



# Effect of Dietary Supplementation of Garlic (*Allium sativum*) and Black Pepper (*Piper nigrum* L.) Powder on Growth Performance of Broilers in Konkan Region of India

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### ABSTRACT

An experiment was conducted to assess the effect of dietary supplementation of garlic (*Allium sativum*) bulb and black pepper (*Piper nigrum* L.) powder as herbal feed additives on feed intake, growth performance in broilers; A total of 320 day old broilers chicks of Vencobb-400 strain were divided into four treatment groups with four replicates of 20 chicks in each treatment using completely randomized design. The control group (C) was fed on basal diet without any supplementation and other three treatment groups were supplementation with 0.5% garlic bulb powder 0.5% black pepper powder and 0.5% of each supplement (garlic bulb powder and black pepper powder) in G, B and GB groups, respectively statistical analysis of data revealed no effect of garlic and black pepper alone or no in combination of feed intake of experimental birds. Growth performance and efficiency of feed utilization for growth was significantly ( $P < 0.05$ ) higher in the garlic supplemented group (G and GB) as compared to C and B groups. The study reveals that supplementation of garlic bulb alone or in combination with black pepper seed powder improves growth performance and feed utilization efficiency in intensive broiler production in agro-ecological conditions of Konkan in India.

### 1. Introduction

Hot and humid climate, poor crop harvesting, inadequate drying and storage facilities and insect infestation make feedstuffs susceptible to fungal contamination resulting economic losses in crop husbandry. When crops failure due to above reasons farmers should moves towards the livestock farming for supportive business for earning money. Intensive poultry production is possible in hot and humid climate and high rainfall areas. Poultry production is the fastest growing segment of livestock industry in India. It contributes a major share of nutritious food through egg and meat. Backyard poultry farming with poultry holds the key among the rural people not only as source of income generation and supplementary livelihood activity but also to meet the demands of poultry.

Small scale farmers want to engage in efficient broiler enterprises, but they do not understand the importance of the feeding programs and management practices on the development and growth of broiler chickens as well as its effect on broiler meat quality that stands to be scrutinized by consumers when their birds reached in the market for selling. At the same time small scale farmers are also focused on reducing the cost of production of broilers at the farm. Feed represents over 70% of the cost of producing chicken meat (Agah and Norollahi, 2008) on the other hand due to reduction in growing period, because of changing the growth pattern of broiler chickens; the length of time that various diets are fed has also tended to change. Whereas nutrition plays vital role in poultry production accounting for more than 60% of production cost. Poultry nutrition is going through a gradual but constant change in feed formulation with a steady improvement in feed efficiency.

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This improvement is due to the improved genetic potential and managerial practices. Feed additives are indispensable element of poultry feed formulation and may be described as non-nutrient substances that accelerate the growth, feed efficiency and are supposed to be beneficial for health or metabolism of the animal (Church and Pond, 1988). Alternative substances like probiotics, prebiotics and herbs as natural feed additives which can be used in poultry diets to enhance the performance of birds (Rahmatnejad *et al.*, 2009). In this regard, plant products seem to be the best option due to their easy availability, no side effects, historic faith of population and simple processing technique for manufacture. Photogenic feed additives such as herbs and spices are commonly incorporated into diets of agricultural livestock's, palatability therefore enhancing productive performance (Windisch *et al.*, 2008). Pepper species commonly used in diet and traditional medicine were assessed for their antioxidant potential. Black pepper improves digestibility and is found rich in glutathione peroxidase and glucose-6-phosphate dehydrogenase. (Khalaf, 2008). Garlic (*Allium sativum*) has been used as a spice and a native medicine since long ago (Rivilin, 2001) and as a natural growth promoter can improve growth performance of broiler chickens (Demir *et al.*, 2003; Lewis *et al.*, 2003 and Tollba and Hassan, 2003). Based on the above information, an experiment was planned to assess the effect of dietary supplementation of garlic bulb and black pepper seed powder as herbal feed additives on feed intake, growth performance in broiler chicken in Konkan region of India.

