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Relative Intake of Selected Leguminous Browse Plants by West African Dwarf (WAD) Buck

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Abstract
This study was carried out to determine the relative intake of selected leguminous browse plants by West African Dwarf Bucks. Four bucks averaging 12 months and 8kg in age and weight respectively were used. The bucks were housed individually in a cement-floored pens equipped with feeders and waterers. Four selected browse plants; *Calapogonium mucunoides* (Cm), *Gliricidia sepium* (Gs), *Centrosema pubescens* (Cp) and *Pueraria phaseoloides* (Pp) were harvested from the local environment. The trial lasted for seven (7) days wherein each goat constituted an observation, the different daily browse intake formed the treatment while the number of days of the experiment constitutes replicate. Daily feed intake of individual goat for the four selected forage was calculated as the difference between the quantity of feed offered and refused daily. The Mean Daily Dry Matter intake, Coefficient of Preference (COP) and Relative Coefficient of Preference (RCP) in percentage were determined for each of the forages offered. Significant difference ($P < 0.05$) in the intake of Cm and Cp was observed. Highest Daily Dry Matter intake of 2035.58g/day was obtained from Cp followed by 1885.71g/day from Pp while lower values of 1733.51 and 1570.65g/day were obtained from Cm and Gs respectively. COP of 0.87, 0.96, 1.04 and 1.13 and RCP of 110, 100, 120 and 129 were recorded from Cm, Gs, Pp and Cp respectively. The result of this study revealed that combination of Pp and CP will be more suitable for both intensive and extensive goat farming in the tropics.

Keywords: Relative, feed intake, leguminous, Browse plant.

Introduction

Goats are small ruminants which belong to the order Artiodactyla, the family Bovidae and genus Capra. Goat enterprise plays important role in the livelihood of Nigerian rural population as it contributes significantly to the improvement of family nutrition and health (Ahamefule *et al*., 2012), Goat husbandry serves as a form of food security and source of independent income for rural households and subsistent farmers. Presently, the demand for goat meat is in excess of supply, and this has resulted in very high prices of goat meat (Devendra, 1987). Their production provides sustenance and income to rural households and subsistent farmers. Goat production in Nigeria is greatly encouraged for several reasons, firstly to meet the ever-increasing demand for animal protein for the teeming population, and secondly the economics of production, at least, the subsistent level is quite low and attainable to rural communities and peasant farmers. Goat has shorter generation interval than the large ruminant while twinning and triplet births are also possible. These features make them prolific.

However, goat production in the country has witnessed tremendous neglect. Apart from nutrition, such factors as lack of health personnel and medicaments, lack of improved breeds and absence of good husbandry and management practices have militated strongly against their production. Goat production in the zone is limited to free range/extensive system where little or no care is given to the animals. The nutrition and breeding of these animals are not controlled, and this greatly affects their performance. Forages remain the cheapest sources of feed for ruminant production. Barring other constraints, goat production in Nigeria can be promoted by increasing the area and quality of legume-based pastures.

Leguminous plants produce high-quality fodder and serve as potential substitutes for other feed resources (Adejumo *et al* 1991). They are highly palatable to livestock and are very rich in protein and minerals (Nworgu *et al*., 2001) and can be integrated into crop-livestock farming. There is little information on the nutritional potential and intake of some of our tropical leguminous crops.

This study is therefore designed to evaluate the relative intake of selected leguminous browse plants (*Calapogonium mucunoides, Gliricidia sepium, Centrosema pubescens and Puereria phaseoloides*) by West African Dwarf Bucks in order to generate a preference index that will add to fodder resource base for goat production in the tropics.

Materials and Methods

The experiment was carried out at the Livestock Unit of the Teaching and Research Farm of Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria. Located at Latitude 5^0, 28' North, longitude 7^0, 32' East and on an altitude of 122m was sea level. The area falls within the tropical Rainforest zone. Annual rainfall averages 2177mm. The monthly ambient temperature range between 20^0C and 36^0C, and the relative humidity between 50 and 60% depending on the season (NRCRI, 2004). Four West African Dwarf (WAD) bucks averaging 12 months and 8kg in age and weight respectively will be chosen from the university flock and housed individually in cement-floored pens equipped with feeding trough and water trough.

The Experimental layout was such that each goat constituted an observation, the different Daily Forage Intake constituted treatments and the number of days of experiment coconstitutenstitute replicates. Selected browse plants (*Calapogonium mucunoides, Gliricidia sepium, Centrocema pubescens and puereria phaseoloides*) were harvested from the local environment. Each of the animals where offered 1 kg each of the selected leguminous browse plants daily. The sequence of offer were random in a 7-day period. Each of the selected leguminous browse plants was offered in the morning in feeding racks in each of the four pens housing the experimental animals. The leftover was measured the next day, daily feed intake of individual goat was calculated as the difference between the quantity of feed offered and refused (Ponnampalam *et al.,* 2004).

