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RESEARCH ARTICLE

EFFECT OF DIETARY SUPPLEMENTATION OF GARLIC AND GINGER IN DIFFERENT COMBINATION ON FEED INTAKE AND GROWTH PERFORMANCE IN COMMERCIAL BROILERS

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ABSTRACT

A study was conducted at AFU livestock farm, Rampur, Chitwan in 2017-18 to determine the effect of dietary supplementation of garlic and ginger in different combination on feed intake, growth performance and economics by using commercial Cobb 500 broilers. A total of two hundred, 11-day-old chicks were allocated randomly to five different treatments. The experiment was designed in a Completely Randomized Design, each treatment with four replication and each replication had 10 birds. They were fed isoproteinous and isocaloric Basal diet (BD) and BD supplemented with four different levels of garlic and ginger such as T₁ (BD only), T₂ (BD + 1% garlic); T₃ (BD + 1.0% ginger); T₄ (BD + 0.5% garlic and 0.5% ginger) and T₅ (BD + 1% garlic and 1% ginger). Weekly average body weight, weight gain, feed consumption, and feed efficiency were recorded up to sixth week of age. All data were statistical analyzed using Completely Randomized Design. The results showed that overall feed consumption was significantly ($P \leq 0.05$) higher for broiler fed diet supplemented with 0.5% garlic and 0.5% ginger (T₄) followed by T₅ (basal diet with 1% garlic and 1% ginger). On the other hand significantly higher ($P \leq 0.01$) cumulative weekly live body weight and body weight gain (g/bird) was found for the treatment with supplemented 1% garlic powder (T₂), followed by broiler fed diet supplemented with 0.5% garlic and 0.5% ginger powder (T₄). Similarly, feed conversion ratio was significantly ($P \leq 0.01$) better in broiler fed basal diet with supplementation of 1% garlic (T₂) followed by basal diet with supplementation of 0.5% garlic and 0.5% ginger (T₄). The maximum benefit was obtained from the broiler fed basal diet with supplementation of 1% garlic (T₂). The findings revealed that broiler fed basal diet with supplementation of 1% garlic powder had helped as a growth promoter contributing to the better growth performance, feed efficiency and higher benefit: cost ratio. Thus, addition of 1% garlic powder can be safely recommended as a growth promoter in broilers.

KEYWORDS

broiler, feed conversion ratio, garlic, ginger, growth performance.

1. INTRODUCTION

Poultry industry is the epitome of economy in Nepal in the recent decades. It has become one of the major national industries (Bhattarai, 2005). According to FAOSTAT 2014, GDP contribution by the poultry industry is 3.5% and the investment in the industry is NRs 22 billion with the growth rate of 17-18%. Poultry meat is very good and cheap source of protein which is essential for the growth and maintenance of body. Increasing awareness about the nutritional value of meat among the consumer, increase income level of people, change in food habits, population growth, inflow of tourists and easy access to market, the demand of poultry meat is increasing every year. Poultry meat is very good and cheap source of protein which is essential for the growth and maintenance of body.

Increasing awareness about the nutritional value of meat among the consumer, increase income level of people, change in food habits, population growth, inflow of tourists and easy access to market, the demand of poultry meat is increasing every year. 80% of the total cost of production of the poultry industry is contributed by the poultry feed (Borazjanizadeh et al., 2011).

As the poultry industry is booming, there is always a challenge to maintain the surplus supply of feed. To soar the efficiency of the feed, different organic and inorganic substances are added to the feed, which are feed additives. Feed additives are the non-nutritional substance that accelerate growth and efficiency of the feed utilization (Church and Pond, 1998). The use of additive in poultry feed to attain the properties like antibiotic,

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antioxidant, and growth promoter. Implementation of such properties of the additives eventually minimize the effective cost of the feed. In the commercial scale most of the feed additive used are the synthetic feed additives. There are various questionable effect of the synthetic product in the poultry health. And the use of antibiotics in the commercial scale are questionable due to the antimicrobial resistance. Due to various factors like antibiotic resistance, phasing out of antibiotic compound as growth promoter from animal feed has been reported (William et al 2001). To replace synthetic additives without adversely affecting the performance of birds, natural growth promoters such as prebiotics, probiotics, synbiotics, enzymes, plant extracts, etc., can be used to feed the broilers (Borazjanizadeh et al.,2011).