## 2. Materials and Methods

A total of three hundred and twenty, day old broiler chicks of Vencobb-400 strain were divided into four treatment groups with 4 replicates of 20 chicks in each replication using completely randomized design (CRD). All experimental chicks were randomly assigned to 16 pens and identified with wing bands. The control group (C) was fed with basal diet without any supplementations and the treatment groups G, B and GB were supplemented with 0.5% garlic bulb powder, 0.5% black pepper powder and 0.5% of each supplement (garlic bulb powder and black pepper powder), respectively. The birds were fed as per recommendation of BIS (1992) feeding standards to meet the energy and protein requirements during starter phase (0-28 days) and finisher phase (29-42 days). The ingredients composition of mash feed for starter and finisher phase of experiment birds is presented in Table 1. The respective feed was prepared at feed factory Godrej Agro vet, Pune. Garlic and black pepper powder was mixed daily with control diet as per the proportion for treatment group.

The experimental feed was analyzed by method of AOAC, 1995. Daily feed intake was recorded. Fortnightly body weight of birds was recorded to determine the growth rate. The data of study analyzed statistically by following completely randomized design (Snedecor and Cochran, 1992)

**Table 1.** Ingredients and nutrient composition of Starter and Finisher feeds

| Ingredient (%)               | Starter feed | Finisher feed |
|------------------------------|--------------|---------------|
| Maize                        | 500          | 500           |
| Maize Gluten                 | 75           | 52            |
| De-oiled Rice Bran           | 90           | 100           |
| Rice Polish                  | 50           | 95            |
| De-oiled Soya Cake           | 87           | 50            |
| Ground Nut Cake              | 90           | 75            |
| Protolive                    | 79           | 99            |
| Mineral Mixture <sup>1</sup> | 1            | 1             |
| DCP                          | 25           | 25            |
| Salt                         | 1.5          | 1.5           |
| Biometh                      | 0.3          | 0.3           |
| Lysine                       | 0.3          | 0.3           |
| Toxin Binder                 | 0.5          | 0.5           |
| Choline                      | 0.3          | 0.3           |
| Meriplex                     | 0.1          | 0.1           |
| Total(kg)                    | 1000         | 1000          |
| Cal.CP%                      | 23.08        | 21.34         |
| Cal.ME (Kcal/kg)             | 2922         | 2939          |

<sup>1</sup> Tracemin CB: Each 1 kg contain -Mn-91 g, Zn- 82 g, Fe-90 g, Cu-16 g, I-2 g and Se-310 g

## 3. Results and Discussion

### 3.1 Chemical composition of feed

Table 2 represents the chemical composition of feed offered to the bird during starter and finisher phase. The Crude protein (CP) content (%) of starter and finisher feed was 23.54 and 21.24, as per the recommendations of BIS (1992). All other nutrients were also within the prescribed limit of BIS (1992)

**Table 2.** Chemical composition (%)

| Ingredients | Starter feed | Finisher feed |
|-------------|--------------|---------------|
| DM          | 93.36        | 92.38         |
| CP          | 23.54        | 21.24         |
| EE          | 3.58         | 3.36          |
| CF          | 4.21         | 4.54          |
| NFE         | 60.53        | 61.89         |
| TA          | 8.14         | 8.97          |
| Ca          | 1.21         | 1.26          |
| P           | 0.80         | 0.85          |

