Ilaro Journal of Science and Technology (IJST), 2023
Published Online October 2023 (https://sciencetechjournal.federalpolyilaro.edu.ng)
Volume 3, 2023 Edition
ISSN: 2437- 1505

Effect of African Parquetina Aqeous Extract on the Haematology and Serum Biochemical Parameters of Broiler Chicken

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Abstract: *The effects of aqueous extract of Parquetina nigrescens leaves on the haematological and serum biochemical parameters of broilers were investigated at dose of 400 g/4litres of water. 120 broilers were grouped into 4 treatments, 3 replicate of 10 broilers each. Treatment 1(control) was administered normal water and vaccination/medication when necessary. The other groups were administered extracts via: Treatment 2 – 400g aqueous extract/4liters of water for 2days weekly, Treatment 3 – 400g aqueous extract/4liters of water for 3days weekly and Treatment 4 – 400g aqueous extract/4liters of water for 5 days weekly. The result shows there was a significant different (P<0.05) in the lymphocyte and basophils percentage. Treatment 3 has the highest lymphocyte value (34.50 %) while treatment 1 has the least value (25.24 %). The control group has the highest basophils (3.86 %) percentage and it is significantly (P<0.05) different from other treatments. There was a significant difference (p<0.05) in the heterophils, esinophils, lymphocyte, RBC count, hemoglobin and PCV percentage of the broiler chicken. Treatment 1 has the highest value of PCV, hemoglobin, RBC count and lymphocyte respectively while treatment 3 has the least value. Treatment 1 has the least value (45.68 %) of heterophils while treatment 3 has the highest value (59.58 %). The results on serum profile of the broiler at Starter phase showed a significant (p<0.05) decrease in the values of Creatinine as the days of administration of the test herb increases. The control group has the highest value (132.75 µmol/l) of creatinine while treatment 3 has the least value (18.43 µmol/l). The 400g level of the aqueous extract of Parquetina nigrescens in 4litres of drinking water of broiler chickens for 3 days in a week were found to be most suitable in terms health and wellbeing of the chickens because it did not compromise their biochemical and physiological status*

Keywords: African Parquetina , Serum Biochemical, Chicken

Introduction

Poultry production has been identified as the fastest means of bridging the protein deficiency gap, especially in developing countries. This is because poultry remains one of the most efficient converters of food to animal protein as it is known to have a short gestation interval and can multiply quickly. The poultry industry in Nigeria is faced with the challenges of limited/non-availability of conventional feed ingredients (Agbede, 2019). Hence, a search for alternative feedstuffs that could reduce the cost of feed production becomes a relevant factor. The use of unconventional feed sources like plants, crop residues and agro-industrial by-products has been seen as an alternative solution to the problem of feed crises in poultry production (Agbede,

2019; Igbasan, 2019). Broiler birds have been widely reported to be a good converter of feed to meat without any religious barriers (Haveenstein et al., 1994). Poultry has achieved its pride of place due to its superior economic importance occasioned by egg production (Laseinde, 2007). Poultry meat and eggs are beginning to substantially contribute to ameliorating animal protein insufficiency in many African countries. However, not much can be said of poultry without a

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mention of feed. A greater percentage of the total feed produced in Nigeria is majorly poultry feed, according

to Agbede (2019). The sharp increase in the demand for poultry products in recent times, especially in Nigeria, has been attributable to the growth in numbers of fast-food restaurants whose major menu source in urban centres is chicken (Akinnusotu et al., 2018). Feeds and feeding play a very important role in poultry farming as it determines the profit of the business.

