International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
www.chemijournal.com
IJCS 2020; 8(2): 232-236

Received: 07-01-2020
Accepted: 09-02-2020

Dr. Kalyani W Sarap
Subject Matter Specialist, Krishi Vigyan Kendra, Buldhana (Maharashtra) Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra, India

Corresponding Author:
Dr. Kalyani W Sarap
Subject Matter Specialist, Krishi Vigyan Kendra, Buldhana (Maharashtra) Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra, India

Effect of feeding ginger (*Zingiber officinale*) powder on broiler performance

Dr. Kalyani W Sarap

DOI: https://doi.org/10.22271/chemi.2020.v8.i2d.8774

Abstract
The study targeted effect of addition of ginger root powder as natural feed additive on growth performance of broiler chicks. The experiment was carried out on Two hundred and sixty unsexed one-day-old broiler chicks strain (Vencobb) for a period of fourty two days. In addition to the control diet (0 % ginger root powder) another diet were formulated to meet the nutritional requirement of broiler chick with graded level of ginger root powder 1 %. The starter ration was fed during 0-3 weeks contained 23.06 per cent crude protein and 2800.14 Kcal/kg metabolizable energy (ME) and finisher diet was offered during 4-6 weeks containing 20.09 per cent crude protein and 2899.65 Kcal/kg metabolizable energy.
The control group (T1) was without ginger powder while (T2) was having 1 per cent ginger powder. At the end of sixth week average cumulative body weights for groups T1 and T2 were 1103.35 and 1146.97 g respectively, indicating highest body weight of birds in one per cent ginger powder. The average weekly gain in body weight at the end of sixth week for treatment groups T1 & T2 were 264.4g and 216.3g respectively. However, gain in weight was non-significant from each other group. Weekly gain in weight was higher in T2 group fed one per cent ginger powder followed by T1 group. The average feed consumption per bird was 606.6 and 652.9g/bird/week in T1and T2 group respectively.
However, the feed conversion ratio in sixth week was 2.6 and 3.3 recorded for T1 and T2 group respectively. The feed conversion ratio was significantly ($P<0.05$) better in T2 over other group.net profit per bird in Rs. Highest in T2 (29.70) than T1(21.49).From the overall observations of the present study, it can be inferred that the inclusion of ginger powder at the rate one per cent in the ration of broilers was beneficial, it improved feed efficiency thereby improving the performance of birds, and obtained higher net profit as compared to control group and other treatment groups.

Keywords: Broilers, ginger, performance

Introduction
Poultry industry in India is now full-fledged business because of assured returns, short generation intervals and limited land requirements. Production of assured number of eggs and broiler meat has opened the global market opportunity for better economics of poultry farming. The industry is having golden future with continuous increase in domestic market, rapid industrialization and economic liberalization. Nutrition plays a vital role in enabling improvement as the feed cost represents an expensive input of 70-80 per cent of broiler production cost (Akdeniz e*t al*., 2006) [2].
Poultry scientists are searching new alternatives to antibiotics like hazardous growth promoters without side effects on poultry and in turn to the human being. In the last decade, there has been growing interest in the use of natural herbs and medicinal plants as feed additives in poultry diets to maximize their potential output (Khan *et al*., 2012) [8]. It is conceivable that herbal agents could serve as safer alternatives as growth promoters due to their suitability and preference, lower cost of production, reduced risks of toxicity and minimum health hazards. Interestingly recent biological trials of certain herbal formulations in India as growth promoter have shown encouraging results and some of the reports have demonstrated improvement with respect to weight gain, feed efficiency, lowered mortality and increased livability in poultry birds. Several herbal additives contain a substance which increases the production of digestive juices and thereby enhances appetite and digestion (Barreto *et al*., 2008) [5]; also act as an immune-stimulant without affecting the growth (Nidaullah *et al*., 2010) [11]. Some of the important herbal feed additives include ginger, garlic, fenugreek, thyme etc. Feeding of ginger led to higher body weight and lower total feed intake.

