

INFLUENCE OF STRAIN ON HAEMATOLOGICAL VALUES, BLOOD CHEMISTRY AND CARCASS CHARACTERISTICS OF THREE STRAINS OF NOILER CHICKEN

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ABSTRACT

The experiment evaluated the influence of strain on haematological values, blood chemistry and carcass characteristics of three strains (black, brown and spotted) of Noiler chicken. The experiment was conducted at the poultry section of the Bauchi State Agricultural Development Programme (BSADP) in Bauchi. A total of one hundred and thirty-six (136) eight weeks old Noiler birds were purchased from the Bauchi State Agricultural Development Programme (BSADP). The birds were raised on deep litter system until the age of 18 weeks before they were transferred to battery cage housing system. They were randomly distributed into 3 treatment groups based on strain using a Completely Randomized Design (CRD). The experiment lasted for a period of three months from the first day of lay. The birds were fed uniformly with a standard commercial diet and water was supplied ad-libitum. At 34 weeks, seventy-two (72) birds were randomly selected from three different strains (24 birds per strain) for haematology and biochemical analysis while at the end of the experiment, a total of fifty-seven (57) birds were randomly selected from different strains (19 per strain) for gut and carcass analysis. The Haemoglobin (Hb) result indicated that all the treatments were within the normal range (10.2 – 15.1g/dl), the packed cell volume (PCV) were within the normal recommended values. The result for lymphocytes fell within the normal value of 40 – 70% indicating that the birds were normal. The lymphocytes, neutrophils, Basophils, Eosinophils and monocytes were all within the normal range. The result showed that strain ($p < 0.05$) significantly affected albumin glucose cholesterol and calcium. Dressing percentage, liver, large intestine pancreas and abdominal fat were also influenced by strain. This study therefore concludes that strain affected the haematological values, blood chemistry and carcass characteristics of Noiler chicken.

Keywords: Strain, Noiler, Haematological, Carcass, Blood Chemistry

INTRODUCTION

Chickens are regarded as the most important and widely spread avian species among poultry birds (Dutta *et al.*, 2013). Poultry production is an important agricultural activity of almost all rural communities in Africa and provides scarce animal protein in the form of meat and eggs, and is a reliable source of petty cash, they are said to be one of the important animal genetic resources used as a weapon for fighting poverty and malnutrition, especially in rural areas of most developing countries, which results in the growing interest on the use of chicken as a tool for poverty alleviation in villages throughout the world (Dunya *et al.*, 2015). However, chicken growth and development is a complicated life process and is subject to a significant amount of control by genetic and non-genetic factors (Pourtorabi *et al.*, 2017; Zhenqiang *et al.*, 2013). Poultry production is fast growing in Nigeria as it significantly contribute to animal protein source of the Nigeria population, Most farmers keep broilers for meat and pullets are kept for egg production. With the increasing population, there is need for a low cost feed input breed with increased output of meat and egg production. To achieve this, a dual purpose chicken breed like Noiler is unavoidable. Noiler is a dual purpose breed of chicken developed in Nigeria by a noble hatchery with the sole aim of addressing the challenges of animal food insecurity and also to solve problems of financial challenges especially of rural communities and small holder farmers as Noiler production is highly profitable and can easily substitute local chicken. The haematological profile, both in human and animals is an important index of the physiological state of the individual, the ability to interpret the state of blood profile in normal and diseased conditions is among its primary tasks (khan *et al.*, 1987). Hematological indices are an index and a reflection of the status and condition of the blood available for an animal to meet its physiological, biochemical, and metabolic necessities (Euola *et al.*, 2004). Therefore the objectives of this study was to establish the haematological and serum biochemical values of the three strains of Noiler chicken and to determine the effects of strain on carcass yield and gut characteristics of Noiler chickens.