Plants and their derivatives play key roles in world health and have long been known to possess biological activity (Omoboyowa et al., 2013). The use of these plants by man for the treatment of various diseases has been in practice and is very popular in many developing countries of the world for over a long period of time (Gill, 1990; Idowu et al., 2009). This practice has gradually gained popularity in some parts of Europe and North America (Leese and William, 1994; Odeigah et al., 1999). In Africa, especially in the tropical areas, several factors such as poverty and illiteracy still militate against availability and accessibility of Western medical services. Medicinal plants possess therapeutic properties and despite the widespread use of modern medicine, herbal products are still in use in most developing countries of Africa and Asia for the management of ailments, Parquetina nigrescens happens to be one of such medicinal plants (Owoyele et al., 2011). Hematology and serum parameters have been observed to be good indicators of the physiological status of animal and changes in them are important in assessing the response of animal to various physiological and nutritional situations. It is therefore necessary to investigate the effect of aqueous plant extract of Parquetina nigrescens on blood parameters such as haematological, serum biochemical, lipid as well as antioxidant parameter and to assess the health status of broiler chickens offered aqeous plant extract of Parquetina nigrescens through their haematological parameters and serum biochemistry. The objective of the study is to assess the health status of broiler chickens offered aqeous plant extract of Parquetina nigrescens through their haematological parameters and serum biochemistry.

Materials & Methods

The field experiment was carried out at the poultry unit, Directorate of agro-services and entrepreneur farms, Federal Polytechnic Ilaro, Ogun State, Nigeria. Parquetina nigrescens was properly washed, weighed,

400g into 4litre of water (at room temperature), then, it was soaked for 72 h inside different containers, stir vigorously at 12 h intervals. After soaking for 72 h, it was filtered with a muslin cloth and the filtered concentrate into a whitish solution. Filtration was done using sieve with muslin cloth to obtain a clear solution which was given to the birds according to the treatments. The aqueous extracts was stored in a freezer to avoid fermentation and made in batches when needed.

Few days before the arrival of the chicks, the brooder house was thoroughly cleaned and disinfected. Wood shavings were spread on the ground and were constantly changed at different interval during brooding to avoid dampness. One hundred and twenty day (120) old broiler chicks of Arbor Acre strain was procured from a reputable hatchery and brooded for two week. Birds was fed with commercial feeds, broiler starter with crude protein of 23% and metabolizable energy of 2800Kcal/kg at the brooding phase while broiler finisher with crude protein of 18% CP and metabolizable energy of 3000Kcal/kg was fed at the finishing stage. Feed and water/extract was provided ad libitum. All vaccination and medication was administered and supplementation was carried out when and where necessary. After two weeks of brooding, One hundred and twenty (120) birds were randomly distributed into experimental treatments.

Experimental Design

The experiment was arranged in a Complete Randomize Design (CRD). A total of two One hundred and twenty birds were used for this experiment. The birds were randomly distributed into 4 treatments; each treatment was assigned 30 birds. The treatments were further divided into 3 replicates with each replicate containing 10 birds. Each replicate will have dimension of 150cm by 90cm and was demarcated using a wire mesh. Experimental birds

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wasgiven herbal extract in the drinking water at four graded level (400g/ 4litre drinking water).

Experimental Design.

Table 1.0: Experimental Design

Treatment	Noof Birds/ treatment	No of Replicates	No of Birds per replicate
T1 (control)	30	3	10
T2 (400g/4l/2days/week)	30	3	10
T3 (400g/4l/3days/week)	30	3	10
T4(400g/4l/5days/ week)	30	3	10

Data collection

Production performance

- Feed intake

A known quantity of feed was given to the birds in each replicate, while the leftover feed was weighed the following morning. The weight of the leftover feed will then subtracted from the feed given to determine the feed intake.

Feed intake (g) = Feed given (g) – Feed leftover (g)

- Water intake

Water offered and left over was recorded daily in order to calculate water intake.

Water intake (l) = Water given (l) – Water leftover (l)

- Weight gain

Initial weight of the birds was taken at day old, and the subsequent body weight was taken at the end of every week.

