Acta Scientific Veterinary Sciences (ISSN: 2582-3183)

Volume 5 Issue 9 September 2023

Research Article

Effect of *Moringa oleifera* and *Centrosema pubescence* Leaf Meal as Diet Components on Haematological and Serum Biochemistry in Broiler Chicken

Nwankwo CA[1]*, Allahbamu C[2] , Ezejesi HC[1] and Okafor EC[1]

[1]*Department of Animal Science and Technology Nnamdi Azikiwe University Awka, Nigeria*

[2]*Division of Agricultural Colleges, College of Agriculture and Animal Science, Ahmadu Bello University, Mando, Kaduna State, Nigeria*

***Corresponding Author:** Nwankwo CA, Department of Animal Science and Technology Nnamdi Azikiwe University Awka, Nigeria.

DOI: 10.31080/ASVS.2023.05.0739

Received: July 24, 2023

Published: August 30, 2023

Abstract

Feeding has become a major concern among livestock farmers today, especially in developing countries. The study was focused on the effect of inclusion of forage leaf meal (Moringa oleifera plus Centrosema pubescence in 50:50 ratio) at varying levels (0, 2.5, 5.0 and 7.5%), represented as T1, T2, T3 and T4 respectively on haematological indices and serum biochemistry of broiler chickens. Parameters studied were packed cell volume (PCV), haemoglobin, white blood cell (WBC), red blood cell (RBC) and platelet count for haematological indices while albumin, globulin, protein, cholesterol, urea and glucose were studied for serum biochemistry. Result indicated that haematological parameters were significantly influenced by leaf meal inclusion. The PCV, haemoglobin, white blood cell and red blood cell value increased as percentage of leaf meal inclusion increased. However, there was a significant difference on platelet count among all treatments with birds fed (7.5%) level of inclusion recording the highest and the control treatment (0%) inclusion recording the lowest. Serum biochemistry also showed increase in all parameters investigated in accordance to increase of leaf meal inclusion, except for globulin where T3 (5.0%) leaf meal inclusion diet was significantly higher in birds fed at T4 (7.5%) leaf meal inclusions rate.

Keywords: Centrosema; Haematological Indices; Leaf Meal; Moringa; Serum Biochemistry

Introduction

Poultry, a subsector of agriculture has been considered a very lucrative sector with high return. In Nigeria, the subsector has served as a major source of food, employment and also has boasted the economy [1]. But no doubt, provision of balanced diet for the birds has become a major challenge the sector is facing especially in developing countries, as it appears to threaten the existence of the sector. A 10% low difference in protein intake has been recorded in developing countries as compared to developed countries [2]. In Nigeria, poultry feed is majorly derived from raw materials of both plants and animals sources. However, the raging threat around security in the country, calls for a serious concern as it relatively affects the production of some of these feed stuff thereby resulting to scarcity. Security challenges such as kidnapping, farmer-herders clash, and cattle rustling, have initiated the prohibition of tall crop farming such as Maize, millet, sorghum etc., which were perceived to increasingly promote occurrence of the above incidence. Although it has negatively impact in the poultry sector considering this crops serve as a major energy source in poultry feed. This scarcity has grievously affected the cost of production, thereby causing the average citizen not being able to afford meat, which has promoted the sudden lookout for remedies. Gadzirayi., *et al*. [3] suggested that shrubs legume plants could be processed and used as alternative to feed, stating that it will not only serve as a protein source in the feed, but will also serve as source of other vitamins.

Moringa oleifera has been reported to be inexpensive and readily available thereby serving as an unconventional source of energy,

although the plant is known majorly for it protein content [4]. Also based on findings, Moringa at a 15% level can serve as replacement of concentrate mixture to improve body weight gain, feed intake and protein intake of Murrah buffalo calves [4].

Leaf meal derived from shrub fodder has also been reported to significantly boast income of small scale farmers in Tanzania [5].

In view of the above and considering the stake involved, this study is aimed at evaluating the response of broiler birds to *Moringa oleifera* and *Centrosema pubescence* leaf meal inclusion on haematological indices and serum biochemistry.

Materials and Method

Study Area

The study was conducted at the Animal Science Teaching and Research farm of the Nnamdi Azikiwe University, Awka, Anambra Nigeria. The area is located on longitude $7^{0}08^{1}31.\ 9^{"}$E and latitude $6^{0}15^{1}10.1^{"}$N [6].

