

NUTRIENT COMPOSITION OF SELECTED TROPICAL FORAGES AND THEIR EFFECT ON ACCEPTABILITY IN RABBIT FEEDING

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ABSTRACT

The ability of rabbits to make use of forages is an important factor in rabbit nutrition. Tridax procumbens, Euphorbia heterophylla, Alternanthera brasiliensis, Aspilota africana, Tithonia diversifolia are common forages for rabbits. Previous authors have reported the nutrient composition of these plants but there is scanty of information on the how the available nutrient affects consumption of the plants. This study was designed to ascertain the effect of nutrients present in these plants on its preferences. A total of thirty weaner rabbits (Breeds of rabbit should be indicated) were used in the experiment. Omale, J The rabbits were separated into groups A and B, fifteen rabbits are in each group. Animals in group A were offered fresh forages while those in group B were offered dry forages in a cafeteria arrangement. With the aid of cameras installed in the pens, the behaviours of experimental animals were recorded to help study the frequency of visitation to the various forages. Results of this study showed that Euphorbia heterophylla was the most visited while Aspilota africana was the least visited. The crude protein in the forages ranged from 4.70% - 5.62% with Tithonia diversifolia and Euphorbia heterophylla having the significantly ($p \leq 0.05$) highest and least values, respectively. Aspilota africana recorded significantly highest ($p \leq 0.05$) values for NDF, ADF and ADL followed by Tridax procumbens. Hemicellulose of Euphorbia heterophylla was the significantly ($p \leq 0.05$) highest. It was concluded that of the selected forages, Euphorbia heterophylla was the most preferred while the least was Aspilota africana.

Key words: Rabbits, Forages, Visitation. Preference, Nutrients

INTRODUCTION

There is competition in the use of conventional feed ingredients like maize, sorghum, wheat among others, for human consumption and as feed ingredients in the pig and poultry industry which has made feeding more expensive in the industry. This competition can be reduced by raising rabbits on forages (Safwat *et al.*, 2014) since rabbits have the ability to make good use of forages as a result of caecum present in their digestive system, which allows them to carry out caecotrophy; a process similar to chewing the cud in ruminant animals. Several authors (Farinu *et al.*, 2008; Adeyemo *et al.*, 2014, Okpakpor *et al.*, 2021) have reported that rabbits are capable of making use of forages as feed in replacement of conventional feed ingredients or in combination with concentrates.

Livestock production in recent times is faced with the challenge of producing large volumes of high-quality animal products at low prices. To achieve this, it is important to make use of low-cost feed materials which could help reduces cost of feeding while improving productivity. Since rabbits are able to make use of a range of forages alongside household wastes as feed there is a need for better documentation of such forages. Forages commonly used as feed by small scale rabbit farmers are those plants that are better referred to as weeds (Okpakpor *et al.*, 2022) because they grow in unwanted places and are not planted by the farmers. In a review by Mailafia *et al.* (2010) on the problem and prospect of rabbit production in Nigeria, the authors suggested the need for more study to be carried out on the nutritional values of tropical forages used in feeding rabbits. Available literature only consider the proximate composition of such plants and not much information is available on how the nutrient composition influences consumption of such forage. The nutrients, and fibre fraction present in plants could be capable of affecting palatability of the plants and its preferences hence the need for this study.

MATERIALS AND METHODS

The study was carried out at the Rabbit Unit, Teaching and Research Farm of Federal College of Agriculture, Akure. *Tridax procumbens*, *Euphorbia heterophylla*, *Alternanthera brasiliensis*, *Aspilia africana* and *Tithonia diversifolia* were collected from the of the Teaching and Research farm. The selected forages were identified by agronomist at the Federal University of Technology, Akure and registered in the university's herbarium under the following herbarium codes; *Tridax procumbens* (0345), *Euphorbia heterophylla* (0346), *Alternanthera brasiliensis* (0347), *Aspilia africana* (0348) and *Tithonia diversifolia* (0344).

A total of thirty unsexed mixed breed weaner rabbits of about six (6) weeks of age were used in the experiment. The rabbits were separated into two groups (A and B) of fifteen (15) rabbits in each group. The groups were sub-divided into 3 smaller groups (replicates) of 5 rabbits each. Animals in group A were offered fresh forages while those in group B were offered dry forages. The forages were presented in wooden feeding trough that was properly demarcated into five sections and each selected forage was placed into each section. The feeding troughs were braced with galvanized sheets to prevent the rabbits from eating through the wood. Selected forages were offered to experimental animals in a cafeteria arrangement to study the most preferred forage. With the aid of a V380 Realtek bulb type 360° view panoramic cameras which were installed in the pen, the behavior of experimental animals during days 1-2, days 7-8 and day 13-14 were recorded. The recording was made for the first two hours on the selected days. The video footage collected helped to study the frequency of visitation to the various forages. The experiment lasted for a period of fourteen (14) days.

