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Effect of Strain on Haematology and Serum Biochemical Profile of Broiler Chickens Fed Aqueous Extract of Bitter Leaf

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ABSTRACT

This study aimed to evaluate the effect of strain on the serum biochemical profile and hemoglobin profile of broiler chickens fed bitter leaf (Vernonia amygdalina) extract as a phytoadditive. The commercial hatchery, Mhido Farms, provided the 153-day-old broiler chicks purchased. The 153 chicks, weighing an average of 50g, were randomly assigned to one of three strain level treatments: CBR (Cobb 500), ABR (Abor acre), and RSR (Ross 300). There were three replicates of the results, each with 17 birds, and each treatment comprised 51 birds. For the experiment, a 3x3 completely randomized arrangement was employed. The chicks were raised in equidimensional boxes measuring one meter by one meter. The commercial broiler starter (22% CP and 2900 kcal/kg ME) and finisher (18% CP and 2900 kcal/kg ME) meals were provided to the birds in each treatment group in the same amounts. Additionally, they had unrestricted access to water with the same concentrations of bitter leaf extract (one liter of drinking water containing 25 milliliters of aqueous extract). The usual treatment and immunization schedule of the University Teaching and Research farm, together with ethical requirements, were followed for the birds. There were sixty days in the trial. To examine the biochemistry and haematology of the serum, a blood sample was taken. The results demonstrated that strains had a major impact on the hematological and serum biochemical profile of broiler chicks administered bitter leaf extract. WBC, RBC, and monocyte counts varied considerably ($P<0.05$) in AAR broiler chicks. In the serum biochemical analysis, only albumin showed a significant difference ($P<0.05$), with the AAR and CBR strains showing higher mean values of 18.22 and 18.17 g/L, respectively. In conclusion, bitter leaf can be added to the broiler diet as a phytoadditive, especially in strains of AAR and CBR broilers. Further study is necessary to ascertain the optimal diet formulations, including bitter leaves, for diverse breeds of broiler chickens.

Keywords: Bitter leaf, Broiler strains, Growth performance, Haematology, Phytoadditive.

INTRODUCTION

Poultry farming is one of the agricultural industries growing at the quickest rate in the world. As this company expands, more animal protein will be available to feed the world's expanding population. Among other factors that have a major influence, one of the primary obstacles to chicken production in the tropics is the high cost of feed components, especially those that are not easily accessible locally. The growth performance of cattle and poultry has been greatly enhanced by the use of medicinal herbs in diets and feed. However, by employing different processing methods, the anti-nutritional components can be greatly reduced or eliminated. Their performance has been notably better than that of synthetic feed additives.

Bitterleaf meal, or Vernonia amygdalina, is one of the primary feed additives that can be used. Bitterleaf, or Vernonia amygdalina, is a perennial plant that grows throughout tropical Africa and is an edible vegetable in

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the Asteraceae family. Bitterleaf is the common name for it because of its intensely bitter flavor (Ekpo *et al.*, 2007). It has dual uses as food and medication (Adaramoye *et al.*, 2008; Oseni and Babatunde, 2016; Fasuyi, 2006).

Bitter leaf (*Vernonia amygdalina*) is a widely known plant commonly found in tropical regions of Africa and Asia. It belongs to the Asteraceae family and is well-regarded for its numerous culinary, medicinal, and therapeutic uses. The plant derives its name from the characteristic bitter taste of its leaves, which are often used in traditional soups and herbal remedies.

The leaves of *Vernonia amygdalina* are rich in bioactive compounds that contribute to their medicinal properties. These include alkaloids, saponins, flavonoids, tannins, and terpenoids. Each of these compounds plays a role in supporting health and well-being. For instance, flavonoids are potent antioxidants that help combat oxidative stress and inflammation, while saponins are known for their antimicrobial and cholesterol-lowering properties. Alkaloids, on the other hand, exhibit a range of biological activities, including pain relief and antimicrobial effects.

The chemical composition of bitter leaf also includes essential vitamins and minerals. It is particularly rich in vitamins A, C, and E, which are crucial for immune function, skin health, and overall well-being. Additionally, the leaves contain important minerals such as potassium, calcium, and iron. These nutrients play a vital role in maintaining cardiovascular health, bone strength, and oxygen transport in the body.

