ECONOMICAL AND IMMUNOLOGICAL IMPACT OF GINGER (*Z. OFFICINALE*) EXTRACT ON BROILER CHICKS

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ABSTRACT: This research study was planned to explore the economic and immunological impact of ginger (*Z. officinale*) in commercial broiler chicks. One hundred and sixty (160) day old broiler chicks purchased form local hatchery were divided into four groups A,B,C and D; having 40 chicks in each group. Each group was further replicated four times with 10 chicks per replicate. Ginger extract @ 30, 40 and 50 ml/liter of drinking water was given to groups A, B and C respectively. Group D was kept as control. Data on body weight gain, feed intake and economics were recorded for each replicate of the respective groups. It was observed out that treatment groups gained significantly ($P<0.05$) higher body weight than control group. Significant ($P<0.05$) difference was noticed in mean feed intake in group B and C. Mean anti body titer against IBD was higher for group B and C. Whereas Mean anti body titer against ND was higher for group C. Mean feed cost per chick was not affected by any group. Gross return was significantly ($P<0.05$) better in all the treatment groups as compared to control group D. It was concluded that use of ginger extract had significantly improved the immunity and over all performance of commercial broiler chicks.

Key words: Broiler chicks, economics, body weight, feed intake.

INTRODUCTION

Ginger is a perennial herb, member of *Zingibeacae* that has different medicinal properties (Lee *et al*., 1986; Kiuchi *et al*., 1992; Janssen and Meyboom, 1996). It acts as a stimulating tonic, stomachic, and carminative, increasing the secretion of gastric juice. It is eminently useful in habitual flatulency, atonic dyspepsia, hysteria, and enfeebled and relaxed habits, especially of old and gouty individuals; and is excellent to relieve nausea, pains and cramps of the stomach and bowels, and to obviate tenesmus, and especially when those conditions are due to colds (Onyeagba *et al*., 2004). Ginger is occasionally of value in fevers, particularly where the salivary secretions are scanty and there is pain and movement of gases within the intestines. Here, though a stimulant, it will assist in producing sedation by re-establishing secretion and relieving the distressing gastro-intestinal annoyances (Chanemingver and Chalahat, 2002). Ginger has been shown to be effective against the growth of both Gram-positive and Gram-negative bacteria including Escherichia Coli, Proteus vulgaris, Salmonella typhimurium, Staphylococcus aureus and Streptococcus viridans. (Mascolo, 1989). Other digestive benefits from ginger are the natural enzyme action on protein digestion, stimulation of digestion, pro-biotic support of the natural gut flora, anti-diarreal properties and liver protection. Ginger has been shown to be effective against the growth of both Gram-positive and Gram-negative bacteria including Escherichia Coli, Proteus vulgaris, Salmonella typhimurium, Staphylococcus aureus and Streptococcus viridans. (Srivastav and Mustafa, 1989).

Broiler farming give 80% return over the capital invested due the rapid return, small marketing age, less space requirement and higher weight gain. In broiler production feed cost constitutes about 70-75% of the total cost of production. The economical poultry production needs the efforts to reduce the feed consumption and cost in addition to the increased efficiency of feed utilization (Qureshi, 1991). The present study was conducted to determine the economic and immunological impact of ginger on the production of broiler chicks.

MATERIALS AND METHODS

Present research study was conducted at Agricultural University Khyber Pakhtunkhwa, Peshawar poultry farm to investigate the effect of different levels of ginger (*Z. officinale)* extract given in drinking water to broiler chicks.

Experimental Design: Present research study was conducted in Completely Randomized Design (CRD). One hundred and sixty (160) day old broiler chicks purchased from a local hatchery were divided into four groups A, B, C and D for different treatments. Group A,

B and C were given ginger (*Z. officinale)* extract @ 50ml, 40ml and 30ml/liter of drinking water respectively, while group D was kept as control.

Each group was further divided into four replicates with 10 chicks per replicate. The chicks were kept in pens that were provided with feeders, drinkers, electric bulbs and saw dust was used as bedding material. All the pens were in an open type house.

Parameters:

Body weight gain: Body weight gain was recorded on weekly basis for each replicate by subtracting the initial body weight from the final body weight. Total body weight gain at the end of experiment was calculated from the weekly body weight gain data for each replicate separately.

Feed intake: Commercial ration was given to chicks *ad libitum* throughout the experiment. Total feed intake for each replicate was calculated from the data of feed intake recorded daily. Daily feed intake was calculated by subtracting the amount of feed refused from the amount of feed offered.

Antibody Titer Determination: At the end of experiment blood was collected from all replicates. Serum was separated, labeled and kept at -8ºC till the samples were sent to the Grand Parent Laboratories Lahore, Pakistan for antibody titer determination against Newcastle disease (ND) and Infectious bursal disease (IBD) using ELISA Kit techniques.

Economics of the research study: Economics in term of feed cost and gross return were calculated at the end of research study. Mean feed cost per chick was calculated according to the market rate for feed on per Kg basis including the cost of ginger infusion. Mean gross return per chick was also calculated according to market rate for live bird on per Kg basis.