MATERIALS AND METHODS

The experiment was conducted at the poultry section of the Bauchi State Agricultural Development Programme (BSADP) along Yelwan Makaranta Dass Road, Bauchi State. A total of one hundred and thirty-six (136) eight weeks old Noiler birds were purchased from the Bauchi State Agricultural Development Programme (BSADP). The birds were raised on deep litter system until the age of 18 weeks before they were transferred to battery cage housing system where they were randomly distributed into 3 treatment groups based on strain using a Completely Randomized Design (CRD). The experiment lasted for three months from the first day of lay. The birds were fed uniformly with a standard commercial diet and water was supplied ad-libitum.

Data Collection and Analysis

At 34 weeks, seventy-two (72) birds were randomly selected from three different strains (24 birds per strain) for haematology and biochemical analysis. 3ml of blood samples were collected from the basilic vein of the birds into a well labelled sterile bottle containing Anticoagulants. These were used to determine packed cell volume, haemoglobin (hb), white blood cell count (WBC), and the differential counts which are Neutrophils, lymphocytes, monocytes, Eosinophil and Basophils. Another 3ml sample of blood was collected into sterile labelled bottles without anticoagulants to determine the serum biochemical metabolites as follows: total protein, cholesterol, Glucose, Albumin, calcium, phosphorus, uric acid.

Hematological technique

Total red blood cell count and Total white blood cell count were determined by a manual method using hematocytometer (Campbell, 1995). Differential counts were made on monolayer blood films, fixed and stained with leishman – stain. Packed cell volume was measured by a standard manual technique using micro hematocrit capillary tubes and hematocrit reader. Haemoglobin concentration was measured by cyanhemoglobin method (Ritche *et al.*, 1994).

Biochemical technique

Total protein, glucose, calcium, phosphorus, cholesterol, and uric acid, were determined by automatic analyzer.

Gut and Carcass Analysis

At the end of the experiment, a total of fifty-seven (57) birds were randomly selected from different strains (19 per strain). They were deprived of feed for twelve hours but provided with drinking water. The chickens were weighed and slaughtered. Slaughtered birds were scalded in hot water (about 50°C) for 1 minute and plucked manually, offal were then eviscerated for carcass yield and organ weight determination. The carcass yield and organ weight were calculated as percentage of the live weight. Dressing percentage was calculated using the relationships: -

$$\text{Dressing percentage} = \frac{\text{carcass weight}}{\text{live weight}} \times 100$$

Statistical Analysis

Analysis of variance was carried out on data collected using the general linear model of SPSS 20.0 (2011). Where means differed, Duncan multiple range test (DMRT) was used to separate them (Duncan, 1955).

RESULTS AND DISCUSSION

The result for haematological analysis of three strains of Noiler chicken is presented in Table 1. The result showed ($p < 0.05$) significant difference among some of the parameters measured. Haemoglobin (Hb) values were similar among the treatments. The Hb result indicated that all the treatments were within the normal range (10.2 – 15.1g/dl) which is in agreement with the finding of Petra *et al.*, (2014). The packed cell volume (PCV) were within the normal recommended values for healthy birds in all the treatments (30 – 49%) as outlined by Petra *et al.*, (2014). The result for white blood cell count (WBC) revealed that all the treatments were within the recommended range ($3 - 11 \times 10^9$). The result for lymphocytes fell within the normal value of 40 – 70% indicating that the birds were in a normal health status. The neutrophils, Basophils, Eosinophils and monocytes are all within the normal range for healthy birds as outlined by Petra *et al.*

Table 1: Haematological values of three strains of Noiler Chicken

Parameters	Black strain	Spotted strain	Brown strain	LS
Hemoglobin (g/dl)	11.13	10.33	11.54	0.38827 NS
Packed cell volume%	33.33	30.13	34.13	1.17851 NS
Whiteblood cell(x10)	5.41	3.65	3.75	0.53758 NS
neutrophil%	39.50	40.25	36.45	0.75785 NS
Lymph%	55.45a	51.79b	56.33a	0.86534 *
Mono%	3.92a	2.29b	3.45a	0.17382*
Basophils	0.02	0.01	0.01	0.00000 NS
Eosinophils	0.42a	0.00b	0.00b	0.06034 *

Ls= level of significant, NS/=Not significant, a and b= means with different superscript on the same row varies significantly.