From the Daily Feed Intake gotten, the Mean Daily Dry Matter Intake, Coefficient of Preference (COP) and Relative Coefficient of Preference were calculated. COP which is the ratio of individual intake and the average intake of individual forages was determined while the Relative Coefficient of Preference were determined by equating the forage with the lowest COP to 100 and then the % of others relative to the lowest were determined accordingly. The proximate and mineral compositions of each of the leguminous browse plants were analysed using the standard methods of A.O.A.C. (2000). The Gross Energy (GE) of the samples was determined using regression equation of Nehring and Haenlein (1973) as follows: $Y = 5.72Z_1 + 9.50Z_2 + 4.79Z_3 + 4.03Z_4 \pm 0.9\%$ Where**:** Y = Gross Energy, Z_1 = Crude Protein, Z_2 = Crude Fat, Z_3 = Crude Fibre and Z_4 = Nitrogen Free Extract.

Results and Discussion

The proximate compositions of the selected browse plants used in this study are presented in Table 1. The crude protein content of Cm and GS were comparable but differ significantly (P<0.05) with that Pp and Cp. Highest crude protein of 16.20 was gotten from Pp while the least value of 14.57 was gotten from Cp. The crude protein content of all the forages used met the 14-18% range recommended for goats (NRC, 1981), hence the protein requirements of experimental animals were adequately satisfied.

Table 1: Proximate Composition of Selected Forage Plants

Parameters (%)	Cm	Gs	Pp	Cp	SEM
Dry Matter	70.22^{c}	70.45^{b}	71.60^{a}	71.90^{a}	0.18
Ash	5.08^{ab}	4.42^{b}	4.59^{b}	5.67^{a}	0.25
Crude protein	15.84^{b}	15.66^{b}	16.20^{a}	14.57^{c}	0.38
Ether extract	0.74	0.76	0.77	0.76	0.01
Crude fibre	12.05	11.98	10.52	11.34	1.12
NFE	36.51^{c}	37.63^{b}	39.52^{a}	39.56^{a}	1.50
*GE (mj/kg)	1.68	1.99	2.09	2.02	

^{a,b,c} Means across rows with different superscripts differ significantly at p<0.05; SEM= Standard Error of the Mean.*Gross Energy (GE) of the browse plants was determined using regression equation of Nehring and Haeluin (1973). Cm: *Calapogonium mucunoides*, Gs: *Gliricidia Sepuim*, Pp: *Peureria phaseoloides*, Cp: *Centrosema pubescens.*

The result of the Coefficient of Preference (COP) by WAD goats fed selected leguminous browse plants is presented in table 2. The free intake of dry matter as shown in table 2 reveal that the animals were able to consume above 1kg of each of the four legumes offered wherein Cp and Pp were better consumed than the rest. Coefficient of preference (COP) which is the ratio of individual intake and the average intake of individual forages showed that all the forages have their COP to be up to unity. This means that all the forages were accepted based on their COP. Ogunbosoye and Otukoya (2014) have it that forages with COP less than unity were not accepted while those up to unity were accepted. *Centrocema pubescens* had the highest coefficient of preference followed by *Peureria phaseoloides* and *Calapogonium mucunoides* while the least value was recorded in *Gliricidia sepium*. The other of preference is Cp > PP > Cm> respectively. The results of this study support the fact that ruminants are able to select their diets from a range of plant parts that differ in their physical and chemical composition.

Table 2: shows the Coefficient of Preference of Leguminous Browse Plants by WAD Goats

Legume	Mean daily Dm intake (g)	Coefficient of Preference (COP)	Relative Coefficient of Preference %
Cm	1733.51	0.96	110
Gs	1570.65	0.87	100
Pp	1885.71	1.04	120
Cp	2035.58	1.13	129

Cm: *Calapogonium mucunoides*, Gs: *Gliricidia Sepuim*, Pp: *Peureria phaseoloides*, Cp: *Centrosema pubescens.*

Higher coefficient of preference and relative feed intake recorded in Cp and Pp means that when west African dwarf goats are given opportunity to graze in a pasture made up of different forages, they will eat more of Cp and Pp. this means that

when establishing pasture for goat production in the tropics, sufficient quantity of Cp and Pp should be introduced, this will ensure that the Daily dry matter intake of the animal is met thereby helping to meet their nutrient requirement.

Lower intake of Cm and Gs despite their higher crude protein content could be attributed to a number of factors which ranges from their physical nature to their chemical composition. Dove (1996) reported that ruminants select their diets from a range of plant species and plant parts that differ in their physical and chemical composition. The hairy and rough nature of Cm compared to Cp could be the reason while the animals consumed less of it. Result of this study recorded the lowest voluntary intake of *G. sepium* compared to other browse plants. This could be attributed to the anti-nutrient content of *G. sepium*. Ogunbosoye and Otukoya (2014) have reported the presence of Coumarin in *G. sepium* as a major limiting factor in its utilization by ruminants. Similarly, the presence of mimosine in L. leucocephala has been reported as a limiting factor to its utilization by ruminants (Ogunbosoye and Otukoya, 2014). Two of the leguminous browse plants Pp and Cp used in this study was accepted by the animals while Cm and Gs were rejected as shown in the Coefficient of Preference, it means that Pp and Cp are suitable for goat production in the tropics.

Conclusion and Recommendation

The odrer of preference for the leguminous browse plants is: *Centrosema pubescens* > *Puereria phaseloides* > *Calopogonium mucunoides* > *Gliricidia sepium*. Therefore, in establishing pasture for goat production, there is need to use leguminous browse plants that have shown high preference compared to the others.

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