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HAEMATOLOGICAL INDICES OF GROWING AND ADULT RABBITS FED DIETS CONTAINING CHICKEN FAECAL SLURRY

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Abstract
Chicken faecal slurry is a new potential non-conventional feedstuff on trial, whose effects on rabbit performance and health have not been adequately investigated. Therefore, this study was conducted in order to assess the heamatological parameters of growing and adult rabbits offered feeds containing chicken faecal slurry. In a completely randomized design, a total of 36 growing (7 weeks old) and 36 adults (20 weeks old) rabbits were allotted to four experimental diets with varying levels of chicken faecal slurry: 0% (control), 5%, 7.5% and 10% for growing rabbits; 0% (control), 5%, 10% and 15% for adult rabbits. Each treatment subdivided into 3 replicates with 3 animals per replicate consisted of 9 rabbits. The experiment lasted for 8 weeks and data were collected on blood profile such as packed cell volume (PCV), red blood cell (RBC), white blood cell (WBC), platelets, haemoglobin (Hb) and WBC differential counts, following blood collection at the end of the experiment. Results revealed that, all the blood parameters recorded were within the normal range. For growing rabbits, except for heterophil (47-33% - 55.00%, $p = 0.030$), there was no treatment effect ($p>0.05$) on all other blood parameters. Meanwhile, for the adult rabbits, notable effects ($p\leq0.05$) of diets were recorded in all the parameters except platelets ($110.00\times10^3/\mu l$ – $112.67\times10^3/\mu l$, $p = 0.425$). It can be concluded that, supplementing diets of growing and adult rabbits with feed containing chicken faecal slurry up to 10% and 15% levels respectively, will not have any deleterious effect on the haematological indices.

Keywords: Chicken faeces, rabbits, haematology, diets, bio-digester

Description of problem

Persistent rise in the cost of livestock feed production in Nigeria is still an issue to be given more attention. Feed ingredients in high competition and need as food by increasing human population are not affordable anymore, especially by small and medium scale farmers which dominated the country's livestock sector. The quest for sustainable and environmentally friendly practices in rabbit production has led to the exploration of alternative feed ingredients, such as chicken faecal slurry [1]. Bio-slurry is a by-product of the anaerobic digestion process in biogas plants, where organic materials such as animal manure are broken down by microorganisms in the absence of oxygen [2, 3]. The resulting material, bio-slurry, is rich in nutrients and organic matter [4]. Its composition typically includes significant amounts of nitrogen, phosphorus, potassium and other trace elements, along with beneficial microbes and organic carbon [5]. Incorporating bio-slurry as supplement in the feed of rabbits can reduce feed costs, particularly for subsistence rabbit farmers, as well as contribute to waste recycling and reduction in environmental pollution [3]. Haematological parameters are essential indicators of animal health, which reflect the physiological responsiveness of the animal to the change of internal and/or external conditions, which include feeding [6]. Understanding how chicken faecal slurry containing feeds may affect these parameters is crucial for its adoption as a feed ingredient. Therefore, this study aims to evaluate the possible effects of chicken faecal slurry based diets on the blood profile of growing and adult rabbits.

Materials and methods

Location: This study was carried out at the rabbitry unit of Teaching and Research Farm, O. A. U., Ile-Ife. Laboratory analyses was carried out at a commercial analytical laboratory in Ibadan, Oyo State, Nigeria.

Experimental design: In a completely randomized design, a total of 36 growing and 36 adult rabbits were randomly distributed to 4 treatments comprising 3 replicates with 3 animals per replicate. Feeding lasted for 8

weeks in growing and 14 weeks in adult rabbits before blood samples collection.

Chicken faecal slurry processing: Wet faecal droppings from chickens were collected, mixed with water after removal of solid non-feacal materials such as feathers and loaded into the biodigester (2000L plastic tank buried 90% into the soil) for anaerobic decomposition. This produces combustible gases, sulphur gas and water vapour channeled out of the biodigester. After three (3) days, the biodigester was reloaded with fresh droppings which pushed out the previous digested faeces, known as slurry through the outlet. The collected slurry was allowed to dry, grounded and packaged for use [7].

