APRW -24

Hematological and Serum Biochemical Characteristics of Broiler Finisher Fed Different Feed Forms

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Abstract
A 56-day study was carried out to evaluate the effects of two different feed forms on the haematology and serum biochemistry of broiler finisher birds. A total of 90 day old "Sayed" chicks were assigned to three dietary treatments, T_1 (mash diet) served as control, T_2 (50% mash+50% pelleted) and T_3 (pellet diet) in a completely randomized design (CRD) with 30 birds per treatment and each treatment replicated three times with 10 birds per replicate. Feed and water were served ad-libitum throughout the experimental period. Data were collected for haematological and biochemical analysis. The haematological parameters include packed cell volume (PCV), red blood cell (RBC), white blood cell (WBC), haemoglobin (Hb), mean corpuscular haemoglobin concentration (MCHC), mean corpuscular volume (MCV) and mean corpuscular haemoglobin (MCH).The biochemical parameters include urea, total protein, albumin, globulin, creatinine, cholesterol and glucose. The haematological parameters showed non-significant ($p>0.05$) differences among treatment means, while that of biochemistry showed non-significant ($p>0.05$) differences in all the parameters except urea that differed significantly ($p<0.05$). Feed forms to a large extent do not pose any deleterious effect on the birds.

Keywords*:* Haematology, blood chemistry, feed forms, broilers

Introduction

The physical forms of diets and feed particle size have a great effect on poultry yield (Amerah and Ravindran, 2008). More so; they stated that feed processing provides an opportunity to improve broiler performance. This rapid rate of growth is due to high feed intake rather than increased nutrient digestibility. Severalauthors also found an effect of feed form (mash or pellet) on some blood parameters as total protein, albumin, serum ALT and aspartate aminotransferase (AST) (Andi *et al.* 2011, Corzo *et al.* 2012).The use of blood examination as a way of assessing the health status of animals has been documented (Muhammad *et al*., 2000). Haematological and serum biochemical profiles provide reliable information on the health status of animals (Cetin *et al*., 2009). They also reflect the responsiveness of an animal to its internal and external environments (Esonu *et al.,* 2001). Haematological tests have been widely used for the diagnosis of various livestock diseases (Cetin *et al*., 2009).

The current study therefore investigated the haematological and biochemical characteristics of broiler finisher fed different feed forms (pelleted and mash).

Materials and Methods

The research was carried out at the poultry project site of the Federal College of Agriculture, Ishiagu Ebonyi State. The feed ingredients were procured from Ogbete Main Market in Enugu state. The materials were ground, mixed and pelletized uniformly in a feed milling industry in Enugu. The mash and pellets, mash and pellet mixture were sun-dried after production to reduce the moisture content and prevent mold growth. Ninety (90) day-old unsexed Sayed broiler chicks were used for the experiment. They were randomly assigned to the three experimental diets in a completely randomized design (CRD) with ten (10) birds per replicate, given a total number of 30 birds per treatment diet. Feed and water were given *ad-libitum* and vaccination were given to the birds as at when due.

Blood Collection for hematological and biochemical analysis: At the end of the feeding trial, about 5mls of blood sample was collected for the analysis. The blood samples were taken from the wing vein of the bird using disposable needle and syringe. For haematological analysis, about 2mls used for analysis was stored in a bottle containing anticoagulant, ethylene diamine tetra acetic acid (EDTA) to prevent clotting and subsequently analyzed to determine RBC, WBC, PCV, Hb MCHC, MCH and MCV. While for serum biochemistry analysis, about 3mls was used. It was store without anticoagulant, after coagulation it was separated and the harvested serum was used to determine the following parameters urea, total protein, albumin, globulin, creatinine, cholesterol, and glucose.

Statistical analysis of data**:** Data collected for haematological and biochemical parameters were analyzed using analysis of variance (ANOVA) appropriate for (CRD) and treatment means were separated using Duncan multiple range test (DMRT).

Table 1: Experimental Diet

Ingredients	Percentage
Maize	52
Wheat offal	5.0
Soyabean meal	15
Groundnut cake	14.5
Palm kernel cake	8.0
Fish meal	1.5
Bone meal	2.0
Limestone	1.0
Salt	0.25
Vitamin/mineral premix	0.25
Methionine	0.25
Lysine	0.25
Total	100
ME (Kcal/kg)	2,915.38
Crude protein	20.99