Experimental procedure

A total of ninety-six (96) day-old unsexed broiler chicks (abor acre broiler strain) were used in this experiment. Chicks were brooded in the same pen for the period of one week, after which they were allocated to four (4) different dietary treatments with equal ratio of (50:50) of both *Moringa oleifera* and *Centrosema pubescence* leaf meal. Each treatment was replicated three (3) times with eight (8) birds per pen summing up to 24 birds per treatment.

Treatments	Diet (50:50)	Inclusion levels (%)
T1	Centrosema pubescence+ Moringa *oleifera*	0
T2	Centrosema pubescence+ Moringa *oleifera*	2.50
T3	Centrosema pubescence+ Moringa *oleifera*	5.00
T4	Centrosema pubescence+ Moringa *oleifera*	7.50

Table 1: Gross proportion of experimental diet (leaf meal).

On arrival chicks were given water with glucose in it and fed *ad libitum* and with tray feeders for easier consumption and recognition of feed by chicks up to ten days of age. Temperatures were kept at 32^{0}C for the first 7days and monitored frequently for about 3times/day i.e., in the morning, during the day, and at night. Sufficient air exchange was also allowed, and after 7 days temperatures were reduced gradually and equipment adjustments were done until the end of the experiment. The chicks in groups and feeds were weighed weekly according to cage numbers using a normal scale. The fecal trays were cleaned twice weekly to avoid the build-up of diseases and contamination of feed. At 8th day, all the chicks were moved from the brooding house to the experimental pens and divided into 12 pens (8chickens/pen). Each pens contained a two fountain plastic drinkers and two feeding troughs (1500mm). The diets were formulated to meet all the bird's dietary nutrient requirements for super starter (0-4 weeks), and finisher (5-8 weeks) phases. The ingredient and chemical composition of all the phases is shown on (Table 2).

Ingredients (Kg)	Super starter (0-4 weeks)	Finisher (5-8weeks)
Fine maize	224.12	528.35
Soya oil cake	124.61	202.76
Fish meal	10.14	32
Sunflower oil	8.00	13.52
Limestone	5.91	10.85
Mono calcium phosphate	3.44	6.11
Methionine	1.25	1.89
Salt	1.32	2.49
Vitamin + mineral premix	0.47	0.93
Sodium bicarbonate	0.34	-
chlorine chloride	0.31	0.2
Lysine	0.07	0.62
Threosine	0.02	0.27

Table 2: The ingredient composition of broiler starter and finisher feed.

The following parameters were determined; Total protein, globulin, albumin, glucose, cholesterol, and urea. Haematology- packed cell volume, red blood cell, white blood cell, haemoglobin, platelet count, cell count. Four ml of blood was collected from the wing vein with a hypodermic sterile needle and syringe through the marginal wing vein for serum biochemistry and haematology studies. An initial 2 ml was collected over labeled sterilized bottle containing EDTA (Ethylene Diamine Tetraceti Acid) which prevented the blood from coagulating and used for hematological studies, while 2 ml was also collected over anti-coagulant free bottle Data Collection.

At about eight (8) weeks, one (1) bird was selected per treatment, making a total of 4 birds and blood samples were collected through wing veins of the birds. A set of samples were collected into

sterilized tubes containing EDTA labeled bottle for haematological studies, while another set of blood samples were collected from the same birds into heparinized tubes for serum Chemistry determination Packed cell volume (PCV), red blood cell (RBC),white blood cell (WBC) and haemoglobin (Hb) was determined using improved Neubar's haemaetometer after dilution and serum metabolites such as total protein, albumin, and urea was determined by the method of Hyduke [7], while globulin was estimated by the subtraction of albumin value from serum total protein value [8].

Data Analysis

Data collected over the course of the experiment was subjected to the statistical analysis of variance (ANOVA) within a completely randomized design (CRD) using Statistical Package for Social Sciences (SPSS version 20). However, significant means were separated using LSD at 5% level of significance.

Result and Discussion

The result shows that leaf meal inclusion in poultry production had a significant effect on haematological indices as observed (Table 3). A higher ($P < 0.05$) value of packed cell volume (PCV) was recorded in birds fed 5% and 7.5% leaf meal diet, with a significant decrease ($P > 0.05$) on the side of birds fed 2.5% and control diet (0%). The haemoglobin (Hb) values were significantly higher ($P < 0.05$) with birds fed 5% and 7.5% leaf meal diet. However, figure was significantly ($P > 0.05$) reduced in birds fed 2.5% leaf meal diet and the control diet (0%). Also, white blood cells (WBC) increased significantly ($P < 0.05$) with birds fed both 5% and 7.5% leaf meal diet, but a significant ($P > 0.05$) decrease was observed with birds fed control diet. Higher significant differences were recorded for Red blood cells (RBC) in birds fed control diet (0%), 5% and 7.5% while significantly ($P > 0.05$) lower value was recorded for birds fed 2.5%. Platelets count was significantly higher with birds fed 7.5% leaf meal diet.