Another significant component of bitter leaf is its phytochemical compounds, such as vernonioside, which have been linked to anti-malarial, anti-diabetic, and anti-cancer properties. Studies have shown that these compounds can help regulate blood sugar levels, enhance immune responses, and inhibit the growth of certain cancerous cells. The leaves also possess natural detoxifying properties, aiding in the removal of toxins from the body.

Traditionally, bitter leaf is used to treat a variety of ailments, including malaria, diabetes, fever, and gastrointestinal issues. It is commonly consumed as a fresh extract, in teas, or as part of meals. Despite its bitterness, the leaf is highly valued for its health benefits and is often prepared in ways that reduce its strong taste, such as boiling or blanching.

Vernonia amygdalina leaves contain a large number of anti-nutritional components, including a high concentration of tannic acid and saponin (Charles and Boulevard, 2012). Research indicates that Vernonia amygdalina (either the leaf meal or the aqueous extract) has several beneficial properties, such as anti-bacterial, anti-parasitic, and anti-coccidiosis qualities, that make it useful for controlling poultry diseases (Dakpogan, 2006; Akinyele *et al.*, 2014; Gbolade, 2009; Tadesse *et al.*, 1993). Additionally, it has antioxidant properties (Erasto *et al.*, 2007) and increases feed conversion efficiency, which fosters development (Huffman *et al.*, 1996; Olobatoke and Oloniruha, 2009).

Numerous studies have connected this plant to a wide range of bioactive chemicals, including flavonoids, saponins, alkaloids, tannins, phenolics, terpenes, steroidal glycosides, triterpenoids, and different kinds of sesquiterpene lactones (Farombi and Owoeye, 2011; Adedapo *et al.*, 2014). These bioactive compounds gave them a range of pharmacological properties, including antimicrobial, antioxidant, laxative, hypoglycemic, and anti-inflammatory effects, according to several studies (Igile *et al.*, 1994; Akinpelu, 1999; Erasto *et al.*, 2007; Yeap *et al.*, 2010; Farombi and Owoeye, 2011; Anibijuwon *et al.*, 2012). The aim of the study was to evaluate the influence of strain on the hematological and serum biochemical profiles of broiler chickens that were fed an aqueous extract of bitter leaf (Vernonia amygdalina), in light of the previously indicated efficacy of bitter leaf.

MATERIALS AND METHODS

Location of the study

The experiment was carried out at the Federal University of Oye Ekiti, Ikole campus, poultry unit of the teaching and research farm of the Department of Animal Production and Health. Ekiti State. Nigeria. The geographic location of Ikole, a local government in Ekiti

State, is between latitudes 7.7979°C North and 5.326°C East. The average annual temperature there is 24.6°C, with a high humidity level.

Experimental materials

The experimental birds (Cobb-500, Ross-308, and Abor Acre) were procured from a commercial hatchery. While the bitter leaves were harvested from the Teaching and Research farm (Crop Production Unit) of the Federal University, Oye-Ekiti.

Preparation of plant extract

The Federal University of Oye-Ekiti's Teaching and Research farm provided the plant material (V. amygdalina) for the experiment. The materials made of leaves were carefully cleaned and emptied. Following that, 50g of bitter leaves were weighed, infused throughout the experiment in 1 liter of hot, boiling water, and supplied to the birds at a rate of 25 milliliters per liter of drinking water, ad libitum.

Treatment and Experimental Design

In the experiment, the treatment consisted of three levels of the strain, which were repeated three times. There were 17 birds in each replication, for a total sample size of 153 birds. A Completely Randomized Design (CRD) is the type of experimental design used.

Management of the Poultry house before the birds' arrival

There were light sources available all day, every day. The experimental birds were kept on a deep litter system in an open-sided wall housing. The pens were thoroughly cleaned with Izal ® solution disinfectant before the birds arrived. This was followed by scouring, cleaning, and the removal of cobwebs and dirt. Tarpaulin was appropriately used to cover the enclosures' outside walls to prevent heat loss. Spread to a depth of 5 cm, fresh wood shavings helped preserve heat, especially during the brooding phase. During the period of brooding, locally made lamp-lights and rechargeable lamps were employed as illumination sources and charcoal stoves as heat sources. Other appliances such as drinkers and feeders were also provided. The house was demarcated and divided into 9 units.

