

EFFECT OF DRIED VARIETIES OF RHIZOMES AND BULBS ON GROWTH AND HAEMATOLOGICAL INDICES OF GROWING Hyla RABBITS

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ABSTRACT

A nine-week study was conducted to evaluate performance and haematological indices of growing rabbits fed dried varieties of rhizomes and bulbs based-diets. Thirty (30) rabbits were assigned to five dietary treatments in triplicate of six (6) rabbits/treatment to contain T_1 (control), T_2 (dried ginger), T_3 (dried turmeric), T_4 (dried garlic) and T_5 (dried onions) respectively in a completely randomized design. Data were collected on performance traits. Blood samples were collected for haematological analysis. The results obtained for performance showed that there were significant ($P<0.05$) difference in final weight, weight gain, average daily weight gain and feed conversion ratio. Final weight gain had higher ($P<0.05$) value in T_1 while T_4 had the least value. For weight gain, the highest ($P<0.05$) value was recorded on T_1 , followed by T_2 and T_5 , while T_3 and T_4 had lowest values respectively. Similar trend was obtained for average daily weight. However, for the feed conversion ratio, T_1 and T_2 had the least significant values. Haematological analysis showed significant ($P<0.05$) difference in white blood cells and mean corpuscular haemoglobin concentration (MCHC) among all parameters assessed. For white blood cell, the highest ($P<0.05$) values were recorded on T_1 and T_4 , followed by T_3 and T_5 while T_2 had the least value. MCHC recorded highest ($P<0.05$) value for T_5 followed by T_1 , T_2 and T_3 while the least value was obtained in T_4 (dried garlic). It is therefore concluded that the inclusion of dried rhizomes and bulbs does not have detrimental effect on the growth and haematological parameters of growing hyla rabbits.

Keywords: Hyla rabbit, Rhizomes, Bulbs, Performance, Haematology.

INTRODUCTION

The domestic rabbit possesses many absolute and comparative advantages when compared to other livestock species. The rabbit has a short gestation length, exhibits early maturity, a high prolificacy efficient reproduction and the ability to be rebred shortly after parturition. These attributes lead to short generation interval (Mmereole, 2009; Ekuma, et al., 2017; Amaduruonye, et al., 2021). Rabbit production has the potential to bridge the gap of animal protein deficiency in Nigeria (Ajala and Balogun, 2004). It is characterized by high nutritional and healthful meat, with low fat and cholesterol and high level of protein (about 20.8%), which makes it one of the healthiest meats for human consumption. However, it is also very favourable that its consumption is not frowned by many cultures and religions (Aduku and Olukosi, 2004; Biobaku and Oguntona, 2007). Rhizomes and bulbs are underground plant structures that play a crucial role in the survival and propagation of various plant species (Ametovoa *et al.*, 2020; Brewer, 2019). Rhizomes, such as those found in ginger and turmeric, are modified stems that produce new shoots and roots, allowing plants to adapt to changing environments (Kumar *et al.*, 2017). Bulbs, such as those found in onions and garlic, are modified leaves that store nutrients and water, enabling plants to survive during periods of drought or extreme temperatures (Kamenetsky, 2017). Both rhizomes and bulbs have been used for centuries in traditional medicine and have been shown to possess various bioactive compounds with potential health benefits (Srinivasan *et al.*, 2017). Blood indices are considered to be critical indicators of the physiological stages of farm animals, thus reflecting the relationship between their nutrition and health. They are useful for clinical evaluation of various animal diseases and feed quality. Packed cell volume and red blood cells help to determine the feed toxicity and anemia in farm animals. Blood parameters change in relation to the physiological status of an animal. These changes could be as a result of several factors such feeding level, feed quality, age, sex, breed, temperature and physiological status of animals. Hence, this study was conducted to evaluate the effect of dried varieties of rhizomes and bulbs on growth and haematological indices of growing hyla rabbits.

MATERIALS AND METHOD

Experimental location and Duration: The experiment was carried out at the Rabbitary unit of Federal College of Animal Health and Production Technology, Ibadan. The experiment lasted for a period of nine weeks.

