

Haematological and Biochemical Characteristics of Broiler Finisher Fed Different Feed Forms (Pelleted and Mash)

Ilo S.U.^{1*}; Maduneme, F.C.²; Ogbu, O.C.³; Okonkwo, M.N.²

¹Department of Animal Science, University of Nigeria Nsukka, Nigeria

²Department of Animal Production Technology, Federal Coll. of Agric. Isiagu Ebonyi
state, Nigeria

³ Department of Agricultural Technology, Federal Polytechnic Oko Anambra state,
Nigeria

*¹Corresponding author: Stanley.ilo@unn.edu.ng

Haematological and Biochemical Characteristics of Broiler Finisher Fed Different Feed Forms (Pelleted and Mash)

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, T₁ (mash diet) served as control, T₂ (50% mash+50% pelleted) and T₃ (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 parameters 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 and 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. Several authors 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 unit of the teaching and research farm of the Federal College of Agriculture Ishiagu Ebonyi State, Nigeria.

Procurement of materials

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.

Experimental birds and management

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. T₁ (mash diet) served as control, T₂ (50% mash+50% pelleted) and T₃ (pellet diet). Feed and water were given *ad-libitum* and vaccinations were given to the birds as at when due.

Data collection

Blood Collection for Haematological and Biochemical Analysis was done 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 Composition
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
Vit./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 finisher broiler fed different feed forms. All the parameters showed non-significant ($p > 0.05$) differences. PCV result ranges from 29.67 to 30.67%. Birds on T₃ diet had the highest PCV value, followed by T₁, while the least PCV value was recorded in T₂. The PCV result agreed with the range reported by (Banerjee, 2005; and 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. Hb result ranges from 10.00 to 10.43 (g/dl). Birds on T₃ gave the highest value, followed by T₁ while T₂ gave the least Hb value. The findings 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 anaemia which may probably lead to reduction in the oxygen carrying capacity of blood. RBC result ranges from 4.08 to 4.37 ($\times 10^{12}/l$). Birds on T₁ gave the highest value, followed by T₃, while T₂ 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 ($\times 10^6/mm^3$) reported by Jain (1986), but lower than the range of 8 to 11 ($\times 10^6/mm^3$) reported by (Simaraks *et al.*, 2004). MCHC result ranges from 33.72 to 34.54 (%). Birds on T₃ gave the highest MCHC value, followed by birds on T₁, while birds on T₂ 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 ($\times 10^9/l$). Birds on T₃ gave the highest WBC value, followed by birds on T₂, while birds on T₁ gave the least WBC. The result disagreed with the findings of Adeyemo and Sani (2013) that showed significant ($p < 0.05$) differences.

Table 2: Haematological Characteristics of Broiler Finisher Fed Different Feed Forms

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 ($\times 10^{12}/l$)	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 ($\times 10^9/l$)	9.20	10.67	11.07	0.97

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

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 on T₂ differed from T₁ and T₃. 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 by (Café *et al.*, 2012). Biochemical parameters generally 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 ($p < 0.05$).

