

NUTRIENT DIGESTIBILITY OF AFRICAN WILD GRAPE LEAF (*Lannea microcarpa*) FED TO WEANER RABBITS

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ABSTRACT

The experiment was conducted to determine the nutrient digestibility of African wild grape leaf meal fed to weaner rabbit at Teaching and Research Farm of Department of animal science, Kano University of Science and Technology Wudil. A total of twenty mongrel weaner rabbits at the age of 4-5 weeks with an average weight of 643.3g were randomly allocated to Five (5) diets formulated with African wild grape leaf (meal) at 0, 5, 10, 15 and 20% levels designated as treatments T₁, T₂, T₃, T₄ and T₅ respectively. Completely randomized design (CRD) was employed and each treatment was replicated 4 times. The experiment lasted for 8 weeks, and digestibility trial was done at the last 7 days of feeding trial. The results on nutrient digestibility values for dry matter (DM), crude protein (CP), crude fibre (CF); ether extract (EE), Ash and NFE were numerically within the range of 85.36-89.70%; 57.00-72.00%; 61.00-82.00%; 52.21-68.00%; 56.00-71.00% and 75.00-92.00% respectively. There were significant ($p < 0.05$) difference on all parameters (DM, CF, EE, NFE and Ash) except on CP which recorded non-significant ($p > 0.05$). It revealed that apparent nutrient digestibility percentages were higher for rabbits on dietary treatment 2, 3, 4 and 5 than control (T₁) with exception of Ash. The general trend showed that as the level of African wild grape inclusion increased from T₂ - T₄, the values obtained for the various nutrients increased accordingly. It was concluded that inclusion of African wild grape leaf (meal) in the diet of weaner rabbits at various levels recorded significant nutrient digestibility without any adverse effect. Thus could improve performance.

Keywords: African-wild grape meal; Browse plants; Forage; *Lannea microcarpa*; Nutrient digestibility.

INTRODUCTION

Rabbit has been identified as an economic livestock that could bridge the wide gap in dietary protein intake in Nigeria (Kalio *et al.*, 2008). It is micro-livestock producing about 47 Kg of meat per doe per year, which is enough to solely meet the animal protein requirements of a medium-sized family under small-scale rural farming systems (Abdulmalik, 1994; Hassan and Owolabi, 1996). Available literature show that the white meat of rabbit is very nutritious, easily digestible and extremely low in cholesterol and Sodium levels (Omole *et al.*, 2005). They are known to have the ability to thrive on non-conventional feedstuffs and forage which cannot be consumed by human being, such forages are cheap, abundant and available all the year round in many parts of Nigeria (Odeyinka and Ijiyemi, 1997; Shiawoya and Musa, 2006). Feeding rabbits as well as other livestock with qualitative diets has continued to be the problem of most farmers because of high price of feed ingredients. In order to arrest this situation, much attention has been focused on the exploitation and utilization of non-conventional feed materials that are available and affordable to be used as livestock ingredients (Buraimah *et al.*, 2011). The leaf meal of some Tropical legume browse plants such as African wild grape (*Lannea microcarpa*) especially in view of the quality and quantity of nutrients it contains in terms of crude protein, water and fat soluble vitamins, Calcium, Phosphorus and Iron (John and Kenaleone, 2014). *Lannea microcarpa* commonly known as African grape, Wild Grape or "Faaru" in Hausa belongs to the family Anacardiaceae. It is found in the savanna and the drier forest re-growth zone of West Africa. The unripe fruits are green in colour while ripe ones are purplish black (Yunus *et al.*, 2013). Hence, this research investigated the effect of dietary inclusion of the African wild grape on nutrient digestibility of weaner rabbits.

