

HAEMATOLOGICAL RESPONSE OF GROWER TURKEYS FED DIFFERENT FIBRE SOURCES IN THE DIET

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Abstract

An experiment was conducted to evaluate the haematological response of grower turkeys to diets containing different fibre sources. A total of 120 grower turkeys were used to evaluate the growth response for this study. Four experimental diets were formulated and designated as T1, T2, T3, and T4. T1 (control diet) contained none of the agro industrial by products used while T2, T3 and T4 contained 15% each of Wheat offal, Maize offal and Rice offal respectively. The turkeys were randomly allocated to four experimental treatments of thirty birds per treatment while each treatment was replicated three times (3) with ten (10) birds per pen in a completely randomized design. There were no significant differences ($P>0.05$) in all the haematological parameters and serum biochemical indices measured except PCV which decreased across the treatment groups. It was concluded that inclusion of different fibre sources in the diet of growing turkey did not have adverse effect on the health status of the birds.

Keywords- grower turkeys, wheat offal, maize offal, rice offal, haematology

Introduction

Feed production has become an increasing global phenomenon and high feed prices resulting from the use of conventional feed stuffs have tendency of reducing producer's profit margin especially in poultry production, therefore the search for alternative feed ingredients continues to be the focus of animal nutritionists. The use of agro industrial by products (such as rice offal, maize offal, wheat offal, brewers dried grain, palm kernel meal etc) to replace cereal grains in poultry diets have been studied (Dafwang and Damang, 1995; Carew *et al.*, 2005; Makinde *et al.*, 2014) and have been successfully fed to broiler chickens at lower levels of inclusion (Amaefule *et al.*, 2006; Yakubue *et al.*, 2007; Makinde *et al.*, 2014) in order to reduce feed costs and increase the profit margin. Higher levels of inclusion may result in low calcification, decreased feed intake and even mortality at above 80% inclusion (ArunaTomar and Singh, 1999). Aduku (1993) reported that wheat offal contains 1256 and 2320 Kcal of metabolisable energy per kg for poultry and swine respectively, 15.6% crude protein and mineral elements such as calcium and phosphorus. Kocher (2001) reported that rice offal is known to contain high level of fibre and low protein and energy and

high dietary fibre depresses apparent digestibility of dry matter and nitrogen, decreases daily body weight and increase feed to gain ratio (Longe and Adekoya, 1988). The effect of these fibres on the health status of grower turkeys has made this research necessary.

Materials and Method

Experimental site

This study was conducted at the Poultry Unit of the Teaching and Research Farm, Federal College of Wildlife Management (FCWM), New Bussa, Niger State, Nigeria. The poultry building is an open sided type that permits adequate ventilation in the house, with a concrete floor and zinc-roofing sheet. New Bussa sits at 9°53'N 4°31'E, and the original town of Bussa is located about 40 km North of New Bussa at 10°13'51"N 4°28'31"E (altitude 561 ft or 170 meters). The climate of the area is tropical with monthly average temperature of 34°C and mean annual relative humidity of 60%.

Sources of Experimental Materials

The agro industrial by-products used in this study were wheat offal, rice offal and maize offal which were purchased around Neighbouring market

within New-Bussa and its catchment areas.

Experimental Design and Management of Birds

One hundred and twenty day old unsexed turkeys (Narraganset and bronze breed) were purchased from a reputable hatchery in Ibadan, Nigeria. The birds were raised on deep litter pen with wood shaving as litter material. They were fed on a common diet for the first four (4) weeks of life. Feed and water was supplied *ad-libitum*. Management practices and vaccination programme was followed strictly. At the end of the four (4) weeks, the grower turkeys were randomly allocated to four experimental treatments of thirty

birds per treatment, while each treatment was replicated three times (10birds per replicate) in a completely randomized design (CRD).

Experimental diets

Four experimental diets were formulated and designated as T1, T2, T3, and T4. T1 (control diet) contained none of the agro industrial by products used while T2, T3 and T4 contained 15% each of Wheat offal, Maize offal, Rice offal respectively. The gross composition and proximate composition of the experimental diets are presented on Table 1 and 2 respectively.

