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# COMPARATIVE STUDY OF GROWTH PERFORMANCE OF *ORYNCTOLAGUS CUNICULUS* (RABBITS) FED RABBITS FEED AND SOME FORAGES IN CAPTIVITY

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## ABSTRACT

This research was carried out to compare the growth performance of rabbits in order to meet the increasing demand in animal protein as a way of meeting human needs. It investigated the growth performances of rabbits; (*Orynctolagus cuniculus*) fed with rabbit feed and some forages. A total of Thirty (30) weaner rabbits of mixed sexes with the average initial weight of 400g-450g were used in the experiment. The rabbits were randomly selected into two experimental groups; Treatment A and Treatment B, each treatment was composed of three replicates and five rabbits over a period of 12 weeks in a completely randomized design. The control groups (Treatment A) were fed diet without any inclusion of forages while Treatment B were fed diet containing some forages that was formulated. The results from the proximate analysis showed the content of crude protein was (19.69%) while Treatment A (16.10). Data were collected weekly and parameters monitored were weekly weight gain, Percentage weight gain, Specific growth ratio and Food conversion Ratio. Studies on result of feed utilization and growth performance showed that weight gain was higher in rabbit fed Treatment B (542.00g) than Treatment A (337.33g). The percentage weight gain was highest in Treatment B (132.53) and the least in Treatment A (80.98) The specific growth ratio of rabbits fed with treatment B was significance difference from those fed with Treatment A. The best Food Conversion Ratio was recorded in the rabbits fed with Treatment B (17.82) than those fed with the rabbit feed, Treatment A (31.26), however, Analysis of variance (ANOVA) showed that Treatment A was significantly different from Treatment B. The results showed that feeding rabbits forages enhanced their growth performance as indicated growth rate and food conversion ratio as it contains all the necessary nutrients for growth.

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Rabbit; feed; growth and Forages.

## INTRODUCTION

The nutritional level of the Nigerian population is characterized by inadequate intake of protein both in quality and quantity (FAO, 2000). Animal protein consumption is very essential for covering protein requirement of the organism. The average daily protein intake is still far less than the value of 35 g per adult per day recommended by (FAO, 2007). The myriad attempt aimed at solving low protein intake and poverty alleviation by Nigerian government still remains a mirage (Nworgu and Hammed, 2009). The reasons behind this inadequate intake of animal proteins includes short supply of animal products due to poverty, general economic recession and low level of production of the indigenous breeds of animals (Ogunbosoye and Babayemi, 2010). Improved rabbit production can help in boosting the protein supply in Nigeria. Animal protein production from cattle, sheep and goat require much capital as compared to rabbit which has small body size and short gestation interval. Fast-growing animals such as rabbits possess a number of features that might be of advantage to the small holder subsistence – type integrated farming especially in developing countries. The potentials and attributes of rabbit which makes it unique among farm animals include, high growth rate, high efficiency of conversion, short gestation period, and high prolificacy, low cost of production, high quality (meat which includes low fat, sodium, and cholesterol levels). However, feeding of rabbits just like other monogastric animals accounts for about 70 and 80% of its production (Arijeniwa *et al.,* 2000). The high cost of feed coupled with the ignorance of possible alternative and cheap feed ingredients are among important factors militating against increased commercial rabbit production in Nigeria. As opined by Ahaotu, *et al.,* 2010 the high cost of feed ingredients in most tropical countries clearly indicates that the production of feeds for livestock business is grossly inadequate. This major constraint has brought about the search for alternative feed resources that are readily available, inexpensive and less competed for by humans. This has necessitated the need to seek alternative forages which could be available all year round and cheap to process. This is especially so because of the availability of forage and the ability of rabbits to convert forage into meat for human consumption (Aliyu, 2001). This has generated concern in rabbit farmers and has consequently opened research interest in the use of non-conventional protein source for rabbit's production (Ahamefule *et al.,* 2007). (Onwudike, 1995) observed that Nigerian rabbit keepers believed that the access of rabbit to green feeds allows for a better growth rate when compared with rabbits that do not have access to green feeds (Forage). (Bamikole and Ezenwa, 2001) recommended Guinea grass (*Panicum maximum)* for high crude fibre and digestibility followed by elephant grass (*Pennisetum purpureum)* which is fed to rabbits. This study is a part of the ongoing research from my PhD work and is also aimed at assessing the growth performance of rabbits in captivity fed on Rabbit feed and some forages.

## MATERIALS AND METHODS

### Experimental Site

The study was conducted at the Animal House of the Biochemistry Department, Nnamdi Azikiwe University, Awka in Awka South Local Government Area of Anambra State. It falls

within the geographical co-ordinates of $06^{0}15^{1}$ $10^{11}$ N and $7^{0}$ $6^{1}$ $50^{11}$ E and humid area, average rainfall of 2169.8 mm, and average ambient temperature of $29^{0}$C and $34^{0}$C. The vegetation is of the Guinea Savannah.

