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Determination of Nutritive Values of Kenaf (Hibiscus Cannabinus) and Moringa Oleifera Leaves for Goat Feed

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ABSTRACT

Goat industry in Malaysia is constrained by factors such as malnutrition due to lack of feed that contain the essential nutrients, the objective of this study were to compare the selected nutritive values, in goats. Proximate analysis was conducted on Kenaf and Moringa leaves collected from Bachok, Kelantan in malaysia. Kenaf, leaf contained 25.6% DM, 23.6% CP, 14.3% CF, 2.1% EE, 324.1Kcal/g GE, 6.1% ASH, 4.14% Ca, 2.07% P, 0.54% Mg, 0.18% Na, 2.23% K, 207 ppm Fe, 9 ppm Cu, 20 ppm Mn, 18 ppm Zn, while for Moringa, 23.6% DM, 25.2% CP, 7.2% CF, 4.2% EE, 9.2% ASH, 345.8Kcal/g GE, 0.98% Ca, 2.13% P, 0.45% Mg, 0.02% Na, 1.30% P, 250 ppm Fe, 10 ppm Cu, 290 ppm Mn, and 38 ppm Zn In conclusion, the study showed that the leaves of the two plants contained significant quantity of nutrients required for feeding goats. Comparison of the mean differences in the nutritional and mineral composition of kenaf and Moringa t-test was used Statistical analysis was performed by using the software SPSS version 17.0. The post hoc statistical significance test employed was Duncan, differences between the means were considered significant at $P < 0.05$.

Keywords : Feed, Goat, Kenaf, Moringa, Nutritive Value

I. INTRODUCTION

Nutrition in Goat; proper nutrition is essential for the health and productivity of all animals and is the basis of successful production systems. A well-planned and executed preventive health program cannot overcome problems that are created by poor nutrition, nor can advanced reproductive technologies overcome nutritional limitations of reproduction. Therefore, nutrition of the goat is of paramount importance for successful goat production. Nutrition is the science of providing nutrients to animals in adequate amounts and in forms that the animals will consume. For sustainable and profitable production, these nutrients must also be provided in a cost-effective manner. (Wan Zahari *et al.*, 2016)

Kenaf is an annual tropical plant belonging to the hibiscus family and closely related to cotton *(Gossypium hirsutum),* okra *(Abelmochus esculentus)* and "bunga raya" (*Hibiscus*). Kenaf is tolerance to drought and adaptable to various local agro-climatic conditions. It is a fast growing plant, rising to heights of 3.0-3.2 m in about 44.5 months. The dry matter yield of Kenaf can go up to 30/tons/ha/year, depending on variety, age, soil condition and rate of fertilizer application. Thus it has a great potential to be utilized as a fodder source for ruminant livestock (Wan Zahari *et al.*, 1999).The multipurpose utilization and development of Kenaf as a potential crop has been the subject of numerous researchers in many countries including Malaysia. The use of Kenaf as a feed source has been extensively reported (Chow *et al.*, 2000) but its nutritive value information in Malaysia is scanty.

Moringa oleifera is another plant which has potential to be utilized. Despite considerable interest in the use of *Moringa oleifera* as a nutrient source, gaps and inconsistencies in the information on the nutrient content of this interesting plant remain. With the paucity of information on the nutritional values of Kenaf and Moringa as animal feeds in this part of the world, this research is aimed at determining the nutritive content of these two plants so as to recommend to local farmers, their use as fodders or to be incorporated into feeds as supplements as they are readily available and affordable. (Onyekwere and Nwafor, 2014)

II. MATERIALS AND METHOD

The powdered leaves of Moringa and Kenaf were analysed for moisture content, ash, crude protein, ether extract and crude fibre. For each analysis, the experiment was replicated three times. The nutritive contents were carried out by the various methods described by AOAC procedure (2002). Dry matter (DM) content was determined as described by James (1995). Crude Ash content was determined using ignition method (CARBOLITE, United Kingdom).

Crude Protein content was determined by a Kjeldhal method (Mc Donald *et. al.*, 2011). Ether Extract (EE) as described by McDonald *et al.* (2011). Crude Fibre was determined according to the protocol described by Gerhardt (2011). The mineral content was determined by atomic absorption spectrophotometer (Prapasri *et.al.,* 2011). Determinations of macro and micro minerals, and heavy metals were done by using Atomic Absorption Spectroscopy, Pinnacle 900 Model (Pelkin-Elmer,USA) to determine Sodium (Na), Potassium (K), Calcium (Ca), Magnesium (Mg), lead (Pb), Cadmium (Cd), Copper (Cu), and Zinc (Zn).

Comparison of the mean differences in the nutritional and mineral composition of kenaf and Moringa t-test was used Statistical analysis was performed by using the software SPSS version 17.0. The post hoc statistical significance test employed was Duncan, differences between the means were considered significant at $P < 0.05$.

III. RESULTS AND DISCUSSION

The nutrient content of Moringa and Kenaf leaves is shown in Table 1. The CP, EE, GE, and ash content of Moringa were higher than that of Kenaf leaves at ($P<0.05$). However, the DM, and CF, content of Kenaf was higher than that of Moringa at ($P<0.05$).

