International Journal of Agricultural Technology 2013 Vol. 9(5): 1151-1156
Available online http://www.ijat-aatsea.com
ISSN 2630-0192 (Online)

Haematological and biochemical characteristics of West African dwarf rams fed different levels of poultry droppings/ maggots combination

Okah, U.[1*], Chibueze, C.O.[1] and Anya, M.I.[2]

[1]College of Animal Science and Animal Production, Michael Okpara University of Agriculture, Umudike, P.M.B. 7267, Umuahia, Abia State, Nigeria, [2]Department of Animal Science, Faculty of Agriculture, University of Calabar, Calabar, Cross River State, Nigeria.

Okah, U., Chibueze, C.O. and Anya, M.I. (2013). Haematological and biochemical characteristics of West African dwarf rams fed different levels of poultry droppings/maggots combination. International Journal of Agricultural Technology 9(5):1151-1156.

Abstract A study was conducted to evaluate the haematological and biochemical indices of West African Dwarf rams fed different levels of poultry droppings/maggots combination (PDMC). Three diets were formulated to contain PDMC at 0, 10 and 20% designated A, B, and C respectively. Six rams aged between 12 to 16 months with weight range of 7 to 9 kg were randomly assigned to three (3) treatments groups in a 3X3 Latin Square design experiment. There were three periods of the study and each period lasted 21 days. Blood samples were collected through the jugular vein of the sheep in the last day of each period for evaluation of haematological and biochemical indices of the animals. The crude protein and crude fibre contents of the diets were significantly ($P<0.05$) higher in diets B and C than in A, and were 13.18, 14.12 and 14.30%, and 7.37, 7.58, and 7.59% respectively. NFE was significantly ($P<0.05$) higher in diet A than B and C. Haemoglobin (g/dl), packed cell volume (%) and Red blood cell (µ/l) were significantly ($P<0.05$) higher in diets B and C than A; and the values were 9.00, 10.05, and 10.20 (µ/l); 26.75, 30.00 and 31.00 (%) and 9.00, 10.80 and 11.00 x 10^6 (µ/l) respectively. White blood cell was significantly ($P<0.05$) higher in the group fed diet C than those on diets A and B. the values were 1.20, 1.50 and 2.00 x 10^3 (µ/l). Mean corpuscular volume (MCV) was significantly ($P<0.05$) higher in the group fed diet A than those on diet B. Serum glutamic oxalo-acetate transaminase SGOT (g/dl) values of 62.00, 63.00 and 82.00 was significantly ($P<0.05$) higher in the group on diet C than those on diets A and B. The haematological and biochemical indices of rams fed poultry droppings/maggots combination were within the range recommended for sheep. Therefore, the incorporation of PDMC up to 30% in the diets of sheep did not constitute health hazards to the animals. Further studies, however should be carried out to evaluate growth performance of the animals and optimal inclusion level of PDMC for sheep.

Keywords: Haematological biochemical, maggots, poultry droppings, rams, diets

[*] **Corresponding author:** Okah, U; **e-mail:** okahuc@yahoo.co.uk

Introduction

Protein inadequacy in the diets of most people in a developing country like Nigeria has been a major concern to animal scientists. The average daily consumption of 54 g of protein with 6.5 g from animal sources fall below the recommended daily protein intake of 34 g and 86 g of animal protein (Ejiofor, 1998). The low nitrogen content of dry season fodder usually confers severe nutritional stress on ruminants. The dry season results in a rapid decline in the quantity and quality of forages leading to low forage intake and digestibility with resultant poor animal performances. It has been reported (Adegbola, 2002) that poor quality roughages fed to ruminants without supplementation during the dry season caused considerable weight losses and death of the animal. The prices of conventional sources of protein in livestock ration have risen exorbitantly (Akinmutimi, 2004) and this has necessitated the search for cheap alternative feed materials that can meet nutritional requirements of farm animals. Again these alternative feed materials should not be in high demands by humans and should be cheap (Ahamefule, 2005).

Sheep are small ruminant animal which belong to the order Artiodactyla, family of bovidae and the genus *Ovis* of the Nigerian breed. In Nigeria, there are four distinct breeds of sheep that exist, they include West African Dwarf (WAD) sheep, Yankasa sheep, Balami sheep, and Uda sheep which are prevalent in the South and form greater percentage of the ruminants.

About 60% of Nigerian rural household keep between 2 to 15 animals per household, where they are easily housed and managed and provide the family with meat for improved nutrition and serve as source of income. The objective of this study was to investigate the effect of maggots-upgraded poultry dropping based diet on the haematological and the blood chemistry of the sheep.

Materials and methods

Location of study

The study was carried at the Sheep and Goat Unit of the Teaching and Research Farm of College of Animal Science and Animal Production, Michael Okpara University of Agriculture Umudike.