Experimental diets: Four (4) experimental diets were formulated with varying inclusion levels of chicken faecal slurry: 0% (control, GT1), 5% (GT2), 7.5% (GT3) and 10% (GT4) for growing rabbits; 0% (control, AT1), 5% (AT2), 10% (AT3) and 15% (AT4) for adult rabbits. The gross composition of the experimental diets (Table 1) is shown below.

Table 1: Gross composition of the experimental diets

Ingredients	Inclusion levels of chicken faecal slurry							
	Growing rabbits				Adult rabbits			
	GT1	GT2	GT3	GT4	AT1	AT2	AT3	AT4
*Faecal slurry	0	5	7.5	10	0	5	10	15
Maize	16.3	17.3	17.8	17.6	16	16.3	18	19.5
SBM	5.7	5.5	5.3	5	6	6	5.2	4.2
Wheat offal	20	13.9	8.3	4.8	15.7	9.4	4	2.5
PKC	31.35	31.6	33.2	34	30	32.8	34	32.3
Rice bran	24.05	24.1	25.3	26	29.8	28	26.3	24
Fish meal	0.7	0.7	0.7	0.7	0.5	0.5	0.5	0.5
Salt	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Limestone	0.9	0.9	0.9	0.9	1	1	1	1
Bone meal	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Premix	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100	100	100	100
Calculated Analysis								
Crude protein	15.22	15.11	15.01	14.93	15.02	15.05	14.99	14.97
Crude fibre	10.28	10.02	10.04	10.02	10.44	10.03	9.99	9.56
ME (Kcal/kg)	2530	2507	2515	2502	2573	2537	2510	2499

SBM – soya bean meal, PKC – palm kernel cake, ME – metabolizable energy, *faecal slurry was mainly used as a filler, not as a replacement for any ingredient.

Housing and management: Thirty-six (36) growing rabbits (8 weeks) and 36 adult rabbits (20 weeks) were ear-tagged and housed individually in a galvanized metal cage with automatic nipple drinkers and mortar feeders. Feed and water were provided *ad-libitum* and other standard practice of rabbit management were observed.

Sample/data collection: At the end of feeding trial, 2ml syringe was used to collect blood samples from two animals per replicate via ear veins and was immediately transferred into 5ml EDTA collection bottles. Samples were analysed for PCV, Hb, RBC, Platelets, WBC and WBC differential counts according to the procedure of [8].

Statistical analysis: Data collected were subjected to one-way analysis of variance using SAS v9. Means differences were separated by Duncan Multiple Range Test of the same software at $p \leq 0.05$.

Results and Discussion

The result of haematological parameters of growing rabbits fed chicken faecal slurry diets is presented in Table 2. Except for heterophils/neutrophils (47.33 – 55.00%; p = 0.030), diets containing varying levels of faecal slurry did not have any significant (p>0.05) effect on all other blood quality indices compared with the control diet, with values ranging from 32.67 – 36.67%, 10.73 – 12.23g/dl, 4.71 – 5.96×10^6/µl, 94.00 – 110.00×10^3/µl, 4.43 – 5.30×10^3/µl, 42.67 – 45.00%, 2.00 -3.00%, 2.00 – 3.00% and 0.29 – 0.33% for PCV, Hb, RBC, Platelets, WBC, lymphocytes, monophils, eosinophils and basophils, respectively. In general, these findings suggest that, supplementing growing rabbits concentrate diets with chicken faecal slurry up to 10% support the normal red blood volume, haemoglobin concentration, oxygen carrying capacity, blood clotting and immune response, as the values recorded in this study fell within the normal ranges quoted for growing rabbits by [9, 10, 11]

Table 2: Haematological parameters of growing rabbits fed chicken faecal slurry based diets