Ginger (*Zingiber Officinale*) is a potential rhizome which has been widely used in many countries as a food condiment and as a medicinal herb. The important compounds in Ginger are gingerol, gingerdiol, shogaols and gingerdione (Kikuzaki and Nakatani, 1996) [9] which have the ability to stimulate digestive enzymes, affect the microbial activity and also have anti-oxidative activity. Ginger (*Zingiber officinale*) is a perennial plant which belongs to family Zingiberaceae. Ginger possesses anti-hypercholesterolemic activity, effective on lowering blood cholesterol level (Zomrawi *et al.*, 2013) [14]. Ginger has gained prominence due to their wide range of properties not only in reducing lipids but in many other ways where the utmost aim is to improve the nutritive value of the animal product with increase in production (meat, milk or egg). In broilers and layers, this plant has been used in different forms, doses and durations (Khan *et al.*, 2012) [8]. The effect of garlic and ginger mixtures has greater influence as an anti-hypercholesterolemia agent. The mixture however, considered non-toxic as shown by the White Blood Cell count (Bamidele and Adejumo, 2012) [4]. The present experimental work was therefore, planned to study the effect of Ginger (*Zingiber officinale*) powder on production performance and economics of broiler chicken.

Materials and Methods

Birds and Protocol design

The experiment was carried out on 260, day-old Vencobb straight run commercial broiler chicks for a period of 42 days (6 weeks). The chicks were obtained from vyenktesh hatcheries, pune, Maharashtra. On arrival, the chicks were weighed individually and distributed randomly on equal body weight basis in to one control group (T1) and one group provided 1% ginger powder with of 10 chicks in each. The total birds were allocated to different treatment groups are presented in Table 1.

Table 1: Experimental details

Sr. No.	Treatment group	Treatment details	No. of birds in each replicate	Average bodyweight (g)
1	T1	Standard broiler ration	10	45.79±0.11
2	T2	Standard broiler ration + ginger powder @ 10g/kg feed	10	45.13±0.43

Data Collection

In each pen, total bird body weight, bird numbers and the weight of unconsumed and added feed were recorded on days 0, 10, 22 and 42. Mean body weight gains, feed intake and feed conversion ratios were calculated for each pen between 0-10, 11-22, 23-42 and 0-42 days. For each time period, body weight gain was calculated and expressed as grams per bird. Feed intake (g of feed intake/bird) over the entire grow-out period was calculated by totalling feed consumption in each time interval between each bird sampling. Feed conversion ratio (g of food intake/g of body weight gain) was calculated by dividing total feed intake by total weight gain in each pen.

Preparation of Ginger Powder

Fresh matured ginger roots were kindly provided by a local market and were processed into dry ginger powders.The collected ginger powder was mixed into diets.

Experimental design and statistical evaluation

All data were analyzed using the CRD (Completely Randomized Design) of the program (SAS Intitute,1998

Results and Discussion

Feed Consumption

The effect of feeding graded levels of ginger root powder (*Zingiber Officinale*) on weekly feed intake is presented in Table 2. The results showed that the dietary treatment had no significant difference (P>0.05) on feed intake. The highest feed intake was obtained by the birds fed 1% ginger root powder during fifth week followed by sixth, fourth,thirdand second weeks Also the results in Table 5. Showed that there was an increase in total feed intake in level 1%but with no significant difference (P>0.05) between all levels during the experiment duration this result was comparable with the findings of Doley *et al*., (2009) [6] who revealed that no differences in feed intake for broilers fed with ginger extract for 6 weeks period.The increment in feed consumption which was illustrated in this study may be due to pungent test or aroma and flavor of ginger. also compared with the work of Ademola *et al*., (2009) [1] who reported higher feed intake of broilers on diet supplemented with ginger and agrees with Kulka (1967) [10] the effect of pungent test in feed intake cause by number of components predominated by gingerols followed by shogaols and zinger one.

