

# The Effect of Garlic (*Allium sativum*) as a Natural Feed Additive on the Growth Performance of Broiler Chickens

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**Abstract-** A Thirty five (35) day feeding trial was conducted to assess the effect of garlic on the growth performance of broiler chicken. One hundred and fifty-six unsexed Cobb 500 commercial broiler chicken of three weeks old were randomly allocated to four dietary treatments in a completely randomized Design (CRD), with three replicates of 13 birds each. The birds received the treatment diets as follows; the control (0%) and the supplemented diets containing 2.5%, 5.0% and 7.5% garlic powder (*Allium sativum*) for treatment T2, T3 and T4 respectively. Feed and water were supplied *ad libitum*. The parameters measured were; average feed intake (AFI), body weight gain (BWG), feed conversion ratio (FCR), mortality and performance index (PI).

Feed consumption of birds fed treatment T4 recorded the highest feed intake which was not significantly ( $p>0.05$ ) different from T1 and T3, but significantly ( $p<0.05$ ) different from T2. The average body weight gain differed significantly ( $p<0.05$ ) between T3 and T4 but there was no significant ( $p>0.05$ ) difference between T1 and T2. Diet T2 recorded the lowest feed conversion ratio which was significantly ( $p<0.05$ ) different from T4. No significant difference was observed for performance index. Feed cost/kg weight gain was significantly ( $p<0.05$ ) higher for birds fed on diet T4 than those fed on T2 and T3 but was not significantly ( $p>0.05$ ) different from the control. Therefore, it was concluded that, the inclusion of garlic powder in the broiler diet did not have any deleterious effect on the birds.

**Index Terms-** Garlic powder, *ad libitum*, performance index (PI)

## I. INTRODUCTION

Feeds containing no chemical additives are increasingly used in broiler nutrition. Therefore, antibiotic growth promoters in poultry feeds are discredited by consumer associations as well as scientists. Consequently, the animal feed manufacturers are exposed to increasing consumer pressure to reduce the use of antibiotic growth promoters as feed additive and find alternatives to these in poultry diets (Newman, 1997; Humphrey *et al.*, 2002).

These new generations of growth enhancers include botanical additives like appropriate blends of herbs or plant extracts.

Garlic supplement in broiler diet has been recognized for its strong stimulating effects on the immune system in addition to its positive effects on digestion in birds due to the rich aromatic oil content of garlic called garlic essential oil (Demir *et al.*, 2005). Therefore, this study was initiated to assess the effect of garlic on the growth performance of broiler chickens as well as economy of production.

## II. MATERIALS AND METHODS

### Duration and Location of the Experiment

The experiment was conducted at Wahu Onyame Asem poultry farms at Bosore in the Kwabre District of Ashanti region, Ghana. The duration of the experiment was thirty-five (35) days.

### Source of the Garlic Powder

The garlic powder was obtained from the European market in Adum near Opoku Trading Company, Kumasi, Ghana.

### Chemical Analysis

Proximate analysis of the garlic powder was carried out as described by (AOAC, 1990). Metabolizable energy (ME) was computed using the equation as described by NRC (1994):  
$$ME \text{ (kcal/kg)} = (35x\%CP) + (85x\%CF) + (35x\%NFE)$$

### Experimental Birds and Procedure

One hundred and fifty-six unsexed day-old commercial broiler chicks obtained from Akate farms in Buokrom district of the Ashanti Region, Ghana were used in the experiment. They were brooded for three weeks before the test diets were fed. Graded levels of garlic powder 2.5%, 5.0% and 7.5% were added to a basal diet (Table 1).

**Table 1: Percentage composition of experimental diets**

ITEMS	T1 (0% garlic)	T2 (2.5% garlic)	T3 (5.0% garlic)	T4 (7.5% garlic)
Maize	60	60	60	60
Fish meal	17	17	17	17
Wheat bran	8	8	8	8
Hendrix concentrate	12	12	12	12
Oyster shell	2	2	2	2
Microchem*	0.5	0.5	0.5	0.5
Salt	0.5	0.5	0.5	0.5
Total	100	100	100	100
Analyzed nutrient composition				
Crude protein (%)	22.4	22.4	22.4	23.1
M.E. (kcal/kg)	2875.9	2894.8	2819.5	2969.5

**Microchem\*: a mineral mix.**

### Data Collection and Analysis

The parameter measured were; feed intake, feed conversion ratio, initial and final body weights, body weight gain, live weight, mortality, performance index and dressed weight. The data obtained were analyzed using the GENSTAT 12 edition (2009).

### III. RESULTS AND DISCUSSION

**Nutrient Composition of Garlic Powder:** The proximate analysis of garlic powder on dry matter basis is recorded in Table 2.

**Table 2: Proximate composition of Garlic powder**

CONSTITUENTS	PERCENTAGE (%)
Crude Protein	20.0
Crude Fiber	2.02
Ether Extract	0.5
Ash	13.0
Nitrogen Free Extract	61.48
Moisture	13.0
Metabolizable Energy (kcal/kg)	2894.3

The values obtained for the proximate composition of garlic powder in this work are not in agreement with the values

obtained in the analysis of garlic powder done at Research 900 Laboratory as reported in the Encyclopedia of Chemical Technology (1980) (moisture, 5.4%; crude protein, 17.5%; ether extract, 0.6% and ME, 3676.4kcal/kg). Probably, this might be attributed to differences in the environment.