Statistical analysis: The data were statistically analyzed by the standard procedure of analysis of variance using Completely Randomized Design (CRD) and comparison of means in different groups was made by Duncan's multiple-range test (Steel *et al*., 1997). The statistical package M STATC was used to perform the data analysis.

Statistical Model:

$Yij = \mu + \alpha j + Eij$

Yij = Yield subjected to i th chick and j th treatment.

μ = Population mean. αj = treatment effect.

Eij = Random error subjected to i th chick and j th treatment and

Eij is normally distributed with zero (0) mean and constant variance $\delta 2$ i.e. Eij ~ N (0. $\delta 2$).

RESULTS AND DISCUSSION

Body weight gain: Mean body weight gain for group A, B, C and D was 1335g, 1349g, 1353g and 1215g, respectively (Table 1). All the treatment groups gained significantly (P>0.05) higher body weight as compared to control group. However, there was no significant difference in body weight gain among all the three treatment groups. Results of the present study are in agreement with the results of Elwinger *et al*. (1993), who reported *Z. officinale* has growth promoting effect in broiler chicken. Results of present study could be correlated with the finding of Jamroz and Kamel (2002), who observed improvement of 8.1% in daily weight gain in 17 day old pullets fed a diet supplemented with an herbal plant extract.

Table 1: Mean body weight gain per chick in gm.

Group	*Z. officinale* infusion per litter of water	Mean body weight gain per chick (gm)
A	30ml	1335 [a]
B	40ml	1349 [a]
C	50ml	1353 [a]
D	Control	1215 [b]

Means in the columns with different superscripts are significantly different at α=0.05

Feed intake: Mean feed intake for group A, B, C and D was 2393g, 2243g, 2302g and 2399g, respectively (Table 2). Treatment group B and C had significantly lower feed intake as compared to control group C. The results of present study could be correlated with the results of Hernandez *et al*. (2004), who fed plant extract to broiler chicks as growth promoter. Results of present study are also in agreement with the results of Jamroz and Kamel (2002), who observed improvement in weight gain in 17 day old pullets fed a diet supplemented with herbal plant extract.

Table 2: Mean feed intake per chick in gm.

Group	Z. officinale infusion per litter of water	Mean feed intake per chick (gm)
A	30ml	2393 [a]
B	40ml	2243 [b]
C	50ml	2302 [b]
D	Control	2399 [a]

Means in the columns with different superscripts are significantly different at α=0.05

Anti body titer: Mean anti body titer values against IBD for group A, B, C and D were 2968, 3604, 4402 and 2628, respectively (Table 3). All the treatment groups had higher antibody titers than control group D. The mean

anti body titer against IBD was higher for group C than group A, B and D. Mean anti body titer values against ND for group A, B, C and D was 4.58, 4.33, 5.33 and 4.50, respectively (Table 3). Mean anti body titer against ND was higher for group C than group A, B and D. These results indicate that ginger (*Z. officinale*) has improved immunity by increasing the antibody titer against IBD and ND (Chansm and Nelsen, 1995; Masuda and Jitoe, 1995).

Table 3: Mean Anti body titer for IBD and NDV.

Group	Z. officinale infusion per litter of water	Means Anti body titer for IBD	Means Anti body titer for NDV
A	30ml	2968	4.58
B	40ml	3604	4.33
C	50ml	4402	5.33
D	Control	2628	4.50

Economics of the Experiment study: One objective of the present study was to determine the feasibility of addition of ginger (*Z.officinale*) extract, in commercial broiler production under local condition. Economics were calculated on term of feed cost including the cost of ginger infusion and gross return. Mean feed cost per chick was Rs. 33.15, 31.54, 34.34 and 30.24 for group A, B, C and D, respectively (Table 4). Mean gross return per chick was Rs.86.79, 88.74, 88.94 and 84.49 for group A, B, C and D, respectively (Table 4). Mean feed cost per chick was not significantly affected by any group. Gross return was significantly affected by the ginger extract treatment and was significantly lower ($P<0.05$) for control group D. No significant difference ($P>0.05$) was found in group A, B and C for gross return. The results are in agreement with previuos studies conducted by Wuthi *et al*., 2000).

Table 4: Mean cost of feed intake and gross return per chicks.

Group	Z. officinale infusion per litter of water	Mean feed cost per chick (Rs.)	Mean gross return per chick (Rs.)
A	30ml	33.155^{a}	86.79^{a}
B	40ml	31.545^{a}	88.74^{a}
C	50ml	31.288^{a}	88.94^{a}
D	Control	33.240^{a}	84.49^{b}

Means in the columns with superscripts are significantly different at $\alpha=0.05$

Conclusions: From the present research study it is concluded that ginger (*Z. officinale*) extract had considerably improved the performance of commercial broiler chicks in terms of enhanced body weight, increased gross return and improved values of anti body titer.

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