Management of chicks and experimental layout

A commercial hatchery (Mhido farms) provided the one hundred and fifty-three (153) day-old broiler chicks (51 Ross 300, 51 Abor acre, and 51 Cobb 500). With an average weight of 50g, the 153 chicks were divided into three strain level treatments at random: RSR (Ross 300), ABR (Abor acre), and CBR (Cobb 500). Each treatment consisted of 51 birds, and it was repeated three times, with each replication consisting of 17 birds. The chicks were reared in one-meter-by-one-meter equidimensional enclosures. The commercial broiler starter (22% CP and 2900 kcal/kg ME) and finisher (18% CP and 2900 kcal/kg ME) feeds were supplied to the birds in each treatment group in the same amounts (25 ml per liter) and they were free to drink water with the same amounts of bitter leaf aqueous extract. The University Teaching and Research farm's standard medicine and vaccine schedule, along with ethical guidelines, were adhered to for the birds. Eight weeks passed during the trial.

HAEMATOLOGICAL ANALYSIS

Every chicken's jugular vein was used to extract blood. Two 5 ml vacuum tubes contained the blood samples. The ethylene diamine tetra-acetic acid in one of the five milliliter blood tubes is for use in haematological investigations (anticoagulant).

SERUM BIOCHEMICAL ANALYSIS

The serum was taken out of the second 5 ml vacuum-sealed blood tube set, centrifuged at 3500 rpm for 20 minutes, and then kept at -20 °C. The albumin concentration (Al, g/dl) and total plasma proteins (TP, g/dl) were measured using the Silanikove *et al.* (2000) method.

Statistical analysis

Utilizing SPSS, a one-way analysis of variance (ANOVA) was performed on all of the acquired data. To compare the means, Duncan's Multiple Range Test (DMRT) was employed.

RESULTS

Hematological parameters on three strains of broiler chicken fed aqueous extracts of bitter Leaf

Table 1 displays the hematological parameters findings for three strains of broiler chicken given an aqueous extract of bitter leaf. The mean levels of WBC, RBC, and monocytes varied significantly amongst the experimental treatments, according to the data. While CBR and RSR showed comparable mean values of 7.17 and 2.98x10^6/mm3, respectively, WBC and RBC in AAR had the highest significant values at 12.17x10^6/mm3 and 3.21 x10^6/mm3, respectively. RSR, on the other hand, had the greatest significant value in monocytes (6.33%), while CBR had the lowest value (5.33%). There was no discernible variation seen in the other characteristics. The table presents the hematological parameters of three strains of broiler chickens—AAR, CBR, and RSR—along with their standard errors (±SEM) and p-values to determine statistical significance.

The packed cell volume (PCV%) values ranged from 29.0% in AAR to 26.33% in RSR. Although the p-value of 0.07 suggests that the differences were not statistically significant, a slight downward trend was observed from AAR to RSR. Similarly, hemoglobin (Hb) levels showed no significant variation across the strains, with values ranging from 7.15 g/dL in AAR to 6.77 g/dL in RSR (p = 0.47).

For white blood cell (WBC) count, AAR recorded the highest value at 12.17 ×10^3/mm³, significantly higher than the values for CBR (7.17 ×10^3/mm³) and RSR (8.0 ×10^3/mm³), as indicated by the p-value of 0.05. This suggests that AAR may possess a stronger immune response capability. Similarly, AAR had a significantly higher red blood cell (RBC) count (3.21 ×10^6/mm³) compared to CBR (2.98 ×10^6/mm³) and RSR (2.91 ×10^6/mm³), with a p-value of 0.05, implying a better oxygen-carrying capacity in this strain.

Neutrophil percentages were fairly similar across strains, ranging from 17.67% in AAR to 20.33% in RSR, with no significant differences (p = 0.48). Lymphocyte percentages were also comparable, with CBR exhibiting the highest value at 75% and RSR the lowest at 66.67%. However, the p-value of 0.24 indicates that these differences were not statistically significant.

