



Effect of Dietary Incorporation of Aniseed (*Pimpinella anisum*) and Ginger (*Zingiber officinale*) Rhizome Powder as Feed Additive on Growth Performance and Nutrient Utilization in Broiler Chickens

Tushar Gupta*, D.P. Tiwari, K.P. Narayana and B.C. Mondal

Department of Animal Nutrition, College of Veterinary and Animal Sciences, G. B. Pant University of Agriculture and Technology, Pantnagar-Uttarakhand, INDIA

*Corresponding author: T Gupta; E-mail: tushargupta633@gmail.com

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ABSTRACT

A feeding trial was conducted to discern the effect of dietary incorporation of aniseed and ginger rhizome powder on growth performance and nutrient utilization in commercial broiler chickens. A total of 120, day-old broiler chicks were divided randomly into 4 treatment groups with 3 replicates each i.e. 10 broiler chicks per replicate. The feeding trial lasted for 42 days viz., A metabolism trial was conducted during the 6th week of feeding trial to know the nutrient utilization. During the starter phase, maximum weight gain was recorded in broiler chicks of treatment group T₃ (827.70 g) fed diet incorporated with 1.0% ginger rhizome powder followed by treatment groups T₁, T₂ and T₄, however, there was no significant difference in body weight gain amongst the different treatment groups. During finisher phase, the average body weight gain was 1313.50, 1365.32, 1308.20 and 1291.36 g in broiler chicks of treatment groups T₁, T₂, T₃ and T₄, respectively and did not differ significantly among different groups. During entire feeding trial period (0-42 days), incorporation of aniseed and ginger rhizome powder in the basal diets non-significantly improved growth performance in terms of body weight gain, feed conversion ratio and performance index. The average cumulative body weight gain was 2120.57, 2152.75, 2135.90 and 2064.43 g in broiler chicks of treatment groups T₁, T₂, T₃ and T₄, respectively and did not differ significantly among different groups. There was no significant difference in nutrient utilization among different treatment groups of broiler chickens.

Keywords: Aniseed, Broiler chicks, Ginger rhizome powder, Growth performance, Nutrient utilization

The fast-growing nature of broilers and their short generation interval has been associated with the use of antibiotic growth promoters in animal feeds. However, the use of antibiotics in the diet is restricted because of their residual effect on birds and in turn adverse effect on human health, environmental hazards and subsequent resistance to bacteria (Lee *et al.*, 2004). Now a day's current research is focused to improve feed conversion ratio and growth rate of birds using useful herbs and herbal preparations as an alternative to antibiotics (Bunyapraphatsara, 2007; Manesh, 2012). Aniseed contains trans-anethole, methylchavicol (Estragole), eugenol, psedoisoeugenol, anisaldehyde. Anethole also inhibits growth of mycotoxin produced by *Aspergillus* species. Anethole, anisaldehyde and myristicin (in aniseed), along with d-carvone (present

in *P. anisum* plant), have been found to have mild insecticidal properties (Leung and Foster, 1996). Aniseed has the ability to improve digestive enzymes by enhancing utilization of nutrients, preventing the growth and activity of pathogenic microorganisms. Pharmacological studies were carried out in broilers, and anise oil showed significant antipyretic activities in rats (Afifi *et al.*, 1994). Aniseed is used to treat dyspeptic and catarrh of the respiratory tract, and as mild expectorants. It was also reported that extracts from anise fruits have therapeutic effects on several conditions, such as gynaecological

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and neurological disorders (Lawless, 1999). The most important phytochemical compounds present in ginger are gingerol, gingerdiol and gingerdione which have the ability to stimulate digestive enzymes for enhancing utilization of nutrients, preventing the growth and activity of pathogenic microorganisms in the gut and possess anti-oxidative activity (Dieumou *et al.*, 2009; Platel and Srinivasan, 2000). It is reported that ginger has lipid-lowering effects, antioxidant and anti-atherosclerotic properties (Shirin and Prakash, 2010). The ginger preserves the lipid-based feeds due to the prevention of auto-oxidation of linoleic acid by gingerol (Kikuzaki and Nakatani, 1993), improves the shelf-life of meat (Ziauddin *et al.*, 1995) and fermented meat sausage (Al-Jalay *et al.*, 1987).