Table 2: Feed intake of broiler chicks (g/bird/week) as affected by addition of ginger root powder

Items	Ginger levels		
	0 %	1%	Sig
1st week	103.5±3.1	102.5±2.9	Ns
2nd week	231.2±5.9	247.4±8.3	Ns
3rd week	291.4±16.2	303.1±15.5	Ns
4th week	414.4±14.9	437.9±29.6	Ns
5th week	619.4±5	699.7±29.8	Ns
6th week	606.6±11.9	652.9±36.5	Ns

Values are means ± standard error of the mean for(10) birds/pen.
NS = no significant difference (P>0.05).

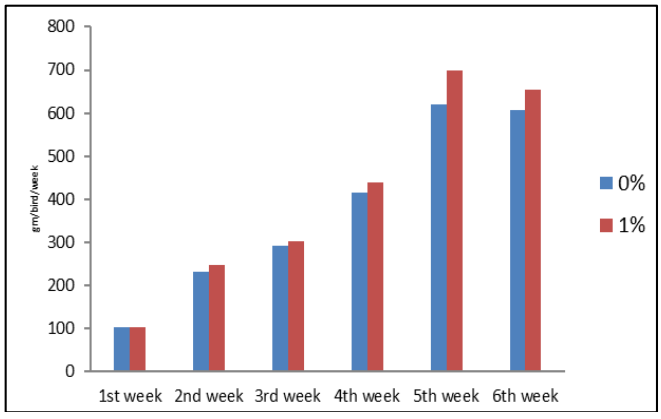

Fig 1: Feed intake of broiler chicks (g/bird/week)

Average Weekly Gain in Body Weight

The growth performance of experimental birds was assessed by recording weekly body weight of birds. The average weekly cumulative body weight of individual bird was recorded throughout the experimental period and is given in Table 2. The nature of growth observed in experimental broiler chicks maintained under different treatments from 0-6 weeks of age are indicated in Fig.1. The mean initial body weights of day-old broiler chicks were 45.79 and 45.13 g for treatments T1 and T2 respectively. From the Table 3 it may be observed that the average weekly cumulative body weight of experimental birds

fed with different rations were more or less similar with non-significant differences among treatment groups up to starter phase of experiment.

At the end of fourth week significantly (P<0.05) higher body weights were observed in experimental birds of T2 group as compared to T1 groups. However, no significant difference with respect to average weekly cumulative body weight was observed in experimental birds of (as control), T1. At the end of fifth week T2 (313.4 g) group gained significantly (P<0.05) higher body weight as compared to T1 (251.4 g) the growth pattern indicated that optimum beneficial effect of ginger.

Table 3: Average weekly gain in Body weight of broiler chicks (g/bird/week) as affected by addition of ginger root powder

Items	Ginger levels		
	0 %	1%	Sig
1st week	59.1±1	71.9±4.9	Ns
2nd week	117.4±10	102.9±16.9	Ns
3rd week	159.6±6.5	166.9±10.4	Ns
4th week	212.5±10	236.6±16.6	Ns
5th week	251.4±11	313.4±9.4	Ns
6th week	264.4±43	216.3±35.9	Ns

Values are means ± standard error of the mean for (10) birds/pen.
NS = no significant difference (P>0.05).

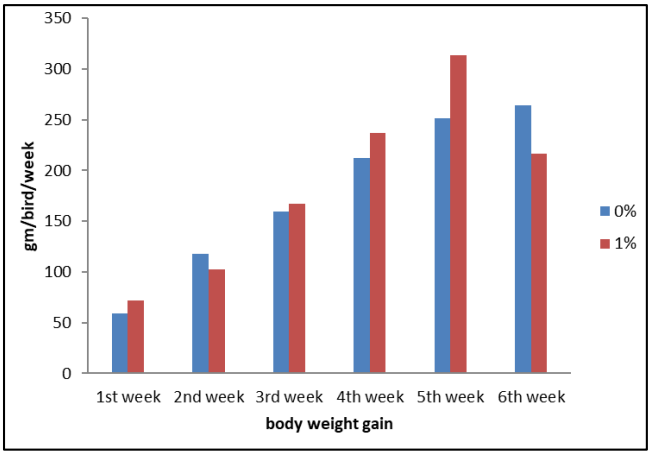

Fig 2: Average weekly gain in Body weight of broiler chicks'

