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Perfomance and Carcass Characteristics of Rabbit Fed Graded Levels of Morning Glory Leafs (*Ipomoea Asarifolia* L.)

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Abstract- A study was conducted to evaluate the effects of the inclusion of graded levels of Morning glory *(Ipomoea asarifolia)* leaf meal in the diets of growing rabbits on growth performance, nutrients retention, and carcass characteristics. Four experimental diets were formulated, with inclusion levels of 0, 5, 10 and 15 g/kg of *Ipomoea asarifolia leaf meals as* T_1, T_2, T_3 *and* T_4 respectively. Forty male rabbits used for the experiment were allotted to four treatments groups (1, 2, 3, and 4) with two rabbits per replicate in a completely randomized design. The rabbits were fed with the respective diets for 56 days. Parameters such as fed intake, weight gain, feed conversion ratio (FCR) and mortality rate where monitored. The data generated where subjected to analysis of variance (ANOVA). Where significant difference ($P<0.05$) exists, least significant difference (LSD) was used to compare between the treatment means. The results indicated that growth performance of the animals was not significantly different across the treatments, except for final weight and feed conversion ratio. The effects of diet on carcass characteristic indices showed that *Ipomoea asarifolia* inclusion had no negative effect on the carcass yield. All other parameters differed significantly with exception of stomach, small and large intestine ($p>0.05$).

Keywords: rabbit, performace, carcass, ipomoea asarifolia.

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Keywords: rabbit, performace, carcass, ipomoea asarifolia.

I. Background To The Study

Rabbit production is important in alleviating animal protein deficiency in Nigeria (Agala and Balogun, 2004). Rabbits have immense potentials and good attributes, which include high growth rate, high efficiency in converting forage to meat, short gestation period, high prolificacy, relatively low cost of production and high nutritional quality of meat which includes low fat and cholesterol levels. Rabbit meat has a high protein level of about 18 % and, its consumption is bereft of cultural and religious biases (Biobaku and Oguntona, 1997; Ndor *et al.,* 2009). Due to these potentials, there is a need to encourage farmers to go into rabbit production to supply animal protein at a cheaper cost.

The plant belongs to the family *Convolvulaceae*, *Ipomoea asarifolia,* also calledmorning gloryis a succulent perennial plant trailing on the ground. *Ipomoea asarifolia* (morning glory). In Nigeria, the traditional names include "Domo" kada, in Hausa, and ''Gboro Ababa, in the Yoruba language) the plat have purple flowers which develop three seeds for sexual propagation, although asexual propagation can also be achieved by stolon. It is found throughout West Africa and is a common weed of hydromorphic soils, low lying and inland valleys, streams and river banks (*Jegede et al.,* 2009). In Nigeria, the leaf of *Ipomoea asarifolia*is not generally consumed by either humans or livestock. It mostly grows like a weed and thus popularly used as compost material, ethno-veterinary and human medication practice and mulch.*Ipomoea asarifolia*is a potential cheap feed ingredient for optimum and sustainable poultry production.

II. Methodology

a) Experimental site

The experiment was carried out at the Livestock Teaching and Research Farm of the Department of Animal Science, Faculty of Agriculture, Usmanu Danfodiyo University, Sokoto, Sokoto state is located in the north-western part of Nigeria between longitudes 4^0 8' and 6^0 54' E and latitudes 12^0 0'N and 13^0 58'N and attain altitude of 350m above sea level (Mamman *et al*., 2000). The state has a semi-arid climate which is characterized by low rainfall, ranging from 500-1300 mm with seasonal variations. Heat is more severe in the state during the months of March and April, but the weather is usually cool in the mornings and hot in the afternoons except during the harmattan period (SSMIYSC, 2010). A minimum temperature of 13^0 C has been recorded in January and a maximum of 44^0 C in

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April (SSDG, 2002). Sokoto has two main seasons, the dry season; which starts from October and last up to April, in some part it may extend to May or June. The wet season begins in most of the state in May or June and lasts up to either September or October (SSMIYSC, 2010).

b) Management of Experimental Animals

Forty male (New Zealand White breed) of 5-6 weeks old rabbits weighing an average of 900 g were sourced from National Veterinary Research Institute, Vom, Nigeria. The animals were housed in cages measuring 35 × 35 × 55 cm (width × length × height). The cages were cleaned. Plastic drinkers and improvised metallic feeding trough were provided in each cage. The drinkers were washed daily. Both feed and water were provided ad-libitum during the experimental period. All the experimental rabbits were identified and allowed two weeks pre-conditioning period to acclimatize. They were medicated against coccidiosis and mange. They were given prophylactic coccidiostat (Ampro-tetracycline), via drinking water as recommended by the manufacturer, the rabbits were dipped with cinatic powder base on the instruction given by manufacturer. The animals were housed in 20 pens containing two rabbits each. The pens are made of concrete floor and zinc roofing. $1M^2$ per rabbit was used, Wayne (2009).The rabbits are fed twice a day (morning and evening. Figure 2shows the photograph of the house containing the cages where the rabbit was reared.

