

EFFECT OF ROSEMARY LEAF MEAL AND SODIUM BENTONITE ON THE HAEMATOLOGICAL PROFILE OF BROILER CHICKEN STRAIN

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Abstract

The study was conducted to determine the effect of rosemary leaf meal and sodium bentonite on the haematological profile of broiler chicken strain. A total of 180 day-old broiler chicks of Cobb 500 strain were used for the study. The birds were randomly divided into 6 groups and allotted into 6 dietary treatments, each treatment was replicated thrice, with 30 birds per treatment and 10 birds per replicate in a 2×3 factorial arrangement in a completely randomized design (CRD). Sodium bentonite (SB) and rosemary leaf meal (RLM) were incorporated into the diets at different levels, Treatment (T1) contained 0gSB+0gRLM/kg diet), T2 (0gSB+3gRLM/kg diet), T3 (0gSB+6gRLM/kg diet), T4 (15gSB+0gRLM), T5 (15gSB+3gRLM), T6 (15gSB+6gRLM), respectively. Feed and water were provided to the birds *ad libitum*. Routine management practices were applied as at when due. At the end of the feeding trial, blood samples were randomly collected from 6 birds per treatment, representing two birds per replicate, for haematological analysis. The experiment lasted for 8 weeks. The results showed that the interaction of rosemary leaf meal (RLM) and sodium bentonite (SB) significantly ($p<0.05$) increased haematological profiles. The inclusion level of 3gRLM+15gSB/kg diet increased PCV (32.33 to 40.00%), RBC (9.63 to $10.50 \times 10^6/L$ Hb (9.50 to 11.67 g/dl), MCH (10.83 to 12.69 pg) and MCHC (26.79 to 35.85 g/dl). It was therefore concluded that inclusion of 3gRLM+15gSB/kg diet improved haematological profile of Cobb 500 broiler strain, and thus, recommended for haematological improvement of broiler chickens.

Keywords: Rosemary, sodium bentonite, haematology, broiler and strain

Description of Problem

Broiler chicken industry has undergone rapid growth few decades ago. During this period, high usage of antibiotics was adopted and used in broiler chicken production. However, due to resistance of bacterial populations to antibiotics, antibiotic residues in products and increasing consumer demand for quality meat, search for alternatives to antibiotics without causing loss to productivity or product quality has accelerated [1]. Several alternatives of antibiotics in poultry production includes vitamins and minerals, herbal drugs, plant extracts and phytogenics. Phytogenic feed additives are increasingly popular as growth promoters in broiler chicken production. One of such phytogenics is Rosemary Leaf Meal. The extracts of Rosemary are suitable for use as

food preservatives [2] because they have many polyphenolic compounds with antioxidant activity which contribute to reducing lipid oxidation, inhibiting microbial growth and extending health of broiler chickens. Poultry are highly susceptible to mycotoxins such as aflatoxins [3]. Recent studies have shown that, the addition of hydrated sodium calcium aluminum silicate (HSCAS) and sodium bentonite clays to corn decreased the effect of aflatoxin in swine [4].

Haematology is a branch of medicine that is concerned with the study of cause, prognosis, treatments and prevention of diseases related to blood. Several researchers have reported significant effects on the haematological parameters of broiler chickens when fed diets containing

rosemary leaf meal and sodium bentonite [5]. In addition, [6], reported that the inclusion of hydrated sodium calcium aluminosilicates had significant effects on haematological indices of Geese. Despite the effects of dietary rosemary and bentonite on improving meat quality, health [7] and microbial balance in the gut of chickens [8], applications of potential polyphenols obtained from rosemary are still under investigation. Thus, this study aimed at determining the effect of rosemary leaf meal and sodium bentonite on the haematological profile of broiler chicken strain.

Materials and Methods

Location of the study

The experiment was carried out at the Poultry Unit of the Department of Animal Science Teaching and Research Farm, University of Nigeria, Nsukka.

Experimental Materials

Rosemary leaves and sodium bentonite were sourced from Ogige Market in Nsukka, Enugu state, Nigeria, processed and included in the experimental diets.

Experimental Animals and Management

A total of 180 day-old broiler chicks of Cobb 500 strain were used for the experiment. The chicks were randomly assigned to six (6) treatment group. Each treatment contained 30 birds and was replicated (3) times. Each replicate was assigned 10 birds in a 2×3 factorial arrangement in completely randomized design (CRD). The treatments comprised of T1 = 0g SB+0g RLM/kg feed, T2 = 0g SB+3g RLM/kg feed, T3 = 0g SB+6g RLM/kg feed, T4 = 15g SB+0g RLM/kg feed, T5 = 15g SB+3g RLM/kg feed and T6 = 15g SB+6g RLM/kg feed. The birds were managed in deep litter system. Prior to the arrival of the day-old chicks, the pens were thoroughly washed, dried and wood shavings spread as litter materials. On arrival, the chicks were weighed individually using an Electronic digital weighing scale. Feed and water were provided *ad libitum*. Vaccination and medications were employed as at when due.

Experimental Diet

The birds were fed formulated broiler starter and finisher diets fortified with the test ingredients.

The starter ration contained 20% CP and 2950 kcal/ME, while, finisher ration contained 17% CP and 3000 kcal/ME.

Data analysis

Data collected were subjected to a two-way analysis of variance (ANOVA), in a completely randomized design (CRD), using statistical package of social science (SPSS version 26). Significant different means were separated using Duncan New Multiple Range Test [8].

