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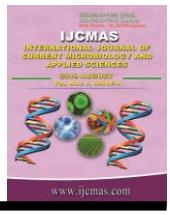

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Studies on Feed Intake, Growth Performance and Economics of Broilers Fed Garlic Powder

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A B S T R A C T

The present experiment was conducted to find out the effects of adding different levels (0, 0.1 and 0.5%) of garlic (*Allium sativum*) powder to the basal experimental diet on the feed intake, growth performance and economics of broiler chicks. One hundred and eighty (n=180) day old unsexed white commercial broiler chicks (Cobb-400) were randomly distributed into three dietary treatments of 60 birds/dietary treatment and each treatment contained 4 replicates (15 birds/replicate). The dietary treatments were control (T_1-basal diet only), garlic powder supplemented at 0.1% (T_2) and 0.5% (T_3) in basal diet. Daily feed intake, weekly body weight and residue left over were recorded to calculate the feed conversion ratio. Results revealed that dietary supplementation of 0.1% garlic powder (T_2) significantly ($P<0.001$) improved body weight, body weight gain as compared to birds supplemented with 0.5 % garlic powder (T_3) and control (T_1). Dietary supplementation of 0.1% garlic powder (T_2) significantly ($P<0.05$) improved feed intake and feed conversion ratio as compared to birds supplemented with 0.5 % garlic powder (T_3) and control (T_1). Total cost (₹)/kg meat was reduced ($P<0.001$) in 0.1% garlic (T_2) as compared to 0.5 % garlic (T_3) supplemented birds or control (T_1). Thus, dietary supplementation of 0.1 % garlic had beneficial effect on growth performance and cost of production.

Introduction

Feeds containing no chemical additives are increasingly used in poultry nutrition. For this reason, herbs and natural feed additives i.e. garlic, fenugreek, thyme, etc. are being investigated as natural sources biologically important substances (Demir *et al.*, 2003). Garlic (*Allium sativum*) is bulbous vegetable, well known spice and medicinal plant. It contains organic sulphurius compounds such as aliin, allicin, ajoene, allylpropyl disulphide, diallyl trisulphide and sallilcisteine (Mansoub, 2011). Recent research works on garlic formulations as feed additives have shown encouraging results with regards to weight

gain, feed efficiency, lowered mortality and increased livability in poultry birds (Karangiya *et al.,* 2016). Hence, the present study was designed to study the potential of incorporating different levels of garlic as a growth promoter in commercial broilers.

Materials and Methods

Birds, ration, experimental design and place of work

One hundred and eighty (n=180) day old commercial broiler chicks (strain 'Cobb-400') were randomly distributed into three groups with 4 replicates of 15 birds in each group. Garlic bulbs used in trial was procured from local market then dried in hot air oven, dry bulbs were powdered in an electrical grinder and stored in air tight container at room temperature for use. Dietary treatments were T_1: Basal diet without garlic powder supplementation (Control), T_2: Basal diet with garlic powder supplementation 1g/kg of feed and T_3: Basal diet with garlic powder supplementation 5g/kg of feed. The basal diets were formulated as per the standards of NRC (1994). The research work was conducted for six weeks at private poultry farm of Dangia village, Dantiwada taluka, Banaskantha district of Gujarat, India.

Observations Recorded

Body weight and body weight gain

Body weight of the individual experimental chicks were recorded in the morning before feeding with the help of digital weighing balance at day old and thereafter at weekly interval till six weeks of age.

Feed intake and feed conversion ration

Feed consumption was measured by weighed quantity of feed offered to each group and at the end of week feed left over was weighed and recorded. On the basis of that average weekly feed intake and feed conversion ratio (FCR) was calculated.

Mortality

Broilers under study were routinely supervised for any ailment or death on day-to-day basis during regular operation viz., feeding, watering etc. Mortality was recorded as and when occurred. Mortality rate (%) was calculated from the records of dead birds up to end of the study against total number of birds.

Economics

Relative economics was calculated by subtracting the cost of feeding from the output of bird sold at ₹ 70 per kg live weight. Garlic used for experimental feeding was purchased at ₹ 60 per kg.

Statistical analysis

All the recorded and calculated data were subjected to statistical analysis by "factorial and completely randomized design" (FCRD) employing one-way analysis of variance as per Snedecor and Cochran (1994). A p-value of <0.05 was considered as significant difference among the treatments groups and the comparison of means were tested as per Duncan's multiple range test (DMRT) described by Duncan (1955).

Results and Discussion

Body weight

Average initial body weight (IBW) and corresponding final body weight (FBW) of broiler chicks are presented in Table 1. The body weight of birds were significantly higher ($P<0.001$) in garlic supplemented birds as compared to without supplemented control

birds. When the diet of birds were supplemented with 0.1 % garlic powder (T_2) resulted in higher (P<0.001) body weight as compared to birds fed with 0.5 % garlic powder (T_3) and without garlic supplemented control birds (T_1). Mahmood *et al.,* (2009) and Aji *et al.,* (2011) also supported that garlic supplementation significantly improved body weight. While Rahimi *et al.,* (2011) reported that garlic supplementation had no significant effect on body weight.

