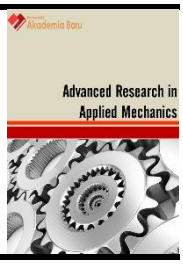
Penerbit Akademia Baru

Journal of Advanced Research in Applied Mechanics

Journal homepage: www.akademiabaru.com/aram.html
ISSN: 2289-7895



Performance of Grower Rabbits Fed Varying Dietary Levels of *leptadenia hastata* Leaves as Basal Diet

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ABSTRACT

An experience was conducted to study the effect of leptadenia hastata leaves on the performance of grower rabbits. A total of twenty-seven grower rabbits of different sexes with an average weight of 1133.5g were randomly assigned to three treatment groups with three rabbits each as replicate in a Complete Randomized Designed (CRD) arrangement. The rabbits were fed L. hastata leaves as basal diets at 0.25 and 50% level of inclution to replace cowpea hay. Parameters measured include body weight, body weight gain, feed intake, feed conversion ratio and mortality. Results showed no significant ($p>0.05$) difference across the treatment means for all performance evaluated except for rabbits fed 0% L. hastata compared to 7.41 and 7.73 for 25% and 50% L. hastata. Result of the haematological parameters (PCV, WBC, MCH, MCHC and MCV) showed significant difference ($p<0.05$) between parameters indicating that L. hastata leaves might have influenced the parameters measured. Significant differences ($p<0.05$) were observed among the carcass parameters except for weight of head. On the organ relative weight, significance difference ($p<0.05$) were observed for all rabbits on the treatment groups. It was concluded that laptadenia hastata leaves could be included up to 25% as basal diets for rabbits for improved growth performance and carcass characteristics.

Keywords:
Leptadenia hastata, leaves, diet, grower rabbits

1. Introduction

Animals are important sources of high quality proteins that are required for healthy leaving, proteins are very important because they are the only dietary sources of amino acids. In meat, all the essential amino acids are well balanced in the ratio that the body needs, Schlolaut [21] reported that meat is considerd a source of high quality proteins. Norma [17] observed that meat is intrinsically important and is consumed all over the world. In Nigeria, meat is generally eaten as part of daily meals, and in combination with traditional starch based meals [5].

One of the major problems to the supply and consumption of adequate animals' protein in most developing countries of the world is the high cost of the finished products. This has affected the nutrition of the populace of these countries [5]. There has been a wide spread and marked inadequacy of protein intakes (both in quality and quantity) among the populace in Nigeria [9]. This low protein intake led to malnutrition among children particularly of low income earners. This unwanted trend is of great cocnern and requires intensified effort to overcome it.

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The rapid increases in population result to the increase in the demand for protein of animal origin and depend mainly on traditional livestock for animal protein source which proved insufficient. Food and Agricultural Organization [9] estiamted an annual five to seven percent growth rate for meat cnsumption. Such increase cannot be easily met by large animals, such as cattle, sheep and goats becuase of their slow production cycles [9]. However, the gap could be filled with short life cycle animals such as rabbits and poultry that are characterized with short generation intervals, large litter size and quick returns of capital investment in addition to their successful raising at back yard of our houses [2].

Rabbit production has been on the increase in Nigeria in recent years. It is the most productive meat producing among all domesticated animals.

Small size, short generation interval with short gestation period of 30-31 days, rapid growth and early maturity gave rabbit an upper hand over other animals [2,4].

Though rabbit can survive on all forage diet, optimum performance could only be ensured in a mixed feeding regime involving forage and concentrate formulated feeds [4]. From the nutritional point of view, rabbit meat is found to be superior in nutritive value compared to other types of meat. Also the cheapness of rabbit meat is enhanced by the high growth rate and high prolificacy and more importantly by the fact that it can thrive on forage with high fiber content and household left over [7].

Leptadenia hastata (pers) Deene belongs to the family *Aselepia deceae*, used as food by many African populations. It is commonly used as a vegetable and is considered as a famine food due to its high content of valuable nutrients in Niger Republic. It is also used as herbal medicine against milk drying, sex-impotence, trypanosomiasis, acute rhinopharyngitis and wounds [15,23]. The leaves are often chewed by shepherds against polydiasis and mouth dryness [18] due to its high concentration of water, minerals and vitamins. In some parts of the Northern Nigeria, leaves extract is used for the treatment of stomach upset in children [3]. The plant is an important camel, goat, and cattle fodder. In veterinary medicine the plant is used against colic in horses and cattle [6].