RESULTS

Figure 1 shows the relationship between fresh forage consumed and frequency of visiting by rabbits. It is observed that the most visited forage was also the most consumed while the least visited forage was the least consumed. Forage B (*Euphorbia heterophylla*) was the most visited and the most consumed of the selected forages while forage D (*Aspilia africana*) was the least visited and least consumed in both the fresh and dry forms.

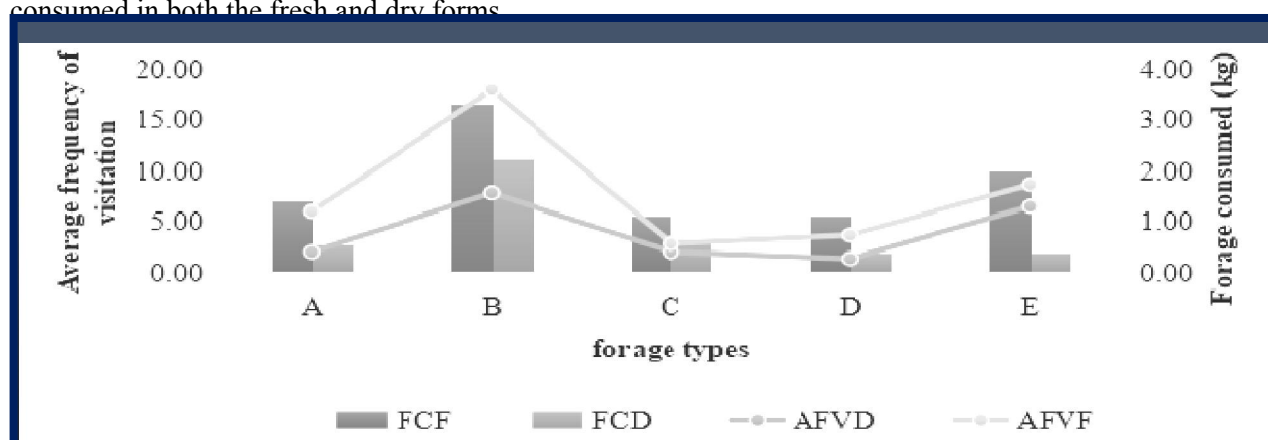


Figure 1: Relationship between forage consumed and frequency of visiting by weaner rabbits

Key: A- *Tridax procumbens*, B- *Euphorbia heterophylla*, C- *Alternanthera brasiliensis*, D- *Aspilia africana*, E- *Tithonia diversifolia*, FCF- Forage Consumed Fresh, FCD- Forage Consumed Dry, AFVF- Average frequency of Visiting Fresh Forage, AFVD- Average Frequency of Visiting Dry Forage.

Result of the nutrient composition (%) of the five selected tropical forages used for feeding rabbits is presented in Table 1. The nutrient composition of the various plants differed significantly ($p \leq 0.05$) from each other. The crude protein content of the forages ranged from 4.70% to 5.62% with *Tithonia diversifolia* and *Euphorbia heterophylla* having the significantly ($p \leq 0.05$) highest and least values respectively. The crude fibre content of the forages range between 2.66 and 8.11%. *Aspilia africana* recorded significantly highest ($p \leq 0.05$) values for NDF, ADF and ADL followed by *Tridax procumbens*, while the level of significance ($p \leq 0.05$) between other plants studied varied. The hemicellulose content of *Euphorbia heterophylla* was the significantly ($p \leq 0.05$) while that of *Aspilia africana* was the least.