Monocyte percentages showed a significant difference, with values increasing from 4.67% in AAR to 6.33% in RSR (p = 0.05). This indicates potential variations in immune system activity, with RSR potentially experiencing heightened immune responses or physiological stress. Eosinophil counts were consistent across strains, ranging from 2.33% in CBR to 2.67% in both AAR and RSR, with no significant differences (p = 0.70). Basophils were absent in AAR and CBR but were present at a low level (0.33%) in RSR. However, this variation was not statistically significant (p = 0.28).

TABLE 1: Hematological Parameters on Broiler Chicken fed Aqueous Extracts of Bitter Leaf

Parameters	Strains of Broiler Chicken			±SEM	*p-value*
	AAR	CBR	RSR		
PCV%	29.0	28.0	26.33	1.186	0.07
WBC (x103/mm3)	12.17[a]	7.17[b]	8.0[b]	2.058	0.05
Hb (g dLG1)	7.15	7.12	6.77	0.487	0.47
RBC (x106/mm3)	3.21[a]	2.98[b]	2.91[b]	0.125	0.05
Neutrophils (%)	17.67	19.0	20.33	3.453	0.48
Lymphocytes (%)	74.0	75.0	66.67	6.313	0.24
Monocytes (%)	4.67[c]	5.33[b]	6.33[a]	0.667	0.05
Eosinophils (%)	2.67	2.33	2.67	0.816	0.70
Basophils(%)	0.0	0.0	0.33	0.272	0.28

Means with different superscripts are significantly different ($p<0.05$), PCV = packed cell volume, WBC = white blood cell, HB = hemoglobin, RBC red blood cell.

Serum Biochemical. Parameters on Broiler Chicken fed Aqueous Extracts of Bitter Leaf

Table 2 displays the outcomes of the serum biochemistry study conducted on broiler chickens given aqueous extracts of bitter leaf. The table presents biochemical parameters for three broiler chicken strains: AAR, CBR, and RSR. Cholesterol levels ranged from 3.12 mg/dL in the RSR strain to 3.42 mg/dL in the CBR strain, with a non-significant p-value of 0.34, indicating no meaningful differences between the strains. Similarly, glucose levels were identical for AAR and CBR at 73 mg/dL, while the RSR strain recorded a slightly lower level at 62 mg/dL. However, the difference was not statistically significant (p = 0.76).

High-Density Lipoprotein (HDL) levels varied minimally, with values between 2.0 mg/dL in AAR and 2.3 mg/dL in RSR. The p-value of 0.37 suggests no significant variation between the strains. Low-Density Lipoprotein (LDL) levels were highest in CBR (1.20 mg/dL) and lowest in RSR (0.73 mg/dL), though this difference remained statistically insignificant (p = 0.12).

Aspartate Aminotransferase (AST) levels showed a notable difference, with AAR having a much higher level (396.8) compared to 261.5 in both CBR and RSR. Despite this disparity, the p-value of 0.27 indicates no significant difference. Alanine Aminotransferase (AAT) levels were similar across the strains, ranging from 40.6 in AAR to 47.2 in RSR, with no statistically significant differences observed (p = 0.30).

Alkaline Phosphatase (ALP) levels showed wide variation, with CBR recording the highest value (5683.61) and RSR the lowest (3664.40). However, the difference was not statistically significant (p = 0.43). Total protein levels followed a similar pattern, with CBR having the highest value (3.622 g/L) and RSR the lowest (2.787 g/L), although this difference was also non-significant (p = 0.12). Notably, albumin levels revealed a statistically significant difference (p = 0.05), with RSR having a lower value (1.663 g/L) compared to AAR (1.822 g/L) and CBR (1.817 g/L).