MATERIALS AND METHODS

Experimental site

The study was conducted at the Rabbitary Unit of the Teaching and Research Farm, Department of Animal Science, Kano University of Science and Technology Wudil, Kano State. The farm is located on latitude 11° 37' N and longitude 8° 58' E at an altitude of 403m above sea level. The annual rainfall ranges from 850 to 870 mm,

while minimum and maximum temperatures ranges between 26 and 33°C. The relative humidity of the region is always low and ranges between 40 to 51.3% (Olofin *et al.*, 2008).

Experimental Diet, Animals and Their Management

Five experimental diets were formulated at different levels of inclusion of African wild grape leaf meal at 0, 5, 10, 15 and 20% levels designated as treatments T₁, T₂, T₃, T₄ and T₅ respectively (Table 2). Twenty (20) mixed sex of weaner rabbit (Mongrel) were used. The experimental design used was Completely Randomized Design (CRD) and each treatment was replicated (4) times. They were allowed a week for adjustment and treated against internal and external parasites before the commencement of the research. Administration of ivermectin at dose rate of 0.1ml subcutaneously and antibiotics (Oxytetracycline) were given via drinking water for 3-4 consecutive days as prophylaxis treatment. The experiment lasted for six (6) weeks.

Processing of African wild grape leaf meal, proximate composition and Nutrient digestibility

Fresh African wild grape leaves were obtained from Teaching and research farm, Gaya, then dried and subjected to proximate analysis using analytical method of (AOAC, 2005) (Table 1) at Animal Science Laboratory, Kano University of Science and Technology Wudil, Kano state. Five iso-caloric and iso-nitrogenous diet was formulated to meet the nutritional requirement of rabbit according to NRC requirement (Table 2). Digestibility trials during the last 7 days of the feeding trial was conducted using 1 rabbit from each replicate and faecal samples were collected while fasting them for 12 Hours to empty their gut. The droppings collected were oven dried for a period of 18 Hours at 105°C and weighed daily. At the end of the collection period, the faecal samples collected from each replicate per day was bulked, ground and thoroughly mixed to obtain a homogenous mixture. They were analysed according to (AOAC, 2005). All data collected were subjected to analysis of variance (ANOVA) using Statistical Analysis System (SAS). Duncan's Multiple Range Test was used to separate the means (Duncan, 1955) where treatment means were significant ($p < 0.05$).

Table: Proximate composition of African Wild Grape Leaf

COMPONENTS	CONTENTS (%)
Moisture	70.55 ± 2.0
Crude protein	8.71 ± 1.98
Crude lipid	1.87 ± 0.34
Crude fibre	5.21 ± 1.67
Ash	3.48 ± 0.81
Carbohydrate (available)	80.73 ± 0.01
Calorific value (Kcal/100g)	374.59 ± 4.32

Source: Kano University of Science and Technology Wudil. Animal Science Laboratory

Table 2: Composition of weaner rabbit diet containing African wild grape leaf meal

Ingredients	T ₁ (0%)	T ₂ (5%)	T ₃ 10%	T ₄ (15%)	T ₅ (20%)
Maize	43.02	38.02	33.02	28.02	36.02
Soya bean	15.89	15.89	15.89	15.89	15.99
A.W.G.	0.00	5.00	10.00	15.00	20.00
Wheat Offal	36.59	36.59	36.59	36.59	36.59
Bone meal	3.50	3.50	3.50	3.50	3.50
Salt	0.30	0.30	0.30	0.30	0.30
Lysine	0.20	0.20	0.20	0.20	0.20
Methionine	0.20	0.20	0.20	0.20	0.20
Vitamin. P	0.30	0.30	0.30	0.30	0.30
Total	100	100	100	100	100
Calculated Analysis					
Crude protein(%)	18.00	18.00	18.00	18.00	18.00
M.E. (Kcal/kg)	2568	2453	2534	2623	2645
Crude fibre (%)	12.23	11.98	12.34	13.01	12.02
Ether extract (%)	4.56	5.45	4.98	5.32	5.12
Ash (%)	6.32	6.19	5.34	6.02	5.88