Cumulative body weight

The growth performance of experimental birds was assessed by recording weekly body weight of birds. The average weekly cumulative body weight of individual bird was recorded throughout the experimental period and is given in Table 4. The mean initial body weights of day old broiler chicks were 45.79 and45.13g for treatmentsT1 and T2 and respectively. From the Table 4. it may be observed that the average weekly cumulative body weight of experimental birds fed with different rations were more or less similar with non- significant differences among treatment groups up to starter phase of experiment. At the end of fourth week significantly (P<0.05) higher body weights were observed in experimental birds of T2 group as compared to T1 groups. At the end of sixth week T2 (1146.97 g) group gained significantly (P<0.05) higher body weight as compared to T1 (1103.35 g) groups. The lowest body weight was observed in birds fed control ration without ginger powder T1 as compared to T2 groups. On the perusal of Table 4. it can be seen that highest cumulative body weight of 1146.97 g was obtained in the broilers receiving 1 per cent ginger powder (T2) followed by 1103.35 g without ginger powder.The growth pattern indicated that optimum beneficial effect of ginger powder supplementation as an herbal feed additive could be achieved at 1 per cent level of inclusion In the present study, the effect of supplementation of ginger powder was evaluated. It was found that addition of ginger powder in broiler ration exhibited better weight gain (1146.97 g) than without ginger powder (1103.35g). It is due to the ability of ginger powder to increase digestive fluids, increase absorption and neutralize toxins and stomach acid there by resulting in to better performance of broilers.

Table 4: Average weekly body weight (g) of broilers at different age

Age in weeks	Ginger levels		
	0 %	1%	Sig
1st week	164.09±2.00	167.58±2.95	Ns
2nd week	422.07±4.34	439.80±7.44	Ns
3rd week	780.44±4.29	798.44±11.89	Ns
4th week	1000.98±38.12	1098.12±48.21	Ns
5th week	1100.38±42.72	1145.91±21.88	Ns
6th week	1103.35±47.82	1146.97±37.88	Ns

Values are means ± standard error of the mean for(10) birds/pen.
NS = no significant difference (P>0.05).

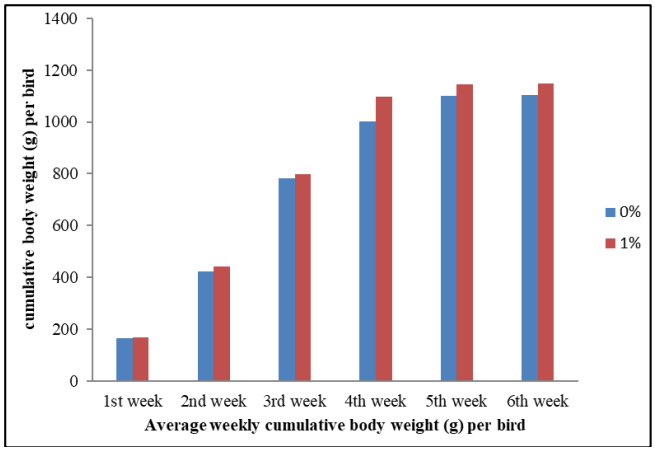

Fig 3: Average weekly cumulative body weight (g)

Feed conversion ratio

There were no significant differences (P>0.05) in weekly feed conversion ratio between treatments as appear in table 5. The present results agree with findings of Wafaa *et al*., (2012) [12] who reported that no difference among birds fed on 0% and 1% and ginger root powder in feed conversion ratio.