Table 2: Serum Biochemical Parameters on Broiler Chicken fed Aqueous Extracts of Bitter Leaf

Parameters	Strains of Broiler Chicken			±SEM	*p-value*
	AAR	CBR	RSR		
Cholesterol (mg dLG1)	3.38	3.42	3.12	0.2808	0.34
Glucose (FBS) (mg dLG1)	73	73	62	0.527	0.76
HDL (mg dLG1)	2.0	2.2	2.3	0.2694	0.37
LDL (mg LG1)	0.87	1.20	0.73	0.2556	0.12
AST	396.8	261.5	261.5	109.4	0.27
AAT	40.6	44.9	47.2	5.7043	0.30
ALP	4313.08	5683.61	3664.40	2292.11	0.43
Total protein (g LG1)	2.913	3.622	2.787	0.4535	0.12
Albumin (g LG1)	1.822^{a}	1.817^{a}	1.663^{b}	0.0652	0.05

Means with different superscripts are significantly different (p<0.05), AST=Aspartate amino-Transferase, AAT=Alanine Amino-Transferase, ALP=Alkaline Phosphatase, LDL= low density lipoprotein, HDL= high density lipoprotein

Overall, the results suggest that most biochemical parameters did not differ significantly between the strains, indicating relatively uniform metabolic and physiological characteristics. However, the lower albumin levels in RSR may point to unique metabolic traits, which could be of interest for further investigation. Additionally, the elevated ALP levels in CBR may warrant closer examination of potential differences in bone health or metabolic processes. These findings could inform breeding strategies and management practices aimed at improving broiler health and productivity.

DISCUSSION

The experimental birds' serum biochemical and hematological characteristics are displayed in Tables 1 and 2. The RBC of the experimental birds showed statistically significant differences ($p<0.05$), with the AAR strain revealing the highest mean value of 3.21. The other two strains, CBR and RSR, showed statistically similar values, despite numerical discrepancies. The three strains of birds' total White Blood Cell (WBC) count rose considerably after they consumed bitter leaf extract. Nonetheless, the WBC numbers from this investigation remained within the 9–31 x 10 mm normal range for a healthy chicken, according to Mitruka and Rawnskey (1997). According to Aregheore *et al.* (1998), several phytochemicals in bitter leaf extract cause an animal to react as though it is infected. Therefore, the presence of anti-nutritional chemicals in Vernonia amygdalina may potentially be responsible for the rise in WBC.

The significant differences observed in white blood cell (WBC) counts suggest that the AAR strain may exhibit a stronger immune response compared to CBR and RSR. The higher WBC count in AAR ($12.17 \times 10^3/mm^3$) aligns with previous research by Aengwanich *et al.* (2007), who reported that increased WBC levels are indicative of enhanced immune functions and better disease resistance in poultry. The elevated red blood cell (RBC) count in AAR ($3.21 \times 10^6/mm^3$) compared to CBR and RSR is noteworthy. According to Mitruka and Rawnsley (1981), higher RBC levels are associated with improved oxygen transport and overall vitality in chickens.

On the other hand, RSR exhibited the highest monocyte count (6.33%), suggesting potential immune activation or stress. Elevated monocyte levels have been linked to increased immune surveillance and inflammation in poultry (Etim *et al.*, 2014). The lack of significant variation in other hematological parameters, such as packed cell volume (PCV), hemoglobin (Hb), and differential leukocyte counts (neutrophils, eosinophils, and basophils), suggests that the aqueous extract did not drastically affect these traits across the strains.

Table 1 displays the white blood differential values of broiler chickens given varied amounts of bitter leaf meal. There was no significant difference ($p>0.05$) seen in neutrophils or eosinophils, however, there was a significant difference ($P<0.05$) in the mean number of monocytes. The obtained values for neutrophils varied from 17.67% to 20.33%. Higher numbers indicate healthier birds because neutrophils, a component of white blood cells, are one of the most significant haematological indicators for determining the health state of a healthy bird. The study's findings demonstrated that bitter leaf meal has nutrients and the ability to fend off invasive illnesses and enhance the birds' overall health. Regarding the three strains of birds given aqueous bitter leaf extracts, lymphocytes did not significantly vary ($p>0.05$), while the RSR strain had the greatest numerical mean value. The range of values was 66.67% to 70.67%. Imaga and Bamigbetan (2013), however, believed that these values were above the range of 50–62% for healthy birds. AAR (4.67) for monocytes had the lowest mean value, and RSR (6.33) had the highest significant mean value. These results were consistent with the opinion of Ezekwesili et al. (2004) that bitter leaf extracts can modify immune cell profiles and possibly boost monocyte-mediated immune responses. The PCV readings fell between the typical range of 25 and 45%. According to Mitruka and Rawnsley's (1997) research, there was no discernible pattern, although the observed values fell within the standard range of 22% to 35%, indicating that V. amygdalina had no negative impact on the PCV levels of broiler chickens. The Hb concentration, which was within the typical range for broiler chickens, provides proof of this. Nonetheless, AAR strain had the greatest mean value, 29.0, followed by CBR 28.0, and RSR had the lowest mean PCV value, 26.33.