Table 1: Gross Composition of Experimental Diets

Ingredients	T1 (control)	T2 (15% W.O)	T3 (15% M.O)	T4 (15%R.O)
Maize	52.00	46.00	46.00	46.00
Wheat offal	-	15.00	-	-
Maize offal	-	-	15.00	-
Rice offal	-	-	-	15.00
GNC	24.00	10.00	10.00	10.00
Fish meal	13.45	18.45	18.45	18.45
Palm oil	2.00	2.00	2.00	2.00
*Premix	0.40	0.40	0.40	0.40
Limestone	3.00	3.00	3.00	3.00
Bone meal	4.50	4.50	4.50	4.50
Salt	0.25	0.25	0.25	0.25
Methionine	0.30	0.30	0.30	0.30
Lysine	0.12	0.12	0.12	0.12
TOTAL	100	100	100	100
Calculated Nutrients				
Energy (Kcal/Kg ME)	2999	2876	2784	2691
Crude Prot. (%)	25.34	25.01	24.42	24.09
Crude fibre (%)	2.50	3.89	4.08	4.59
Ether Extract(%)	3.80	3.80	3.80	3.80
Calcium (%)	1.20	1.20	1.20	1.20
Methionine (%)	0.80	0.80	0.80	0.80
Lysine (%)	1.60	1.60	1.60	1.60

*Composition of vitamin premix per kg is as follows: Vitamin A, 8000 iu; Vitamin D₃, 1600 iu; Vitamin E 5 iu, Vitamin K 0.200 mg; Vitamins B, Thiamine B₁ 0.5mg; Riboflavin B₂ 4mg; Pyridoxine B₆ 0.015 mg; Niacin 0.015mg; B₁₂ 0.01mg; Pantothenic acid 0.5mg; folic acid 0.5mg and Biotin 0.020 mg; Chlorine chloride 0.02 mg; Anti-oxidant 0.125g and Minerals (Mn, Zn, Fe, Cu, I, Si, Co) 0.156g. WO=wheat offal, MO=Maize offal, RO= Rice offal

Table 2: Proximate Composition of Experimental Diets

Nutrients, %	Control	15% W.O	15% M.O	15% R.O
Dry Matter	92.93	93.48	94.51	93.68
Crude Protein	25.25	24.97	23.90	23.08
Crude fibre	3.78	4.01	4.56	5.02
Ash	5.68	6.71	6.98	7.28
Ether Extract	6.21	6.52	6.75	6.98
NFE	61.17	61.93	59.42	60.45

NFE-Nitrogen free extract. WO=wheat offal, MO=Maize offal, RO= Rice offal

Data collection

Blood collection

At the end of the study period, 5ml of blood was collected from three birds per treatment through the wing vein and put into bottles containing Ethylene Diaminetetra- acetic Acid (EDTA) to determine the packed cell volume (PCV), red blood cell (RBC), haemoglobin (Hb), and white blood cell (WBC). Blood sample meant for serum biochemical studies were collected into plane bottles (without Anti-coagulant) to enhance serum separation. The blood serum obtained was used to determine total protein (TP), Albumin, Globulin, Glucose and Urea. All the analysis was done at the College Research Laboratory according to the methods described by Kohn and Allen (1995); Schalm *et al.* (1975) and Peters *et al.* (1982).

Chemical analysis

Proximate composition of experimental diets was analysed using the method of AOAC (1990).

Statistical analysis

Data collected were subjected to analysis of Variance (ANOVA) using SAS software (SAS, 2008), while significant means were separated with Duncan multiple range test at 5% level of significance.

Results

Table 3 shows the result of haematological parameters and serum biochemical indices of grower turkeys fed diets containing different agro industrial by-products. There were no differences ($P>0.05$) in the values obtained for haemoglobin, white blood cell and red blood cell across the treatment groups. Packed cell volume was however different ($P<0.05$). Birds fed control and 15% W.O diets recorded higher values for Packed Cell Volume than those fed 15% M.O and 15% R.O based diets. The results of serum biochemical indices show that there were no differences in all the parameters measured ($P>0.05$). The values obtained for Total Protein, Glucose, Albumin, Globulin and urea were not affected ($P>0.05$) by the dietary treatments.