c) Experimental Feed Sources

Four diets were formulated using the following feed ingredients: Maize, fresh *Ipomoea asarifolia* (Morning glory), wheat offal, groundnut cake, groundnut haulms, fish meal, limestone, salt (NaCl) and premix. All the ingredients were purchased from the Sokoto central market, milled and separately bagged for diet formulation. Fresh*Ipomoea asarifolia* leaves were sourced within the main campus of Usmanu Danfodiyo University. The plants were dried under the shade in open-air, milled and kept in air tight containers.

d) Formulation of Experimental Diets

Four experimental diets were formulated and fed as a complete diet (Table 4).*Ipomoea asarifolia* was included at 0, 5, 10,15g /kg inclusion levels. The diets were designated as diet 1, 2, 3, and 4 respectively in the experiment. The composition of the experimental diet and calculated chemical composition are shown in Table 1.

Table 1: Composition of the experiment Diets.

TREATMENTS (supplemented level of *I. Asarifolia g/kg*)

Ingredients	T1 (0)	T2 (5)	T3 (10)	T4 (15)
Maize	34	34	34	34
Wheat offal	17	17	17	17
Groundnut cake	27	27	27	27
Groundnut Haulms	16.50	16.50	16.50	16.50
Fish meal	3	3	3	3
Limestone	2	2	2	2
Salt	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25
Total	100	100	100	100
Supplemented level of *I. Asarifolia* (g/kg)	0	5	10	15
Calculated chemical composition				
Energy (ME/kcal/kg)	2954.29	2954.29	2954.29	2954.29
Crude protein (%)	21.91	21.91	21.91	21.91
Crude fiber (%)	9.50	9.50	9.50	9.50
Ether extract (%)	3.32	3.32	3.32	3.32

e) Experimental Layout

Complete Randomized Design (CRD) was used with four treatments replicated five times with two animals per replicate making a total of forty rabbits.

f) Data Collection

Body weight (g) of each rabbit was taken at the beginning of the experiment (day 0). Subsequently, the measurement was carried out weekly. Feed intake was recorded daily by subtracting the left over from the quantity of feed offered to the animals the previous day. Feed conversion ratio was determined using feed intake and body weight gain. Average daily gain (ADG) was calculated from weight gain and a total number of days of the experimental period.

Feed intake (g/rabbit) =Feed offered (g) - Leftover (g)

Feed conversion ratio (FCR) FCR=DM Intake (g) / live weight gain (g)

Average daily gain (ADG) = (final body weight – initial body weight) / total days of the experiment.

i. *Carcass evaluation and internal organs measurements*

Three rabbits from each treatment were randomly selected. Before slaughter, the rabbits fasted for 12 hours to avoid error due to gut fill. All the rabbits were weighed before and after slaughter. After slaughtering, the tail close to the base was first removed so also the head, feet and the pelt. During evisceration, the internal organs and the gut contents were removed and weighed. The skinless carcass was weighed and expressed as a percentage of live weight. The organs weights were expressed as a percentage of dressed weight. Dressing percentage was as determined as follows:

$$Dressing\ perentage = \frac{Dressed\ weight}{Slaughter\ weight} \times 100$$

Dressing percentage = Dressed carcass weight /Slaughter weight × 100

g) Data Analysis

The data collected from the experiment were subjected to analysis of variance (ANOVA) Significant difference among treatment means were separated by least significant difference (LSD).

III. Results

a) Growth performance of rabbit fed graded levels ofIpomoea asarifolia

The growth performance of rabbit feed graded level of *Ipomoea asarifolia* is shown in Table (2).Results indicated a significant difference (P<0.05) in the feed intake, feed conversion ratio final body weight gain and Average Daily Gain. There was no significant difference (P>0.05) in initial body weight of the animals.

Table 2: Growth performance of rabbits fed graded levels of *Ipomoea asarifolia*.