Parameters	Inclusion levels of faecal slurry (%)				±SEM	P-value
	0 (GT1)	5 (GT2)	7.5 (GT3)	10 (GT4)		
Packed cell volume (%)	36.67	33.33	32.67	33.67	2.05	0.362
Haemoglobin (g/dl)	12.23	10.73	10.73	11.93	0.68	0.371
Red blood cells (×10^6/µl)	5.96	5.29	4.71	5.41	0.41	0.207
Platelets (×10^3/µl)	106.67	110.00	94.00	105.03	7.75	0.871
White blood cells (×10^3/µl)	4.75	4.95	4.43	5.30	0.16	0.675
Lymphocytes (%)	44.33	45.00	43.67	42.67	2.54	0.598
Heterophils (%)	50.67^b	47.33^c	50.65^b	55.00^a	1.84	0.030
Monocytes (%)	3.00	2.00	3.00	2.33	0.40	0.482
Eosinophils (%)	2.33	2.00	2.00	3.00	0.45	0.341
Basophils (%)	0.30	0.33	0.29	0.32	0.02	0.802

abc: means in the same row with different superscripts differ significantly at P≤0.05; SEM – standard error of mean

Table 3 shows the effect of chicken faecal slurry diets on the haematological indices of adult rabbits. Significant effects of treatments (p<0.05) were observed in PCV (36.67 - 46.00%), Hb (10.73 – 12.23g/dl), RBC (5.82 – 7.56×10^6/µl), WBC (8.10 – 4.37×10^3/µl), lymphocytes (50.00 - 54.67%), heterophils (41.67 - 46.33%), monocytes (1.00 - 3.00%), eosinophils (1.33 - 2.33%) and basophils (0.33 - 0.67%). Meanwhile, both control and faecal slurry diets did not have significant influence (p>0.05) on platelets count (110.00 – 112.67×10^3/µl). The range of PCV, RBC, Hb and platelets recorded in this study were within the normal ranged reported in the literatures [12, 13]. Likewise, WBC and its differentials were not negatively affected by the treatment effects, which is in line with the acceptable range from other researchers [14, 15, 16]. This is an indication that, chicken faecal slurry supplementation up to 15% had no deleterious effect on the immune function of the experimental rabbits.

Table 3: Haematological parameters of adult rabbits fed chicken faecal slurry based diets

Parameters	Inclusion levels of faecal slurry (%)				±SEM	P-value
	0 (AT1)	5 (AT2)	10 (AT3)	15 (AT4)		
Packed cell volume (%)	40.33^b	46.00^a	45.33^a	36.67^c	1.43	0.043
Haemoglobin (g/dl)	12.23^a	10.73^c	10.81^c	11.65^b	0.68	0.032
Red blood cells (×10^6/µl)	6.22^b	7.19^{ab}	7.56^a	5.82^c	0.29	0.029
Platelets (×10^3/µl)	111.33	112.67	111.45	110.00	4.21	0.425
White blood cells (×10^3/µl)	4.37^d	6.48^b	8.10^a	5.25^c	0.73	0.012
Lymphocytes (%)	50.53^b	54.67^a	53.48^{ab}	50.00^b	1.87	0.039
Heterophils (%)	45.33^{ab}	41.67^b	42.00^b	46.33^a	1.34	0.042

Monocytes (%)	1.00^{c}	1.33^{bc}	3.00^{a}	2.00^{b}	0.44	0.019
Eosinophils (%)	2.33^{a}	1.67^{b}	1.33^{c}	1.67^{b}	0.32	0.024
Basophils (%)	0.67^{a}	0.33^{b}	0.67^{a}	0.33^{b}	0.19	0.045

abc: means in the same row with different superscripts differ significantly at P≤0.05; SEM – standard error of means

Conclusion and Application

It can be concluded that, 5-10% of chicken faecal slurry can be included in the concentrate diets of growing rabbits, while adult feed can be supplement up to 15% without any negative effect on the haematological indices. Though, the parameters were within the normal range, 5-10% levels appeared to be more preferable based on the adult rabbit PCV.

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