



RESEARCH ARTICLE

EFFECT OF MORINGA (*MORINGA OLEIFERA*) AND NEEM (*AZADIRACHTA INDICA*) LEAF EXTRACTS ON HAEMATOLOGY AND SERUM BIOCHEMISTRY OF FINISHER BROILERS

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ABSTRACT

Sixty (60) day old chicks were used in an experiment with the aim to access the haematology and serum biochemistry of finisher broilers on *Moringa oleifera* and *Azadirachta indica* leaf extracts. The experiment consisted of four treatments in a Completely Randomized Design (CRD) of five birds per replicate. The treatments were T1 (control), T2 (40mL of moringa leaf extract), T3 (40mL of neem leaf extract) and T4 (20mL of moringa leaf extract + 20mL of neem leaf extract) in per Litre of water. After eight weeks of feeding, samples of blood were collected and taken to laboratory for blood profile analysis to determine the effect of the extracts on haematology and serum biochemistry of the broilers. The results showed that there were significant differences ($P < 0.05$) in all the haematological parameters except for mean cells hemoglobin (MCH) and mean cell volume (MCV) with T4 recorded the highest values in packed cell volume (31.33%), hemaoglobin (13.00g/dL), red blood cell ($3.68 \times 10^6/\text{mm}^3$) and white blood cell ($23.72 \times 10^3/\text{mm}^3$) significantly ($P < 0.05$) higher compared to other treatments means. The results of serum biochemical in urea, Aspartate Aminotransferase (AST) and Alanine Aminotransferase (ALT) showed no significant ($P > 0.05$) difference across the treatment means. Birds on T₄ (3.78g/dL, 2.39g/dL and 1.39g/dL) recorded higher mean value ($P < 0.05$) compared to birds in other treatments for total protein, albumin and globulin respectively. The total cholesterol of birds across the treatments were reduced significantly ($P < 0.05$) when extract were added to the drinking water compared to birds on the control. In conclusion, leaf extracts such as moringa combining with neem at same quantity (20mL+20mL) can be added in the drinking water of finisher broilers without any deleterious effect on their blood parameters.

KEYWORDS

Moringa, Neem, haematology, serum biochemistry, finisher broilers

1. INTRODUCTION

Livestock industry as one of the instruments for socio economic changes has contributed greatly to the improvement in income and quality of life of rural dwellers in Nigeria (Okumadewa, 1999). Poultry production remains the most widely spread of all livestock industries, as it constitutes vital pillar of food security (Alabi et al., 2017). Broiler can be any chicken that is bred and raised specifically for meat purpose. Its meat is one of the primary sources of income and employment to Nigerians compared to other domestic animals. Production of these broilers in developing countries is faced by many challenges; some of these challenges include diseases and high cost of feeding. Meanwhile, antibiotics have been used to prevent diseases and as growth promoters; and their administration in water has helped in recovering from poultry birds from diseases (Philips et al., 2004; Khalafalla et al., 2010). However, studies have shown that

usage of these antibiotics resulted into some genus of bacteria developing resistance to these drugs (Ogbe and John, 2012).

For safety, attention is now being shifted to natural alternatives such as plants to replace antibiotics (Alabi et al., 2017). As reported that *Moringa oleifera* (figure 1) is widely available in many countries, particularly, tropical countries and serve as a good source of antioxidant compounds (Siddhuraju and Becker, 2003). It is believed that it can strengthen immune activities and promote growth in broilers (Ghazalah and Ali, 2008). Similarly reported that *Moringa* can serve as alternative to synthetic antibiotics to promote growth in poultry, (Alabi et al., 2017). In addition, neem leaves (figure 2) have some active components which has some anti inflammatory, antifungal, antibacterial, antiviral and antioxidants effects (Tufail et al., 2025).

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Figure 1: Moringa leaves



Figure 2: Neem leaves

Despite reports on the natural plants as replacement for antibiotics, little work has been carried out on the effect of *Moringa oleifera* and neem leaf extracts on the serum biochemistry and haematology of broiler finishers. Therefore, the general objective of this study was to evaluate the effect of *Moringa oleifera*, neem leaf extracts and their combination on haematology and serum biochemistry of finisher broilers.

2. MATERIALS AND METHODS

2.1 Location of Experimental Site

This study was carried out at Research and Teaching farm, poultry unit of Federal College of Agriculture, Ishiagu, Ivo Local Government Area, Ebonyi State, Nigeria. The college is about three kilometers from the major town of Ishiagu. The college is located at latitude 5.56°N and longitude 7.31°E, with an average annual rainfall of 1653mm, a prevailing temperature of 28.50°C, and a relative humidity of approximately 80%.

2.2 Sourcing and Processing of Moringa and Neem leaves

Fresh leaves of moringa and neem were harvested from college environment. The leaves were rinsed separately in water to get rid of contaminants, dried for about 14 days. They were milled into ground form and later stored in different air tight containers prior to usage. Ground leaves in a separate container were macerated in 1 liter of water and allowed to settle for 12 hours overnight. The solutions were filtered and the extracts were collected for further dilution.

