
| Zinc | 35.5 |

*Calculated as ME = O.82DE.



(roots and tubers), rye grass at ear emergence, potato silage, and better than other hays, dried grass, green legumes and crops, and straws used in feeding ruminant livestock (McDonald, Edwards, and Greenhalgh, 1981)

The micromineral composition of *A. africana* indicates that the hay contained optimum levels of Cu, Fe, and iron, but lower amount of Zn suggested for feeds for ruminant livestock. ARC (Agricultural Research Council, 1980) recommended that feedstuffs for ruminant should contain the following levels of microminerals (mg/kg DM): Cu - 5 for sheep and 10 for cattle, Fe - 30 for dry cows and 200 for lactating cows, Mn - 40, and Zn - 50 for all ruminants.

With respect to macrominerals, the, Ca, Mg, and K levels satisfied requirements for ruminant livestock diets (*i.e.* 0.2% Mg, 0.6-0.0% K, Bondi, 1987).

These observations are in line with an earlier report (Bondi, 1987) that most roughages contain sufficient quantities of Fe, Cu, and K to meet requirements for most ruminant livestock. The high K concentration of 3.5% which is 0.5% above the recommended maximum could reduce Mg availability and utilization with the long term effect of hypomagnesemia. However, some of the effect could be offset

TABLE 2. Intake and disgestibility of feed nutrients from Aspilia africana hay by castrated goats.

| | VALUE ± SE |
|---|---|
| Number of Animals | 4 |
| Average Live Weight Intake | 22.00±0.28 |
| Dry Matter (g/day/animal) | 352.86±7.95 |
| Crude Protein (g/day/animal) | 56.67±3.42 |
| Crude Protein as a Percentage of Dry Matter Intake | 16.34+0.18 |
| Dry matter/100kg Liveweight | 1.75±0.1 |
| Digestibility Coefficients % Dry matter | 62.5±4.7 |
| Crude Protein | 78.85±4.59 |
| Acid Detergent Fibre | 59.44±2.17 |
| Neutral Detergent Fibre | 63.34±1.44 |
| Gross Energy | 66.47±2.54 |



by the relatively high Mg content (0.41%) which is twice the recommended level of 0.20% suggested by Bondi (1987). The Na and P levels suggested the need to supplement with commercial mineral supplements diet based solely on flowered *A. africana*.

Table 2 shows the average intake of dry matter and crude protein (g/day) and the apparent digestibility coefficients (%) of nutrients from *A. africana* hay. The average voluntary intake of dry matter (352.86±7.95) which amounted to 1.75±0.1% of animal's body weight was within reported dry matter intakes of 1-3% of body weight (Preston and Leng, 1987) for tropical pastures. This reported amount of 1-3% varied according to pasture compostion and time of season. The high energy status of the hay could have accounted for the low value of 1.75±0.1%.

This is because animals eat primarily to satisfy their energy requirement. Secondly, with animals being restricted to metabolic cages, their daily energy requirements were reduced, hence the low dry matter intake.

The apparent dry matter digestibility of 62.5±4.7 indicated that *A. africana* can be fed as a whole meal to support ruminant livestock for both maintenance and

productivity. Preston and Leng (1987) reported that tropical forages with apparent digestibility coefficients of 55-65% have high potential to support growth and milk production.

The high crude protein digestibility coefficent (Table 2) suggested that the *A. africana* hay could be used as a source of highly degradable nitrogen for ruminant livestock on high fibre, low nitrogen standing hay during the dry seasons of the year.

The high degradability of acid and neutral detergent fibre (Table 2) led to a high digestibility coefficient for gross energy. The combination of high crude protein and gross energy digestibility makes the *A. africana* hay a suitable material for use as supplement to low quality forages available for ruminant livestock as feed during the dry seasons of the year. This is because after digestion there will be adequate levels of both protein and energy, thus ensuring effective utilization of each other by the animal. This will help to improve the efficiency of utilization of low quality tropical forages and other fibrous crop residues that form the bulk of ruminant livestock feed during the dry seasons of the year. This will inturn help to prevent loss of livestock which results from malnutrition.

## CONCLUSION

It is feasible to feed *A. africana* because it grows in most vegetational zones in the country (Ghana). Also, for most periods of the year when grasses and legumes are dried, they remain green and grow luxuriantly. *Aspilia africana* can be used to reinforce existing pasturage to increase the quality and quantity of nitrogen obtained from available fodder for ruminant livestock feeding.

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