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Effect of various Management Strategies and Garlic Granules on Haematological Status of Broilers in the Tropics

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Target Audience: Poultry Farmers, Animal Scientists, Poultry Nutritionists

Abstract

A total of Ninety (90) day old broiler birds were assigned to five (5) treatments, using the Completely Randomized Design (CRD). The five treatments were; Treatment A (No drugs, No vaccines, No garlic; Control), Treatment B (Drugs + Vaccines + Garlic), Treatment C (Drugs + Vaccines), Treatment D (Garlic + Vaccines), Treatment E (Garlic only). The garlic granules were added to the daily ration at the rate of 100g/ kg of feed. Each treatment was replicated thrice (3 times) and comprised of 6 birds per replicate. The trial lasted for 8 weeks. At the end of the experiment, one bird (1) per replicate was randomly selected for collection of blood samples for the different haematological parameters. The data obtained were analyzed statistically, using the ANOVA while significant differences were separated with the Duncan Multiple Range Test. The result obtained showed that there were significant differences (P< 0.05) in almost all the parameters studied except in red blood cells (RBC) and mean corpuscular hemoglobin concentration (MCHC). The significant differences were however within the normal range for each parameter as specified for poultry except in MCV and MCH. It was obvious from this study that the broilers in the control treatment performed better in almost all the parameters studied compared to the other treatments.

Key words: Garlic, Haematological status, Broilers and tropics.

Description of Problem

The practice of complementary and alternative medicine is now on the increase in developing countries in response to World Health Organization directives culminating in several pre-clinical and clinical studies that have provided the scientific basis for the efficacy of many plants used in folk medicine to treat infections (1)

Garlic, (Allium sativum, a member of the Allium family, Liliaceae), has been known and utilized as spices and herbal remedy for more than 4000 years and is said to have originated from central China (2). In herbal medicine, garlic has been found to be

effective against pathogenic bacteria. According to (3) garlic as a plant is used for the treatment of birds suffering from different microbial diseases. Because of its antibiotic, anticancer, antioxidant,

immune modulator,anti-inflammatory, hypoglycemic and cardiovascular-protecting effects. Also, garlic granules have been reported to play a role in reversing the incidence of atherosclerosis in the Japanese quail (4).Moreover, garlic is very rich in aromatic oils, which enhance digestion and positively influenced respiratory system being inhaled into air sacs and lungs of birds. It was also found that garlic has strong anti-oxidative effects. In pursuance of improved broiler health and in order to fulfill consumer expectation in relation to food quality, poultry producers commonly apply natural feeding supplements, mainly herbs (5). Garlic extract and/or garlic components were able to prevent chemically induced tumors or acute toxic effects of chemicals. The chemo-preventive potential of garlic has been attributed to the presence of several bioactive organosulfur compounds. These compounds act as antioxidants (6,). The anti-oxidative stress properties of garlic might result from the contributions of its sulfur component in different steps and not necessarily from the contribution of only one of them, (6). Garlic has also been shown to have strong antimicrobial action (1, 7). *Allium sativum* taken at a low dose may have some therapeutic potential against gastric ulcers associated with *H. pylori* infection (8). Garlic extracts is also reported to have significant inhibitory effects against microorganisms associated with dental cares, (9). Since the use of synthetic drugs in animal feeds provokes great side effects, with the health risks being more apparent, as in the case of the cancer-causing drug, like Nitrofuran being passed from broiler meat to humans, through the residues and drugs from the penicillin family sometimes causing allergic reactions in humans from its residual effects. This study was therefore aimed at evaluating the blood parameters of broiler birds using different health management strategies along with garlic supplementation in broiler diets.

Materials and Methods

The research was conducted at the University of Port Harcourt Demonstration Farm, Choba, Rivers State. A total of 90-day-old broiler birds were assigned to the five (5) treatments, using the Completely Randomized Design (CRD). The five treatments were: Treatment A (No drugs, No vaccines, No garlic; as Control), Treatment B (Drugs + Vaccines + Garlic), Treatment C (Drugs + Vaccines), Treatment D (Garlic+ Vaccines), Treatment E (Garlic only). The control treatment simply implied that during the experimental period, the birds did not receive any medication, vaccine and garlic in their diet. The garlic cloves were separated and peeled, then sundried and ground to fine powder. The granules were included in treatment D and E at the rate of 100g/kg feed. The composition of experimental broiler starter was 2,950Kcal ME/kg, CP 21%, CF 4%, Ca 0.48%, P 0.45%, Lysine 0.5% and Methionine 0.5% while the finisher diet had 3,100Kcal ME/kg, CP 18.5%, CF 4%, Ca 0.9%, P 0.40%, Lysine 1.0% and Methionine 0.45%. An open sided poultry house was

used to accommodate the birds with demarcations between individual pens which served as the replicates. Wood shaving was used as litters. Feed and water were provided *ad libitum* throughout the experimental period. Each treatment was replicated thrice (3 times) comprising of 6 birds and the trial lasted for duration of 8 weeks.

The feeding of the birds was divided into starter phase (0 -4 weeks) and the finisher phase (4- 8 weeks) respectively. The mortality record was taken daily. At the end of the trial, blood was collected from one bird per replicate for laboratory analysis. Blood samples were analyzed within one hour of collection. The haemoglobin (Hb) level was determined spectrophotometrically by diluting whole blood, (1ml in 20 litres) in a modified Drabkin's solution, which contains Potassium Ferricyanide and Potassium Cyanide. This is converted by the Cyanide to a stable HCN, which was absorbed at 540nm, the cyanmethemoglobin method.

