EFFECT OF SUPPLEMENTATION OF GARLIC (*ALLIUM SATIVUM*) POWDER ON EXTERNAL EGG QUALITY IN KADAKNATH LAYERS

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ABSTRACT

A study was designed to evaluate the effect of different dietary levels of Garlic (*Allium sativum*) powder on egg quality in the ration of Kadaknath layers. For that a feeding trial of 84 days were conducted on150 Kadaknath birds of 39 weeks age. The Kadaknath birds were divided into five treatments having three replicates in each group with 10 birds in each replicate. The treatment T_1 *i.e*. control group fed with unsupplemented diet and T_2, T_3, T_4, T_5 supplemented with 0.5%, 1%, 1.5% and 2% level, of Garlic powder along with basal diet, respectively.A metabolic trial of five days were also conducted for this study. External egg quality focuses on texture and shape, egg weight and shell weight, which are important in consumer's acceptability of shelled eggs. Egg weight was significantly ($P<0.05$) highest in T_4 (1.5% Garlic (*Allium sativum*) powder) treatment group. Shape index, shell weight, shell weight (percent of egg weight) and shell thickness of egg were not influenced by dietary treatments.

***Key words*:** External egg quality, egg shape index, egg shell thickness, garlic, Kadaknath layers

Introduction

Now the poultry industry throughout the world has been evolved itself from a mere backyard proposition into an agribusiness state (Singh *et al.,* 2015). External egg quality could be determined of the egg without breaking the egg. External egg quality includes egg weight, egg shape index, eggshell thickness and egg shell weight. Egg weight influences egg quality as well as grading of the egg (Farooq *et al*., 2003). Egg size refers to the weight of an egg rather than the dimensions of the egg. The egg weight has positive effect on hatchability and chick hatch weight (Ramaphala and Mnajiorgu, 2013). In market much preference is given to egg size and eggs are sold on the basis of egg size. The consumer prefers large sized egg to small sized which enforces poultry farmers to give equal emphasis towards the higher egg production along with maximum egg size. The relationship between egg length and egg width was reported by Choprakarn *et al*. (1998).The shape index of egg is a matter of natural convenience rather than aesthetic consideration and it should be smooth in order to assist in laying. Eggshell quality traits play an important role reason being only eggs with an intact shellare considered for hatching or as table eggs. Eggshell thickness plays a major role for eggshell quality. Significant impacts on egg quality and egg weight were reported due the positive impact of herb via reducing the count of pathogens in the digestive tract, enhancing immune response, improve intestine length, width and depth of digestive tract villi along with the activity of digestive enzymes resulting in increased retention of nutrients and minerals (Alcicek *et al*., 2003; Shahryar *et al*., 2011; Abd El-Wareth, 2012).

Garlic (*Allium sativum*) is bulbous perennial herb used for organic poultry production in recent trend. It has several anti-parasitic, anti-viral, anti-bacterial and anti-fungal properties (Puvaca *et al*., 2014) and has been used traditionally for treating respiratory infections, ulcers, diarrhoea and skin infections (Fenwick *et al.,* 1985). Nuutila *et al.* (2003) and Thomson and Ali (2003) reported that Garlic exhibited radical scavenging activity. The two major compounds in Garlic, S-allylcysteine and S-allylmercapto-L-cysteine had the highest radical scavenging activity.Ankri and Mirelman (1999) observed that Allicin, one of the active principles of Garlic has various antimicrobial activities. It was demonstrated that Garlic (*Allium sativum*) have considerable antioxidant, antibacterial,digestive and appetite stimulant and hepatoprotective and immunomodulative properties. External egg quality is composed of those characteristics of an egg that affect its acceptability to consumers, preservation and marketing of eggs, therefore, important attention is paid to maintain the quality of eggs. Hence, in the present study, this parameter has been considered to assess the effect of supplementation of Garlic (*Allium sativum*) powder.

Materials and Methods

A total of 150 Kadaknath layers of 39 weeks age were used in the experiment and birds were reared on deep litter at college poultry farm for 12 weeks period. The experimental layers were selected on body weight basis. The layers were assigned randomly to various experimental groups.

A total of 150 birds, 39 weeks old of Kadaknath layers were randomly allotted to one of the five treatments with 30 layers in each treatment with three replications. The completely randomized design was adopted for the present feeding trial. Herbal feed additive Garlic (*Allium sativum*) powder were supplemented to prepare five different treatment diets for the feeding of birds under different dietary groups. The chemical composition of basal diet, Garlic (*Allium sativum*) powder was presented in Table 1.The T_1*i.e*.control group was fed on basal diet while T_2 and T_3 treatment groups were supplemented with 0.50% and 1.00% Garlic (*Allium sativum*) powder in the

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Table 1: Chemical composition of basal feed and Garlic powder (% DM basis)

S.No.	Chemical composition	Basal feed	Garlic powder
1.	Dry matter	91.04	94.22
2.	Crude protein	18.09	12.23
3.	Ether extract	5.19	0.76
4.	Crude fibre	5.10	8.42
5.	Total ash	15.15	3.21
6.	Nitrogen free extract	56.47	75.38
7.	Calcium	5.61	2.56
8.	Phosphorus	0.90	0.09

basal diet, respectively. Whereas T_4 and T_5 treatment groups were supplemented with 1.5% and 2.00% of Garlic (*Allium sativum*) powder in the basal diet, respectively.