Table 1. Nutrient content of Moringa and Kenaf leaves.

Proximate analysis	Dry matter%	Crude% protein	Ether Extract%	Crude fibre%	Ash%	Gross + Energy
Leaves Moringa	23.6±0.2	25.2±0.9	4.2±0.1	7.2±0.2	9.2±0.06	345.8Kcal/g
Kenaf	25.6±0.3	23.3±0.6	2.1±0.0	14.3±0.6	6.1±0.5	324.1Kcal/g
P value	>0.05	>0.05	<0.05	<0.05	<0.05	<0.05

Table 2. Macro mineral content of Kenaf and Moringa leaves

Minerals / Leaves	Calcium (%)	Phosphorus (%)	Magnesium (%)	Sodium (%)	Potassium (%)
Moringa	0.98±0.02	2.13±0.1	0.45±0.00	0.02±0.0	1.30±0.01
Kenaf	4.14±0.02	2.07±0.0	0.54±0.02	0.18±0.00	2.23±0.01
Pvalue	<0.05	>0.05	>0.05	>0.05	>0.05

Table 3. Micromineral content of Kenaf and Moringa leaves

Minerals / Leaves	Iron (ppm)	Copper (ppm)	Manganese (ppm)	Zinc (ppm)
Moringa	250±7	10±2	290±8	38±0.1
Kenaf	207±10	9±0.1	20±2	18±0.1
P value	<0.05	>0.05	<0.05	<0.05

DISCUSSION

Moringa leaves had higher DM compared to kenaf leaves (23.6% vs. 25.6%). However there was no significant differences in the DM content of the two leaves ($p>0.05$). The feed intake in terms of DM reflects the capacity of the animals to utilize the feed. The result showed that the CP content of Moringa was higher than that of Kenaf (25.2% vs 23.3%). However, the difference was not significant ($P>0.05$). This study showed that both plants have considerable amounts of CP. Therefore the leaves can be used as a protein supplement. The EE content of Moringa was significantly higher than that of Kenaf leaf (4.2% vs 2.1%) ($P<0.05$). The EE content of Moringa and Kenaf leaves in this study is of considerable quantity that could meet the nutritional requirements of the goats. Fats produce approximately 2.25 more times the energy than carbohydrates. In this respect, fats contain more energy per unit of weight. The CF content of Moringa (7.2%) was significantly lower than that of Kenaf (14.3%) ($P<0.005$). Digestible energy is a gross estimate of the energy content of a feed, content. There were no significance difference in the estimated GE content of Moringa and Kenaf, with the mean values of 345.8Kcal/g and 324.1Kcal/g

respectively. The ash content, which is the total mineral concentration, was significantly higher in Moringa than that of Kenaf (6.1%) ($p<0.05$).

The macro mineral content of Moringa and Kenaf leaves is shown in Table 2. The Ca, K, Na and Mg content of Moringa was lower than that of Kenaf. There was significant difference in the content of Ca in Moringa and Kenaf, however there was no significant difference in the content K, Mg and ($P >0.05$). This present study revealed that both Moringa and Kenaf leave were rich in Ca that has potential to meet the nutritional requirements of goats and sheep if there is no limitation in feed intake. Therefore, the two plants can serve as a very good source of Ca when incorporated into animal feed. Ca content in Moringa and Kenaf were 0.98% and 4.14% and the difference was significant at $p<0.05$.

The result revealed that the Mg content of Moringa leaf (0.45%) was lower than that of Kenaf leaf (0.54%). However there was no significant difference in the Mg content of the two plants. Na content of Moringa leaf in this present study was lower than that of Kenaf leaf (0.02% vs 0.18%) and the difference was significant ($P<0.05$). The K content of Moringa was significantly ($P<0.05$) lower than that of Kenaf (1.30% vs 2.23%). K is required in relatively large quantities by sheep and goats for various body functions.

The micromineral content of Moringa and Kenaf leaves is shown in Table 4.3 Zn, Mn, Fe and Cu content of Moringa leaf were higher than that of kenaf leaf. However there were no siginifcant different in Fe, Mn and Zn at ($P >0.05$). Moringa has higher Fe content than Kenaf (250ppm vs 207ppm). T-test showed that there was significant differences in the Fe content of the two plant leaves ($P<0.05$) Moringa has insignificantly ($P>0.05$) higher content than Kenaf (10 ppm vs 9 ppm) and, Mn content in Moringa leaves was significantly ($P<0.05$) higher than that of kenaf (290 ppm vs 20 ppm). The Zn content of Moringa leaves was significantly higher ($P<0.05$) than that of Kenaf leaves (38 ppm vs 18 ppm).

Note. Lead and Cadmium was not detected from the leaf of kenaf and Moringa

IV. CONCLUSION

The findings of the present study revealed that, the two plants contained high amount of nutrients and minerals which are very essential in the development and growth of small ruminants. Because of the high nutrient and mineral contents of the two, they can be used as a fodder or incorporated into feeds as supplements as they are readily available and affordable by local farmers.

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