The Packed Cell Volume (PCV) was determined by microhaematocrit method (10). The white blood cell and red blood cell count were estimated using the haemocytometer (10). The mean corpuscular hemoglobin, MCH [(Hb ÷ RBC) x10], mean corpuscular volume, MCV [(PCV ÷ RBC) X10], and mean corpuscular hemoglobin concentration, MCHC [(Hb ÷ PCV) X100] were calculated from the Hb, PCV and RBC analyzed (11).

Data collected were subjected to Statistical Analysis System (SAS) and errors were presented as standard errors of means (SEM). Differences in the means were separated with the Duncan Multiple Range Test (12).

Result and Discussion

The result of the various management strategies and the inclusion of garlic in the diet of broiler birds are presented in Table 1. The result showed that there were significant differences ($P< 0.05$) in most of the parameters studied. Only the RBC and MCHC had no significant differences.

Although the values of PCV, Hb, RBC and WBC obtained in this study were significantly different ($P< 0.05$), they were within the normal range for each parameter (22 -35%, 7-13g/dl, 2-4 x 10^6/l, 9-34 x 10^6/l for PCV, Hb, RBC and WBC respectively) according to (13). This supported the works of (14 to 17). Similar result was obtained by (18) who stated that a mixture of garlic and ginger in diet for broiler birds significantly decreased the PCV values. The Hb and other values which were within the normal range for poultry showed that there was no challenge to cellular respiration and metabolic reactions due to the treatments. It was obvious that the various management strategies and the inclusion of garlic at 100g/kg feed were adequate for broiler production and did not cause any toxicity, anemic condition or dehydration. The birds rather had high oxygen carrying capacity had ability to withstand stress.

Table 1: Effect of various management strategies and garlic granules on blood parameters

Parameters	A	B	C	D	E	SEM
Packed cell Volume, PCV (%)	34.67^{a}	28.33^{b}	24.33^{bc}	24.33^{bc}	22.33^{c}	4.89
Haemoglobin ,Hb (g/dl)	11.53^{a}	9.43^{b}	8.13^{bc}	8.12^{bc}	7.47^{c}	1.90
Red Blood Cell (RBC), $x10^{6}$/l	3.41	3.33	3.31	3.30	3.32	0.04
White Blood Cell (WBC), $x10^{6}$/l	29.11^{b}	22.83^{c}	29.67^{b}	34.67^{a}	33.33^{ab}	4.80
Total Protein (g/dl)	6.70^{a}	4.20^{d}	6.13^{b}	5.23^{c}	4.86^{c}	0.39
Urea (mmol/l)	0.567^{b}	0.510^{b}	0.693^{a}	0.557^{b}	0.593^{ab}	0.12
Glucose (mg/dl)	14.35^{a}	13.59^{b}	12.91^{bc}	12.96^{bc}	12.80^{b}	0.74
Neutrophils (%)	43.67^{a}	41.67^{a}	31.67^{b}	41.67^{a}	35.00^{b}	3.42
Lymphocytes (%)	56.33^{b}	58.33^{b}	68.33^{a}	58.33^{b}	65.00^{a}	2.49
MCV (fl)	101.67^{a}	85.07^{b}	73.50^{c}	73.72^{c}	67.26^{d}	0.78
MCH (pg)	33.51^{a}	28.31^{b}	$24.56b^{c}$	24.60^{bc}	22.50^{c}	1.81
MCHC (%)	33.26	32.89	33.42	36.36	33.45	0.31

$^{a, b, c, d, e;}$ Means within the same row with different superscripts are significantly d ifferent ($P<0.05$) MCH = Mean corpuscular haemoglobin , MCV = Mean cell volume, MCHC = Mean corpuscular haemoglobin concentration

The significantly different ($P < 0.05$) values obtained from the total protein, urea and glucose, though lower in the treated groups than in the control, were within the normal range (except for total protein in B which was lower) stated for birds (5-7 g/dl, 0.5-6 mmol/l and 12-20mg/dl) according to (13,19). This result tallied with that of (20) who stated that garlic contributed to significant decrease in blood protein and lipid levels in turkey. It was however contrary to the result obtained by (21) who reported that garlic did not significantly affect the glucose level when included in broiler diet compared to the control. The result obtained suggested that the treatments contributed to better use of the protein content of the feed and did not cause any negative interaction between the energy and the protein level of the feed. It therefore points to the fact that the diets were nutritionally adequate for broiler production.

The result of this study which showed that the WBC differentials (neutrophils and lymphocytes) were significantly different ($P < 0.05$) from the control, though within the normal range for birds showed that the immune system was not affected by the treatments. This result was however contrary to report by (22), who reported non-significant differences in differential counts when garlic was used in broiler diet. It also differed from the report of (21, 23) who recorded increased counts when garlic was included in broiler diet.

The MCV and MCH obtained showed that only the control group had normal values (101.67 fl and 33.81pg for MCV and MCH). The treated groups had significantly lower values, 67.26 – 85.07 fl instead of 90-140fl according to (13), below that specified for poultry and 22.50- 28.31pg instead of 33-47pg, for MCV and MCH respectively. These low values could be attributed to the significantly lower values of PCV and Hb that were obtained even though the PCV and Hb were within the range specified for birds.

The result obtained from MCHC which had no significant difference ($P > 0.05$)

amongst the groups, yet within the normal range (26 -35%) according to (13) implied that the Hb of the broilers were favoured by the strategic management techniques and the inclusion of garlic in the diet.

Conclusion and Application

1. It was obvious from this study that most of the parameters studied had better result from the control.
2. The significant differences recorded in the treated groups were within the normal range for chickens except in MCV and MCH.
3. The strategic management techniques and the inclusion of garlic therefore had no deleterious effect on the broilers birds.

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