The aim of this study is to evaluate the response of rabbits fed *Leptadenia hastata* leaves as basal diet in growth performance, carcass characteristics, organ weight and haemotological indices.

2. Materials and Methods

2.1 Experimental site and location

The experiments were carried out at the Livestock Teaching and Research Farm of the Department of Animal Science, Faculty of Agriculture, Usmanu Danfodiyo University, Sokoto State Nigeria.

2.2 Experiment diets

A concentrate diets was formulated and fed along with cowpea hay as basal diets for the control treatment. Subsequent treatments contain *L. hastata* leaves replacing cowpea hay at 25 and 50% levels inclusion respectively. The experimental diets were iso-caloric and iso-nitrogenous.

Table 1
Gross Composition of Experimental Diets fed to Rabbits

Ingredient	Diet 1	Diet 2	Diet 3
Basal			
Cowpea hay (%)	100	75	50
Leptadenia hastata (%)	0	25	50
Concentrate			
Maize	51.20	51.20	51.20
Groundnut cake	17.00	17.00	17.00
Wheat offal	25.00	25.00	25.00
Bone meal	2.50	2.50	2.50
Limestone	2.50	2.50	2.50
Premix	0.50	0.50	0.50
Methionine	0.50	0.50	0.50
Lysine	0.50	0.50	0.50
Salt	0.50	0.50	0.50
Total	100g	100g	100g
Calculated analysis of the concentration diets			
Metabolizable Energy (kcal/kg)	2726.22	2726.22	2726.22
Crude protein (%)	16.49	16.49	16.49

2.3 The Experimental Animals and their Management

Twenty-seven grower rabbits of mixed breeds and sexes with an average weight of 1133.5g were purchased and used for the experiment. The rabbits were alloted to three treatments with three rabbits in each treatment and each treatment replicated three times.

The rabbits were fed morning and evening, fresh cool and clean water were provided *ad-libitum*, clay pot was used as feeders and drinkers. Each rabbit was fed *ad-libitum,* with concentrate, and *L. hastata* leaves and cowpea hay as basal diet. Regular disinfection of utensils (water troughs and feeders) was carried out throughout the trial. The house was always cleaned and rabbit droppings removed weekly. Routine prophylatic treatments using antibiotics such as Amprolium in drinking water was carried out.

2.4 Experimental Layout

Complete Randomized Design (CRD) was used as our experimental design for the research work. there were three treatments with three replicates per treatment (3x3x3=27 Rabbits), was used. The experiment lasted for 8 weeks.

Basal diets	Diet 1	Diet 2	Diet 3
Cowpea hay	100%	75%	50%
L. hastata leaves	0.00%	25%	50%

2.5 Data Collection

Initial body weight of rabbits in each treatment was recorded. Subsequently, the rabbits were weighed on weekly basis using 10kg capacity scale. Records of body weight gain was calculated from the initial and final body weights. Feed consumption was recorded and calcualted on daily basis by substracting the left over from the quantity of feed offfered to the rabbits on the previous day. Feed

conversion ratio was also calculated from the records of feed intake and body weight gains of the animals.

The body weight gains and feed conversion ratio was calculated using these formulae respectively.

Thus rate of body weight gain (daily) = $\frac{BW\ wk1-BWwk0}{BWwk0\ x\ 7} x100$

Weight gain = final weight – initial weight
where:
BWwk1 = body weight of animal at the end of the current week(g)
BWwk0 = body weight of animal at end of previous week(g):
Feed conversion ratio = $\frac{feed\ intake}{Weight\ gain}$
Feed conversion rate = $\frac{FCwk1}{BWwk1-BWwk0}$

where: FC quantity of feed consumed by the animal for the current week(g)

2.6 Carcass Evaluation

At the end of the feeding trial, three rabbits were randomly selected from each treatment one rabbit per replicate. The rabbit was starved for 12 hours, supplied with water tagged and weighed. The rabbit was slaughtered by severing the throat and jugular veins. The slaughtered rabbit was bled by hanging it head down ward for about thirty (30) minutes, dressing was done by flaying, external offal was removed and weighed seperately after evisceration, dressed carcasses were weighed, each carcass was first divided into two equal half by cutting through its vertebral, each half was then divided into the following primal cuts:

Shoulder, ribs, rack, loin and legs, the whole cuts was weighed individually using a top loading scale 1kg capacity). The pelt, external offal, adipose fat and gastro intestinal track were expressed as percentage of live weight.