Sourcing and Preparation of Test Ingredients: The dried rhizomes and bulbs used for the experiment were ginger, turmeric, garlic and onion which were obtained from a reputable market in Ibadan. They were cleaned, sliced into smaller pieces and processed by sun and oven drying methods. Afterwards, they were grinded into powder, kept in an airtight container then later incorporated into their diets.

Experimental Animal and their Management: A total of thirty (30) hyla breed of rabbits were used for the study. The rabbits were kept in a standard hutch that measured 120 by 150 cm and was lifted 120 cm from the ground. Prior to the arrival, hutches were washed and disinfected. The rabbits were stabilized for the period of 14 days before the start of the experiment during which respectively. They were weighed and balanced for weight before carefully placed into the five dietary treatment groups according to the experimental layout. Experimental diets and clean water were offered to the rabbits ad-libitum. All routine management practices were strictly adhered to throughout the experimental period.

Experimental diets and design: The design of this study was a Complete Randomized Design experiment with five (5) treatments consisting of T₁ – T₅. and the treatment was replicated thrice, having six (6) rabbits each. Treatment 1 served as the control with no inclusion, Treatments 2, 3, 4 & 5 had 5% inclusion of dried ginger, dried turmeric, dried garlic and dried onions respectively.

Data collection:

Growth performance characteristics: The following growth performance parameters: feed intake, weight gain and mortality were measured weekly, and the feed conversion ratio was calculated as the ratio of the feed intake to the weight gain.

Haematological analysis: At the end of feeding trial, blood sample was collected through the ear vein puncture using a sterile disposable syringe and needle then deposited into sample bottle with anticoagulant (EDTA) for haematological study.

Statistical analysis: The data were subjected to analysis of variance and significantly ($P < 0.05$) different means were separated using Tukey's Test as contained in Minitab 17 (2013) package.

RESULT AND DISCUSSION

The result of the effect of dried varieties of rhizomes and bulbs on growth performance of growing rabbit is presented in Table 1. Significant difference ($P < 0.05$) was recorded in final weight, weight gain, average daily weight gain and the feed conversion ratio, among all parameters evaluated. For final weight, T₁ had the highest ($P < 0.05$) value followed by T₂ & T₅ while T₃ & T₄ had the least values respectively. Similar trends were observed for weight gain and average weight gain. However, treatment T₂ exhibited the highest feed conversion ratio which compared favorably with the control group. This indicates that rabbits in T₂ with inclusion of ginger efficiently converted their diet into muscle. The significant result obtained in this study partially agreed with the findings of Ademolue *et al.*, (2024) who recorded improved growth parameters in rabbits' groups fed blends of garlic and ginger which could be due to synergetic effects of bioactive allicin, gingerols and Terpenes present in the two phytochemical feed additives that improve digestion, absorption and utilization of feed nutrients resulting in positive effects on rabbit health and consequence excellent growth. This result also corroborates the findings of Ademola *et al.* (2009) who reported a significant increase in body weight gain of rats and broilers fed a mixture of garlic and ginger respectively.

Table 1: Effect of different varieties of dried rhizomes and bulb on performance of growing rabbits

Parameters	T ₁ (0%)	T ₂ (5%)	T ₃ (5%)	T ₄ (5%)	T ₅ (5%)	SEM	P-value
Initial weight (g)	1442.03	1452.83	1404.17	1411.67	1424.75	11.97	0.74
Final weight (g)	2259.00 ^a	2173.50 ^{ab}	1996.50 ^{cd}	1912.00 ^d	2011.75 ^{bc}	36.54	0.00
Weight gain (g/r)	816.00 ^a	720.67 ^{ab}	592.17 ^{bc}	500.33 ^c	691.00 ^{ab}	34.99	0.01
ADWG (g/r/d)	12.97 ^a	11.44 ^{ab}	9.39 ^{bc}	7.94 ^c	10.97 ^{ab}	0.56	0.01
Feed intake (g/r)	4157.30	4237.90	4825.50	4654.50	4727.10	176.22	0.73
ADFI (g/r/d)	65.99	67.27	76.59	73.88	75.03	2.79	0.73
Feed conversion ratio	5.17 ^c	5.87 ^c	8.15 ^{ab}	9.29 ^a	6.87 ^{bc}	0.45	0.00

^{abcd} means along the same rows with different superscript are significantly. ADWG- Average daily weight gain, ADFI- Average daily feed intake.