Due to the growth promoting effect, antibiotic effect, and immunological effect of the garlic and ginger, in the present scenario garlic and ginger are broadly used as feed additives in the poultry feed. The use of garlic as food supplement has been reported for great health benefits (Sallam 2004, Stomacev et al 2011). The chemical properties of the substances in the garlic and ginger shows antibacterial effects, antifungal and antiparasitic effects (Ankri and Mirelman 1999; Konjufea et al 1977). Report showed that dietary immunomodulator (like garlic and ginger) that enhance humoral immunity and immunological stress will affect growth performance most positively Garlic shows immune enhancing activities that include the promotion of lymphocyte formation (Kyo et al 2001; Humphrey, 2012). The inhibitory properties of garlic on growth of microorganism including bacteria, yeast, viruses and fungi has been documented (Kivanc and Kunduhoglu, 1997).

2. MATERIALS AND METHODS

The experiment was conducted from 15th November 2017 to 24th December 2017 at AFU Livestock, Rampur Chitwan. A total of 200, day old Cobb500 broiler chicks were grouped brooded in deep litter for 10 days and were fed commercial broiler starter ration. After 10 days, birds were shifted to deep litter housing system for experimental trial in Completely Randomized Design (CRD) with five treatment and four replications. The starter ration was feed for 0-4 weeks and finisher ration was fed for 5-6 weeks. Garlic and Ginger was cut into smaller pieces and dried sufficiently in the sunlight. After drying, required amount of ginger and garlic was prepared by fine grinding and passing through 1 mm sieve and stored in the airtight plastic container till incorporated in feed. Other feed ingredients were also purchased from local market was grounded at feed meal of AFU. Then grounded garlic and ginger were mixed in the prepared feed in the proportion of 0.5% and 1% on weight basis for required treatment groups. Thus, experimental diets consisted of standard broiler feed (Basal diet) supplemented with different levels of garlic and ginger. Diets were formulated in such a way that each diet contained at least the minimum recommended levels of protein and energy, recommended for Cobb 500 broilers. Different dietary treatments used in experiment were as follows.

- T₁ : Control diet (Basal diet)
- T₂ : Basal diet + 1% garlic
- T₃ : Basal diet + 1% ginger
- T₄ : Basal diet + 0.5% garlic + 0.5% ginger
- T₅ : Basal diet + 1% garlic + 1% ginger

Poultry are very sensitive to the environmental condition in which they are raised.

Floors, interiors of the walls as well as the roof were scrubbed, and the entire previous litter and undesirable materials were removed from the poultry house. All pens in experimental shed were washed with clean water, phenol and coated with lime. Before the start of experiment, the experimental unit was disinfected by using 5% phenol solution, followed by spraying of 3% solution of Kohrsolin inside and outside of the experimental house. A thin layer of dust lime was broadcasted as disinfectant on the floor and rice husks was used as litter. Filament bulbs and gas brooder were used during brooding period. Experiment groups were separated using concrete partitioning. All groups were provided with individual feeder and waterer. Manual turning and mixing of feed was done frequently 4-5 times in a day. All the groups were provided similar environmental and management condition during entire experimental period.

The feed intake was calculated weekly by subtracting the feed residue over from each feed offered. The average weekly body weight gain was calculated by subtracting previous live weight of the birds from their corresponding body weight. The weekly cumulative feed conversion ratio

of the birds in each replication was determined by dividing the weekly cumulative feed intake by their respective average total body weight. While calculating the economy, the gross expenditure was calculated by the sum of cost of chicks, brooding, medicines, herbs, feeds, labors etc. at the end of the experiment. Gross income was obtained by selling of final body weight of birds and litters. The data collected were analyzed statistically using MSTAT. The data were subjected to analysis of variance. Differences between the treatments were tested for significance by Least Significance difference (LSD) by using MSTAT. Where needed descriptive analysis was done by using MS Excel 2007.

3. RESULT AND DISCUSSION

The overall weekly feed consumption was recorded significantly ($P < 0.05$) highest (1.302 kg) in treatment fed basal ration supplemented with 0.5% garlic and 0.5% ginger (T₄) which was statistically similar with T₅ (basal diet with 1% garlic and 1% ginger). Similarly, significantly ($P < 0.05$) minimum weekly feed consumption (1.208 kg) was recorded in control group (T₁) whereas treatments T₂ (basal diet with 1% garlic) and T₃ (basal diet with 1% ginger) were in between T₄ and T₁. Similar result was also observed in overall mean daily feed consumption. Some researchers had reported the similar results to this study who had reported that feed intake was higher in garlic supplemented broilers as compare to control group (Oladele et al., 2012; Isa, 2011; Mansoub and Myandoab, 2011). In 4th week of experiment, significantly ($P < 0.01$) maximum body weight (2645.75 g) was recorded for T₂ (Basal ration supplemented with 1% garlic) which was statistically similar with T₃, T₄ and T₅. Significantly ($P < 0.05$) minimum body weight (2170.00 g) was observed in T₁ (control group).