2.7 Haematological Analysis

Blood sample were collected from three rabbits per treatment one per replicate in EDTA treated bottles for heamotological analysis. This was done at the end of the experiment. Blood samples were analysed for White Blood Cell (WBC), Red Blood Cell (RBC), Haemoglobin (Hb), Packed Cell Volume (PCV), Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin (MCH), Mean Corpuscular Haemoglobin Concentration (MCHC), Monocyte (M), Lymphocyte (L), Esmophils (E), Neutropils (N) and Byscophils (B) at the Chemical Pathology Laboratory, Veterinary Teaching Hospital, Usmanu Danfodiyo University Sokoto.

- Mean Corpuscular Volume (MCV) was calcualted as

$$MCV = \frac{PVC\ x\ 10}{RBC\ (mm^3)}$$

- Mean corpsuclar haemoglobin (MCMH) was calculated as:

$$\langle CH = \frac{Haemoglobin\ (g/dl)\ x\ 10}{RBC}$$

Mean Copsucular Haemoglobin Concentration (MCHC) was calculated as $MCHC = \frac{Haemoglobin\ (g/dl)\ x\ 10}{PCV}$

The dressing percentage was calculated as the ratio of the carcasses weight to the live weight which was expressed as $\frac{carcass\ weight}{Live\ weight}\ x\ 100$

2.8 Water Holding Capacity

Filter paper compressing method was determined as described by Aynur [5]. In this procedure, 20 grammes sample of meat was taken from each treatment, weight, ground and placed on the filter paper and external force of 500g was applied to the sample for a period of 20 seconds and then removed, the total area of the exudates on the water absorbing sheet was used as an indicator for water holding capacity of the meat.

2.8.1 Data analysis

Data collected were subjected to Analysis of variance using stat-view analytical computer package. Duncan Multiple Range Test was used to separate means, where significant differences exist among the treatment.

Table 2
Growth Performance of Rabbits Fed *L. hastata* leaves as Basal Diet

	Treatment			
Parameters	**1**	**2**	**3**	**SEM**
Average Initial weight (g)	1133.40	1133.50	1133.36	0.118
Average final weight (g)	2011.53	1799.96	1684.60	90.44
Average Weight gain (g)	878.67	666.43	551.03	90.55
Average DWG (g)	15.67	11.89	9.84	1.61
Average Mortality (%)	22.20	0.00	11.10	11.10
ADFI Conc. (g)	74.37	88.41	75.62	5.49
ADFI Basal (g)	26.96	30.25	29.23	1.11
FCR Conc. (g)	5.09^{c}	7.41b^{c}	7.73^{ab}	0.74
FCR Basal (g)	1.85^{c}	2.60b^{c}	2.99^{ab}	0.35
Cost/kg Conc. (N)	382.50^{c}	554.55^{a}	434.30^{bc}	28.74
Cost/kg Basal (N)	76.70	157.82^{b}	178.24^{a}	4.73

abc=means within same row with different superscript are significantly different (p<0.05)

Table 3
Carcass Evaluation of Rabbits Fed *L. hastata* Leaves as Basal Diet

	Treatment			
Parameters	**1**	**2**	**3**	**SEM**
Average live weight (g)	1466.66^{bc}	1386.67^{c}	1536.66^{ab}	37.34
Average Carcass weight (g)	787.54^{b}	701.26c	84170^{a}	6.68
Average Dressing %	53.70b^{c}	50.65^{c}	55.23^{ab}	1.28
Average Pelt %	10.18^{a}	8.70b^{c}	8.85^{c}	0.18
Average Left rib %	23.55^{a}	21.39^{bc}	19.36^{c}	0.51
Average Right rib %	21.04^{ab}	20.13^{bc}	19.22^{c}	0.51
Average Left Loin %	25.37	25.90^{bc}	30.14^{c}	0.16
Average Right Loin %	25.04^{c}	25.36^{bc}	26.27^{a}	0.34
Average Legs %	2.00^{bc}	1.92^{c}	2.35^{a}	0.26
Average Neck %	4.95^{a}	4.39^{b}	3.29^{c}	0.23
Average Head %	9.58	9.24	9.35	0.21

abc=means within same row with different superscript are significantly different (p<0.05)

Table 4
Organ characteristics in relation to the carcass weight of rabbits fed L. hastata leaves as basal diet