Parameter TREATMENTS (supplemented level of *I. Asarifolia g/kg*)					
	T1 (0)	T2 (5)	T3 (10)	T4 (15)	SEM
Initial body wt (g/rabbit)	924.14	923.57	923.28	923.00	8.09
Final body wt (g/rabbit)	1518.33[a]	1494.33 [a]	1186.69 [b]	1190.67[b]	80.09
Body weight gain (g/rabbit)	594.19[a]	570.76[a]	263.39[b]	267.67[b]	108.27
Feed intake (g/rabbit/day)	136.013[a]	142.623[a]	118.40[b]	108.18[b]	5.76
Feed conversion ratio	12.82[a]	13.99[a]	25.19[b]	22.63[b]	4.67
Average daily gain (g/rabbit)	10.61[a]	10.19[a]	4.70[b]	4.78[b]	1.95
Mortality (%)	0.00 [b]	0.00 [b]	28.57[a]	28.57[a]	5.05

a, b, c, mean values with different superscripts denote significant (p<0.05) difference between mean within the same rows

The initial body weight of the experimental rabbits was similar across treatment. Rabbits fed the control diet and, those fed 5g/kg *IA* had higher feed intake (136 and 142.6g/kg) (P>0.05) that different significantly (P<0.05) from the feed intake of these fed 10 and 15g/kg *IA* (118.40 and 108.18g/kg) (P>0.05). Final body weight of rabbits in the control group and treatment group two was also better (1518.33 and 1494.33g (P>0.05) and significantly higher (P<0.05) than the final body weight of those in treatment groups three and four (1186.7 and 1190.7g) which were similar (P>0.05).

Average body weight gain followed a similar pattern. Rabbits fed the control diet and those fed diet 2 gained more (594.19, and 570.76g) (P>0.05) compared to those fed diet 3 and 4 which had significantly lower (P<0.05) average body weight gain (263.4 and 267.6g) which were also similar to each other, similarly with regards to feed conversion Ratio (FCR). It was better for rabbits fed the control diet (12.52) and those fed 5g/kg *IA* (13.99) and 15g/kg *IA* (25.19) (P>0.05). Rabbit fed 10g/kg *IA* also had similar FCR (22.63) with those fed 15g/ kg *IA* (P>0.05).

The rabbits that consumed the highest level of *IA* (10 and 15g/kg) had the highest mortality rate of 29 %. Those that consumed 0 and 5g/kg *IA* diets survived the experimental period with 0 % mortality. Changes in live weight of rabbits during the eight weeks of the feeding trail is shown in figure 1.

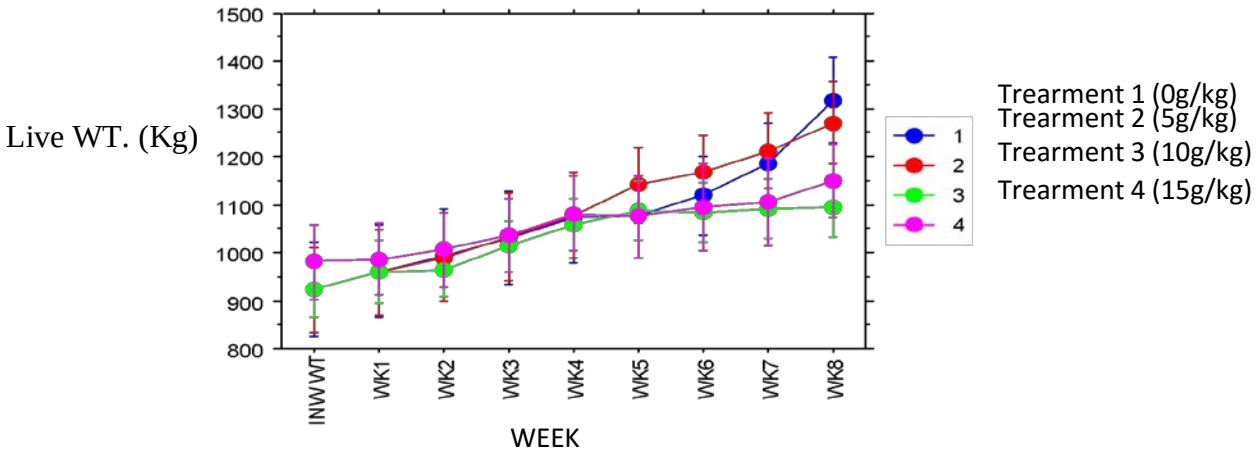

Fig. 1: Live weight changes of Rabbits fed graded levels of *Ipomoea asarifolia.*

b) Carcass Characteristics

The carcass characteristics of rabbit fed graded levels of*Ipomoea asarifolia* meal is shown in Table 3.Results indicated a significantly higher live weight, slaughter weight and dressing percentage (%) for animals fed diets with lower levels of *Ipomoea asarifolia* (Treatment 2) and those fed the control diet (Treatment 1) ($p<0.05$). There was no significant difference in the weight of the kidneys, lungs, heart, small and large intestines ($p>0.05$). Weight of the thighs, shoulder, loin, and the rack were significantly lower for animals fed diets containing higher levels of *Ipomoea asarifolia*($p<0.05$).