MATERIALS AND METHODS

A total of 120, day-old commercial broiler chicks (Ven Cobb 400 strain) were procured from R.K. poultry, Bajpur, Uttarakhand and randomly divided into 4 treatment groups with 3 replications having 10 chicks in each in a completely randomized design. The broiler chicks in group T₁, were fed basal diet (control) whereas chicks of group T₂, T₃ and T₄ were fed basal diet and incorporated with 1% aniseed powder, 1% ginger rhizome powder and 0.5% aniseed powder plus 0.5% ginger rhizome powder, respectively. Standard broiler diets for starter (0-3 weeks) and finisher (3-6 weeks) phases of growth were prepared by mixing the different ingredients as shown in Table 1 and provided to all the broiler chicks so as to meet the nutrient requirements as per BIS (2007). The feeds were analyzed for proximate principles as per standard methods (AOAC, 1995). The broiler chicks were raised in a deep litter system under standard management condition and provided *ad libitum* feed and clean drinking water throughout the trial period.

Body weight of the chicks and feed intake were recorded weekly during the feeding trial and feed conversion ratio (FCR) and performance index were calculated. During the 6th weeks of the experiment, a metabolism trial following standard procedure was conducted for three days 2 chicks from each replicate in each treatment to know the nutrients utilization. The experimental data obtained during the study were analyzed statistically (Snedecor and Cochran, 1994).

RESULT AND DISCUSSION

The chemical composition of broilers starter and finisher diets are presented in Table 1. The growth performance of broiler chicks fed experimental diet is presented in Table 2. During the starter phase (0-21 days) body weight gain, feed intake, feed conversion ratio and performance index did not differ significantly among different treatment groups of broiler chickens due to dietary incorporation of aniseed and ginger rhizome powder.

Table 1: Ingredient and chemical composition (%) of basal diet of broiler starter and finisher diets

| Ingredients | Broiler starter (0 -3 weeks) | Broiler finisher (3 – 6 weeks) |
|-----------------------------|---------------------------------|-----------------------------------|
| Maize | 53.00 | 56.00 |
| Deoiled soyabean meal | 36.00 | 32.00 |
| Vegetable oil | 1.00 | 2.00 |
| Rice polish | 3.55 | 3.55 |
| Groundnut cake | 3.00 | 3.00 |
| Lysine | 0.20 | 0.20 |
| DL-methionine | 0.30 | 0.30 |
| Dicalcium phosphate | 1.50 | 1.50 |
| Trace mineral mixture | 0.50 | 0.50 |
| Common salt | 0.40 | 0.40 |
| Vitamin premix | 0.35 | 0.35 |
| Cocciostat | 0.05 | 0.05 |
| Hepatocare | 0.10 | 0.10 |
| Choline chloride | 0.05 | 0.05 |
| Chemical Composition | | |
| Dry matter | 94.52 | 93.20 |
| Crude protein | 22.17 | 20.21 |
| Ether extract | 5.50 | 5.00 |
| Crude fibre | 4.40 | 4.30 |
| Ash | 6.20 | 7.70 |
| Nitrogen-free extract | 61.73 | 62.79 |

The results of present study corroborated with the finding of Yazdi *et al.* (2014) who did not find any significant effect on weight gain and feed conversion ratio of broilers due to incorporation of aniseed powder. Similarly, to the present findings, Barazesh *et al.* (2013) also showed that addition of ginger powder as feed additives in diet of broilers did not affect growth performance. During the finisher phase (21-42 days) body weight gain, feed intake, feed conversion ratio and performance index (Table 2) did not differ significantly among different treatment groups of broiler chickens due to dietary inclusion of aniseed and ginger rhizome powder.

Table 2: Average cumulative growth performance of broiler chicks fed diets incorporated with aniseed and ginger rhizome powder