Table 1: Nutrient Composition (%) of Five Selected Forages used for Feeding Rabbits

	<i>Tridax procumbens</i>	<i>Euphobia heterophylla</i>	<i>Alternanthera brasiliiana</i>	<i>Aspilia africana</i>	<i>Tithonia diversifolia</i>	p-value
Moisture	78.28±0.14 ^d	80.50±0.28 ^b	79.72±0.01 ^c	76.27±0.02 ^e	81.14±0.01 ^a	0.00
Crude Protein	4.90±0.03 ^d	4.70±0.02 ^e	5.52±0.01 ^b	5.62±0.03 ^a	5.46±0.01 ^c	0.00
Crude Fibre	8.11±0.01 ^a	5.81±0.00 ^b	2.66±0.01 ^c	3.58±0.01 ^c	2.78±0.01 ^d	0.00
Ether extract	1.93±0.03 ^b	1.18±0.01 ^c	2.05±0.01 ^a	1.18±0.01 ^c	1.14±0.02 ^c	0.00
NFE	4.82±0.11 ^e	6.13±0.01 ^d	7.49±0.01 ^c	10.92±0.08 ^a	8.05±0.01 ^b	0.00
NDF	12.80±0.02 ^b	12.41±0.12 ^b	7.69±0.01 ^d	23.00±0.04 ^a	13.74±0.74 ^c	0.00
ADF	7.83±0.12 ^b	5.81±0.24 ^c	5.15±0.02 ^d	22.29±0.00 ^a	7.40±0.12 ^b	0.00
ADL	2.80±0.12 ^b	2.60±0.24 ^b	2.01±0.43 ^c	3.40±0.13 ^a	2.00±0.09 ^c	0.00
Hemicellulose	4.97±0.07 ^c	6.59±0.18 ^a	2.54±0.01 ^d	0.71±0.04 ^e	6.40±43 ^{bc}	0.01

^{a,b,c} Mean ±SD - means on same row with different subscripts are significantly different ($p \leq 0.05$)

NFE- Nitrogen free extracts, NDF- Neutral detergent fiber, ADF- Acid detergent fiber, ADL- Acid detergent lignin.

DISCUSSION

The video footage from this study revealed that the rabbits scratch their faces with the fore limbs a result of itching sensation experienced after visits to *Aspilia africana*. This could be as a result of the presences of trichomes (tiny hairy appendages present on leaves and stem of plants). Trichomes are capable of causing itching and burning rash in humans and other animals that could last up to 12 hrs (Melissa, 2023). No visit was recorded to *Alternanthera brasiliiana* in the first 1hr of observation. *Alternanthera brasiliiana* is an herbaceous tropical weed with purple leaves and stem which could make it unattractive to rabbits. Although rabbits do not seem to pay much attention on colours they are more sensitive to green colour (Andreea, 2019). Rabbits are often referred to as protanopic animals because they possess a form of colour blindness where they confuse red and green colour and have a loss of sensitivity to red light (Keil, 2018). The result of this study also showed the rabbits recorded high frequency of visitation to the forages mostly consumed. Salem *et al.* (2011) reported that rabbits will always visit a spot where they find a preferred feed until such feed is no longer available.

Feeding rabbits solely on any of the selected forages should be discouraged among farmers as the plants do not contain high quantity of crude protein and crude fibre to meet the nutrient requirement of the animal. Crude protein content of the selected forages in this study ranged from 4.70±0.02 (*Euphobia heterophylla*) to 5.62±0.01 (*Aspilia africana*). The selected plants can be said to have low protein content in relation to 12 to 15%CP required for growing rabbits, dry does and herd buck (Holcomb *et al.*, 2017). When the selected plants are used solely as feed for rabbits, it is important to supplement such feed with protein nutrients to help the rabbit meet up with required nutrients. The result obtained for *Euphobia heterophylla* (4.70±0.02 CP) in this study fell within the range reported by Omale and Emmanuel (2010) for fresh and dried samples of same plant. Pratap (2017) reported 5.00%CP for *Alternanthera brasiliiana* while Ikewuchi, *et al.* (2009) reported lower value (3.44%CP) for fresh samples of *Tridax procumbence*. The hemicellulose content of *Euphobia heterophylla* was significantly ($p \leq 0.05$) higher than those from all other plants. Gidenne and Lebas (2002) reported that hemicellulose is more digestible in the tract of rabbits than cellulose. The high level of digestibility of hemicellulose in rabbits could be because it is more rapidly hydrolyzed and fermented than cellulose. It is important to note that several other factors could affect the nutrient composition of forages harvested to feed livestock. Some of such factors include maturity stage at harvest, leaf-to-stem ratio, plant species and cultivars (OSU, 2023).

In conclusion, of the selected forages rabbits preferred *Euphobia heterophylla* while the least preferred forage was *Aspilia africana*. Feeding rabbits solely on any of the selected forages should be discouraged as those forages do not contain high quantity of crude protein and crude fibre to meet the requirement of rabbits.

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