### 3.2 Feed intake and growth performance

The average feed consumption by birds during the whole experimental period was comparable among different treatments (Table 3) indicating no adverse effect of above herbal feed additives on palatability and feed intake. However, the values obtained for average feed consumption were lower as compared to BIS (1992) Values of 3200 g/bird. Similar non- significant effects of garlic supplementation of feed intake in broilers were also reported by Choi *et al.* (2010) In contrast to present results Moorthy *et al.* (2009) recorded higher feed intake ( $P < 0.01$ ) in broilers birds supplemented with black pepper powder. Supplementation of garlic (G) and combination of garlic and black pepper powder (GB) stimulated ( $P < 0.05$ ) growth rate resulting into significant ( $P < 0.05$ ) improved final body weight, net gain and average daily gain (ADG) compared to control (C) and black pepper powder supplemented (B) groups. The differences of growth performance between C and B were non-significant ( $P > 0.05$ ). The improve meat in weight gain in garlic supplemented group (G and GB) may be due to the action of allicin, an organo sulfur compound which inhibits the growth of pathogenic bacteria and aflatoxin producing fungi leading to improved gut environment ( Reeds *et al.*, 1993; Meraj, 1998). Lewis *et al.* (2003) also mentioned that allicin promotes the performance of the intestinal flora, thereby improving digestion and enhancing the utilization of energy for improved growth rate. Significantly ( $P < 0.05$ )

higher body weight gain was observed (30.97 g/day) in garlic bulb powder supplemented group as compared other treatment groups. Higher body weight gain with comparable feed intake resulted into significant ( $P < 0.05$ ) improvement in feed conversion ratio (FCR) in G and GB groups pointing towards the potential of garlic as improving feed utilization efficiency. In case of growth performance, black pepper powder alone failed to exert any significant improvement in FCR showing its idle role in feed utilization efficiency. The best value for FCR was observed in G group supplemented with garlic bulb powder (0.5%) alone. Improvement in FCR of garlic supplemented group may be due to control growth and colonization of various pathogenic microorganisms in the gut of broilers on garlic supplementation resulting into enhanced efficiency of utilization of feed (Bedford, 2000). Meanwhile group G showed generally a high value of dressing percent in comparison with rest treatments. Whereas all treatments revealed no significant difference among them in accordance with edible giblets (Heart %, Gizzard% and liver %) traits. These results assure that the addition of probiotic and prebiotic diet had no significant effects on these traits (Akinleye *et al.*, 2008).

### Conclusion

The study concluded that supplementation of garlic bulb alone or in combination with black pepper seed powder improves growth performance and feed utilization efficiency in intensive broiler production in agro-ecological conditions of Konkan in India.

**Table 3.** Feed intake and growth performance of broilers birds in different dietary treatments

| Parameters                                   | Treatments           |                      |                      |                      |       |
|--|----------------------|----------------------|----------------------|----------------------|-------|
|  | C                    | G                    | B                    | GB                   | SEM   |
| Initial body weight (g/chick)                | 52.00                | 52.00                | 52.00                | 52.00                | --    |
| Final body weight (g/chick)                  | 1245.75 <sup>b</sup> | 1352.75 <sup>a</sup> | 1279.00 <sup>b</sup> | 1336.25 <sup>a</sup> | 9.28  |
| Body weight gain (1-42 d)(g/chick)           | 1193.75 <sup>b</sup> | 1300.75 <sup>a</sup> | 1227.00 <sup>b</sup> | 1284.25 <sup>a</sup> | 21.78 |
| Total feed consumption (g/chick) (1-42 days) | 2789.50              | 2819.25              | 2829.75              | 2811.25              | 40.67 |
| Average daily gain (g/day)                   | 28.42 <sup>b</sup>   | 30.97 <sup>a</sup>   | 28.79 <sup>b</sup>   | 30.57 <sup>a</sup>   | 0.55  |
| Feed conversion ratio ( FCR)                 | 2.33 <sup>a</sup>    | 2.16 <sup>b</sup>    | 2.31 <sup>a</sup>    | 2.18 <sup>b</sup>    | 0.04  |
| Edible parts                                 |                      |                      |                      |                      |       |
| Heart %                                      | 0.70                 | 0.74                 | 0.73                 | 0.76                 | --    |
| Liver %                                      | 3.75                 | 3.68                 | 3.71                 | 3.74                 | --    |
| Gizzard %                                    | 3.18                 | 3.20                 | 3.28                 | 3.36                 | --    |
| Dressing percentage                          | 71.23                | 72.68                | 71.20                | 72.00                | --    |
| Mortality %                                  | 6.00                 | 3.00                 | 5.50                 | 4.50                 | --    |