Table 5: Effect of dietary ground ginger root on Feed conversion ratio of broiler chicks

Weeks	0 %	1%	Sig
1st week	1.7±0.06	1.4±0.07	Ns
2nd week	2.2±0.12	2.6±0.4	Ns
3rd week	1.8±0.03	1.8±0.02	Ns
4th week	1.9±09	1.8±0.04	Ns
5th week	2.5±0.1	2.2±0.1	Ns
6th week	2.6±06	3.3±0.7	Ns

Values are means ±standard error of the mean for (4) replicates of (10) birds/pen.
Means with different superscripts along rows were not significantly different (P>0.05)

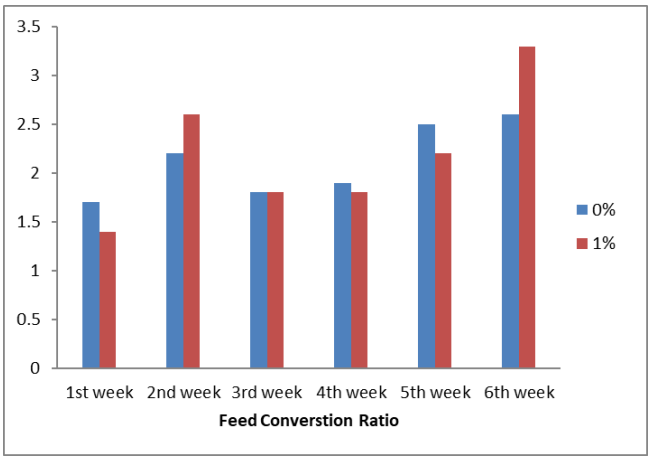

Fig 4: Feed conversion ratio

Mortality

Mortality was recorded throughout the period of the study as an when it occurred. The data of mortality are presented in Table 6 and 2. The mortality was recorded in control and T2 group. There was no mortality up to 3rd week of experiment, in all the treatment groups. The recorded mortality in present study is in agreement with Zomrawi *et al*., (2012) [13] and Zomrawi *et al*., (2013) [14] who observed non-significant differences among the treatments.

Table 6: Mortality of broilers under different treatment groups

Age (weeks)	T1	T2
1st	0	0
2nd	0	0
3rd	0	0
4th	1	1
5th	0	0
6th	1	0
Total mortality	2	1

Table 7: Per cent mortality of birds

Treatment groups	Total No. of Birds	No. of mortality	Mortality %
T1	20	2	10
T2	20	1	5

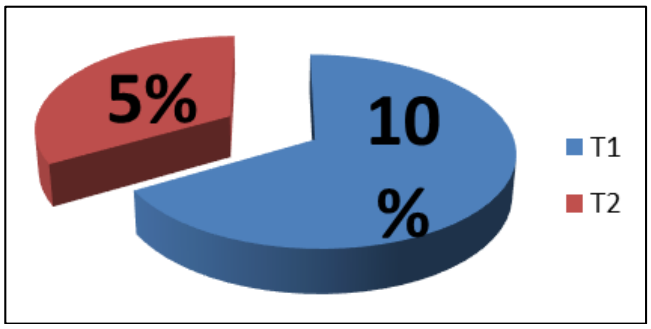

Fig 5: Mortality of broilers under different treatment groups

Economics of broiler production

The profit and loss was estimated by considering the total amount of feed consumed by broilers under control and dietary treatment group. Other factors such as cost of day-old chicks, medicines, vaccines and litter material were common for treatment and control group. The data regarding average live body weight (g), average feed consumption (g), feed consumption (g) per kg live weight gain, cost of feed (Rs.), total cost of feed (including cost of ginger powder under different treatments), cost of feed per kg live weight gain and net profit per bird are given in Table 6. The data regarding the economics of broiler production are presented in Table 6. The average feed consumption per bird for control (T1) and 1 per cent ginger powder in feed (T2) were 3690.11 and 3443.73 g respectively. The average body weights of birds in T1 and T2 were 2063.33 and 2243.67 g respectively. The cost of feed per kg for control and T2 were Rs. 26.92 and 30.12. The net profit obtained per bird was Rs. 21.49 and 29.70 for control (T1) and T2 treatments groups respectively. The highest net profit per bird was obtained for birds in treatment T2 (Rs. 29.70) followed by T1. In calculations of profit or loss per bird for different treatments for the different factors like chick cost, average feed consumption per bird, cost of medicine, vaccine, etc. average body weight and average price received were considered The net profit per bird was highest in T2 (Rs.29.70) followed by T1 (Rs. 21.49) Thus the most economic group was found to be T2 treatment group (diet with one per cent ginger powder) followed by T1 control group.

