



HAEMATOLOGY AND BIOCHEMICAL INDICES OF BROILER FINISHER CHICKEN FED GRADED LEVELS OF ZIZIPHUS MAURITIANA FRUIT PULP

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ABSTRACT

An experiment was conducted to investigate the replacement of maize with ziziphusmauritiana fruit meal in broiler finisher diets. One hundred and twenty Anak 2000 broilers were used for the study. Four diets were formulated using ZMFM at 0%, 5%, 10% and 15% in the diets respectively. The birds were randomly allotted to dietary treatments in a completely randomized design. Each treatment consists of thirty birds with ten birds per replicate. The experiment lasted for four weeks. Feed and water were given ad-libitum. The Haematological indices indicate high significant ($P < 0.05$) difference at different levels of maize replacement with ZMFM in packed cell volume (PCV), Red blood cell (RBC) Haemoglobin (Hb) while blood cell (WBC), mean corpuscular Haemoglobin (MCH) Haemoglobin concentration (HB) Heterophils and Lymphocytes. The serum biochemical indices revealed high significant ($P < 0.05$) difference in total protein, albumen, glucose, chloride, potassium and sodium. In view of above, up to 15% replacement of maize with ziziphusmauritiana fruit meal has no adverse effect on the blood component of broiler finisher chicken.

Keywords: Broiler finisher, ziziphusmauritiana fruit meal maize and blood components.

INTRODUCTION

The rising cost of feed resources for livestock production has remained a serious impediment to meeting the demand for animal protein in developing countries like Nigeria. Cost of feeding has been estimated to account for up to 70% of the cost of production in broiler production (Adejinm et al., 2000). The most important and expensive feed stuffs are the energy sources, usually maize which accounts for the largest proportion of about 50 – 55% of the poultry diet (Afolayan et al., 2002). The escalating rise in the cost of maize is brought about by its declining production conditions and stiff

competition for its use by man and other livestock species (Agbede et al., 2002).

One of the several non-conventional feed resources available is the *Ziziphus mauritiana* fruit. *Ziziphus mauritiana* wild (Rhamnaceae). Locally known as Jujube (English Name) Magarya or Kurnain Hausa, is for tropical evergreen tree grows in the east and West Africa, Nigeria (Adzu et al., 2001). The fruits taste like a mixture of dates and apples and are highly prized by the Bedouin and were found to have a very high energy value. Fruit can be eaten raw or dried for later use and has a pleasant sub-acid taste, somewhat resembling dried apples (Facciola, 1990). The food from this plant is an important source of energy, protein and mineral (Amantha et al., 2003). The fruit contain 83.98% carbohydrate, 6.18% crude protein and 1.67% fibre (Keta, 2017). This experiment was carried out to investigate the effect of replacing maize with graded levels of *Ziziphus mauritiana* fruit meal on Haematological and serum biochemical indices of broiler finisher chickens.

MATERIAL AND METHOD

Study Area

The experiment was conducted at the teaching and research farm of college of agriculture, Jalingo Taraba State which is located between latitude 8°30" North and longitude 11° 50" East in Guinea Savannah zone of northern Nigeria. *Ziziphus mauritiana* fruit meal preparation the *Ziziphus mauritiana* fruits were obtained from the local market and bush within Ardo-Kola local government of Taraba State, the dry fruits were pounded to separate the pulp and the hard kernel. The pulp was thoroughly sundried, ground into meal and packed in a polythene bag and stored at room temperature for formulation of the experimental diets. Proximate analysis of the *Ziziphus mauritiana* fruits meal was carried out according to the procedures of A.O.A (1995) to determine the crude protein, crude fibre, ether extract and gross energy.

Table 1: Proximate composition of ziziphusmauritiana fruit meal

| Nutrient | % |
|-----------------------------|---------|
| Dry matter (DM) | 94.00 |
| Crude protein (CP) | 19.27 |
| Crude fibre (CF) | 17.00 |
| Ether Extract (EE) | 5.00 |
| Ash | 5.00 |
| Nitrogen free extract (NFE) | 53.73 |
| M.E (Kcal/kg) | 3025.40 |

Experimental Diet

Four experimental diets were formulated containing ziziphusmauritiana fruit meal at 0%, 5%, 10% and 15% and were designated diets T1, T2, T3 and T4 respectively (Table 2).

