

## HAEMATOLOGICAL EFFECTS OF USING GARLIC AS AN ADDITIVE IN BROILER PRODUCTION

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### ABSTRACT

An experiment that involved the haematological effects of using garlic (*Allium sativum*) as an additive in broiler production was carried out in Livestock Investigation Department (L.I.D) of the National Veterinary Research Institute (N.V.R.I), Vom. The experiment lasted for eight weeks. A total of 144 day old broiler chicks of Aburica breed were used for the study in a completely randomized design (CRD). The birds were allotted into four (4) treatments with each having three (3) replicates. Processed garlic was added into the drinking water of each treatment at 0g, 3g, 6g and 9g per liter of drinking water representing treatments 1, 2, 3 and 4 respectively. The result of haematological analysis showed that all the parameters were significantly ( $P>0.05$ ) different across the dietary treatments. The white blood cells did not show significant ( $P<0.05$ ) difference except for T4 that indicates slight difference in value. However, birds in T4 gave the best in terms of white blood cells, haemoglobin, Lymphocytes and Monocytes compared to the control treatment (T1). Packed cell volume (PCV) level of T4 was the Lowest among the dietary treatment. It can therefore be concluded that garlic as an additive in drinking water showed no deleterious effect in haematological parameters of broiler chickens.

**Keywords:** Broilers, garlic, haematology, blood, feed additive.

### INTRODUCTION

Blood assay is a sensitive indicator that reveals the health status in animals and has been an indispensable tool in the diagnosis, treatment and prognosis of many diseases (Owen *et al.*, 2008). Garlic (*Allium sativum*) has been known and utilized as spice and herbal remedy for more than 4000 years and most likely originate from central China (Kuetter *et al.*, 2000). Garlic has been found to be effective against pathogenic bacteria in herbal medicine since ancient time. In fact in Iraq, in Veterinary Medicine, garlic was used for treatment of birds suffering from different microbial diseases (Mendham, 2011). In Chinese folklore medicine garlic has been said to cure just about everything from the common cold and flu to the plague. It further stated that garlic has sulphuric compound and in general a stronger tasting clove which has more sulphurous content and hence more potential medicinal value. The bacteria in the body do not evolve resistance to garlic as they do with many pharmaceutical antibiotics (Mendham, 2011).

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### MATERIALS AND METHODS

#### Experimental Design and Management of Birds

One hundred and forty four day old broiler chicks of Aburica breed were allotted randomly into pens and were assigned into four treatments consisting of 36 birds per treatment; each treatment contained three replicate having twelve birds each in a completely randomized design (CRD). 200 watt bulbs were used to generate light and warmth during the brooding period routine. Feed formulation was made 23% CP for starter and the finisher was 20% CP according to (NRC, (1994). Garlic was included into their drinking water at 0g, 3g, 6g and 9g per liter for treatment 1, 2, 3 and 4 respectively at the starter and finisher phases. Vaccinations and medications were strictly observed in the course of the study. Feed and water were administered to the birds *ad libitum*, the proximate analysis and haematological parameters were taken. The experimental birds were randomly allotted into pens made of wood and wire mesh with a small door. Each treatment contained 36 birds and 12 replicates containing 12 birds each. The birds were fed with formulated and compounded feed and water given *ad-libitum* along with feed. The weights of the birds were taken before the

commencement of the practical to take their initial weight and weight gain on weekly bases.

#### Laboratory Analysis

The sample of garlic was taken to biochemistry department of National Veterinary Research Institute (NVRI), Vom and analyzed for proximate composition. Blood samples were collected from 2 birds in each replicate and put into EDTA bottles and taken to the haematological department of the Federal College of Medical Laboratory Technology, National Veterinary Research Institute (NVRI), Vom, where the samples were analyzed according to the method of (Decie and Lewis, 2006).

#### Statistical Analysis

All data obtained were subjected to analysis of variance (ANOVA). SPSS (2006) statistical difference between means were separated by Duncan multiply range test option of the same software.

### RESULTS AND DISCUSSION

The result of proximate composition of garlic is presented in Table 4. The result revealed that fresh garlic contains some substantial amount of water of 63.45. However, the protein content is very low (6.80) consequently, fibre (4.80), crude fat (0.55) and all other parameters are low all measured in g/100g. This result indicates that garlic has very low nutritional value and so cannot be used as feed ingredient for animals. It also contains small amount of some minerals like calcium (0.12) and phosphorus (0.09).

The result of the haematological indices is presented in Table 5 and it revealed that there is a significant difference among all the parameters measured. Haematological parameters in birds reveal their health status and goes far to reveal how efficient the feed consume by the animal is. There is significant difference among all the treatment groups which suggests that garlic had an effect on the blood indices of broilers. The result of the WBC revealed that blood collected from birds fed treatments 1, 2 and 3 fell within the normal range ( $3-11 \times 10^9/l$ ) while birds fed treatment 4 had a little above the normal range. WBC usually fights against diseases in the body and their high presence indicates that the birds were stress up. Hb result indicate that treatments 1, 3 and 4 fell within the normal range (7-11 g/dl) and treatment 2 is above the normal range.

