

RESPONSE OF THE INCLUSION OF GARLIC (*Allium sativum*) IN THE DIET OF LAYING HENS ON PERFORMANCE CHARACTERISTICS OF LAYING HENS

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ABSTRACT

This study was conducted to investigate the effects of garlic inclusion in the diet of laying hens on laying performance. A total of eighty 18-week-old Isa brown laying birds were allocated to four dietary treatments. Birds were caged individually and fed diets supplemented with 0 (control), 0.125, 0.25, 0.5% garlic powder. Birds were fed the experimental diets for twelve weeks. Data on feed consumption, egg production and weight gain were recorded weekly from which hen-day production and feed efficiency were calculated. There were significant ($P < 0.05$) differences among the diets in feed consumption, feed efficiency and egg production. In all cases, the better values for these parameters were obtained from the 0.5% garlic powder supplemented group. In conclusion, addition of garlic powder in the diet of laying hens reduced feed intake, improved egg production and feed efficiency.

Keywords: Garlic, Laying hens, Hen-day, Feed intake, Egg production.

Introduction

The use of antibiotics for the prevention of bacterial infections is facing serious criticism (Iji *et al.*, 2001). Drug resistance in bacteria and the drug residues in meat and egg are some of the reasons for restrictions in the use of antibiotics (CAFA, 1997). The poor performance and the increase susceptibility to diseases resulted from removal of antibiotics from birds' diets creates attempts to find other alternatives to use antibiotics. The utilisation of antibacterial of natural origin such as garlic, thyme, Oregano, cloves has become of an interest in recent years (Iji *et al.*, 2001). Garlic (*Allium sativum*) is widely distributed and used in most part of the world. It was used by the ancient Egyptians for medicinal purposes and is still popular today as a health supplement for humans. Garlic is mostly used as spice and for medicinal purposes for the treatment of various diseases in poultry (Rahman *et al.*, 2006, Li *et al.*, 2016). Many studies have evaluated the health benefits of garlic, it has been shown to have anti-thrombotic activity (Block, 1985), lowered blood lipids, blood tension, and have a cardio-protective effect (Neil and Sigaly, 1994; Sigaly *et al.*, 1994), antibacterial properties and a potent inhibitor of food pathogens (Sivam, 2001; Lee *et al.*, 2003). The health benefits of garlic have been attributed to the active compound called allicin which has potent medicinal properties which inhibits the growth of pathogenic bacteria. Egg consumption has increased recently in most part of the world and this has demanded for an increased in poultry production especially in Nigeria. Several antibiotics have been included in the diets of laying hens to improve egg quality and prevent the infection of disease-causing agents (Steiner, 2006), however some of the antibiotics cause harmful effects to the health of humans, which is seen through the consumption of eggs (Casewell *et al.*, 2003; Barug *et al.*, 2006) Some of the harmful effects are believed to have manifested between the period of egg production and storage or consumption, which has necessitated the need to evaluate the effect of garlic on egg quality characteristics.

MATERIALS AND METHODS

Experimental Birds and Diets

A total of 80 eighteen-week-old Isa brown hens, was obtained from a commercial layer farm at Ajibode Area, Ibadan, Nigeria. Hens were weighed and randomly distributed into individual cages and were allowed to acclimatized for one week and the experimental period lasted for 12 weeks

The birds were fed a practical layer's diet during the acclimatisation period until the commencement of the experiment. The birds were randomly allocated to four (4) dietary treatments (table1), 1,2,3,4 with garlic inclusion level of 0%, 0.125%, 0.25% and 0.5% respectively. The experimental diets were formulated to meet the NRC recommendations (NRC, 1994). Each treatment had 20 pullets per treatment of five (5) replicates; each replicate had four (4) pullets in a cage. The birds were given feed and water *ad libitum*.

Processing of Garlic

The garlic powder obtained as developed by Oladele method (a method patented) A method which involved washing and cutting of fresh garlic bulbs, cut into pieces, oven dried and ground into powder and mixed with the diet.

Data Collection and Analysis

Feed intake was collected by weighing a known quantity of feed given to each replicate and subtracting the remnant from the amount offered for each replicate to get the quantity consumed. The quantity consumed was recorded on a daily basis and was summed up to give the total feed consumed per replicate for the 6 weeks, Feed efficiency which is the quantity of feed consumed by the pullet in relation to the number of eggs laid by the pullets was calculated using the standard formula.

Weight Gain was obtained by weighing birds individually on arrival and on weekly basis then subtracting the weights of the previous week from the current week. Eggs were collected and recorded on daily basis; the weight of the eggs collected was recorded individually using a scientific digital electronic chemical weigh top load balance scale. The egg production was converted to percentage Hen-Day production. This was calculated by adding all the eggs laid in a treatment on a weekly basis, divided by the number of birds and then multiply by 100.

