GROWTH PERFORMANCE AND HAEMATOLOGICAL PARAMETERS OF GROWING RABBITS FED DIETS WITH VARYING LEVELS OF MAIZE CHAFF

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ABSTRACT
This study was carried out to evaluate the performance and haematological indices of growing rabbits fed maize chaff (MC) based diets as replacement for Brewer's Dried Grain (BDG). Twenty-four (24) eight weeks old growing rabbits of mixed breeds balanced for sex were randomly selected and assigned to four (4) treatment groups replicated thrice and each treatment contained six (6) rabbits in a Randomized Complete Block Design (RCBD). Four (4) isocaloric and isonitrogenous diets with dietary inclusion levels of maize chaff at 0%, 10%, 20%, and 30% were formulated as replacement for Brewer's Dried Grain (BDG). Data were collected for average feed intake, average weight gain, feed conversion ratio and haematological indices such as packed cell volume, red blood cell, white blood cell count among others. The data collected were subjected to analysis of variance procedure (ANOVA) using General Linear Model (GLM) of SPSS (Version 2015). Results of the study showed that there were no significant differences (P>0.05) in the means of the Average Daily Feed Intake (ADFI), Average Daily Weight Gain (ADWG), Feed Conversion Ratio (FCR), and the Protein Efficiency Ratio (PER)of the rabbits across the four diets. ADWG was highest in rabbits fed T4 (7.14g) and lowest in T2 at 5.13g. The values obtained for the means of the ADFI showed that the rabbits fed the T4 consumed on the average the highest amount of feed per day at 97.3g with rabbit fed the T1 consuming the lowest amount of feed at 91.7g. This may be attributed to the nutritive value of maize chaff compared to BDG. However, significant differences (P<0.05) were observed in packed cell volume (PCV), red blood cell (RBC), haemoglobin concentration (HB), mean corpuscular haemoglobin concentration (MCHC), mean corpuscular haemoglobin (MCH) and mean corpuscular volume (MCV) across all the dietary treatments. It was therefore concluded that maize chaff can replace BDG in rabbit diet up to 30% inclusion level without adversely affecting performance.
Keywords: Brewer's Dried Grain (BDG), Maize chaff (MC), Performance, Rabbit

INTRODUCTION

The increase in population in developing countries like Nigeria and the search for animal protein especially rabbit has made the replacement of convectional feed with alternative but less expensive ones a priority. Rabbit production is a veritable way of alleviating animal protein deficiency in Nigeria (Batholomew et al., 2020). In developing countries, more important consideration would be to formulate cheap diets based on feedstuffs that are of little direct value as human food (Glencross et al., 2023). Maize chaff has been identified as a promising source of nutrient for animal production. Maize chaff, a fibrous by-product that remains after the kernels have been processed for various uses can be used as animal feed including rabbits due to its dietary benefits; supports healthy digestion in rabbits and its coarse texture helps promote dental health by encouraging natural chewing and preventing dental overgrowth (Vastolo et al., 2022). The utilization of maize chaff as feed ingredients offers a promising solution to address these challenges. Consequently, this study was carried out to ascertain the performance and haematological parameters of growing rabbits fed maize chaff-based diets as replacement for brewer's dried grain (BDG).

MATERIAL AND METHODS

This research was conducted at the Rabbitry Unit of the Teaching and Research Farm of the Department of Animal Production and Health, Federal University Oye Ekiti, Ikole campus, Ekiti State, Nigeria. Maize chaff was collected from one of the local mills in Ado Ekiti and used as bought. They were formulated to replace BDG at dietary graded levels of 0, 10, 20 and 30% to give four experimental treatment groups. The control diet is designated T1 while others from 10, 20, and 30% were designated as T2, T3, and T4 respectively. Twenty-four (24) growing rabbits were purchased from the local rabbit farmers in Ado Ekiti. They were randomly assigned to four dietary treatment groups, six (6) rabbits were allotted to each treatment group replicated thrice and each replicate consisted of two (2) growing rabbits. The research lasted for nine (9) weeks inclusive of two (2) weeks adaptation period. The experimental design was Randomized Complete Block Design (RCBD). At the end of the trial, three rabbits were selected from each treatment for blood collection. 2mls of blood sample was collected from each rabbit and put into a sample bottle containing anti-coagulant Ethylene Di-amine tetra acetic acid (EDTA). The blood samples were analysed for pack cell volume (PCV), RBC, HB, MCHC, MCH, and MCV at the Federal University Oye Ekiti laboratory according to the methods described by Lamb (1991). Data obtained were subjected to analysis of

variance using the general linear model procedures of SAS (1993). Significant treatment means were separated using Duncan's Multiple Range Test according to procedures described by Steel and Torries (1980).