Hb is responsible for cellular respiration which is important in metabolic reactions (Fradson, 1981 and McDonald *et.al.*, 1995). The PCV values are within the normal range (27-42 %) which also indicate enough amount of blood in the birds suggesting that the birds were not anaemic or dehydrated during the experiment and may not cause shortage of blood in the birds. It also means that the birds had high oxygen carrying capacity and it is an ability to withstand stress within the body. Heterophil fell within the normal value of 40-70 %. All the lymphocytes analysis result fell above the normal values (20-50 %) this result indicates that the birds had some health issues that made their bodies to produce a lot more of the lymphocytes cells. The monocytes result revealed that treatments 1 and 4 fell within the normal range (0-3 %) while treatments 2 and 3 were above the normal, especially treatment 3 that had 11.67 % which is very high.

### CONCLUSION

It can be concluded that the chickens in all the dietary treatments had good nutritional status and therefore were able to fight pathological and other stressful conditions. This could be the reason why there was no mortality during the experiment. Garlic extract can be added in drinking water of birds (broiler chicken) up to 9g per litre without any adverse effect in the performance of the broiler birds.

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Table 1: Composition of Experimental diets (%)

| Ingredients         | Starter | Finisher |
|---------------------|---------|----------|
| Maize               | 48.96   | 54.96    |
| Soya bean meal      | 34.19   | 27.24    |
| Wheat offal         | 9.00    | 10.00    |
| Fish meal           | 3.00    | 2.00     |
| Bon meal            | 2.50    | 3.00     |
| Lime stone          | 1.50    | 2.00     |
| Methionine          | 0.15    | 0.15     |
| Lysine              | 0.15    | 0.15     |
| *Premix             | 0.25    | 0.25     |
| Salt                | 0.30    | 0.30     |
| Total               | 100.00  | 100.00   |
| Calculated Analysis |         |          |
| CP (%)              | 23.00   | 20.00    |
| ME (kcal/kg)        | 2775.35 | 2808.60  |
| Crude fibre (%)     | 4.94    | 4.57     |
| Ether extract (%)   | 4.62    | 4.38     |
| Calcium (%)         | 1.49    | 1.69     |
| Av. Phosphorus (%)  | 0.55    | 0.59     |
| Lysine (%)          | 1.43    | 1.23     |
| Methionine (%)      | 0.56    | 0.51     |

\*Vitamin premix supplied/kg diet: Vit. A, 9,000 IU; Vit. D<sub>3</sub>, 2,000 IU; Vit. E, 18 IU; Vit. B<sub>1</sub>, 1.8mg; Vit. B<sub>2</sub>, 6.6mg; Vit. B<sub>3</sub>, 10mg; Vit. B<sub>5</sub>, 30mg; Vit. B<sub>6</sub>, 3.0mg; Vit. B<sub>12</sub>, 1.5mg; Vit. K<sub>3</sub>, 2mg; Vit. H<sub>2</sub>, 0.01mg; folic acid, 0.21mg; nicotinic acid, 0.65mg; biotin, 0.14mg; choline, 500mg; Fe, 50mg; Mn, 100mg; Cu, 10mg; Zn, 85mg; I, 1mg; Se, 0.2mg.

**Table 2: Proximate Composition of garlic (g/100g)**

| Sample        | Composition |
|---------------|-------------|
| Moisture      | 63.45       |
| Crude Protein | 6.80        |
| Crude Fibre   | 4.80        |
| Crude Fat     | 0.55        |
| Ash           | 1.25        |
| NFE           | 50.05       |
| Calcium       | 0.12        |
| Phosphorus    | 0.09        |

**Table 3.1 Haematological indices of broilers fed garlic as an additive**

| Parameters               | T1                  | T2                 | T3                  | T4                  | SEM  | P. Value |
|--------------------------|---------------------|--------------------|---------------------|---------------------|------|----------|
| W B C ( $\times 10^9$ l) | 10.21 <sup>b</sup>  | 7.68 <sup>d</sup>  | 8.65 <sup>c</sup>   | 12.13 <sup>a</sup>  | 1.58 | 0.095    |
| Haemoglobin (g/dl)       | 10.50 <sup>c</sup>  | 17.14 <sup>a</sup> | 9.48 <sup>d</sup>   | 10.82 <sup>b</sup>  | 4.26 | 0.301    |
| P C V (%)                | 32.33 <sup>ad</sup> | 40.83 <sup>a</sup> | 32.67 <sup>ab</sup> | 30.60 <sup>ac</sup> | 2.52 | 0.014    |
| Neutrophil (%)           | 33.17 <sup>a</sup>  | 24.17 <sup>c</sup> | 33.17 <sup>b</sup>  | 23.50 <sup>d</sup>  | 7.68 | 0.487    |
| Lymphocytes (%)          | 69.33 <sup>b</sup>  | 68.33 <sup>c</sup> | 55.67 <sup>d</sup>  | 73.17 <sup>a</sup>  | 8.21 | 0.242    |
| Monocytes (%)            | 0.83 <sup>ad</sup>  | 5.33 <sup>b</sup>  | 11.67 <sup>a</sup>  | 2.67 <sup>c</sup>   | 3.98 | 0.107    |

Note: All the means with the same subscription are statistically significant at 5% level.

KEY: SEM - Standard Error Mean