Table 2: Hematological Indices of Rabbits fed diet contained with Dried Rhizomes and Bulbs

Parameters	T ₁	T ₂	T ₃	T ₄	T ₅	SEM	P-Value	* Normal Range
Pack cell volume (%)	42.50	36.50	41.00	38.50	41.50	1.52	0.82	33.00 – 50.00
Haemoglobin (g/dl)	13.70	11.85	13.15	12.20	13.65	0.50	0.79	9.40 – 17.40
Red blood cell (x10 ⁶ /ul)	6.91	5.87	6.94	6.19	7.06	0.31	0.78	4.95 – 7.87
White blood cell (x10 ³ /ul)	6.55 ^a	5.70 ^b	6.05 ^{ab}	6.58 ^a	6.05 ^{ab}	30.9	0.01	5.00 – 12.00
Platelets (x10 ⁵ /ul)	5.57	1.38	1.20	1.31	1.46	93.29	0.53	2.00 – 5.00
Lymphocyte (%)	72.00	70.00	72.00	70.50	72.50	1.16	0.98	50.00 – 80.00
Heterophil (%)	24.50	24.50	22.50	26.00	25.00	1.19	0.96	15.00 – 30.00
Monocyte (%)	1.50	2.50	2.00	2.50	1.50	0.26	0.67	0.00 – 1.00
Eosinophil (%)	2.00	3.00	3.50	1.00	1.00	0.43	0.23	0.00 – 5.00
Mean cell volume	61.45	63.65	59.15	62.20	58.80	1.08	0.69	50.00 – 70.00
MCH	19.80	20.70	18.95	19.70	19.35	0.36	0.73	15.00 – 20.00
MCHC	32.20 ^{ab}	32.50 ^{ab}	32.05 ^{ab}	31.70 ^b	32.90 ^a	0.16	0.20	25.00 – 35.00

^{ab} means with different superscripts on the same row differ significantly ($P < 0.05$). *Adeyemi *et al.*, (2017),

Oyewale *et al.*, (2015) MCH – Mean cell haemoglobin, MCHC – Mean corpuscular haemoglobin concentration, Haematological parameters analysed showed significant ($P<0.05$) difference in white blood cell and mean cell haemoglobin concentration across the treatment means. The highest value for white blood cell was recorded on T₁ (6.55) and T₄ (6.58) followed by T₃ (6.05) and T₅ (6.05) while T₂ (5.70) had the least value. For mean corpuscular hemoglobin concentration, T₅ had the highest ($P<0.05$) value of 32.90 followed by T₁ (32.20), T₂ (32.50) & T₃ (32.05) while the least value was recorded in T₄ (31.70). Although, all other blood parameters fell within the normal physiological ranges for rabbit as observed by Adeyemi *et al.*, (2017) and Oyewale *et al.*, (2015). According to, However, white blood cells are significantly different across the treatment which indicated that the immune system of those rabbits are influenced by the dietary treatments. Although the value of 5.70 – 6.58 $\times 10^3/\mu\text{l}$ recorded in this present study were within the normal ranges of 2.5-12.5 $\times 10^3/\mu\text{l}$ reported by Postgraduate Committee in Veterinary Sciences (1990). Significant results obtained for MCHC in this study were within the value ranges of 30.70 to 32.73 g/d and 27 to 37 g/dL reported by Amaza *et al.*, 2020 and RAR (2009).

CONCLUSION:

This study showed that dried ginger, turmeric, garlic and onion can be grounded and incorporated into the diet of rabbits to enhance growth as it poses no deleterious effect on their health.

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