Similar significant result on total body weight of broiler with garlic supplementation was reported by stated that effect of garlic supplementation was found non-significant on its total body weight (Aji et al., 2011; Rahimi et al., 2011). In contrast, a group researcher had reported that there is no any significant ($P > 0.05$) effect in weight gain of broiler by inclusion of raw garlic paste and sun-dried garlic powder in the broiler diet (Ologhobo et al., 2008).

Mean weekly body gain (2606.32 g) was significantly ($P < 0.01$) higher with fed basal supplemented with 1% garlic (T₂) at 4th week of experimental period which was similar with T₃ (basal ration with 1% ginger), T₄ (basal ration with 0.5% garlic and 0.5% ginger) and T₅ (basal ration with 1% garlic and 1% ginger). While fed basal ration without supplementation garlic and ginger (T₁) has significantly ($P < 0.01$) minimum weekly body weight gain (2132.786 g). The overall daily weight gain was significantly ($P < 0.01$) higher (85.089 g) in broiler fed diet supplemented with 1% garlic (T₂) which was statistically similar with T₄ (basal ration with 0.5% garlic and 0.5% ginger) and T₅ (basal diet with 1% garlic and 1% ginger) followed by weight gain (78.268 g) in broiler fed diet with supplemented with 1% ginger (T₃). Similarly, overall daily weight gain was significantly ($P < 0.05$) minimum (67.777g) in T₁ (control group).

The findings are consistent with the result of who found a positive and significant effect on the body weight gain with addition of garlic in broiler diet (Pourali et al., 2010; Mansoub, 2011; Stanacev et al., 2011; Suriya et al., 2012). These results are similar with the findings of had also the same findings with this results who reported the significant ($P < 0.05$) improvement on body weight gain was found in the broilers supplemented with garlic in their diet as compared to control and to those of mixture of garlic and ginger (Kumar et al., 2010; Songsang et al., 2008; Ahmad, 2005; Mahmood et al., 2009).

The overall mean weekly feed conversion ratio showed significantly ($P < 0.01$) poor feed conversion ratio (2.545) in control group (T₁) whereas basal diet supplemented with 1% garlic (T₂) has significantly ($P < 0.01$) better feed conversion ratio. By the supplementation use of garlic in broiler diet results the better feed conversion ratio, greater feed efficiency and utilization which was also reported by reported that there is better FCR in the broilers supplemented with garlic in their basal diet (Esmail, 2012; Mahmood et al., 2009; Onu, 2010; Fadlalla et al., 2010; Prasad et al., 2009; Raeesi et al., 2010; Mansoub, 2011; Suriya et al., 2012).

While comparing the benefit: cost ratio over feed cost from each bird with control and different treatment groups, it is clear that maximum benefit was obtained in garlic group (T₂) followed by T₄ (basal ration with 0.5% garlic and 0.5% ginger), T₅ (basal ration with 1% garlic and 1% ginger), T₃ (basal ration with 1% ginger). Diet without supplementation of garlic and ginger (T₁) had lowest benefit: cost ratio.

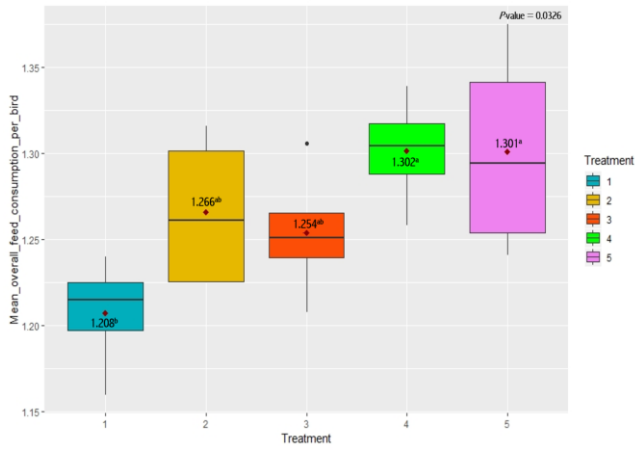


Figure 1: Overall mean weekly feed consumption (Kg/bird)