Weight gain (g) = final weight (g) – initial weight (g)

- Feed conversion ratio

This is the amount of feed consumed to produce 1kg of muscle by the birds.

$$\text{The feed conversion ratio} = \frac{\text{Feed intake}}{\text{Weight gain}}$$

- Mortality

Mortality was recorded daily and percentage mortality was calculated at the end of the experiment

$$\% \text{ Mortality} = \frac{\text{number of dead birds per replicate} \times 100}{\text{Initial number of birds per replicate}}$$

Blood sample collection and laboratory analysis

Haematological analysis

Blood samples were collected at the 4th and 6th week of the experiment from two broiler chickens per replicate using syringe and needle through the wing vein. Samples was collected into a set of sterilized tubes containing Ethylene Diamine Tetra-acetic Acid (EDTA) labeled bottles as anti-coagulant, for the analysis of haematological parameters. Packed cell volume (PCV), red blood cell count (RBC), white blood cell count (WBC) and haemoglobin (HB) was determined using improved neubaur haemycytometer after dilution and cyanomethamoglobin methods respectively as described by Dacie and Lewis (1991). Mean corpuscular volume (MCV), Mean Corpuscular Haemoglobin (MCH) and Mean Corpusular Haemoglobin Concentration (MCHC) was determined by the method of Hyduke (1995).

Serum Biochemical analysis

Blood samples was collected at the 2th and 6th week of the experiment from two broiler chickens per replicate using syringe and needle through the wing vein. Serum urea and creatinine levels was determined using spectrophotometric methods described by Coles (1996). The activities of hepatic marker enzymes was determined in the serum. Alkaline phosphatase. Alanine transaminase (ALT) and aspartate transaminase (AST) activities was determined using the method described by Reitman and Frankel, (1957).

Statistical analysis

Data obtain was subjected to Complete Randomize Design (CRD) analysis, one way Analysis of Variance (ANOVA) and treatment means was compared using Duncan's Multiple Range Test with the aid of SPSS (1997) package.

Results

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Effect of different days of administration of African parquentina on blood parameters broiler chicken at starter phase.

Table 2 shows the blood parameters of broiler chicken at starter phase. There was a significant different (P<0.05) in the lymphocyte and basophils percentage. Treatment 3 has the highest lymphocyte value (34.50 %) while treatment 1 has the least value (25.24 %). The control group has the highest basophils (3.86 %) percentage and it is significantly (P<0.05) different from other treatments.

Table 2 Effect of different days of administration of African parquentina on blood parameters broiler chicken at starter phase

Treatment	PCV (%)	Hb (g/dl)	WBC COUNT (µ/L)	RBC COUNT (µ/L)	LYMPHOCYTES (%)	MONOCYTES (%)	HETROPHILS (%)	BASOPHILS (%)	ESINOPHILS (%)
1	24.99	8.36	44250.00	2430000.00	25.24[b]	6.64	60.90	3.86[a]	3.33
2	26.99	9.02	69000.00	3155000.00	33.08[a]	4.11	57.31	2.90[b]	2.70
3	24.43	8.17	80250.00	2225000.00	34.50[a]	4.00	58.07	1.32[c]	2.00
4	25.22	8.43	52750.00	2550000.00	26.00[b]	3.00	65.85	2.00[bc]	3.19
SEM	0.48	0.16	690.80	164934.56	1.47	0.62	1.36	0.31	0.31
P-value	0.29	0.29	0.26	0.22	0.01	0.21	0.08	0.00	0.50

[a,b,c] Means in the same column by factor with different superscripts are significantly (P<0.05) different

PCV = Packed cell volume, **Hb = Hemoglobin, WBC** = White blood cell count, **RBC** = Red blood cell count

3.2 Effect of different days of administration of African parquentina on blood parameters broiler chicken at finisher phase.

As shown in table 3, there was a significant difference (p<0.05) in the heterophils, esinophils, lymphocyte, RBC count, hemoglobin and PCV percentage of the broiler chicken. Treatment 1 has the highest value (29.31 %, 9.80 g/dl, 1595000.00 µ/L, 46.81 %) of PCV, hemoglobin, RBC count and lymphocyte respectively while treatment 3 has the least value (5.84 %, 1.95 %, 520000.00 µ/L and 31.86 %). Treatment 1 has the least value (45.68 %) of heterophils while treatment 3 has the highest value (59.58 %).

Table 3. Effect of different days of administration of African parquentina on blood parameters broiler chicken at finisher phase.