	Treatment			
Parameters	**1**	**2**	**3**	**SEM**
Small intestine (cm)	271.53^{ab}	238.78^{c}	263.03^{b}	3.11
Small intestine (%)	4.67^{a}	3.67^{c}	3.69^{bc}	0.11
Large intestine (cm)	61.26^{c}	72.17^{b}	80.10^{a}	0.83
Large intestine (%)	4.70^{a}	4.24^{c}	4.27^{bc}	0.56
Liver (%)	2.62^{a}	1.97^{c}	2.49^{b}	0.24
Heart (%)	0.45^{ab}	0.42^{c}	0.44^{bc}	0.09
Kidney (%)	0.74^{b}	0.70^{c}	0.77^{ab}	0.03
Stomach (%)	0.95^{c}	2.08^{a}	1.51^{b}	0.15
Lungs (%)	0.59^{c}	0.75^{ab}	0.71^{b}	0.17
Fat (%)	1.93^{ab}	1.92^{b}	1.10^{c}	0.10

abc=means within same row with different superscript are significantly different (p>0.05)

Table 5
Haematological Parameters of Rabbits Fed *L. hastata* Leaves as Basal Diet

	Treatment			
Parameters	**1**	**2**	**3**	**SEM**
PCV (%)	48.00^{bc}	50.00^{ab}	46.67^{c}	
Hb (g/dl)	18.52^{b}	18.57^{ab}	14.79^{c}	
RBC (x106/mm^2)	4.61^{b}	5.30^{a}	3.91^{c}	
WBC (x106/mm^2)	5.68^{b}	4.47^{c}	6.68^{a}	
MCH (fl)	38.19^{a}	34.65^{b}	31.70^{c}	
MCHC (%)	38.60	37.47	39.13	
MCV (%)	98.02^{bc}	94.23^{c}	112.23^{a}	
Neutrophils (%)	13.13^{bc}	20.84^{a}	12.89^{c}	
Lymphocyte (%)	85.11^{b}	64.00^{c}	86.20^{ab}	
Monocyte (%)	2.10^{c}	4.12^{a}	2.17^{bc}	
Basophils (%)	0.00	0.00	0.00	
Eosinonphils (%)	0.00	0.00	0.00	

abc=means within same row with different superscript are significantly different (p<0.05)

Table 6
Water Holding Capacity of Rabbit Meat (WHC)

	Treatment			
Parameters	**1**	**2**	**3**	**SE**
WHC (cm)	20.47^{b}	23.10^{a}	20.37^{bc}	0.47

abc=means within same row with different superscripts are significantly different (p>0.05)

3. Conclusion and Recommendation

3.1 Feed consumption

The average feed intake of the experimental rabbits was found to be similar to the report of Maigandi and Ngang [19] who fed varying levels of calabash seed cake to rabbits. The fed intake of experiment was however lower to that recorded by Ayers *et, al.* [15] when they fed rabbits with feed containing varying levels of popular leaf meal. The result of the fed intake suggested that feeding *L. hastata* at this levels tried did not yield any significant effect on this parameter.

3.2 Feed Conversion Ratio (FCR)

Feed conversion ratio differed significantly ($p<0.05$) between treatments, for both concentrate and basal diets. The rabbits in T_1 converted better (5.09 for concentrate and 1.85 for basal diet) than T_2 (7.41 for concentrate and 2.60 for basal diet) and T_3 (7.73 for concentrate and 2.99 for basal diet). Feed conversion ratio obtained in this study is higher than those recorded by (2.78,263 and 2.39) by Maigandi and Abdullahi [20] when they fed morning glory as a source of forage and calabash seed cake respectively for rabbits in a semi-arid zone of Nigeria.

Feed conversion ratio is among the important factors to consider when making statement on cost of production [24]. Lower body weight gain and poor feed conversion ratio was recorded in the rabbits fed 50% *L. hastata* leaves. This poor feed conversion ratio for the rabbits fed *L. hastata* may be attributed to the higher levels of the experimental ingredient.

3.3 Body Weight Gain

There were no significance differences ($p>0.05$) in the final body weight gain among the rabbits in the treatment groups (Table 3). The higher numerical weight gain of rabbits fed 0% *L. hastata* leaves at the end of trial could be as a result of higher digestion of the nutrient consumed by the rabbits and greater efficiency in the utilization of feed which resulted in enhanced growth. The performance body weight of rabbits in this study was similar to those reported by Eustace *et, al.* [8] when they fed rabbits with varying dietary cyanide levels, because all the values of final body weight gain and average daily gain were statistically the same. Growth performance of rabbits could vary with breed, genotype, age, nutrition, duration of experiment, ambient temperature, disease as well as the management [16].