Table 1: Nutrient/Proximate Composition of Maize Chaff (MC)

Parameters (%)	Maize Chaff
Moisture	16.17
Crude Protein	7.20
Crude Fibre	6.67
Ether Extract	1.44
Carbohydrates	64.43
Ash	4.09

Table 2: Nutrient Composition of Brewer's Dried Grain (BDG)

Parameters (%)	Brewer's Dried Grain (BDG)
Ash	4.20
Crude Fat	7.90
Crude Fibre	14.00
Crude Protein	24.10
Carbohydrate	54.10
Moisture	10.00

Table 3: Nutrient Composition of Experimental Diets

Parameters (%)	T1(0%)	T2(10%)	T3(20%)	T4(30%)
Ash	9.21	11.14	10.85	9.32
Crude Fat	9.50	10.77	9.66	9.79
Crude Fibre	10.01	12.86	7.637	7.27
Crude Protein	27.63	17.49	22.83	20.63

Table 4: Composition of Experimental Diets (%)

Ingredients (%)	INCLUSION OF MAIZE CHAFF			
	T1(0%)	T2(10%)	T3(20%)	T4(30%)
Maize	21.5	21.5	21.5	21.5
BDG	30	20	10	0
Fish Meal	1.0	1.0	1.0	1.0
Palm Kernel Cake	20	20	20	20
Groundnut Cake	10	10	10	10
Bone Meal	2.5	2.5	2.5	2.5
Oyster Shell	1.0	1.0	1.0	1.0
Premix	2.5	25	2.5	2.5
Salt	0.5	0.5	0.5	0.5
Maize Chaff	0	10	20	30
Total	100	100	100	100
CALCULATED NUTRIENT ANALYSIS (%)				
Crude Fibre	13.7	12.5	11.3	10.1
Crude Protein	16.50	15.70	14.90	14.10
Calcium	32.41	26.71	21.01	15.31
Phosphorus	26.29	25.62	24.95	24.28

M.E (Kcal/kg)	2759	2649	2539	2429

RESULTS AND DISCUSSION

The result from Table 1.0 shows the proximate composition of maize chaff. It had crude fibre of 6.67, crude protein at 7.20 but low in crude fat value of 1.4%. The Nutrient composition of the BDG is shown in Table2.0 and the percentage nutrient composition of the formulated diet is shown in Table 3.0. Table 4.0 shows the composition of the experimental diets while Table 5.0 shows the performance of growing rabbits fed maize chaff-based diets as replacement for brewer's dried grain (BDG). The average daily feed intake (ADFI) of rabbits fed on T1(control diet), T2, T3, and T4 were not significantly different (P>0.05) among the treatments in which the value ranges from 91.6g to 97.3g. T4 had the highest value 97.3g while lowest value was recorded in T1 (control diet 0%). There was no significant difference (P>0.05) on ADWG, FCR and PER of rabbits fed graded maize chaff as replacement for brewer's dried grain (BDG) Table 5.0.

The mean of haematological values of packed cell volume (PVC), RBC, HB, MCHC, MCH and MCV obtained in this study are significantly different (P<0.05) across all the dietary treatment group as shown in Table 5.0. T4 (30% maize chaff) showed the highest PCV value at 35.05% followed by T1 (0% maize chaff) at 35.02%. However, PCV level significantly decreased (P<0.05) at T3 (20% maize chaff) having the lowest PCV value at 20.21%. Highest MCH was recorded in T4(30% maize chaff) at 14.04pg while T3 (20% maize chaff) had the lowest MCH value at 12.73pg.