Table 3: Haematological parameters and Serum biochemical indices of grower turkeys fed diets containing different agro industrial by-products

Parameters	T1	T2	T3	T4	SEM
Packed cell volume, %	30.21 ^a	31.66 ^a	23.42 ^b	24.30 ^b	2.75
Haemoglobin, g/dl	8.97	10.55	8.81	8.77	0.93
White blood cell, $\times 10^6$	44.60	48.25	49.24	50.68	3.86
Red blood cell, $\times 10^{12}$	4.16	5.60	5.37	5.89	0.43
Glucose, g/dl	129.50	105.50	126.27	114.00	14.67
Albumin, g/dl	3.06	3.13	2.87	2.39	0.25
Globulin, g/dl	3.59	3.03	3.97	3.46	0.31
Urea, mg/dl	52.16	55.97	53.91	65.78	6.95
Total Protein, g/dl	6.64	6.33	6.84	6.85	0.12

abc = mean with different superscripts within the same row are significantly ($P<0.05$) different.

SEM=standard error of mean. WO=wheat offal, MO=Maize offal, RO= Rice offal

Discussion

There have been wide variations in responses of Chickens to the use of Agro industrial byproducts in poultry diets. These were attributed to differences in quality, varieties, storage periods, climatic conditions to mention but a few. However, there are several literature reports on the inclusion levels of this unconventional, agro by-product in broiler diets without adverse effect on performance in Nigeria (Maikano, 2005; Duru, 2010).

The observation on haematological parameters and serum biochemical indices revealed that there were no significant differences ($P>0.05$) in the parameters measured except for PCV. The increase in the values of WBC across the treatment

groups is an indication of health hazard. This could be due to infections, inflammatory conditions, stress condition or conditions induced by A.N.Fs content of the feed (Brijet *et al.*, 1977). Higher levels of White blood cell have been produced in farm animals in a bid to fight against the foreign bodies. Oduguwa (2006) reported that an elevated White blood cell showed that the birds were reacting to one or more dietary factors which in this study could be tannin, NSP and HCN residues present in the fibre sources used. White blood cell played protective roles and associated with the production of antibodies and recognition of foreign substance such as bacteria and viruses.

Turkeys fed 15% M.O and 15% R.O diets recorded lower values for PCV and Haemoglobin. Report

had suggested that PCV is beneficial in assessing the protein status and possibly forecasting the degree of protein supplementation at different physiological states (Daramola *et al.*, 2005). Keir *et al* (1982) reported that the reduced value of PCV is an indication of poor nutritional status and pointer to iron deficiency or nutritional anaemia. The poor nutritional value of maize offal and rice offal as compared to the control diet could be linked with the low PCV values obtained among turkeys fed 15% M.O and 15% R.O diets in this study. Also, reduced Haemoglobin values obtained among birds fed 15% M.O and 15% R.O diets is a confirmation of the poor dietary protein quality. Udo (1987) reported that nutrition was the most important factor affecting haemoglobin levels of the blood. The range of $44.60 - 50.68 \times 10^6$ observed for WBC, $4.16 - 5.89 \times 10^{12}$ for RBC, 23.42 – 31.66% for PCV and 8.07 – 10.55 g/dl for haemoglobin were within the ranges reported by Obadiyet *et al.* (2015) for grower turkeys fed diets containing malted sorghum sprouts supplemented with enzyme. All the parameters measured for serum biochemical indices were within the normal range reported by Elizabeth *et al.* (2010) and Obadiyet *et al.* (2015) for healthy domestic turkeys.

Conclusion

From the result of this study, it can be concluded that the inclusion of different fibre sources in the diet of growing turkey did not have adverse effect on the health status of the birds.

Recommendation

Based on the result of haematological parameters and serum biochemical indices obtained in this study, it is recommended that different fibre sources can be included into the diet of growing turkeys.

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