2.3 Experimental Animals and Design

Sixty (60) day old chicks were purchased from reputable commercial farm. Before the arrival of the day old chicks, the brooding house were cleaned and disinfected. The birds were allotted into four treatments with 15 birds per treatment. Treatment 1 (T1) contain no extract concentration, Treatment 2 (T2) contain 40mL *Moringa oleifera* leaf extract in 1 liter of water, Treatment 3 (T3) contain 40mL neem leaf extract in 1 liter of water, Treatment 4 (T4) contain 20mL of *Moringa oleifera* leaf extract and 20mL of neem leaf extract in 1 liter of water. Each treatment was replicated three

times with five (5) birds per replicate in a Completely Randomized Design (CRD), feed and water were made available to the chicks *ad libitum*. All birds were fed with the same feed for eight weeks.

2.4 Data Collection

2.4.1 Chemical Analysis

Leaves of moringa and neem, used for this experiment were taken to the laboratory for proximate analysis following method of (AOAC, 1990).

2.4.2 Serum Biochemistry

At the end of the eight weeks of the experiment, 2.5mL of blood sample was collected by using needle and syringe via the wing vein of the birds into empty bottles for serum biochemical analysis (total serum protein, serum albumin, globulin, alanine and asparate transaminase).

2.4.3 Haematological Parameters

Blood samples for the evaluation of haematological parameters were collected into the bottle containing Ethylene Diamine Tetra – acetic Acid (EDTA) as anti coagulants. Haemoglobin concentration (Hb), Red Blood Cell counts (RBC), White Blood Cell counts (WBC), Packed Cell Volume (PCV), Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin (MCH) and Mean Corpuscular Haemoglobin Concentration (MCHC) were evaluated following methods of Jain (1986).

2.5 Statistical Analysis

Data obtained were statistically evaluated and subjected to Analysis of Variance (ANOVA) analyzed using the General Linear Model of SAS (2013) and the Duncan New Multiple Range Test option was used to detect significant differences among means (SAS, 2013).

3. RESULTS

Table 1 shows the proximate composition of moringa leaf. The proximate composition of *moringa oleifera* as it contains 86.20% dry matter, 29.01% Crude protein, 22.17% Crude fibre, 4.38% Ether extract and 44.44% NFE.

Table 1: Proximate composition of *Moringa oleifera*

Parameters	Percentage (%)
Dry matter	86.20
Crude protein	29.01
Crude fibre	22.17
Ether Extract	4.38
Nitrogen Free Extract (NFE)	44.44

Proximate composition of neem is shown in Table 2. It shows 96.04% Dry matter, 22.17% crude protein, 14.14% ether extract, 7.42% crude fibre, 4.55% Ash and 51.72% NFE.

Table 2: Proximate composition of Neem

Parameters	Percentage (%)
Dry matter	96.04
Crude protein	22.17
Ether extract	14.14
Crude fiber	7.42
Ash	4.55
Nitrogen Free Extract (NFE)	51.72

Table 3 shows the effect of moringa and neem leaf extracts on the haematology of finisher broilers. There were significant ($P < 0.05$) differences in all the parameters observed, Haemoglobin (Hb), Packed cell volume (PCV), Red Blood Cells (RBC), White Blood Cells (WBC) and MCHC, except MCH and MCV that do not differ significantly ($P > 0.05$) across the treatments. Haemoglobin in T4 (13.00g/dL) and T2 (12.29g/dL) were significantly higher ($P < 0.05$) than T1 (11.87g/dL) but similar to T3 (12.13g/dL). Birds in T4 have highest haemoglobin in their blood which might have improved their oxygen-carrying capacity. Similar trend was

observed in the PCV, RBC and WBC. The PCV values are 28.33%, 27.33%, 27.33% and 31.33% for T1, T2, T3 and T4 respectively.

The value observed in T4 ($3.68 \times 10^3 \text{mm}^3$) for RBC was higher significantly ($P < 0.05$) compared to ($3.02, 3.14$ and 3.13) $\times 10^3 \text{mm}^3$ observed for T1, T2 and T3 respectively. T3 ($22.87 \times 10^3 \text{mm}^3$) and T4 ($23.72 \times 10^3 \text{mm}^3$) were significantly higher ($P < 0.05$) than T1 ($20.33 \times 10^3 \text{mm}^3$) but similar ($P > 0.05$) to T2 ($21.52 \times 10^3 \text{mm}^3$) in the values observed for WBC.