**Experimental Design**

The experimental design used, was completely randomized design. In this experiment, a total of thirty (30) weaner rabbits of 5 – 6 weeks old, weighing between 400g – 450g were used. These rabbits were randomly assigned to two treatment diets of A – Rabbit feed and B – some forages. Each treatment had three replicates. Animals in the various groups were of homogenous body weight. The rabbits were managed under the intensive system with rabbits housed in individual cages made of wooden frames and wire gauze of 90 ×60 × 30cm. Before the experiment, the rabbits were dewormed thoroughly using $ESB_{3}12$ drugs in order to ensure that the animals are in good health condition. The study lasted for a period of Twelve weeks besides one week of acclimatization.

**Animal feed Formulation and feeding**

The Forages that were choosen includes; Cassava leaf (*Manihot esculenta),* Lead plant (*Leucaena leucocephala),* Guinea grass *(panicum maximum),* Elephant grass *(Pennisetum purpureum),* Paw paw *(Carica papaya)* and Cabbage (*Brassica oleracea)*due to their palatability to the rabbits and were gotten around Nnamdi Azikiwe University and environs, chopped into pieces and then air-dried for seven days (in order to remain its nutritional value) under shade until they were crispy to touch while retaining its green colouration before grinding at a feed-mill. The nutrient requirement value was determined from the National Research Council publication for a specific livestock (NRC, 2001). The protein requirement is based on the animal's class, production stage and level. The forages were measured out and mixed in a large bowl, pelleted, air dried, bagged and stored at room temperature to avoid spoilage and deterioration. The composition of rabbit feed obtained from Umudike Research Institute of Agriculture, Umudike Abia State and the composition of some forage are shown in (table 1).The rabbits were fed 200g of the ration types A and B two times daily at 8.00am and 6.00pm. Plastic troughs and feeder were made for feeding and providing water for the animals.

**Data collection**

The following data were collected; weekly weight gain (WG), percentage weight gain (PWG), Specific growth rate (SGR), food conversion Ratio (FCR).

Daily feed intake = food fed- feed left over (gm)

Weekly weight gain= weekly final mean weight (g) - weekly initial mean weight (g)

$$\mathrm{PWG} = \frac{\text{Mean final weight} - \text{mean initial weight}}{\text{mean initial weight}} \times \frac{100}{1}$$

$$\mathrm{SGR} = \frac{\log w^{2}{}_{e} - \log w^{1}{}_{e}}{T_{2} - T_{1}} \times \frac{100}{1}$$

Where; $w_{1=}$initial mean weight

$w_{2}$ = Final mean weight

$T_{1}$ = Initial time

$T_{2}$ = Final time

log = logarithm.

$$\mathrm{FCR} = \frac{\text{Food consumed by Rabbit (g)}}{\text{Mean weight gain by Rabbit (g)}}$$

## Proximate analysis

The Proximate Analysis of Ration type B was analysed for Moisture Content, Ash Content, Carbohydrate Content, Determination of Crude Fibre, Crude Fat Content, Crude Protein Content and Determination of Food Energy using the methods of the Association of official Analytical chemist (A.O.A.C 1990).

**Ethical Approval**

In this study, there was an ethical clearance from the ethical committee of Nnamdi Azikiwe University, Awka for approval of proper handling of the animal.

**Statistical Analysis**

The data obtained from the indices of growth and feed utilization were subjected to Analysis of variance (ANOVA) and significant difference was analysed using least significant difference (LSD) (SPSS 2013).

**RESULT**

**Feed utilization / performance of rabbits fed on diverse rations A and B.**

The composition of the each of the experimental diets are presented in Table 1 below, while the result of the proximate composition, vitamins and mineral analysis are presented in Table 2,3,4 respectively.

Feed utilization indices and growth performance results of rabbits fed on Experimental diets (A and B) for 8 weeks are presented in the Tables below.

The highest mean weight gain was recorded by rabbits fed on ration B (542.00g) while the least was recorded by those in Treatment A (337.33g). Table 5. The highest percentage weight gain was attained by the rabbits fed on ration B (132.53%) while the least was recorded by those in Treatment A (80.98%) Table 5. The specific growth rate followed the same trend as the percentage weight gain, Treatment B (5.24g) while Treatment A (3.67g) Table 5. The analysis of variance result showed that Treatment B was significantly difference from Treatment A in each of the dietary treatments ($P<0.05$). The best food conversion ratio was recorded for the rabbit fed ration type B (17.82g) and least in ration A (31.26g) and ration type A was significantly ($p<0.05$) different from ration B, Table 5.

## Table 1. The Composition of the Experimental Diets (A and B)

## Feed Components/Ingredients

| **Ration A** | **Quantity in g/kg** | **Ration B** | **Quantity in g/kg** |
|---|---|---|---|
| Maize | 30 | Elephant grass | 20 |
| Wheat | 20 | Guinea grass | 20 |
| Wheat bran | 10 | Lead plant | 20 |
| Rice bran | 10 | Cassava leaf | 10 |
| Sunflower cake | 10 | Pawpaw leaf | 10 |
| Cotton seed cake | 5 | cabbage | 15 |
| Fish meal | 2 | Blood meal | 2 |
| Beans | 10 | Bone meal | 2 |
| Mineral premix | 1 | Mineral/Vitamin premix | 1 |
| **Total** | **100g** | **Total** | **100g** |