Table 1: Composition of Experimental Diets (% DM)

Ingredient (%)	T₁(0% GP)	T₂(0.125%GP)	T₃(0.25%GP)	T₄(0.5%GP)
Maize	34.87	34.87	34.87	34.87
Full Fat soya	22.34	22.34	22.34	22.34
Garlic powder	0.0	0.15	0.25	0.50
Wheat offal	10.82	10.82	10.82	10.82
Corn Bran	18.10	18.00	17.95	17.70
Oyster Shell	8.00	8.00	8.00	8.00
Di-calcium phosphate	2.50	2.50	2.50	2.50
Fish meal	2.00	2.00	2.00	2.00
L-lysine	0.25	0.25	0.25	0.25
DL-Methionine	0.25	0.25	0.25	0.25
Table salt	0.35	0.35	0.35	0.35
*Premix	0.25	0.25	0.25	0.25
Mycofix	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00

Results and Discussion

The performance characteristics of laying hens fed with diet containing graded level of garlic inclusions are presented in Table 2. The results indicated that, garlic inclusion up to a level of 0.5% (Table 3) reduces feed intake in laying birds. The inclusion of garlic did not show any effects in Hen-day production feed efficiency and egg weight when means were compared across the treatment except between 0.5% inclusion and the control diet (Table3). Therefore, inclusion of garlic up to 0.5% level enhances the Hen-day production, feed efficiency and egg weight of laying hens. Dietary garlic had no effects on the initial and final body weight of laying hens. In agreement with the results, Canogullari *et al.*, (2010), reported that feed intake was reduced with increased level of garlic up to a level of 4% having the lowest feed intake and control had the highest feed consumption. Khan *et al.*, (2008) reported that feed consumption was affected during the six (6) weeks in which 0, 2, 6, or 8% garlic powder was fed to the laying hens. This result demonstrates that, the strong odour of garlic acts as a deterrent to feed intake and in this case the 0.5% garlic supplementation caused a negative effect. This is because the specific odour

Table 2: performance Characteristics of laying hens fed garlic

Parameters	T1(0%GP)	T2(0.125%GP)	T3(0.25%GP)	T4(0.5%GP)	SEM
Initial body wt (g/bird)	1.51	1.45	1.52	1.51	0.02
Feed intake (g/day/bird)	95.45 ^a	91.87 ^{ab}	91.25 ^{ab}	87.50 ^b	0.79
Hen-day production(%/)	38.81 ^b	52.26 ^{ab}	53.57 ^{ab}	55.95 ^a	2.52
Feed efficiency	0.60 ^b	0.62 ^{ab}	0.63 ^{ab}	0.65 ^a	0.01
Final body wt(g/bird)	1.13	1.36	1.48	1.42	0.08

* abcd means with different superscripts are significantly different (p>0.05)

of garlic decreases feed intake (Qureshi *et al.*, 1983a). Foluke *et al.*, 2013, reported significant improvement in hen-day production with dietary inclusion of garlic and pepper between 0.04% inclusion and control diet. The result also agrees with that of Khan *et al.* (2008) who reported that feeding garlic powder at 8% may result in better egg production in Desi laying hens. The result which contrasted with that of Behnamifar *et al.* (2015) who reported that feeding garlic extract and thyme and caraway to Japanese quails has no effects on percentage hen-day production. The differences in results of these various researchers may be attributed to the different experimental protocols and garlic preparation methods (Canogullari *et al.*, 2010). Canogullari *et al.*, (2010) reported significant effect in feed efficiency between the control diet and the 1% inclusion of garlic powder. In contrast, Chowhurray *et al.*, (2002) and Reddy *et al.*, (1991) reported that feed efficiency and feed consumption were not affected by supplementation of garlic paste for 6 weeks period or by supplementation of 0.02% garlic oil for 8 weeks. The reason for difference might be the duration of experiment and the fact that different garlic products were used. The inclusion of garlic was shown to have no effects on initial and final body weight of the laying hens. In agreement with the result, Canogullari *et al.*, (2010) reported that the supplementation of garlic powder had no significant effects (P > 0.05) on body weight in laying hens. It was observed that the initial body weight before the experimental period was higher than the final body weight at the end of the experimental period. This could be attributed to facts that the specific odour of garlic decreases feed consumption which may be responsible for loss of weight in the laying hens (Qureshi *et al.*, 1983b).

In conclusion, dietary inclusion of garlic can have beneficial effects on egg performance characteristics of laying hens in terms of enhancement of percentage hen day production and feed efficiency, hence inclusion of garlic in this study decreases feed intake without any negative effects on egg production and the efficiency of utilization of feed. The study further indicates that, the inclusion of garlic at 0.5% gave better result in terms of improvement of egg performance characteristics.

It is recommended that, garlic up to 0.5% can be used as feed additives to improve performance characteristics of laying hens.

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