Treatment	PCV (%)	Hb (g/dl)	WBC COUNT (µ/L)	RBC COUNT ((µ/L)	LYMPHOCYTES (%)
1	29.31[a]	9.80[a]	9223.37	1595000.00[a]	46.81[a]
2	7.55[b]	2.52[b]	9223.37	580000.00[b]	36.50[b]
3	5.84[b]	1.95[b]	9223.37	520000.00[b]	31.86[b]
4	19.56[ab]	6.54[a]	9223.37	1100000.00[ab]	31.97[b]
SEM	2.96	0.99	2156.60	155581.47	2.01
P-value	0.00	0.00	1.00	0.03	0.00

[a,b,c] Means in the same column by factor with different superscripts are significantly (P<0.05) different

Effect of different days of administration of African parquentina on serum profile broiler chicken at Starter phase.

In table 4 there was a significant (p<0.05) decrease in the values of Creatinine as the days of administration of the test herb increases. The control group has the highest value (132.75 µmol/l) of creatinine while treatment three has the least value (18.43 µmol/l). The urea value of treatment 2 (17.56 mg/dl) was significantly higher that the control group (14. 32 mg/dl) while treatment 3 has the least value.

3.3 Effect of different days of administration of African parquentina on serum profile broiler chicken at Starter phase

Treatment	TOTAL PROTEN (g/l)	AST (U/L)	ALBUMIN	ALT (U/L)	ALP (U/L)	CREATININ (µmol/l)	UREA (mg/dl)
1	105.84	247.56	31.63	23.39	330.84	132.75[a]	14.32[b]
2	63.77	301.93	62.04	20.94	165.42	95.87[ab]	17.56[a]
3	110.94	354.12	78.30	11.41	137.84	66.37[bc]	7.83[c]

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4	146.41	234.12	68.16	24.24	413.55	18.43[c]	1.67[b]
SEM	14.80	25.58	6.90	3.36	51.41	15.06	1.12
P-value	0.29	0.36	0.10	0.57	0.16	0.01	0.00

[a,b,c] Means in the same column by factor with different superscripts are significantly (P<0.05) different

3.4 Effect of different days of administration of African parquentina on serum profile broiler chicken at Finisher phase

There was a significant different (P<0.05) in the total protein, AST, Albumin, creatinine and urea

component of the serum. Treatment 5 has the highest value (209.07 U/L, 73.43, 116.15 µmol/l) of AST, albumin and creatinine respectively, it also has the least value (50.28 g/l) of total protein. The control group has the highest value (20.54 mg/dl) of urea and it is significantly (P<0.05) different from other treatment as there was an observed reduction in the urea value as the days of administration reduces with treatment 2 having the least value (11.35 mg/dl).

Table 5. Effect of different days of administration of African parquentina on serum profile broiler chicken at Finisher phase

Treatment	TOTAL PROTEIN (g/l)	AST (U/L)	ALBUMIN	ALT (U/L)	ALP (U/L)	CREATININ (µmol/l)	UREA (mg/dl)
1	53.20[b]	166.21[b]	58.25[b]	16.64	381.84	71.16[ab]	20.54[a]
2	106.03[a]	169.73[b]	66.83[ab]	20.03	380.46	48.30[b]	11.35[b]
3	66.22[ab]	189.53[ab]	43.44[c]	19.28	483.85	25.81[b]	12.16[b]
4	50.28[b]	209.07[a]	73.43[a]	28.29	463.86	116.15[a]	15.40[b]
SEM	9.06	6.18	3.49	2.60	25.56	11.94	1.18
P value	0.02	0.01	0.00	0.41	0.39	0.00	0.00

[a,b,c] Means in the same column by factor with different superscripts are significantly (P<0.05) different