| Parameters | Treatments/ Groups | | | |
|-------------------------------|--------------------|----------------|----------------|----------------|
| | T ₁ | T ₂ | T ₃ | T ₄ |
| 0-21 days | | | | |
| Initial body weight (g) | 41.33±1.45 | 40.17±0.60 | 42.50±0.76 | 42.33±3.47 |
| Body weight (g) | 848.40±27.78 | 827.60±7.85 | 870.20±7.52 | 815.40±10.76 |
| Weight gain (g) | 807.07±28.06 | 787.43±8.38 | 827.70±8.23 | 773.07±13.52 |
| Feed intake (g) | 1114.33±20.35 | 1095.83±22.19 | 1123.83±11.49 | 1079.37±18.7 |
| Feed conversion ratio | 1.38±0.03 | 1.39±0.01 | 1.36±0.02 | 1.40±0.03 |
| Performance index | 584.95±30.67 | 565.93±15.50 | 609.75±11.42 | 554.06±20.04 |
| Feed cost/ kg weight gain (₹) | 48.25±0.94 | 50.38±0.49 | 49.62±0.56 | 50.83±0.92 |
| 21-42 days | | | | |
| Body weight (g) | 2161.90±17.09 | 2192.92±11.32 | 2178.40±37.35 | 2106.76±14.65 |
| Weight gain (g) | 1313.50±13.99 | 1365.32±15.23 | 1308.20±40.93 | 1291.36±20.33 |
| Feed intake (g) | 2834.58±136.59 | 2743.92±49.78 | 2616.20±69.49 | 2619.13±54.84 |
| Feed conversion ratio | 2.16±0.08 | 2.01±0.01 | 2.00±0.02 | 2.03±0.03 |
| Performance index | 610.34±16.20 | 679.42±3.05 | 654.29±24.97 | 637.03±15.07 |
| Feed cost/ kg weight gain (₹) | 75.00±2.80 | 75.17±0.53 | 76.16±0.81 | 76.54±1.24 |
| 0-42 days | | | | |
| Body weight (g) | 2161.90±17.09 | 2192.92±11.32 | 2178.40±37.35 | 2106.76±14.65 |
| Weight gain (g) | 2120.57±17.93 | 2152.75±10.93 | 2135.90±37.34 | 2064.43±16.53 |
| Feed intake (g) | 3948.92±127.09 | 3807.30±8.81 | 3740.03±79.20 | 3725.10±28.81 |
| Feed conversion ratio | 1.86±0.07 | 1.77±0.01 | 1.75±0.01 | 1.80±0.00 |
| Performance index | 1141.64±45.67 | 1217.24±9.75 | 1219.87±18.26 | 1144.10±9.68 |
| Feed cost/ kg weight gain (₹) | 64.85±2.35 | 66.11±0.30 | 65.85±0.36 | 66.89±0.45 |

Table 3: Nutrient utilization (%) in broiler chicks during finisher phase fed diets incorporated with aniseed and ginger rhizome powder

| Parameters | Treatments/ Groups | | | |
|--------------------------------|--------------------|----------------|----------------|----------------|
| | T ₁ | T ₂ | T ₃ | T ₄ |
| Dry matter metabolizability | 74.70±2.45 | 74.98±1.64 | 75.13±1.92 | 75.78±2.32 |
| Crude protein metabolizability | 72.53±2.21 | 74.61±2.28 | 74.73±1.79 | 74.92±1.85 |
| Ether extract digestibility | 75.13±2.36 | 76.69±2.90 | 76.40±2.33 | 77.20±2.77 |

The overall (0-42 days) cumulative performance of broiler (Table 2) in terms of body weight gains, feed intake, feed conversion ratio and performance index did not differ significantly among different treatment groups of broiler chickens due to dietary inclusion of aniseed and ginger rhizome powder. The present results clearly indicated that dietary aniseed and ginger rhizome powder supplementation in broiler diet had no significant effect on growth performance which were similar with the findings of Doley *et al.* (2009) and Amad *et al.* (2011) who reported that growth performance of broiler was not

influenced by inclusion of ginger rhizome powder. Yazdi *et al.* (2014) reported that growth performance of broiler was not influenced by inclusion of aniseed powder.

Data pertaining to the average nutrient utilization in broiler chicks are presented in Table 3. The nutrient utilization such as dry matter, crude protein and ether extract in broiler during the metabolism trial revealed no significant improvement in broilers of treatment groups as compare to control group. The present results indicated that the utilization of dry matter, crude protein and ether extract were non-significantly improved due to incorporation of

aniseed and ginger rhizome powder in the diet of broiler chicks which might be due to fact that the phytochemicals present in aniseed and ginger rhizome stimulate the secretion and activity of digestive enzymes (Zhao *et al.*, 2011; Zhang *et al.*, 2009; Herwati, 2010).

Average feed cost per kg weight gain of broilers given different treatment diets during 0-21 days (starter phase), 21-42 days (finisher phase) and 0-42 days of whole feeding trial did not differ significantly among the various treatment groups of broilers. The average values of feed cost for per kg weight gain of broilers fed different treatment diets during overall experimental period (0-42 days) were ₹ 64.85, 64.11, 65.85 and 66.89 in treatments T₁, T₂, T₃ and T₄, respectively. The highest feed cost per kg live weight gain was observed in treatment group T₄ supplemented with aniseed powder plus ginger rhizome powder followed by T₂ supplemented with aniseed powder, T₃ supplemented with ginger rhizome powder and lowest in T₁ control, without supplementation of aniseed or ginger rhizome powder.

CONCLUSION

In the view of the aforesaid findings, it can be concluded that dietary incorporation of aniseed powder or ginger rhizome powder at a level of 1.0% alone or their combination had no significant effect on growth performance, nutrient utilization.

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