REFERENCES

- Addass, P. A., David, D. L., Edward, A., Zira, K. E. and Midau, A. (2012). Effect of Age, Sex and Management System on Some Haematological Parameters of Intensively and Semi-Intensively Kept Chicken in Mubi, Adamawa State, Nigeria. *Iranian Journal of Applied Animal Science*, 2(3), 277-282.
- Adeyemo, I.A.1 and Sani, A. (2013).Haematological parameters and serum biochemical indices of broiler chickens fed (*Aspergillus niger*) hydrolyzed cassava peel meal based diet.IJRRAS15 (3)24.
- Albokhadaim, I., Althnain, T and El-Bahr, S. M. (2012).Investigation on selected biochemical parameters of local chicken with different age and sex in Al-ahsa, Saudi Arabia.*Pakistan Journal of Biological Sciences* 15 (17): 827-832.
- Amerah, A.M., Ravindran, V. (2008). Influence of method of whole-wheat feeding on the performance, digestive tract development and carcass traits of broiler chickens. *Anim Feed Sci Technol* 147, 326-339
- Andi, M.A., Hashemi, M. andAhmadi, F. (2011).Effect of feed type with/without nanosil on cumulative performance, relative organ weight and some blood parameters of broilers.*Global Vet* 7, 605-609.
- Banerjee, G. C. (2005). A Textbook of Animal Husbandry (8th edition) Oxford and IBH Publishing co PVT Ltd New Delhi India.
- Behnke, K. C. and Beyer, R. S. (2002).Effect of feed processing on broiler performance.VIII International Seminar onPoultry Production and Pathology. Santiago, Chile.
- Café, M. B., Rinaldi, F. B., Morais, H. R., Nascimento, M. R. B., Mundim, A. V. and Marchini, C. F. P. (2012). Biochemical blood parameters of broilers at different ages under thermoneutral environment. *World's Poultry Science Journal, Supplement 1*, Expanded Abstract-Poster Presentation-*Chicken Breeder and Broiler Production*, WPC 2012-Salvador-Bahia-Brazil 5th-9th August.

- Cetin, N., Bekyurek, T and Cetin, E. (2009).Effect of sex, pregnancy and season on some haematological and biochemical blood values in Angora rabbits.*Scand. J. Lab. Anim. Sci.* 36 (2): 155-162.
- Corzo, A., Mejia, L., McDaniel C. D and Moritz, J. S. (2012).Interactive effects of feed form and dietary lysine on growth responses of commercial broiler chicks. *J Appl Poult Res* 21, 70-78
- Esonu, B. O., Emenalom, O. O., Udedibie, A. B. I., Herbert, U., Ekpori, I. C., Iheukwumere, F. C. (2001). Performance and blood chemistry of weaner pigs fed raw mucuna bean (velvet bean) meal. *Trop. Anim. Prod. Invest.* 4: 49-54.
- Iheukwumere, F. C., Abu, A. H. and Ndubuisi, E. C. (2008).Effect of FSH + LH (Pergonal) treatment on haematology, immune status and serum metabolites of West African Dwarf goats. *J Anim Vet Adv*, 7: 46-50.
- Jain, N. C, (1986). Schalm's Veterinary Haematology. 4thedition. Lea and Febiger, Philadelphia.
- Ladokun, A. O., Yakubu, A., Otite, J. R., Omeje, J. N., Sokunbi, O. A. and Onyeji, E. (2008). Haematological and serum biochemical indices of naked neck and normally feathered Nigerian indigenous chickens in a sub humid tropical environment. *International Journal of Poultry Science* 7 (1): 55-58.
- Maiorka, A.F., Dahlke, A., Penz, M. and Kessler, A.M. (2005). Diets formulated on total or digestible amino acid basis with different energy levels and physical form on broiler performance. *Brazilian Journal of poultry Science*, 7: 47-50. *Technology*, 39: 71-78.
- McDonald, P., Edwards, R. A., Greenhalgh, J. F. D. and Morgan, C. A. (1995).Animal Nutrition. 5thedition. Longman Publishers, Edinburgh, UK, pp: 607.
- Muhammad, N.O., Adeyina, A.O and Peters, O.M. (2000). Nutritional evaluation of fungi treated cocoa bean shell. *Nigerian J. Pure and Appl. Sci.*, 5: 1059-1064.

Najib, H. and Al-Aqil, A. (2015).Effect of Seasonal Changes in Environmental Temperatures on Blood Parameters of Local, Necked Neck and White Leghorn Layers. *International Journal of Poultry Science* 14 (7): 398-402.

Simaraks, S., Chinrasi, O. and Aengwanich, S. (2004). Haematological electrolyte and serum biochemical values of the Thai indigenous chickens (*Gallus domesticus*) in North Eastern Thailand. *Song klanakarim. J. Sci. Tech.*, 26: 425-430.

JOURNAL OF AGRICULTURE AND SUSTAINABILITY