Dressing percentage of rabbits fed the control diet and those fed 2 (5g/kg) ware higher and similar to each other (51.52 and 52.37%). Both values were however significantly different from values obtained for rabbits fed diets 3 and 4 (46.22 and 46.30%) which were similar to each other but significantly lower ($P>0.05$) compared to those fed diet 1 and 2.Since the live weight of the rabbits were not similar, there is no basis for statistical comparism. Obviously slaughter and carcass weight must be different.

Table 3: Carcass Characteristics of New-Zealand White rabbit fed graded levels of *Ipomoea asarifolia.*

Parameter	TREATMENTS (supplemented level of *I. Asarifolia g/kg*)				
	T1 (0)	T2 (5)	T3 (10)	T4 (15)	SEM
LW	1518.33^{a}	1494.33^{a}	1186.7^{b}	1190.7^{b}	80.5
SW	1455.66^{a}	1427.66^{a}	1142.66^{ab}	1105.66^{b}	48.38
CW	750.7^{a}	746.7^{a}	530.0^{b}	522.0^{b}	56.0
DP (%)	51.52^{a}	52.37^{a}	46.22^{b}	46.30^{b}	2.51
Kidney (g)	9.00	9.00	8.66	10.66	0.55
Liver (g)	42.0^{a}	47.0^{ab}	38.66^{b}	62.0^{ab}	6.09
Lungs (g)	9.33	10.0	8.88	9.33	1.08
Hear t(g)	3.67	3.67	3.33	3.33	0.33
SI (g)	94.33	82.33	78.33	77.0	9.15
L I (g)	120.0	124.0	120.66	113.0	18.29
Offal (g)	306.0^{ab}	320.0^{a}	256.66^{ab}	248.66^{b}	19.33
Stomach (g)	63.66	63.33	69.00	68.00	16.65
Thigh (g)	216.33^{a}	206.33^{ab}	150.00^{b}	154.00^{b}	18.20
Shoulder (g)	116.00^{ab}	119.00^{a}	85.00^{b}	85.66^{b}	8.43
Loin (g)	98.66^{a}	89.00^{ab}	65.00^{b}	65.66^{b}	7.74
Rack (g)	333.00^{a}	336.33^{a}	255.33^{ab}	250.00ab	25.46

LW=Live weight, SW=Slaughter weight, CW=Carcass weight, DP,= Dressing percentage.SI=Small intestine, I=Large intestine

IV. Discussion

a) Growth performance of rabbits fed graded levels of Ipomoea asarifolia

The significant difference in feed intake, weight gain, average daily gain, and feed conversion ratio is an indication that animals can only utilize *Ipomoea asarifolia* at lower inclusion levels. The average daily weight gain obtained in this study was lower than those reported by Mainasara (2016) but higher than values reported by Wams (2015). The feed intake of the animals further explains the trend of the growth performance. Significant difference in weight gain obtained across the treatments showed poor acceptability of the test ingredient at higher inclusion levels. The performance of rabbits supplemented with *Ipomoea asarifolia* in this study is also comparable to the report of Samokel *et al.* (2006).

b) Carcass Characteristics of rabbits fed Ipomoea asarifolia

The results indicated increased weight of the liver in treatments 3 and 4 showing significant effects of anti-nutritional factors contained in *Ipomoea asarifolia* on the experimental animals the liver grow bigger in order to cope with detoxification of the phyto-Chemicals in the *Ipomoea asarifolia.* The dressing percentage for the rabbits was higher in treatment 1 and 2. The kidney, small and large intestine were all within the range for normal healthy rabbits as evaluated by Mudunuru *et al.,* (2008). The dressing percentage (46.22-52.37 %) reported in this study was lower than 55-67 % reported by Lowa *et al.* (2006).The significantly ($P<0.05$) higher weight of liver and kidney in treatment 4 as observed was due to high content of *Ipomoea asarifolia*. Bone (1979) reported that anti-nutritional factors contained in certain plants because abnormalities as a result of increased metabolic rate of the organs in an attempt to reduce the toxic elements or to convert the anti-nutritional agent to non-toxic metabolism.

V. Conclussion

It was concluded that inclusions of *I pomoea asarifolia* beyond 5g/kg in the diets of rabbit significantly reduced performance.

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