A.W.G. = African wild grape; M.E. = Metabolizable energy

RESULTS AND DISCUSSION

The results on proximate composition of African Wild Grape Leaf is presented in Table 1. It revealed that the presence of moisture content (70.55%), crude protein (8.71%), crude lipid (1.87%), crude fibre (5.21%) and Ash (3.48%). However, NFE (available carbohydrate) recoded (80.73%) while Caloric value was 374.59 Kcal/100g respectively. The moisture content of this present study is lower than the value reported by Elijah *et al.* (2017) on nutritive and anti-nutritive composition of *Xylopia pavarviflora* seeds (95.07%) and lower than that of Hassan and Umar, (2004) who worked on proximate and mineral of seeds and pulp of African Locust bean (*Parkia bigloba*) (23.70%). This is due to difference of experimental treatments, however higher moisture content is associated with rise in microbial activities (Hassan and Umar, 2004). Therefore, the leaf should be properly dried before storing to avoid spoilage and mold. The work of Yunus *et al.* (2013) on Assessment of physicochemical properties of biodiesel from African grapes (*Lannea microcarpa*) recorded lower CP (4.65 %), Ash (3.26%) Crude Lipid (1.19%) and Carbohydrate (74.65%) than the present findings. The ash content of the leaf is an indication that it contains nutritionally important mineral elements. The function of carbohydrate is for energy supply and contribute to the sweetness appearance and textual characteristics of many foods (Ummi and Mirfat, 2014). The result on nutrient digestibility of weaner rabbit fed varying levels of African wild grape meal is presented in Table 3. The DM, CF, EE, Ash and NFE were significantly differed ($p < 0.05$). However, no significant ($p > 0.05$) difference was observed for CP values. The apparent digestibility values for dry matter (DM), crude protein (CP), crude fibre (CF) and ether extract (EE) were generally higher for rabbits on dietary treatment T₃ (89.70%), T₄ (88.04) and T₅ (89.70%) than for those on T₁ (85.36%) and T₂ (87.83%).

Table 3: Nutrient digestibility of weaner rabbits fed varying levels of African wild grape

Parameter (%)	T1 (0%)	T2 (5%)	T3 10%	T4 (15%)	T5 (20%)	SEM
Dry matter	85.36 ^b	87.83 ^c	89.70 ^{ab}	88.04 ^c	89.70 ^a	0.00
Crude protein	62.00	65.63	61.25	72.00	57.00	1.42
Crude fibre	77.00 ^b	82.00 ^a	66.00 ^d	76.00 ^c	61.00 ^c	4.34
Ether extract	52.21 ^c	64.00 ^b	57.00 ^c	68.00 ^a	54.00 ^d	0.00
Ash	71.00 ^a	56.00 ^c	65.00 ^c	70.00 ^b	62.00 ^d	0.00
NFE	85.00 ^b	91.00 ^a	92.00 ^c	81.75 ^d	75.00 ^b	1.42

^{abc} = Means with different superscripts on the same row are significantly different ($p > 0.05$)

SEM = Standard error of means NFE = Nitrogen free extract

The general trend observed for various nutrients increased accordingly. With exception of CP, all other parameters were higher for rabbits on dietary T₂, T₃, and T₄ than those on T₁ respectively. The differences noted between the digestibility coefficients could thus be favored by other chemical composition of the feeds and their interactions. It is also possible that the nature and quantity of the feedstuff that were used for the composition of the feed could alter digestibility of the feed (Zewdie, 2019). The low digestibility of fibrous can be explained by the fact that fibre are able to induce the length of feed stay in the digestibility tract; causing a lower efficiency of the digestive phenomena. Other parietal constituent may also explain the differences noted between the coefficients of feed's digestibility.

CONCLUSION

From the results of this research, it was concluded that inclusion levels of African wild grape leaf meals up to 20% can be used safely in the diet of grower mongrel rabbit with no detrimental effect on nutrient digestibility. Further research on utilization of African wild grape leaf on other livestock such as ruminant is advocated.

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