In Table 2, the biochemical profile revealed non-significant variations in cholesterol, glucose, HDL, and LDL levels across the strains. These findings suggest that the bitter leaf extract had a limited impact on lipid and carbohydrate metabolism. However, the observed slight reduction in cholesterol levels in RSR (3.12 mg/dL) aligns with studies demonstrating the cholesterol-lowering effects of phytogenic compounds (Bonsu *et al.*, 2012).

Interestingly, AST levels were notably higher in AAR (396.8 U/L), although the difference was not statistically significant. Elevated AST levels may be indicative of liver stress or muscle damage (Rehman *et al.*, 2017). The non-significant differences in AAT and ALP further support the absence of severe liver dysfunction across the strains.

The significant reduction in albumin levels in RSR (1.663 g/L) compared to AAR (1.822 g/L) and CBR (1.817 g/L) is noteworthy. Reduced albumin levels may suggest compromised protein synthesis or nutritional imbalances in RSR, which is consistent with findings by Nazifi *et al.* (2011), who noted the sensitivity of albumin as a marker for nutritional and metabolic status in poultry.

The three strains that were given the same amount of bitter leaf in the drinking water saw a decrease in the fasting blood glucose of the broilers on bitter leaf aqueous extract; AAR and CBR showed identical values of 73, while RSR recorded the lowest value of 62. According to Owolabi et al. (2008), the mean readings were less than the typical range of 124–204 mg. Elevated glucose levels signify hyperglycemia, which is associated with diabetes (Osinubi, 2008). This was consistent with a report by Vivian *et al*. (2015), which found that the treated group's glucose level decreased by 5.5-8.23% compared to the control group. The results support the hypoglycemic effect hypothesis put out by Osinubi (2006) and Owen *et al.* (2011b) for Vernonia amygdalina. According to Akah and Okafor (1992), bitter leaf has both hypoglycemic qualities. The hypoglycemic impact of bitter leaf treatment has been explained by two processes. The targeting of insulin synthesis/production from the beta-cells of the islet of Langerhans and the second on the peripheral carbohydrate mechanism are two of the processes described in the studies of Atangwho *et al.* (2007) on the effect of V. amygdalina leaf on renal function of diabetic rats.

Tests for total protein and albumin are often used to assess an animal's health. These tests are frequently used to identify illnesses and track changes in farm animals' health. The blood's albumin and globulin contents combine to form total protein, which represents the birds' overall nutritional condition. Low albumin levels are a sign of renal or liver disease. It could also be connected to the existence of an infection. Given the same level of aqueous bitter leaf extract, the total protein of CBR birds had a mean value of 3.622 compared to AAR 2.913 and RSR 2.787, respectively. This difference was not statistically significant from that of other strains, but it was lower than the normal range of birds, which is 3.25 g/dL – 7.61 g/dL (Ross et al., 1978) and 3.3 g/dL – 5.5 g/dL as reported by Oguwike *et al*. (2013). A similar pattern was noted in the albumin, while the CBR strain's numerical mean value was measured as higher. The results, however, fell within the 1.3 and 2.8 g/dL standard levels for typical birds. This result supports a previous research by Owen *et al.* (2011b). The performance attributes and economic production metrics that were assessed were unaffected by the broiler chickens' diets containing bitter leaf aqueous extract. Moreover, the extract's injection decreased the blood plasma's levels of glucose, LDL, and total cholesterol. With the same amount of aqueous bitter leaf extract, AAR and CBR were the best strains found in this investigation in terms of the cumulative effect on all parameters examined, with AAR exhibiting the highest response. This suggests that giving this natural herb at this inclusion level may have a significant impact on enhancing the health and production of broiler chicks, particularly the AAR broiler strain.