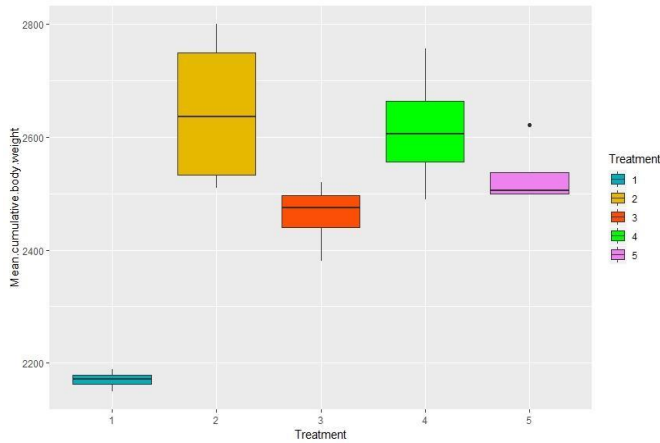


Figure 2: Mean cumulative body weight (g/bird)

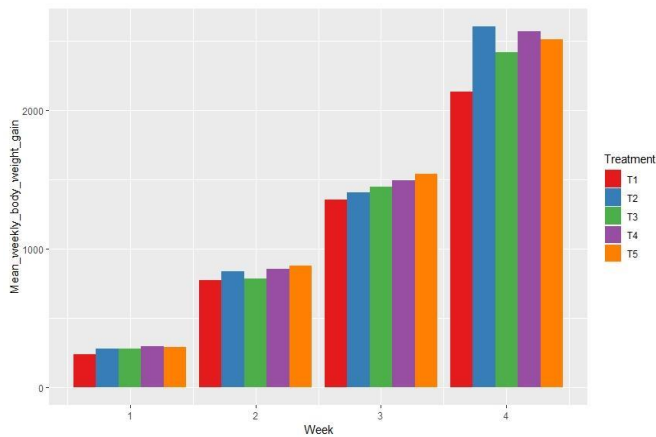


Figure 3: Mean weekly body weight gain (g/bird)

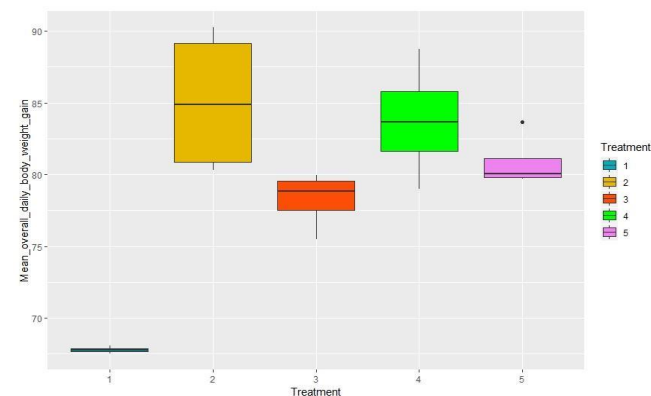


Figure 4: Mean overall daily body weight gain(g/bird)

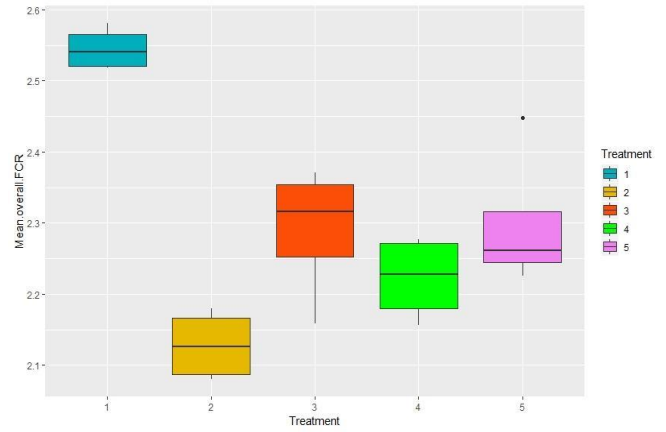


Figure 5: Mean overall FCR

4. CONCLUSION

The study was planned to generate more information about the effect of feeding dietary supplementation of garlic and ginger and their combination on the growth performance of broiler chicken. The results obtained revealed that supplementation of garlic at the rate of 1% had significantly improved body weight, body weight gain and feed conversion ratio. From the results of this experiment, it can be concluded that supplementation of certain proportion of garlic improves performance of broiler when added as feed additives, an alternative to antibiotic growth promoter in commercial broiler farms. In addition, basal feed supplementation of 1% garlic was superior in terms of Benefit: Cost ratio and thus could increase farmer's profitability. However, these results need to be verified in terms of critical level of addition in the farmer's management conditions before making any recommendations.

Farmers/poultry growers can utilize added Garlic powder to increase overall growth performances (AWFI, AWWG, Relative LW and FCR) in broiler production. Also they can utilize it to obtain overall economic profits (Net income/bird and B:C Ratio) in broiler production.

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