### Growth Performance

Feed consumption of birds on treatment T4 recorded the highest feed intake which was not significantly ( $p>0.05$ ) different from T1 and T3, but significantly ( $p<0.05$ ) different from T2 (Table 3). Rahardja *et al.* (2010) reported that at 1, 2, and 4% levels in feed, garlic increased feed intake in a 4-week trial in laying hens. The average body weight gain differed significantly ( $p<0.05$ ) between T3 and T4 but there was no significant ( $p>0.05$ ) difference between T1 and T2. This finding is in agreement with Lewis *et al.*, (2003) who reported that the body weight gain was improved in broilers fed low level (0.2%) of garlic powder. Diet T2 recorded the least feed conversion ratio which was not significantly ( $p>0.05$ ) different from T1 and T3 but significantly ( $p<0.05$ ) different from T4. Tollba and Hassan (2003) reported improved growth and feed conversion ratios in chicken fed garlic supplemented diets at 0.5% inclusion level. Thus, the results of the present study has shown that 2.5% garlic meal supplementation in the diet of these commercial broilers resulted in more efficient production.

**Table 3: The effect of garlic powder on growth performance of broiler chickens**

Initial weight (kg)	0.41	0.41	0.41	0.41	-
Final weight (kg)	1.85	1.93	2.04	1.81	0.228
Weight gain (kg)	1.509 <sup>b</sup>	1.739 <sup>ab</sup>	1.863 <sup>a</sup>	1.489 <sup>b</sup>	0.2503
Feed intake (kg)	3.40 <sup>ab</sup>	3.11 <sup>b</sup>	3.48 <sup>ab</sup>	3.81 <sup>a</sup>	0.423
F.C.R.	2.261 <sup>ab</sup>	1.795 <sup>b</sup>	1.870 <sup>b</sup>	2.602 <sup>a</sup>	0.5225
Mortality (%)	2.25	2.80	1.77	2.25	-
Performance Index (%)	65.0	71.4	62.8	53.9	-
Feed cost/kg weight gain(GHc)	2.559 <sup>ab</sup>	2.088 <sup>b</sup>	2.231 <sup>b</sup>	3.185 <sup>a</sup>	0.6272
Dressed weight (kg)	1.70	1.80	1.78	1.63	0.335

Mean values in the same rows with the same superscript or without any superscript are not significantly ( $P>0.05$ ) different. LSD- Least significant difference.

#### IV. CONCLUSION AND RECOMMENDATION

It is concluded from this study that, garlic powder can be incorporated into the diets of broiler chickens at 2.5% of the diet without any significant adverse effect on growth performance. However, it is suggested that more studies should be done to establish the optimum level with which the best result can be achieved.

#### REFERENCES

- [1] Association of Official Analytical Chemists, AOAC (1990). Official Methods of Analysis 15<sup>th</sup> Edition AOAC, Arlington, Virginia, USA.
- [2] Demir, E., Sarica, S., Ozcan, M. A., and Suicmez, M. (2005). The use of natural feed additives as an alternative for an antioxidant growth promoter in broiler diet. Britain Poultry science 44 (Suppl. 1): 44- 45.
- [3] Encyclopedia of Chemical Technology (1980) Vol. 10, 3<sup>rd</sup> Edn. John Wiley and Sons, New York. pp. 477 – 480.
- [4] Genstat Discovery, (2009). Edition 12, Release 7.22 DE (PC/Windows 7) VSN International Ltd., London.
- [5] Humphrey, B.D., Huang, N. and Klasing, K. C. (2002): Rice expressing lactoferrin and lysozyme has antibiotic-like properties when fed to chicks. J.Nutrition.132, 1214-1218.
- [6] Lewis, M.R., Rose, S.P., Mackenzie, A. M. and Tucker, L.A (2003). Effects of dietary inclusion of plant extracts on the growth performance of male broiler chicken.

- [7] National Research Council [NRC] (1994) Nutrient requirements of poultry. 9th Edition, National Academy Press, Washington DC
- [8] Newman, K., (1997): Herbs and spices: Their role in modern livestock production. pp. 217-224. In: Biotechnology in the Feed Industry (Eds. T.P.Lyons and K.A. Jacques) Nottingham University Press, Loughborough, Leics, U.
- [9] Rahardja, D.P., M.R. Hakim, W. Pakiding and V.S. Lestari, (2010). Hypocholesterolemic effect of garlic powder in laying hens: Low cholesterol egg. J. Indonesian Trop. Anim. Agric., 35: 16-21
- [10] Tollba, A. A. H. & Hassan, M. S. H. Using some natural additives to improve physiological and productive performance of broiler chicks under high temperature conditions 2- black cumin (*Nigella Sativa*) or garlic (*Allium sativum*) Egypt. Poult. Sci. 23:327-40, 2003.

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