**Table 2: Proximate Analysis of the Experimental Diets (A and B)**

| Proximate Composition (%) | Treatment A | Treatment B |
|---|---|---|
| Moisture (%) | 8.75 ± 0.25 | 1.00 ± 0.00 |
| Ash (%) | 8.00 ± 1.00 | 16.00 ± 1.50 |
| Crude protein (%) | 16.10 ± 0.01 | 19.69 ± 0.01 |
| Crude fibre | 8.10 ± 0.10 | 14.20 ± 0.40 |
| Crude fat (%) | 5.10 ± 0.10 | 8.30 ± 0.30 |
| Carbohydrate (%) | 53.95 ± 1.05 | 54.82 ± 1.41 |

**Table 3: Vitamins composition of the experimental feed (A and B)**

| Vitamins | Treatment A | Treatment B |
|---|---|---|
| C (mg/g) | 93.25±0.25 | 93.25±0.75 |
| A (µM) | 0.41±0.12 | 0.29±0.05 |
| B6 (g/g) | 0.03±0.00 | 0.03±0.00 |
| B3 (g/g) | 0.21±0.00 | 0.20±0.00 |
| B1 (mg%) | 0.28±0.00 | 0.06±0.00 |
| B2 (mg%) | 0.27±0.00 | 0.90±0.00 |
| D (mg/g) | 0.69±0.03 | 0.73±0.01 |
| E (µM) | 17.94±1.08 | 17.53±0.17 |

**Table 4: Minerals composition of the Experimental feed. (A and B)**

| **Sample** | **Zinc (ppm)** | **Iron (ppm)** | **Magnesium (ppm)** | **Calcium (ppm)** |
|---|---|---|---|---|
| Treatment A | 0.239 | 0.075 | 0.519 | 0.712 |
| Treatment B | 0.798 | 0.189 | 0.189 | 0.562 |

**Table 5: Growth Performance/ Feed Utilization Indices of Rabbits Fed on Diet Treatments (A and B)**

| **Parameters** | **Treatment A** | **Treatment B** |
|---|---|---|
| Weight gain | 337.33 | 542.00 |
| Percentage Weight Gain | 80.98 | 132.53 |
| Specific Growth Rate | 3.67 | 5.24 |
| Feed conversion ratio | 31.2 | 17.82 |

## DISSCUSION

The proximate analysis of Treatment A, and Treatment B (Table 2) were analyzed to determine their components. Crude protein plays a crucial role in supporting the growth and development of rabbit, and this indicates the reason for higher body mass in Treatment B. Treatment B (8.30 ± 0.30) recorded a higher crude fat content than Treatment A (5.10 ± 0.10) which agrees to earlier studies by Lebas (2013) and MSUBT (2017). Treatment B had a higher crude fat which can also help in boosting of energy and contributes to the higher weight gain and enhanced palatability.The result of the Vitamins content of all the treatments (Table 3) showed a reasonable amount of Vitamin C, treatment A (93.25±0.25) and treatment B (93.25±0.75). Table 4 shows that Zinc, Iron, Magnesium and Calcium poses a good amount of minerals because a high-quality diet provides all the needed minerals so that a salt or trace mineral lick is not required (Lisa, 2019).

From the result of this study) The highest mean final weight gain was recorded by the rabbits fed on ration type B (542.00g), and the least was recorded by those fed on ration A (337.33g) Table 5. The performance of rabbits on the experimental diets showed that there was improved weight gain in all the treatments. However, rabbits fed with Treatment B numerically gained higher weight. Aderinola *et al*. (2018) stated that rabbit is a pseudo ruminant and that the leafier greens are always preferred by the rabbits. The increased weight could have resulted from the anti-oxidant property of forages as well as the extra nutrients it supplied, since forages contain appreciable amounts of proteins, minerals, and fibre. Unigwe *et al*. (2016) reported that the increased weight gain of rabbits could also be associated with anti-microbial activities of forages.

The highest percentage weight gain was recorded in Treatment B, and this is in line with the work of Udeh *et al*. (2021) which reported that a diet that contains forages gives a high level of nutrients for the growth of the rabbits. The result obtained from this study showed that the specific growth rate of Treatment B (5.24g) was higher than that of Treatment A (3.67g). There is significant difference among each dietary treatment (Treatment B to A). Rabbits fed with forages (Treatment B) had the best feed conversion ratio (17.82) while Treatment A (31.26). This shows that the rabbits in Treatment B were able to convert their feed more efficiently and this reflects in the weight gained by the rabbits. The feed conversion ratio obtained in this result was not in agreement with the values obtained by Ukorebi *et al*. (2019). Feed conversion ratios show how much weight the animal gains per kilogram of feed. This implies that animals in Treatment B were able to convert their feed effectively than those in Treatment A. This ability could be attributed to the increase in protein in their feed.

## Conclusion

Forages from the study was proven to have potential to make great impact in the growth rate of rabbits. It will also reduce the cost of rabbit feed for farmers and enhance rabbits production. Results obtained from this study showed that rabbits fed with Treatment B efficiently used the feed given to them more than rabbits fed with Treatment A.

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