Table 2: Ingredient Composition of Broiler finisher diets

| Ingredient | T1 | T2 | T3 | T4 |
|-----------------------------|-------|-------|-------|-------|
| Maize | 46.45 | 41.45 | 36.45 | 31.45 |
| ZMFM | 0.00 | 5.00 | 10.00 | 15.00 |
| Wheat offals | 11.61 | 11.61 | 11.61 | 11.61 |
| Soya beans full fat | 37.44 | 37.44 | 37.44 | 37.44 |
| Bone meal | 3.25 | 3.25 | 3.25 | 3.25 |
| Lime Stone | 0.20 | 0.20 | 0.20 | 0.20 |
| Methionine | 0.20 | 0.20 | 0.20 | 0.20 |
| Lysine | 0.25 | 0.25 | 0.25 | 0.25 |
| Salt | 0.35 | 0.35 | 0.35 | 0.35 |
| Premix | 0.25 | 0.25 | 0.25 | 0.25 |
| Total | 100 | 100 | 100 | 100 |
| Calculated Analysis | | | | |
| Crude Protein (CP) | 20.16 | 19.93 | 19.72 | 19.49 |
| Crude fibre (CF) | 4.28 | 4.38 | 4.22 | 4.18 |
| Ether Extract (EE) | 9.17 | 9.01 | 8.85 | 8.69 |
| Ash | 3.06 | 3.15 | 2.26 | 3.35 |
| Nitrogen free extract (NFE) | 63.33 | 63.53 | 63.95 | 64.29 |
| M.E (Kcal/kg) | 3,050 | 3,084 | 3,034 | 3,017 |

ME – metabolizable energy

ZMFM = Ziziphusmauritiana fruit meal

Premix (Grow fast manufactured by Animal Care Services Consult (Nig) Ltd. Vit. A3200,000 IU; Vitamin D₃, 640,000 IU,; Vit. E, 2000 I-U; Vit. K, 800mg; Thiamin, B, 600mg; Riboflavin B₂

1.600mg Pyridoxine, B6, 600mg Niacin 6.000mg; Vit. B12 4mg; Pantothenic acid; 2,000mg; Folic Acid; 2,000mg, Biotin 8mg; Choline Chloride 80g; Antioxidant 50g; Manganese, 32g, Zinc 20g, Iron 89. Coppe 29 Iodine, 0.48g, Selenium, 80mg and Cobalt, 80 mg.

Experimental Animals and Management

A total of one hundred and twenty broiler finisher were sourced from a commercial farm in Jalingo and allocated to four dietary treatments of 10 birds per replicate and replicated 3 times. All vaccination schedules and management procedures were followed. Feed and water were provided ad-libitum and the experiment lasted for 28 days after an initial adjustment period of one week. Daily feed intake was monitored and weight gain also measured, as well as feed conversion ratio (FCR) determined.

Blood Collection and Analysis

At the week 4, blood samples were collected from three birds in each group (i.e. bird per replicate) for determination of haematological and serum biochemical indices. The birds were fasted overnight and blood samples were collected early the next morning via the wing-vein by means of sterile disposable (21-gauge) syringe and needle and then placed into sets of sample bottles. One set contained diapotassium salts of ethylene diamine tetra-acetic acid (EDTA) and the samples were used for haematological study. The other samples in anti-coagulant-free bottles were used for the determination of serum biochemical indices. Packed cell volume (PCV), red blood cell (RBC) white blood cell (WBC) and haemoglobin concentration (Hb) were analysed according to the method outlined by Bush (1975) mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) were calculated by the formula of Schain et al., (1985). The serum biochemical indices measured were the level of total protein, albumin, glucose, cholesterol, chloride, sodium, potassium, globulin, calcium and urea were analysed according to the method outlined by Bush (1975) and WHO (1980), proximate composition of the

experimental diet carried out according to the method of AOAC (1980).

Statistical Analysis

All data collected were subjected to one way analysis of variance using SAS software (SAS, 2009), means were separated with Duncan Multiple range test at 5% level of significance.

RESULT AND DISCUSSION

The haematological parameter in table 3 should significant ($P < 0.05$) difference in all blood component in difference inclusion level of ziziphusmauritiana fruit meal except in monocytes, eosinophil and basophil. The PCV values are similar to the range of 30-33% reported by Swenson (1970) which indicated that the birds were neither dehydrated nor anacmic. The RBC and values obtained in the research use within the range of $2.5 - 3.2 \times 10^6/\text{mm}^3$ $9 - 31 \times 10/\text{mm}^3$ $6.5 - 9\text{g/dl}$ reported Swenson (1970). The heterophil and lymphocytes values were within the normal range of 25-30% and 55 - 60% reported by Swenson (1977). It has been observed by Esono et al., (2001) that haematological component reflect the responsiveness of the animal to its internal and external environment which includes feed and feeding.

The monocyte, eosinophils and basophil showed no significant ($P > 0.05$) difference among the treatment groups but the range or value observed were similar to the range of values reported by Swenson (1977). This is an indication of adequate production of antibodies and bacterial infection or allergic condition among the birds as observed in this study. The observation collaborated with the report of Dukes (1975) and CCAC (1980).