Following the trend of increase in values of PVC, Hb, WBC and RBC, with birds fed 5% and 7.5% leaf meal, the study is implying that leaf meal combination of *Moringa oleifera*, and *Centrosema molle* at 50:50 ratio had a positive impact on the birds' haematological indices. This could probably be that the treatment of leaf meal before inclusion into diet did help to break anti-nutritional factors that could be present which has been reportedly said to have reduced haematological indices [9]. This study however, disagrees with other researchers [10], which states that leaf meal inclusion at 7.5% reduced haematological profile of broiler birds. The study however agrees with the findings of some researchers [11,12], who confirmed that Moringa leaf meal records a low level of antinutritional factor such as tannin, trypsin, amylase.

Variables	T1	T2	T3	T4	SEM
PCV(%)	16.67^{c}	19^{b}	34.33^{a}	33.33^{a}	1.291
HB(g/dl)	6.53^{b}	6.5^{b}	11.43^{a}	12.1^{a}	0.217
WBC	93.7^{c}	116.93^{b}	167.9^{a}	161.93^{a}	0.707
RBC ($\times 10^{6}$)	2.23^{a}	1.4^{b}	2.48^{a}	2.37^{a}	0.048
Platelet count	13^{d}	15^{c}	15.67^{b}	17.33^{a}	1.027

Table 3: Haematological parameters of broiler fed graded levels of *Moringa oleifera* and *Centrosema molle* leaf meals.

^{abc} Means with different superscripts along the column differed significantly ($P < 0.05$),

SEM: Standard Error of Means. PVC: Packed Cell Volume; HB: Haemoglobin; WBC: White Blood Cell, RBC: Red Blood Cell; T1: 0%; T2: 2.5%; T3: 5.0%; T4: 7.5%.

Table (4) shows the result of serum biochemistry of birds fed varying levels of leaf meal diet. All parameters were significantly influenced by leaf meal inclusion. Albumin and globulin content were both significantly higher in birds fed 5.0% leaf meal and significantly lower with birds fed (2.5%) leaf meal diet and control diet (0%), although for albumin, there was a significant difference with bird fed (7.5%) leaf meal diet as compared to (5.0%). Total protein was statistically similar with birds fed 7.5% and 5.0%. Also, similar significant levels were recorded for birds fed 5.0% and 2.5% leaf meal diet. Total cholesterol was significantly ($P < 0.05$) influenced based on the level of leaf meal inclusion with birds fed 7.5% having highest level while animals on control diet had lowest value. Significantly higher value was recorded in urea for birds that were fed 5.0% and 7.5% inclusion level of leaf meal diet. Glucose however, was significantly influenced by leaf meal inclusion, with birds fed on 5.0% and 7.5% levels having similar higher and differ significantly from birds fed on control diet (0%) leaf meal inclusion.

Consumption of leaf meal in the diets at varying levels reduced the concentration or amount of globulin and glucose in the birds fed 7.5% leaf meal. The progressive effect of the leaf meal at T4 (7.5%) inclusion level could be attributed to the treatment of leaf meal which help curb the adverse influence of the leaves phytotoxins namely lecithin, alkaloids like moringin, moringinine, glucosinolates, phenols including tannins, n/itrite, oxalate and phytate, which has been reported to have a depressive impact on broiler serum biochemistry and performance generally [10] These findings disagree with the findings of Vastana and Daramola [13] who investigated the effects of Moringa leaf meal on haematological parameters and cholesterol content in rabbits and also Akanji [14],

who stated that the increasing level of Moringa in poultry feed negatively impact poultry performance. Similar results have been reported feeding Neem Leaf (*Azadirachta indica*), *Mimosa diplotricha* and Pawpaw leaf (*Carica papaya*) Leaf Extracts [15-17].

Variables	T1	T2	T3	T4	SEM
Albumin	1.58^{b}	1.86^{b}	2.11^{a}	2.13^{a}	0.018
Globulin	1.03^{c}	1.07^{c}	1.37^{a}	1.27^{b}	0.074
Total protein	2.93^{c}	3.08^{b}	3.16^{ab}	3.21^{a}	0.161
Total cholesterol	165^{d}	167.67^{c}	202^{b}	210.33^{a}	1.675
Urea	14.47^{c}	17.2^{b}	21.7^{ab}	23.77^{a}	0.184
Glucose	191^{c}	202^{b}	231.33^{a}	231^{a}	2.068

Table 4: Serum biochemistry of broiler fed graded levels of *Moringa oleifera* and *Centrosema pubescence*leaf meals.