Table 5: Growth Performance of Rabbits Fed Graded Levels of Maize Chaff

Parameters	T1(0%)	T2(10%)	T3(20%)	T4(30%)	SEM	P(0.05)
Average Daily Intake (g)	91.70	94.17	95.17	97.13	2.50	2.04
Average Daily Wt Gain (g)	6.70	5.13	6.33	7.14	1.99	0.77
Feed Conversion Ratio	6.51	7.27	6.68	7.17	1.32	0.92
Protein Efficiency Ratio	0.44	0.35	0.45	0.51	0.14	0.71

NOTE: T1= control diet 0% Maize chaff inclusion level, T2= 10% Maize chaff inclusion level, T3= 20% Maize chaff inclusion level, T4= 30% Maize chaff inclusion level, ADFI= average daily feed intake, ADWG= average daily weight gain, FCR= feed conversion ratio, PER= protein efficiency ratio, SEM= standard error of means, P= significant level

Table 6: Haematological Indices Result of Rabbits Fed Graded Levels of Maize Chaff

Parameters (%)	T1(0%)	T2(10%)	T3(20%)	T4(30%)	Range of Values	SEM	P(0.05)
PCV (%)	35.02^{a}	23.03^{c}	20.21^{d}	30.05^{b}	30-50	0.88	0.00
Hb (g/dL)	10.14^{b}	9.30c	8.05^{d}	11.62^{a}	9.4-17.4	0.18	0.00
RBC (x10^{6} иL)	6.61^{c}	7.08b	6.38^{d}	7.74^{a}	5.4-7.9	0.49	0.00
WBC (L)	8.14^{c}	14.44^{a}	5.85^{d}	9.60^{b}	5.5-12.5	0.52	0.00
MCHC (g/dL)	28.7^{c}	31.98^{a}	40.31^{b}	40.31^{b}	27-34	0.78	0.00
MCV (fL)	53.18^{a}	32.59^{c}	31.60^{d}	38.49^{c}	50-75	0.13	0.00
MCH (pg)	15.37^{b}	13.18^{c}	12.73^{d}	14.04^{a}	18-24	0.53	0.00

a,b,c means with different superscripts in the same column (within variable groups) are significantly different (P<0.05);
PCV= Packed cell volume, RBC= Red blood cells, Hb= Haemoglobin concentration, MCHC= Mean corpuscular haemoglobin concentration, MCV= Mean corpuscular volume, MCH= Mean corpuscular haemoglobin.

The nutrient composition of graded dietary level of maize chaff as shown in Table 3.0 has crude fibre (6.67), crude protein 7.20%, and ash (4.09%) which is lower than the research carried out by (Onunkwo, 2017) who reported crude fibre value of 10.80% and crude protein value of 12.50% for corn mill waste in broiler bird's feed. The differences in the nutrient composition of maize chaff can vary depending on factors like the specific variety of the maize growing conditions and the processing methods. The daily feed intake ranges between 91.70g and 97.13g

was higher than the values of 66.27 to 83.24g and 48.24 to 74.36g reported by Shaahu and Tiough (2019) and Shaahu et al. (2017) respectively. Also, daily weight gain values range from 7.14 to 5.13g.

The FCR values obtained in the study differs from the value (2.67 to 8.73) reported by Shaahu et al. (2014) and also higher than the values obtained by Nuhu (2010) (4.22 to 5.13). Genetic differences may have also contributed to the FCRs observed in this study as opposed to Nuhu (2010).

In table 6.0, the PCV, HB, RBC values were consistent with Lebas (2004) report which stated that the normal ranges of values for rabbits are as follows; PCV: 30-33%, HB: 9.3-129.3g/dl, and RBC: 4.00-8.60 x 106 /mm3 , with the exception of PVC of rabbits fed 10% and 20% maize chaff which indicates that these rabbits were not anaemic (Lebas, 2004) and Togun et al. (2007) state that when haematological values fall within these normal ranges, it indicates that the diets had no negative effects on haematological parameters during the experimental period. White blood cells (WBC) counts fell within the (5.0-12.0 x 10/dl) normal physiological range (Medi rabbits, 2007 and Nuhu 2010).

CONCLUSION AND RECOMMENDATION

The results obtained showed that dietary inclusion of up to 30% maize chaff in the diets of growing rabbits had no adverse effects on their performance and haematological indices. A very large amount of the values obtained in this study are within the typical ranges reported in literature for rabbits and adding maize chaff to the diets of rabbits did not pose a negative impact on haematological parameters. It is recommended that the graded dietary level can be used as local feed ingredients to feed growing rabbits up to 30% inclusion level of graded maize chaff to access consistency in growth performance.

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