Results and Discussion

Table 2 showed the haematological indices of finisherbroiler fed different feed forms. All the parameters showed non-significant (p>0.05) differences.PCVresultranges from 29.67 to 30.67%. Birds on T_3 diet had the highest PCV value, followed by T_1, while the least PCV value was recorded in T_2. The PCV result agreed with the range reported by (Banerjee, 2005; Adeyemo and Sani, 2013). On the other hand it disagreed with the report of Najib and Al-Aqil (2015) that gave a lower PCV value. The differences observed could be due to breed.Hbresult ranges from 10.00 to 10.43 (g/dl). Birds on T_3 gave the highest value, followed by T_1 while T_2 gave the least Hbvalue.Thefindings disagreed with the result of Adeyemo and Sani (2013) and Najib and Al-Aqil (2015) that reported a lower Hb values. Also, the result is lower than the range reported by Iheukwumere *et al.* (2008). These values were within the normal Hb range of 7.00 to 13.00 (g/dl) as reported by Banerjee (2005) for chickens since haemoglobin is responsible for cellular respiration which is important in metabolic reactions Mc Donald *et al.* (1995), a decrease in haemoglobin is an important determinant of anemia which may probably lead to reduction in the oxygen carrying capacity of blood. RBC result ranges from 4.08 to 4.37 ($x10^{12}$/l).

Table 2: Hematologicalcharacteristics of broiler finisher fed different feedforms

Parameters	T_1	T_2	T_3	SEM
PCV (%)	30.33	29.67	30.67	0.83
Hb (g/dl)	10.23	10.00	10.43	0.26
RBC ($x10^{12}$/l)	4.37	4.08	4.28	0.17
MCHC (%)	33.75	33.72	34.54	0.56
MCH (g/dl)	23.65	24.51	24.41	0.37
MCV (fl)	70.06	72.67	71.70	2.89
WBC ($x10^9$/l)	9.20	10.67	11.07	0.97

RBC-Red blood cells; WBC-White blood cells; PCV-Packed cell volume.Hb= Hemoglobin; MCHC-Mean corpuscular hemoglobin concentration; MCH-Mean corpuscular haemoglobin; MCV-Mean corpuscular volume.

Birds on T_1 gave the highest value, followed by T_3, while T_2 gave the least RBC value. The findings disagreed with that of Ladokun *et al.* (2008) and Adeyemo and Sani (2013) that showed significant ($p<0.05$) differences. The values were within the normal range of 2 to 4 ($x10^6/mm^3$) reported by Jain (1986), but lower than the range of 8 to 11($x10^6/mm^3$) reported by (Simaraks *et al.,* 2004). MCHC result ranges from 33.72 to 34.54 (%). Birds on T_3 gave the highest MCHC value, followed by birds on T_1, while birds on T_2 gave the least MCHC value.

The finding agreed with the range reported by Adeyemo and Sani (2013), while it disagreed with Najib and Al-Aqil (2015) on white leghorn layers, they gave a higher MCHC value. The differences could be due to sex of birds (Addass *et al.,* 2012).WBC result ranges from 9.20 to 11.07($x10^9$/l). Birds on T_3 gave the highest WBC value, followed by birds on T_2, while birds on T_1 gave the least WBC. The result disagreed with the findings of Adeyemo and Sani (2013) that showed significant ($p<0.05$) differences.

Table 3 showed the serum biochemical indices of finisher broilers fed different feed forms. The biochemical indices showed non-significant ($p<0.05$) differences among the treatment, except urea that showed significant ($p<0.05$) differences. For serum urea, the result ranges from 2.62 to 7.91 (mg/dl). Result showed that birds onT_2 differed from $T_1$and T_3.The result disagreed with the report of Ladokun *et al.* (2008) and Albokhadaim *et al.* (2012) that showed non-significant ($p>0.05$) differences. Numerically, the result disagreed with the range reported byCafé *et al.* (2012). Biochemical parametersgenerally can be used to monitor protein quality of feeds, they are important in the proper maintenance of the osmotic pressure between the circulating fluid and the fluid in the tissue spaces so that exchange of materials between the blood and cells could be facilitated. They also contribute to the viscosity and maintenance of normal blood pressure and pH (Ladokun *et al.,* 2008).

Table 3: Blood biochemical indices of broiler finisher fed different feed forms

Parameters	T_1	T_2	T_3	SEM
Serum urea (mg/dl)	3.40^b	7.91^a	2.62^b	0.64
Creatinine (mg/dl)	0.67	0.65	0.44	0.05
Cholesterol (mg/dl)	143.97	120.38	148.84	4.98
Glucose (mg/dl)	340.80	295.20	283.80	21.24
Albumin (g/l)	15.47	16.10	19.87	1.09
Globulin (g/l)	14.63	17.53	16.00	1.58
Total protein (g/l)	30.1	33.63	35.87	1.79

a,b, Means within a row with different superscripts differ significantly ($p<0.05$).

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