Table 2: Blood Chemistry of three strains of Noiler Chicken

Parameters	Black strain	Spotted strain	Brown strain	SEM
Total protein (gl)	57.62	60.24	56.67	1.19269NS
Albumin (mmol/l)	21.62 ^b	22.00 _b	26.19 ^a	0.46649*
Glucose (mmol/l)	1.35 ^b	2.95 ^a	1.65 ^b	0.23103*
Cholesterol (mmol/l)	4.91 ^b	3.45 ^c	6.05 ^a	0.22020*
Calcium (mmol/l)	2.26 ^b	3.00 ^a	2.40 ^b	0.07510*
Phosphorus (mmol/l)	2.42	2.11	2.30	0.13478NS

NS= not significant ($p < 0.05$), SEM= standard error of mean, a, b and c= means with different superscripts on the same row varies significantly, *= significant.

The result for blood chemistry of the three strains of Noiler is shown in Table 2. The result showed that strain has effect on most of the serum biochemical parameters measured. The total protein was not significantly different among the three strains, but albumin values were similar in two of the treatments (Black and spotted) but differs significantly ($p < 0.05$) with the brown. The result for glucose showed a similar value for the black and brown strain but differs significantly ($p < 0.05$) with the spotted. All the treatments were within the normal glucose range for birds. Cholesterol levels were within the normal range but vary significantly ($p < 0.05$) among the treatments. Brown strain records higher value for cholesterol compared to the Black and Spotted. Calcium and phosphorus levels were

within the normal range indicating proper metabolism of the calcium and phosphorus and also a proper functioning of the parathyroid gland.

Table 3: Carcass characteristics of three strains Noiler chicken

Parameters	Black strain	Sported strain	Brown strain	SEM
Live weight (g)	2738.5	2853.8	2638.5	0.10608
Pluck weight (g)	2509.2	2500.0	2411.5	0.10449
Eviscerated weight (g)	2249.2	2223.1	2169.2	0.10292
Carcass weight (g)	2107.7	1901.5	1960.0	0.09828
Dressingpercentage (%)	74.92 ^a	66.74. ^b	72.76 ^a	1.24794*
Head (%)	8.8	7.5	8.9	1.247NS
Leg (%)	8.5	7.5	7.8	4.928NS
Gizzard (%)	3.9a	3.5b	3.9a	2.617NS
Liver (%)	4.9 ^a	3.4 ^b	3.13 ^b	9.400*
Kidney (%)	0.3	0.33	0.33	0.522NS
Small intestine(cm)	8.9	8.6	8.2	4.395NS
Large intestine(cm)	0.8 ^b	0.83 ^b	0.96 ^a	0.220*
Pancreas (%)	0.32 ^b	0.31 ^b	0.38 ^a	0.125*
Abdominal fat (%)	8.26 ^b	8.60 ^a	8.21 ^b	9.85*
Spleen (%)	0.18	0.19	0.19	0.50NS
Caecum (%)	1.78	1.72	1.76	2.73NS
Lungs (%)	1.24	1.08	1.06	0.470NS
Hearts (%)	1.23	1.06	1.21	0.44NS
Testes (%)	0.71	0.73	0.78	2.211NS

SEM= standard error of mean, a and b= means with different superscript on the same row varies significantly. NS- not significant.

The result for carcass characteristics of three strains of Noiler chicken is shown in Table 3. The result showed that there were no significant difference on parameters like liver, plucked, eviscerated and carcass weight. The similarity may be as a result of uniformity in feed, environment and their genetic potentials for growth. The result for organ and gut expressed as percentage of body weight showed no significant difference in kidney, heart, testes, lungs, caecum, spleen, gizzard, and small intestines. However, significant ($p < 0.05$) difference was recorded for liver with the black strain recording the highest (42.62). Other parameters measured include pancreas, large intestine, abdominal fat which varied significantly ($P < 0.05$) among the treatments.

CONCLUSION

In conclusion, strain affected the haematological values, blood chemistry and carcass characteristics of Noiler chicken.

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