Table 3: Haematological Indices of Broilers finisher fed graded level of ziziphusmauritiana fruit meal.

| Parameters | T1 (0%) | T2 (5%) | T3 (10%) | T4 (15) | SEM |
|--|---------------------|----------------------|---------------------|---------------------|--------------------|
| Packed cell volume (%) | 33.00 ^a | 30.61 ^{ab} | 30.62 ^{ab} | 33.01 ^a | 1.46 [*] |
| Haemoglobin (gk) | 8.20 ^a | 7.50 ^a | 5.80 ^b | 7.90 ^a | 0.45 [*] |
| Red blood cell (10 ⁶ /mm ³) | 3.19 ^a | 2.80 ^b | 2.16 ^c | 3.08 ^{cb} | 0.17 [*] |
| White blood cell (10 ³ /mm ³) | 18.60 ^a | 17.35 ^{ab} | 16.87 ^b | 18.01 ^{ab} | 0.53 [*] |
| Mean Corpuscular volume (FC) | 96.66 ^b | 100.90 ^{aa} | 117.24 ^a | 25.91 ^{aa} | 1.82 [*] |
| Mean corpuscular haemoglobin (pg) | 85.73 ^{ab} | 25.81 ^{ab} | 26.81 ^a | 25.70 ^a | 0.80 [*] |
| Mean haemoglobin Conc. (g/vl) | 26.39 ^a | 25.70 ^a | 23.30 ^b | 25.32 ^b | 0.75 [*] |
| Hetrophius (%) | 28.35 ^b | 25.71 ^a | 39.30 ^a | 35.04 ^b | 0.91 [*] |
| Lymphocytes (%) | 64.00 ^a | 66.79 | 34.68 ^b | 57.02 ^b | 1.62 [*] |
| Monocytes (%) | 4.50 | 3.34 | 3.10 | 4.68 | 1.1 ^{NS} |
| Eosinophils | 4.30 | 4.34 | 3.70 | 3.34 | 0.75 ^{NS} |
| Basophits | 0.00 | 0.00 | 0.00 | 0.00 | 0.24 ^{NS} |

a,b,c Means within the same row bearing different superscript differ significantly (P<0.05).

= Significant (P<0.05): NA = not statistically analysed

SEM = Standard error mean.

Serum Biochemical Indices

The result of serum Biochemical indices are presented in table 4. The total protein, albumin glucose, chloride, potassium and sodium showed significant (P<0.05) difference. The value recorded in these parameters was within the normal range reported by Dukes (1975). Also the result of total cholesterol, urea globalism and calcium were not significantly different (P>0.05) among the treatment groups and fall within the normal ranges reported by other workers (Anon, 1980, Oyawaye and Ogunkule, 1998). The Biochemical indices were not adversely affected by including 15% ziziphusmauritiana fruit meal in broiler diet.

Table 4: serum Biochemical indices of broilers finisher fed graded level of ziziphusmauritiana fruit meal.

| Parameters | T1 (0%) | T2 (5%) | T3 (10%) | T4 (15) | SEM |
|----------------------------|----------------------|---------------------|---------------------|----------------------|---------------------|
| Total protein (g/l) | 11.002 ^a | 8.00 ^b | 9.40 ^{ab} | 8.70 ^{ab} | 1.55* |
| Albumin (g/l) | 10.40 ^a | 7.10 ^b | 8.56 ^b | 7.70 ^b | 1.57* |
| Glucose (mmol/l) | 7.60 ^a | 9.10 ^b | 9.14 ^a | 8.70 ^b | 0.15* |
| Total cholesterol (mmol/l) | 1.35 | 0.93 | 1.10 | 1.15 | 0.22 ^{NS} |
| Urea (mmol/l) | 2.70 | 2.71 | 2.90 | 2.74 | 0.145 ^{NS} |
| Glubulin(mg/dl) | 2.64 | 2.86 | 2.28 | 2.35 | 0.32 ^{NS} |
| Calcium (mg/dl) | 5.40 | 5.50 | 5.53 | 6.13 | 0.39 ^{NS} |
| Chloride (mmol/dl) | 90.32 ^d | 95.3 ^c | 102.00 ^a | 78.40 ^b | 5.04* |
| Potassium (mmol/dl) | 2.80 ^b | 3.10 ^b | 4.30 ^a | 3.00 ^b | 0.35* |
| Sodium (mmol/dl) | 109.64 ^{ab} | 109.10 ^a | 125.00 ^a | 105.106 ^b | 6.45* |

A,b,c, means within the same row bearing different superscript differs significantly (P<0.05)

* = Significant (P<0.05)

NS = not significantly analysed

SEM = Standard error of means.

CONCLUSION

The result of the study indicated that the level of 15% ziziphusmauritiana fruit in the diet have no adverse effect on haematology and serum biochemical indices of broilers. However future studies are needed to evaluate the histopathology of some selected organs to further confirm the suitability and safety of ziziphusmauritiana fruit in broiler diet.

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