A feeding trial of 12 weeks was carried out. One egg from each replication (3 from a group) was collected at bi-weekly interval to measure the external egg quality parameters. The egg shape index was calculated by egg width/egg length. Egg shells were dried in the air. After drying, shell thickness was measured using screw gauge. The egg shell along with membrane was sunk in 5% EDTA solution for 30 minutes. After that shell membrane was removed carefully. Egg shells were dried in the air and weighed using an electronic balance. Weight of egg shell in term of per cent of egg weight was calculated by the following formula: Egg shell weight (% of egg weight)=Egg shell weight X 100/egg weight. Data collected during the present investigation were subjected to statistical analysis by adopting appropriate methods of analysis of variance as described by Snedecor and Cochran (2004). Wherever the variance ratio (F-values) was found significant at 5 per cent and 1 per cent levels of probability, the significance of mean differences was tested by Duncan's New Multiple Range Test (Duncan's Range Test) as modified by Kramer (Kramer, 1956).

Results and Discussion

External egg quality traits of Kadaknath layers fed with various levels of Garlic (*Allium sativum*) powder during experimental periods are presented there in Table 2.

The results showed that the Garlic powder has significant ($P<0.05$) effect on egg weight among various treatment groups and highest egg weight was observed in T_4 group *i.e.* birds supplemented with 1.5% Garlic (*Allium sativum*) powder. The obtained results in present study were in agreement with the findings of Aswal *et al.* (2017) who recorded significantly increased egg weight due to supplementation of Garlic *(Allium sativum)* powder as feed additive in the diet of White leghorn layer.The results are in partial agreement with the findings of Aydin *et al*. (2006), Aydin *et al*. (2008) and Khan *et al*. (2013) who reported significant increase in egg weight due to black cumin supplementation. It is possible that antioxidant property of black cumin seed powder protects hepatic cell from oxidative damage and might have increase the secretion of egg yolk precursors resulted in increase in egg weight (Bollenger-Lee *et al*., 1998).

In present study also antioxidant property of Garlic could be a reason of increased egg weight in garlic supplemented

Table 2: Effect of different levels of Garlic (*Allium sativum*) powder on egg quality traits of Kadaknath layers

	T_1	T_2	T_3	T_4	T_5	SEM
Egg weight	49.71^{a}	52.56^{bc}	53.13^{bc}	53.45^{c}	50.86^{ab}	0.5382
Egg shape index	77.83	77.38	75.63	76.55	76.97	0.6465
Egg shell thickness (mm)	0.51	0.49	0.49	0.5	0.49	0.006
Egg shell weight	5.44	5.3	5.37	5.32	5.27	0.0825
Egg shell weight (% of egg weight)	10.94	10.08	10.10	9.95	10.36	0.172

a, bc: Means superscripted with different letters within a row differ significantly from each other

group. Egg shape index and eggshell thickness (mm) was not affected by supplementation of garlic. The findings of egg shape index were in line with the results of Olobatoke and Mulugeta (2011) who also recorded non-significant effect of Garlic *(Allium sativum)* powder on egg shape index in laying birds. The results of egg shell thickness obtained in present study were corroborate well with the findings of Lim *et al.* (2006) who also recorded no significant effect of supplementation of Garlic *(Allium sativum)* powder as feed additive in the diet of laying hens.

Eggshell weight was also not affected by supplementation of Garlic powder. The findings on eggshell weight fall in line with the finding of Mohebbifar and Torki (2010) who recorded non-significant effect on egg shell weight due to supplementation of Garlic (*Allium sativum)* powder as feed additive in the diet of laying hens. The results are in partial agreement with the findings of Aydin *et al*. (2008), Bolukbasi *et al*. (2009), Yalcin *et al*. (2012) and Khan *et al*. (2013) who reported non-significant effect of black cumin seed powder on the egg shell weight per cent due to supplementation of black cumin seed powder.

Conclusion

On the basis of findings of present investigation, it can be concluded that dietary supplementation of Garlic (*Allium sativum*) powderhas positive effect on egg weight without affecting egg shape index, egg shell thickness and shell weight. However, supplementation of Garlic (*Allium sativum*) powder resulted in better shelled egg with increased egg weightbut the present observations will provide the basis for future studies with clinical trials on mass level.

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