3.4 Mortality

There were no significance differences ($p>0.05$) between rabbits in the treatment groups. But it is higher in the control group (22.20%) compare to that of treatments 2 (0.00%) and treatments 3 (11.10%). The result coincides with the reports of Doyle [3] that the application of medicinal plants reduces the number of mortality.

3.5 Carcass Characteristics

Live weight, carcass weight and dressing percentage were significantly different between all the treatments groups, live weight was recorded with higher value of 1536.66g for rabbits that were given 50%. *L. hastata* leaves (Table 2) also high value of carcass weight was recorded with higher value of 841.70 with those fed 50% *L. hastata* leaves with least value of 701.26g with those fed 25% *L. hastata* leaves. Improvement in the carcass characteristics of rabbits for 50% *L. hastate* leaves as basal diet could be attributed to the fact that *laptadenia hastata* contained some medicinal properties. Aliero and Wara [3]. The dressing percentage obtained in this study (53.70, 50.65 and 55.23) were higher percentage obtained in the 46.51–50.44% as reported Biya et. al., (2008) and lower than the values recorded by Okori (2003) which ranges between 72.60 – 76.20%.

The percentage, pelt recorded for rabbit on 0% *L. hastate* may be attributed to the values were similar to those recorded by Biya et al., (2008).

Left rib, Right rib, left loin and right loin percentages differ significantly ($p<0.05$) between the treatment groups, and in all the treatments the weight of left ribs and left loin are higher than the

right ribs and right loins (Table 3) weight of legs and Neck also differ significantly ($p<0.05$) among the treatments groups (Table 3) and the values are similar to those recorded by Iyeghe-Erakpotobor *et, al.* (2005) which ranges between 1.93-2.36 for legs and 3.30-3.30-9.96 for neck respectively.

3.6 Organ Relative Weight

Small intestine lengths and weight percentages differ significantly between the treatment groups (Table 3). Also lengths and weights percentages of large intestine and small intestine also differ significantly access the treatments group (Table 3). The result of this study is similar with what was recorded by Yakubu and Wafar (2014) who the values ranges between 210.00-219.33cm for small intestine lengths, 61.45-80.20cm for large intestine and 3.76-4.76, 4.37-4.68% for the weight of small and large intestine respectively. Liver, heart and kidney percentages differed significantly across the treatment (Table 3). The values obtained in this study are similar to that obtained by Biya *et, al.* [1] which ranges between 2.33-2.66 for liver and 0.89-0.94 for kidney, stomach, lungs and fats percentages also differ significantly between treatments groups (Table 3).

3.7 Haematological Result

Haematological parameters are good indicators of the physiological status of animal and its changes are of value in assessing the response of animal to various physiological situations. The haematological indices examine were significantly ($p<0.05$) influence by percentage level of *L. hastata* leaves fed. PCV of rabbits fed 25% *L. hastata* were significantly different ($p<0.05$) and higher than those fed 0% and 50% *L. hastata* leaves (Table 4). But all the treatments groups fall within the normal physiological ranges of haematological component for rabbits i.e 30.0-50.0 PCV [11]. And the result of this study is similar with what was recorded by Yakubu and Wafar [25] that ranges between 46.03-50.44. The haemoglobin values obtained for T_1 and T_2 (Table 4) were higher than what was recorded by Yakubu *et. al.*, [25] ranges between 8.80-10.20 and also slightly higher than the normal physiological ranges of 8.0-17.5 [11,12]. This may probably be due t the effect of anti-nutritional factors in the basal diets. The values of RBC and WBC differed significantly between the treatments groups (Table 4). And the WBC values are similar to those recorded by Ahmefule *et. al.*, [1] which ranges between 5.00-6.80, and also fall within the normal physiological ranges. The values obtained for the MCHC showed no significance difference among the treatments groups and Basophils and Eosinophils were not found in the blood of rabbits across all the treatments groups.

It could be concluded that *Laptedenia hastata* leaves could be fed as basal diet to rabbit at 25% levels without adverse effect on haematological and carcass, characteristic of rabbits.

Base on the observation and finding from the study, the following recommendations were offered:

- Since the *Laptedenia hastata* is abundance in the study area, there is need to utilize it as an additional source of vital phytochemical.
- *Laptedenia hastata* leaves are potentially useful for rabbits production. It will be worthwhile to continue investigations into the use of this plant for rabbits species at different lower levels to compare with the present study.

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