Results and Discussion

The results of the effect of rosemary leaf meal and sodium bentonite is presented in Table 1. The results showed that effect of rosemary leaf meal had significant ($p<0.05$) increase on the haematological indices. It was evident that 6g/kg of feed inclusion level recorded the highest values across the haematological parameters evaluated. This is in agreement with the findings of [9] who reported significant increase in haematological parameters when Pharaoh quail were fed diet containing Rosemary leaf meal [10], also reported significant increase in haematological parameters when Rosemary Leaf Meal was added in broiler chickens' diet.

The result of the effect of Sodium Bentonite on Haematological indices of broiler chickens indicated significant ($p<0.05$) differences in packed cell volume, red blood cell, haemoglobin concentration, MCV and MCHC, except MCH which showed no significant differences ($p>0.05$). It was observed that 15gSB/kg of feed recorded the highest values across the haematological parameters studied. This result is in agreement with the findings of Tang [6], who reported that the inclusion of hydrated sodium calcium aluminosilicates had significant effects on haematological indices of Geese. Also in harmony with the findings of Owen [12] who reported that the use of kaolin in broiler diet had significant effect on haematological indices of broiler birds.

Table 1: The effect of Rosemary leaf meal (*Rosmarinus officinalis*) and Sodium bentonite on the Haematological indices of broiler chicken strain

Treatments/Parameters	PCV (%)	RBC (x10 ⁶ ml)	WBC (x10 ³ mm ³)	Hb (g/dl)	MCV (%)	MCH (pg)	MCHC (g/dl)
Effect of RLM							
0g/kg	34.67 ^b	10.07 ^c	10233.20 ^b	10.08 ^b	10.32 ^b	12.01 ^{NS}	27.14 ^c
3g/kg	36.00 ^a	11.12 ^b	11400.01 ^a	10.50 ^a	11.81 ^a	12.45 ^{NS}	28.80 ^b
6g/kg	37.67 ^a	12.43 ^a	10417.51 ^b	10.65 ^a	10.83 ^b	12.26 ^{NS}	29.33 ^a
SEM	0.45	0.11	127.66	0.08	0.19	0.16	0.54
P-Value	0.05	0.00	0.03	0.02	0.01	0.14	0.00
Effect of SB							
0g/kg	34.44 ^b	9.92 ^b	11433.34 ^a	10.03 ^b	10.42 ^b	12.14 ^{NS}	29.18 ^a
15g/kg	38.11 ^a	10.50 ^a	10267.12 ^b	10.79 ^a	10.90 ^a	12.34 ^{NS}	27.33 ^b
SEM	0.37	0.09	104.23	0.06	0.15	0.13	0.44
P-Value	0.04	0.03	0.05	0.01	0.04	0.21	0.02
Interaction of RLM+SB							
0gRLM+0gSB/kg	32.33 ^c	9.63 ^c	10500.09 ^b	9.50 ^c	10.07 ^b	10.83 ^c	29.43 ^b
0gRLM+15gSB/kg	34.67 ^b	9.87 ^{bc}	10533.76 ^b	10.13 ^b	10.54 ^b	11.32 ^b	29.24 ^b
3gRLM+0gSB/kg	36.33 ^b	10.26 ^{ab}	10267.42 ^b	10.47 ^{ab}	10.63 ^b	12.26 ^b	28.86 ^b
3gRLM+15gSB/kg	40.00 ^a	10.50 ^{ab}	99166.67 ^c	11.67 ^a	10.57 ^b	12.69 ^a	35.85 ^a
6gRLM+0gSB/kg	38.33 ^{ab}	10.38 ^{ab}	10267.41 ^b	10.87 ^a	11.08 ^a	12.57 ^a	28.35 ^b
6gRLM+15gSB/kg	39.00 ^a	10.60 ^a	12567.53 ^a	10.83 ^a	11.04 ^a	12.27 ^b	26.79 ^c
SEM	0.64	0.15	180.53	0.11	0.26	0.23	0.76
P-Value	0.05	0.03	0.05	0.04	0.05	0.02	0.04

^{abc} Means on the same column with different superscripts are significantly different ($p < 0.05$), SEM = Standard error of mean, RLM = Rosemary leaf meal, SB = Sodium bentonite, PCV = Packed cell volume, RBC = Red blood cell, WBC = White blood cell, Hb = Haemoglobin concentration, MCV = Mean corpuscular volume, MCH = Mean corpuscular haemoglobin, MCHC = Mean corpuscula haemoglobin concentration.

The results showed that the interaction of rosemary leaf meal (RLM) and sodium bentonite (SB) significantly ($p < 0.05$) increased haematological profiles. The inclusion level of 3gRLM+15gSB/kg diet increased PCV (32.33 to 40.00 %), RBC (9.63 to 10.50x10⁶ml), Hb (9.50 to 11.67 g/dl), MCH (10.83 to 12.69 pg) and MCHC (26.79 to 35.85 g/dl). The result of this study is in accordance with the findings of Oko [11] who reported that the inclusion of phyllosilicate clays such as kaolin in the ration of broiler chickens resulted in significant differences in some of the hematological indices investigated. It is also in agreement with Uguowo [12], who reported significance increase in haematological indices of broiler birds fed diets containing bentonite clay. However,

this result contradicts the findings of Ezenwosu [13] who reported that kaolin supplementation had no significant effect on haematological indices of broiler chickens. In addition, Polat [14] reported significant increase in haematological parameters when Rosemary Leaf Meal was added in broiler diet. Despite the significant differences all the values were within the normal range and this shows that the birds were able to fight diseases, not dehydrated, and were able to transport oxygen throughout their living cells and showed efficient blood circulation.

Conclusion and Application

It was therefore concluded that inclusion of 3gRLM+15gSB/kg diet improved haematological profile of Cobb 500 broiler strain, and thus, recommended for

haematological improvement of broiler chickens.

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