CONCLUSION

Overall, the results indicate that the AAR strain displayed better hematological parameters, including higher WBC and RBC counts, suggesting stronger immune competence and better physiological status. The significant decrease in albumin levels in RSR highlights potential nutritional concerns, while the lack of significant differences in most biochemical markers suggests that the bitter leaf extract was well-tolerated by the chickens without severe metabolic disruptions. The study's findings suggest that adding aqueous bitter leaf extracts to broiler chicken diets can considerably enhance serum biochemical and haematological markers, albeit there may be some variance in these effects between strains. The potential advantages of bitter leaf supplementation in chicken nutrition are highlighted by the reported improvements in oxygen transport capacity, protein metabolism, and immunological function in particular strains. Still, further research is necessary to improve nutritional formulations for various broiler breeds due to the strain-specific responses. These findings support the potential use of phytogenic additives, such as bitter leaf extract, in improving the health and productivity of broiler chickens, particularly in strains like AAR with robust hematological responses.

Conflict of Interest: There is no conflict of interest.

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تقييم احتجاز الكربون في التربة وتحت السطح: تحليل كمي

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ملخص

هدفت هذه الدراسة إلى تقييم تأثير السلالة على التركيب الكيميائي الحيوي لمصل دجاج التسمين المُغذّى على مستخلص أوراق المرارة (Vernonia amygdalina) كمُضـاف نباتي. وفّرت مزارع مهيدو التجارية كتاكيت التسـمين التي تم شـراؤها بعمر 153 يومًا. وُزّعت الكتاكيت الـــ 153، بمتوسط وزن 50 غرامًا، عشوائيًا على إحدى ثلاث معاملات على مستوى السلالة: CBR (Cobb 500)، وABR (Abor acre)، و(Ross 300) RSR. أُجريت ثلاث مكررات للنتائج، ضـمت كل منها 17 طائرًا، وتضمنت كل معاملة 51 طائرًا. بالنسبة للتجربة، تم استخدام ترتيب عشوائي تمامًا 3 × 3. رُبيت الكتاكيت في صناديق متســاوية الأبعاد تبلغ مســاحتها مترًا واحدًا في متر واحد. تم تقديم وجبات دجاج التســمين التجارية (22٪ CP و 2900 كيلو كالوري / كجم ME) ووجبات التشطيب (18٪ CP و 2900 كيلو كالوري / كجم ME) للطيور في كل مجموعة معالجة بنفس الكميات تمامًا. بالإضــافة إلى ذلك، كان لديهم وصـول غير مقيد إلى الماء بنفس تركيزات مسـتخلص أوراق المر (لتر واحد من مياه الشـرب يحتوي على 25 مل من المسـتخلص المائي). تم اتباع جدول العلاج والتحصـين المعتاد لمزرعة التدريس والبحث الجامعي، إلى جانب المتطلبات الأخلاقية، للطيور. كان هناك ســتون يومًا في التجربة. تم أخذ عينة دم لفحص الكيمياء الحيوية وعلم الدم في المصل. أظهرت النتائج أن السلالات كان لها تأثير كبير على الملف الكيميائي الحيوي للدم والمصل لكتاكيت دجاج التسـمين التي تم إعطاؤها مسـتخلص أوراق المر. تباينت أعداد كريات الدم البيضـاء، وكريات الدم الحمراء، والوحيدات بشـكل كبير (P<0.05) في كتاكيت دجاج التســمين AAR. في التحليل الكيميائي الحيوي للدم، أظهر الألبومين فقط فرقًا معنويًا (P<0.05)، مع ارتفاع متوسـط قيم سـلالتي AAR وCBR، حيث بلغت 18.22 و18.17 غ/لتر على التوالي. ختامًا، يمكن إضـافة أوراق المرارة إلى علائق دجاج التسـمين كمضـاف نباتي، وخاصـةً في سـلالات دجاج التسـمين AAR وCBR. هناك حاجة إلى مزيد من الدراسات لتحديد التركيبات الغذائية المثلى، بما في ذلك أوراق المرارة، لمختلف سلالات دجاج التسمين.

الكلمات الدالة: أوراق المرارة، سلالات دجاج التسمين، أداء النمو، أمراض الدم، مضاف نباتي.

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