Umudike is geographically located on Latitude $05^{o}28'$ North and Longitude of $07^{o}33'$ East and lies at an altitude of 122meters above-sea-level. It is situated within the tropical rainforest of about 2177mm in 148 – 155 rain days; average ambient temperature of 32^{o}C. (NRCRI, 2010).

Experimental diets and design

Freshly voided layer's droppings from poultry were collected from the poultry unit of National Root Crops research Institute (NRCRI) Umudike (battery cage). The dropping was cleaned of feathers. The droppings were exposed to maggot infestation by houseflies for 96hours. The sample was dried, milled and the maggot-upgraded poultry-droppings used for the formulation of feed, at 0%, 10% and 20% inclusion levels (Table1) supplementation in place of protein feedstuffs used to feed the sheep.

Table 1. The Composition of the Experimental Diets

Constituents (%)	**A**	**B**	**C**
Maize Offal	57.50	50.50	50.50
PDMC	0	10.00	20.00
Wheat offal	20.00	17.00	7.00
Palm Kernel Meal	21.00	21.00	21.00
Bone meal	1.00	1.00	1.00
Salt	0.50	0.50	0.50
Total	100	100	100
CP(%)	12.93	13.72	14.02
ME (Kcal/Kg)	2274.64	2274.14	2310.64

PDMC= Poultry Droppings Maggots Combination

Experimental animals and management

Six West African Dwarf (WAD) rams averaging 9.0 kg and aged 12-16 months was used in the study. The animals were first dewormed and also bathed with acaricide against external parasites, using Ferbendazole and Pfizona respectively. They were then housed separately in previously disinfected metabolism cages. Each of the animals was assigned to one of the experimental diets in a 3 x 3 Latin square design experiment. During the first phase of 21 days, each animal received 1kg of one the experimental diets. Potable water was offered *ad libitum* to each animal daily. In phases 2 and 3, each animal was offered each of the remaining 2 experimental diets in rotational periods of 21days each. Blood Sample was withdrawn from each animal in the last day of each phase for haematological and biochemical analyses.

Chemical analysis

The diets were analyzed for proximate components using AOAC (2000) method. Haematological and Biochemical values were also determined by AOAC (2000) methods.

Statistical analysis

Data generated were subjected to Analysis of Variance (ANOVA) applicable to 3x3 Latin Square Experiment. Differences between treatment means were separated using Duncan Multiple Range test (Duncan, 1955).

Results and discussions

The analyzed crude protein (Table 2) of diets B and C were significantly ($p<0.05$) higher than that of A following higher dietary protein content of these diets. The crude fiber was also higher ($p<0.05$) in diets B and C, this might likely be due to high fiber content of dry poultry droppings. Ash content of diets A and C was also significantly ($p<0.05$) higher than that of diet A. This might be as a result of high mineral content especially calcium in diets of laying birds. Nitrogen free extract was higher ($p<0.05$) in diet A than those of diets B and C. This is because higher CP implies higher N, and results in lower NFE. Haemoglobin(g/dl) concentration (Table 3) was higher ($p<0.05$) in the PDMC diets (B and C) but the values (9.00- 10.20g/dl) were within the normal range of 9.00- 15.00g/dl (Banerjee, 2005), indicating that the animals were not predisposed to anemia by any of the diets. Packed cell volume (PCV) values of rams fed diets B and C were significantly ($p<0.05$) higher than for those fed diet A. However, the values (26.75 – 31.00%) were within the normal range of 27-45% (Banergee, 2005). Higher PCV in PDMC diets might suggest the presence of traces of toxic substances in the material (Oyawoye and Ogunkunle, 1998). Red blood cell (RBC) values of 9.00- 11.00 x 10^6 (µl) were within the normal range of 9.00-15.00 x 10^6 (µl) (Banerjee, 2005). This might indicate that the experimental animals did not experience destruction of erythrocytes or depression in erythropoiesis (Okah, 2006). White blood cell (WBC) was higher ($p<0.05$) in diet C group (2.00 x 10^3 (µl)) than in diets A and B groups. The WBC values obtained in this study were quite lower than the normal range of 6.00-15.00 x 10^3 (µl) (Banergee, 2005). Traces of toxic factor might be so insignificant to affect the WBC. Mean corpuscular volume (MCV) differed significantly ($p<0.05$) with higher value in diet A group than in the B, while diet C group was an interface. The difference did not follow any definite pattern and could be attributed to any specific factor. Serum Gutamic Oxalo-acetic

Transaminase (SGOT) (Table 4) was higher ($p<0.05$) in diet C group. However, the values of Serum Gutamic Pyruvic Transaminase (SGPT) did not support the former to attribute it to necrosis or myocardial infarctions associated with poor protein quality (Fasina *et al*., 1999).