^{abc} Means with different superscripts along the column differed significantly (P < 0.05).

SEM: Standard Error of Means. T1: 0%; T2: 2.5%; T3: 5.0%; T4: 7.5%.

Conclusion

From the results obtained in this study, it is concluded that the higher the inclusion level of the leaf meals in diets of broiler chickens the more influence it has on the hematological and serum biochemical profile. However, at 5.0% inclusion level of leaf meal in the broiler diet, high values of white blood cells, red blood cells, packed cell volume were recorded. Hence, it is recommended that *Moringa oleifera* plus *Centrosema pubescence* leaf meal on a 50:50 proportion can be incorporated into the diets of broiler chickens up to 5.0% level to save cost.

Recommendation

From the experiment carried out, even though these leaf meals are presumed to contain some anti- nutritive factors, the study suggest their potentials can always be utilized if properly managed in poultry production as they are protein based plants and a cheap source of protein and additives and from the result of the experiment, I recommend that Farmers should include the leaf meals at 5.0% inclusion level in their feed.

Bibliography

1. Ezekiel CN., *et al*. "Natural occurrence of mycotoxins in peanut cake from Nigeria". *Food control* 27.2 (2012): 338-342.

2. Esonu BO. "Comparative evaluation of raw and urea/toasted Velvet Bean (Mucunapruriens) for broiler chicks". *Nigerian Journal of Animal Production* 28.1 (2001): 40-44.

3. Gadzirayi CT., *et al*. "Performance of broiler chickens fed on mature Moringa oleifera leaf meal as a protein supplement to soyabean meal". *International Journal of Poultry Science* 11.1 (2012): 5-10.

4. Bhavna A., *et al*. "Effect of moringa (Moringa oleifera) leaf meal on performance of Murrah buffalo calves". *International Journal of Chemical Studies* 7.2 (2019): 1722-1728.

5. World agroforestry center. "Spreading the word about leaf meal". *Spore* 125 (2006): 6.

6. Aregheore EM. "Nutritive value and utilization of three grass species by crossbred". *Journal of Animal Science* 14 (2002): 1389-1393.

7. Hyduke RR. "Chemical Biochemistry Laboratory Manual". The University of IOWA Medical Techn (1995). ^ ^

8. Davie JV and Lewis SM. "Practical Haematology 8th Edition Longman Group Limited". *Food and Nutrition Sciences* (1991): 22-28.

9. Tijani H., *et al*. "Integration of microalgae biomass in biomethanation systems". *Renewable and Sustainable Energy Reviews* 52 (2015): 1610-1622.a

10. Odetola OM., *et al*. "Utilization of Moringa leaf meal as a replacement for Soya bean meal in Rabbit's diets". *Journal of Agricultural Science* 2.12 (2012): 309-313.

11. Ogbe AO., *et al*. "Effect of polyherbal aqueous extracts (Moringa oleifera, gum arabic and wild Ganoderma lucidum) in comparison with antibiotic on growth performance and haematological parameters of broiler chickens". *Research Journal for Recent Sciences* 1.7 (2012): 10-18.

12. Makkar HPE and Becker K. "Nutritional value and nutritional components of whole and extracted *Moringa oleifera* leaves". *Animal Feed Science and Technology* 63 (1996): 211-228.

13. Vastana Daramola., *et al*. "The effect of moringaolifera leaf meal on the hematological parameters and the cholesterol level of rabbits". *American journal of Biological, Chemical and Pharmaceutical Sciences* 2.3 (2014): 1-6.

14. Akanji AM. "Enhancing the utilization of some Tropical legume seeds in diets of Exotic chickens". Ph. D Thesis. University of Ibadan (2002).

15. JC Okonkwo., *et al*. "Haematological Characteristics of Broiler Birds Administered Neem Leaf (*Azadirachta indica*) and Paw-paw leaf (*Carica papaya*) Leaf Extracts". *International Journal of Environment and Agricultural Research* 7.7 (2021): 55-59.

16. JC Okonkwo and JC Uba. "Haematological indices of various breeds of broiler chickens fed *Mimosa diplotricha* leaf meal". *International Journal of Agriculture and Biosciences* 6.4 (2017): 189-192.

17. Ezeakacha EM., *et al*. "Effect *of Mimosa diplotricha* leaf meal on the organ weights and organoleptic properties of three broiler strains". *Nigerian Journal of Animal Production* 45.1 (2018): 239-251.