Table 3: Effect of moringa and neem leaf extracts on Haematology of finisher broilers

Parameters	T1	T2	T3	T4	SEM
Haemoglobin (g/dL)	11.87 ^b	12.29 ^{ab}	12.13 ^{ab}	13.00 ^a	0.18
Packed cell volume (%)	28.33 ^b	27.33 ^b	27.33 ^b	31.33 ^a	0.74
Red blood cell ($\times 10^6 \text{mm}^3$)	3.02 ^b	3.14 ^b	3.13 ^b	3.68 ^a	0.09
White blood cell ($\times 10^3 \text{mm}^3$)	20.33 ^b	21.52 ^{ab}	22.87 ^a	23.72 ^a	0.49
MCV (fl)	87.13	87.14	87.40	87.85	0.20
MCH (pg)	38.94	38.94	38.84	36.43	0.47
MCHC (g/dl)	46.10 ^a	44.93 ^a	44.45 ^a	41.56 ^b	0.55

^{a,b}: Means within each row with different superscript are significantly different ($P < 0.05$)

T1: Control (no extract); T2: 40mL of moringa leaf extract; T3: 40mL of neem leaf extract; T4: 20mL of moringa leaf extract + 20mL of neem leaf extract; MCV: Mean Corpuscular Volume; MCH: Mean Corpuscular Haemoglobin; MCHC: Mean Corpuscular Haemoglobin Concentration; SEM: Standard Error of Mean

Table 3 shows the effect of moringa and neem leaf extracts on the serum biochemistry of finisher broilers. There was no significant ($P > 0.05$) difference in urea, AST and ALT. The values observed for urea ranges from 10.09 - 10.78mg/dL, AST ranges from 81.05 - 82.99U/L while ALT ranges from 39.52 - 40.33U/L. Total protein was significantly higher ($P > 0.05$) in T4 (3.78g/dL) than T1 (3.24g/dL), T2 (3.39g/dL) and T3 (3.48g/dL). The

results showed that birds on extracts recorded higher total protein than birds on control (no extract). The total cholesterol ranges from 103.43 - 120.50mg/dL across the treatments with birds in T1 (120.50mg/dL) recorded the highest value. The mean values were reduced significantly ($P < 0.05$) when extract were added to the drinking water compared to birds on the control.

Table 4: Effect of moringa and neem leaf extracts on serum biochemistry of finisher broilers

Parameters	T1	T2	T3	T4	SEM
Total protein (g/dL)	3.24 ^b	3.39 ^b	3.48 ^b	3.78 ^a	0.07

Table 4 (cont): Effect of moringa and neem leaf extracts on serum biochemistry of finisher broilers

Albumin (g/dL)	2.12 ^b	2.15 ^b	2.23 ^b	2.39 ^a	0.04
Globulin (g/dL)	1.12 ^b	1.24 ^b	1.25 ^b	1.39 ^a	0.04
Urea (mg/dL)	10.63	10.09	10.78	10.66	0.25
AST (U/L)	82.99	80.36	81.05	81.62	0.34
ALT (U/L)	39.52	39.45	40.24	40.33	0.26
Total cholesterol (mg/dL)	120.50 ^a	118.13 ^a	113.21 ^{ab}	103.43 ^b	2.43

^b: Means within each row with different superscript are significantly different (P<0.05)

T1: Control (no extract); T2: 40mL of moringa leaf extract; T3: 40mL of neem leaf extract; T4: 20mL of moringa leaf extract + 20mL of neem leaf extract; MCV: Mean Corpuscular Volume; MCH: Mean Corpuscular Haemoglobin; MCHC: Mean Corpuscular Haemoglobin Concentration; SEM: Standard Error of Mean

4. DISCUSSION

The proximate composition of moringa leaf obtained in this study is similar to the results observed by Kakengi et al. (2003). The result of the proximate composition of neem obtained in this study is not different from the results of (Ayuba et al., 2021).

The observed values for Haemoglobin, PCV, RBC and WBC in T4 (Table 3) were significantly (P<0.05) higher than that of other treatments. The increase in the value obtained for birds on T4 could be attributed to the synergistic effect of moringa and neem leaf extract in the drinking water as the extracts particularly moringa leaf extract, contain Vitamins A, C, and E, flavonoids, saponins, zinc and iron which enhance immune response in broilers. The results obtained in this study agreed with the findings who all reported significant higher (P<0.05) value in blood parameters like Hb, WBC, RBC when extract like *Moringa oleifera* and neem were added in the drinking water of broilers (Nworgu et al., 2007; Oyewole et al., 2012; El Tazi, 2014). However, all the results obtained in this study were within the normal range for healthy birds as stated by (Mitruka and Rawnsley, 1977; Banerjee, 1998).

The increase in the values observed in parameters like total protein, albumin and globulin might be due to the contents of moringa and neem leaves as they contain bioactive substances that can enhance these parameters in the blood of broilers. These results are in agreement with the findings of (Oluwafemi et al., 2021; El Tazi, 2014).

5. CONCLUSION

Based on these findings, it can be concluded that *Moringa oleifera* and *Azadirachta indica* leaf extracts, especially when combined together at same concentration can be used to improve the health status of broiler finisher.

RECOMMENDATION

Moringa and neem leaf extracts can be combined together in ratio 50:50 to improve the health status of broilers. However, further study can be carried out to increase their concentration in drinking water for finisher broilers.

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