Table 2. Proximate Composition of Experimental Diet

Composition	Experimental Diets			SEM
	A	B	C	
Dry Matter	89.81	89.83	89.79	0.02
Crude Protein (CP %)	13.18[b]	14.12[a]	14.30[a]	0.18
Ether Extract (EE %)	4.59	4.99	4.98	0.12
Crude Fibre (CF %)	7.37[b]	7.58[a]	7.59[a]	0.05
Ash	5.92[c]	7.84[b]	8.07[a]	0.34
NFE	58.75[a]	55.30[b]	54.83[b]	0.68

[abc] Means on the same column having different superscripts differ significant ($P<0.05$)

Table 3. Haematological Characteristics of WAD Rams Fed Maggots-Upgraded Poultry Dropping/Maggots Combination Diets

Parameters	Treatments Diets			SEM
	A	B	C	
Haemoglobin (g/dl)	9.00[b]	10.05[a]	10.20[a]	0.24
Packed Cell Volume (%)	26.75[b]	30.00[a]	31.00[a]	1.00
RBC x 10^6 (µl)	09.00[b]	10.80[a]	11.00[a]	0.42
WBC x 10^3 (µl)	1.20[b]	1.50[b]	2.00[a]	0.16
MCHC	33.65	33.50	33.00	0.61
MCV	29.75[a]	27.85[b]	28.20[ab]	0.52

[a,b] Means on the same row having different superscripts differ significant ($P<0.05$)
MCV = Mean Corpuscular Volume, RBC = Red Blood Cell, WBC = White Blood Cell
MCHC = Mean Corpuscular Haemoglobin Concentration

Table 4. Biochemical Characteristic of WAD Rams Fed Poultry Droppings /Maggots Combination Diets

Parameters	Treatments Diets			SEM
	A	B	C	
Total Protein (g/dl)	6.80	6.50	6.90	0.09
Albumin (g/dl)	2.50	2.40	2.60	0.07
Globulin (g/dl)	4.30	4.00	4.30	0.12
SGOT (g/dl)	62.00[b]	63.00[b]	82.00[a]	4.09
SGPT (g/dl)	13.00	12.00	10.00	0.84

[a,b] Means on the same row having different superscripts differ significant ($P<0.05$)
SGOT = Serum Gutamic Oxalo-acetic Transaminase
SGPT = Serum Gutamic Pyruvic Transaminase

Conclussion and recommendation

The results of the haematological and biochemical characteristics of sheep fed the poultry droppings/maggots combination (PDMC) indicated that the incorporation of the product up to 30% in the diets of sheep did not constitute health hazards to the animals. Further studies, however, should be carried out to evaluate growth performance of the animals and optimal inclusion level of PDMC for sheep.

References

Adegbola, A.A. (2002). Nutrient intake, digestibility and rumen metabolites of bulls fed rice straw with or without supplements. Nig. J. Anim. Prod., 29:40-46.

Ahamefule, F.O. (2005). Evaluation of pigeon pea-cassava peel based diets for goat production in South-Eastern Nigeria. Ph.D.Dissertation. Michael Okpara University of Agriculture, Umudike. Nigeria.

Akinmutimi, A.H. (2004). Evaluation of sword bean *Canavalia gladiata* as an alternative feed resource for broiler chickens. Ph.D. Dissertation. Michael Okpara University of Agriculture Umudike, Nigeria.

AOAC (2000). Association of Official Analytical Chemists. Official Methods of Analysis, 17th edn. Published by Associatio of Offcial Analytical Chemists, Washington D.C.

Banerjee, G.C. (2005). Animal Husbandry (8th Ed). Bidhan Chendra Krishi Viswaivdyalaya. pp. 99-111.

Duncan, B.B. (1955). New Multiple Range and Multiple F-tests Biometrics 14:1-45

Ejiofor, C.A. (1998). A comparative study of the constituents of the milk of ruminants in a hot-humid tropical environment. B.Sc. Thesis. Department of Animal Science, Michael Okpara University of Agriculture Umudike.

Fasina, O.E., Ologhobo, A.D., Ayoade, G.O., Adeniran, G.A. and Adeyemi, O.A. (1999). Nutritional and Toxicological assessments of various *Amygdalia* pears in nutrition, haematological and biochemical indices. Proc. 4th Ann. Conf. Anim. Sci. Assoc. of Nig (ASAN), Ilorin, Nigeria, March 21st -25th, 1999, 4:19-22.

NRCRI (2010). Agro. Meterologic Unit. National Root Crop Research Institute, Umudike, Nigeria.

Okah, U. (2006). Performance of sheep fed varying levels of pigeon pea(Cajanus cajan) seed in the concentrate diets. Ph. D. Dissertation. Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria.

Oyawoye, E.O. and Ogunkunle, M. (1998). Physiological and Biochemical effects of raw jackbeans on broiler. Proc. Ann. Conf. Of Nig. Soc. Anim. Prod. (NSAP) and inaugural conf. of the West Africa Soc. For Anim. Prod. (WASAP) Gateway Hotel Abeokuta 21st - 26th March, 1998, pp. 141-142.

(Received 4 May 2012; accepted 31 August 2013)