Discussion

Natural medicinal products have been used for the millennia for the treatment of multiple aliments although many have been superseded by conventional pharmaceutical approaches; there is currently aresurgence in interest in the use of natural products by the general public (Ghosh and Playfield, 2003). The result of the haematological parameters observed in this study as shown in table 1, there was a significant difference (P<0.05) in the lymphocyte and basophils percentage. Treatment 3 has the highest lymphocyte while treatment 1 has the least value and also the highest basophils percentage, it is significantly different from other treatments. The treatment offered 400g/4liters of water in 3days has

the highest lymphocyte and basophil percentage which was different from other treatment while the Control group has the least compared to other treatments, also it has the highest basophil percentage and it is significantly different from other treatment. This study differs from that of Sakthi et al., 2017 which states that there is no significant difference in lymphocyte and basophil value between the control group and the treatment group. This is influenced by the difference in the number of days in which herb was administered. As shown in table 2, there was a significant difference (p<0.05) in the heterophils, esinophils, lymphocyte, RBC count, hemoglobin and PCV percentage of the broiler chicken. Treatment 1 has the highest value of PCV, hemoglobin, RBC count and lymphocyte respectively while treatment 3 has the least value. Treatment 1 has the least value of heterophils while treatment 3 has the highest value. This study corroborated with the study of Nwakpa et al, 2014 which states that there is no significant difference in the mean levels of RBC, Hb, PCV and basophils. In chicken the high number of basophils in the blood indicates that they are in abnormal conditions, such as stress due to sufficiently hot air or facing pathogen infection. In this present study as shown in Table 3 there was a significant (p<0.05) decrease in the values of Creatinine as the days of administration of the test herb increases. The control group has the highest value of creatinine while T3 has the least value. The urea value of treatment 2 was

significantly higher that the control group while treatment 3 has the least value, this is due to the reduced muscle bulk, liver disease and significant fluid overload (test herb) the urea value of T2 was significantly higher than the control group while T3 has the least value This report differs from the report of Krishnaveni et al,. 2013 and Tushar et al., 2014 which states that there was a increase in the plasma creatinine level following the investigation of investigation potential of the alcoholic extract of Cucumis sativa as an antiiurothialic agent in male and female rats which are calculi-induced. There was a significant difference in total protein, AST, Albumin, creatinine and urea component of the serum as shown in Table 4 which states that.T4 has the highest value of AST, Albumin and creatinine

respectively, and it also has least value of total protein. The control group has the highest value of urea and it is significantly different from other treatment as there was an observed reduction in the urea value as the days of administration reduces with T2 having the least value. This report differs from the study of Hassan, et al., 2007which states that there is an increases in serum levels of ALT and AST in treating rats with 2000–3000 mg/kg bwt of P. nigrescens extractsand suggested that the extracts must have affected the permeability of liver cell membranes and made them leaky,thus the leakage of ALT and AST to raise their serum levels. And also differs from George et al., 2015 report which states that there was an increase in the total protein, albumin and globulin and with decreased levels of enzymes AST, ALP with other parameters within the normal range.

Conclusion

The aqueous extract of *P.nigrescens* possesses erythropoietic potentials and immunological properties at the varying doses used in this study and the overall results lend support to the folkloric use of the aqueous extract of *Parquetina* nigrescens in the treatment of anaemia and in the enhancement of the immune system. *Parquetina nigrescens* can be used as a radical scavenger as it possesses antioxidant activities which can help in the prevention as well as cure of illnesses associated with oxidative stress. However, since the effect of the extract was dose dependent, caution has to be taken in its use. The haematological and serum biochemistry parameters showed that the aqueous extract of Parquetina nigrescens supported the health and the wellbeing of the broiler chickens. The 400g level of the aqueous extract of *Parquetina nigrescens* in 4litres of drinking water of broiler chickens for 3 days in a week were found to be most suitable in terms health and wellbeing of the chickens because it did not compromise their biochemical and physiological status. Also the aqueous extract of *Parquetina nigrescens* administered to the broilers enhanced the immune protective and hepato protective nature of broilers.

Recommendation

The 400g level of the aqueous extract of *Parquetina nigrescens* in 4lts of drinking water of broiler chickens for 3 days in a week were found tobe most suitable in terms health and wellbeing of the chickens. Further studies on histopathological profile ofbirds offered aqueous extract of *Parquetina nigrescens* is recommended to reveal positive impact on tissues.

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