Means bearing different superscripts in a row differ significantly ( $P < 0.05$ )

## References

- Agah M. J., Norollahi H. 2008. Effect of feed Form and Duration Time in Growing Period on Broilers Performance. *International Journal of Poultry Science*, 7(11): 1074-77.
- Akinleye S.B., Lyoye E.A., Afolani K.D. (2008). The Performance hematology and carcass traits of broiler as affected by diets or without biomine as affected by diets or without biomine natural growth promoter. *World Journal Agriculture Science*, 4: 467 – 470.
- AOAC. 1995 official Methods of Analysis, 16<sup>th</sup> edn. Association of Official Analytical Chemists, Washington. DC.
- Bedford M. 2000. Removal of antibiotic growth promoters from poultry diets: Implications and Strategies to minimize Subsequent problems. *World's Poultry Science Journal*, 56: 347-65.
- BIS. 1992. Indian standard: Poultry feed specifications, 4<sup>th</sup> revision. Bureau of Indian Standards, New Delhi.
- Church D.C., Pond, W.G. 1998. In: Basic Animal Nutrition and feeding, 3<sup>rd</sup> edn. Wiley, New York, NY, USA. Pp: 267-75.
- Demir E., Sarica S, ozcan M.A, Suicmez M. 2003. The use of natural feed additives as alternatives for an antibiotic growth promoter in broiler diets. *Promoter Journal Science*, 44: S44-S45.
- Khalaf A.N., Shakya A.K., Al-Othman, A., El-Agbar Z, Farah H. 2008. Antioxidant activity of some common plants. *Turkish Journal of Biology*, 32: 51-55.
- Lewis M.R., Rose S.P, Mackenize A.M., Tucker L.A. 2003. Effects of dietary inclusion of plant extracts on the growth performance of male broiler chickens. *British Poultry Science*, 44: S43- S44.
- Meraj I. C.A. 1998. Effect of garlic and neem leaves supplementation on the performance as broiler chickens. M.Sc. Thesis, Department of poultry science, University of Agriculture, Faisalabad, Pakistan.
- Moorthy M., Ravi Kumar S, Viswanathan K, Edwin S.C, 2009. Ginger, Pepper and curry leaf powder as feed additive in broiler diet. *International Journal of Poultry Science*, 8: 779- 782.
- Rahmatnejad E, Roshan fekr H., Ashayerizh O, Mamooee M, Ashayerizadeh A. 2009. Evaluation of effetet of several non-antibiotic additives on growth performance of broiler chickens. *Journal of Animal and Veterinary Advances*, 8: 1757 – 60.
- Reeds D.J., Burrin D. G, Dewis T.A, Fiorotto m. L. 1993. Post-natal growth of gut and muscles: Competitors or collaborators, *Proceedings of the Nutrition Society*, 52: 57- 67.
- Rivilln, R.S. 2001. Historical perspective on the use of garlic. *Journal of Nutrition*, 131: 539 – 545.
- Snedecor W.G., Cochran, G.W. 1994. Statistical Methods. East-West Press Pvt. Ltd., New Delhi.
- Tollba A.A. H, Hassan M.S.H. 2003. Using some natural additives to improve physiological and productive performance of broiler chicks under high temperature conditions. Black cumin (*Nigella sativa*) or Garlic (*Allium sativum*). *Poultry Science*, 23: 327 -40.
- Windisch W. K., Schedule C, kroimager A. 2008. Use of phylogenic products as feed additives for swine and poultry. *Journal of Animal Science*, 86: 140-148.