Body weight gain

Total body weight gain was significantly (P<0.001) higher in T_2 as compared to T_3 and T_1 (Table 1). Earlier studies have reported mixed responses in body weight gain to garlic supplementation. Stanacev *et al.,* (2011) and Suriya *et al.,* (2012) reported that garlic supplementation significantly improved body weight gain. In present study, better weight gain in T_2 might be due to the action of allicin which inhibits the growth of pathogenic bacteria by interfering with bacterial cell metabolism (Ghosh *et al.,* 2010). Apart from this, garlic also enhances pancreatic enzymes activity (Ramakrishna *et al.,* 2003) and activates the digestive process which improves absorption of nutrients and ultimately the growth.

Feed intake

Total feed intake was significantly (P<0.05) better in birds receiving 0.1 % garlic (T_2) as compared to birds that are receiving either 0.5 % garlic (T_3) or control (Table 1). Slight reduction in feed intake at higher doses might be due to increasing repulsive odour and taste of garlic (Pourali *et al.,* 2010). Javandel *et al.,* (2008) reported that feed consumption was significantly higher in birds fed diets with lower concentration of garlic 0.125 and 0.25 % as compared to higher level 0.5, 1 and 2 %. Similar findings were also reported by Mansoub and Myandoab (2011). In contrast, Rahimi *et al.,* (2011) reported non-significant effect of garlic supplementation on feed intake in broilers.

Table.1 Growth performance of broilers fed different levels of garlic

Parameters		Treatments		P Value
	T_1	T_2	T_3	
IBW (g)	42.28±0.31	42.27±0.32	42.18±0.33	**NS**
FBW (g)	2013.69±6.89^{a}	2097.02±5.86^{c}	2039.95±3.77^{b}	**0.001*** **
BWG (g)	1971.50±6.92^{a}	2054.70±5.77^{c}	1997.70±3.68^{b}	**0.001*** **
FI (g)	3461.10±36.69^{a}	3615.70±8.8^{b}	3514.70±50.46^{b}	**0.041***
FCR	**1.82±0.01^{b}**	**1.76±0.01^{a}**	**1.79±0.01^{ab}**	**0.017***

Means with different superscripts in a row differ significantly.
*(P < 0.05) ** (P < 0.01) *** (P < 0.001) NS- non-significant
IBW: Initial Body Weight, FBW: Final Body weight, BWG: Body Weight Gain, FI: Feed Intake, FCR: Feed Conversion Ratio

Table.2 Economics of feeding different levels of garlic

Parameters		Treatments		P Value
	T_1	T_2	T_3	
Feed cost (₹)/kg live broiler	48.03±0.40[b]	46.74±0.20[a]	47.92±0.24[b]	**0.022***
Total cost (₹)/kg live broiler	67.34±0.45[b]	65.90±0.22[a]	67.22±0.27[b]	**0.023***
Total cost (₹)/kg meat	90.51±0.60[b]	87.67±0.29[a]	89.90±0.36[b]	**0.003****
Total cost (₹) of production/broiler	**134.20±0.97**	**135.65±0.27**	**135.35±0.49**	**NS**

Means with different superscripts in a row differ significantly.
*(P < 0.05) ** (P < 0.01) *** (P < 0.001) NS- non-significant

Feed conversion ratio

The better feed conversion ratio (P<0.05) was observed in T_2 as compared to T_3 and T_1 (Table 1). Results of the present study are in agreement with previous findings of Fadlalla *et al.,* (2010) and Suriya *et al.,* (2012). On the other hand, Aji *et al.,* (2011) reported non-significant effect of garlic on feed conversion ratio. In the present study better FCR in garlic supplemented group might be due to control of the growth and colonization of various pathogenic microorganisms in the gut leading to enhanced efficiency of utilization of feed. Thus, better FCR in T_2 may be due to nutrient sparing effect of garlic.

Mortality

Out of 180 chicks reared only 3 chicks were died during entire experiment period indicating that the mortality (%) was well within the normal limit. Total mortality (%) was 1.67 in all the treatment groups with 3.33, 0.00 and 1.67 in T_1, T_2 and T_3 experimental groups, respectively. The results of the present study were supported by the earlier findings of Fadlalla *et al.,* (2010). In present study, lower mortality in garlic fed birds may be due to antimicrobial action of garlic

Economics of feeding

Economics of garlic supplementation at various levels is presented in Table 2. The Feed cost (₹)/kg live broiler, Total cost (₹)/kg live broiler was significantly (P<0.05) lower in T_2 as compare to T_3 and T_1. Total cost (₹)/kg meat was significantly (P<0.001) lower in T_2 as compare to T_3 and T_1. Lowered cost of production in garlic supplemented group is mainly because of better feed conversion ratio due to garlic's growth promoting effect. In contrary to present findings, Aji *et al.,* (2011) reported increased feed cost when birds were supplemented with garlic as compared to control.

It could be concluded that 0.1% garlic supplemented group had significantly higher growth rate and better economic benefit than 0.5% garlic supplemented group and control. Garlic at 0.1% is an economical alternative to antibiotic growth promoters and can be easily made and adopted by the poultry farmers.

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