Table 8: Economics of broiler production

Sr. No.	Particulars	T1 (control)	T2
1	Cost of day-old chick (Rs.)	18.00	18.00
2	Cost of feed (Rs. /kg)	26.92	26.92
3	Cost of Ginger Powder (Rs.)	0.00	3.20
4	Total cost of feed (Rs. /kg)	26.92	30.12
5	Average total feed consumed per bird (g)	3690.11	3443.73
6	Cost of feed consumed per	99.30	103.72
7	Average body weight at the end of 6th week (g)	2063.33	2243.67
8	Feed consumption per kg liveweight gain (kg)	1.69	1.49
9	Cost of feed per kg live weight gain (Rs.)	48.13	46.23
10	Cost of medicine, vaccines, litter material etc. per bird (Rs.)	5.64	5.64
11	Total cost of production (Rs.)(1+6+10)	122.94	127.36
12	Average price received @ Rs.70 per kg live weight (Rs.)	144.43	157.06
13	Net profit per bird (Rs.) (12-11)	21.49	29.70

Thus, this indicated that ginger powder supplementation (diet with one per cent ginger powder) had significant effect over the economic returns of the different treatment groups. It may be concluded that T2 treatment group (diet with one per cent ginger powder) was the most effective for obtaining high returns per bird. These results are partially in agreement with Nidaullah *et al*., (2010) [11], Arshad *et al*., (2012) [3] and Elmakki *et al*., (2013) [7].

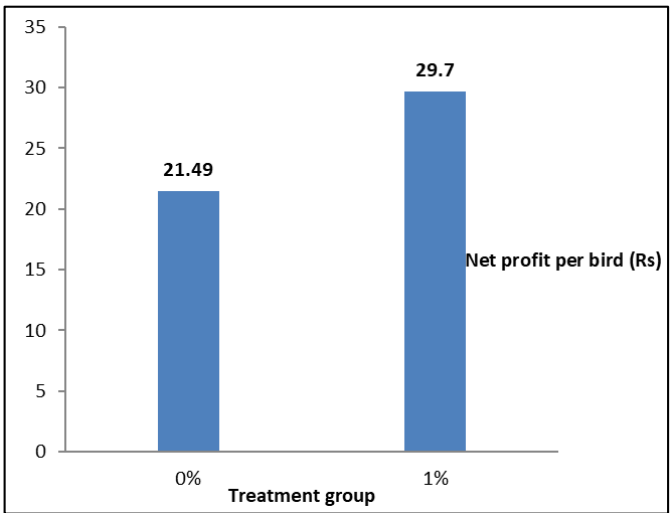

Fig 6: Economics of broiler production

Reference

1. Ademola SG, Farinu GO, Babatunde GM. Serum lipid, Growth and Haematological parameters of broilers fed garlic, ginger and their mixtures. World J Agric. Sci. 2009; 5(1):99-104
2. Akdeniz RC, IAK, Boyar S. Feed Industry and Problems in Turkey, Turkish Agricultural Engineering VI. Technical Congress Proceedings Ankara. 2006; 2(3-7):935-960,
3. Arshad M, Kakar AH, Durrani FR, Akhtar A Shakirullah. Economical and immunological impact of ginger (*Zingiber officinali*) Extract on broiler chicks, Pakistan journal of science. 2012; 64(1):46-48.
4. Bamidele O, Adejumo IO. Effect of Garlic (*Allium sativum* L.) and Ginger (*Zingiber officinale* Roscoe) Mixtures on Performance Characteristics ii and Cholesterol Profile of Growing Pullets. Int. J Poult. Sci., 2012; 11(3):217-220.
5. BarretoMSR, Menten JFM, Racanici AMC, Pereira PWZ, Rizzo PV. Plant extracts used as growth promoters in broilers. Braz. J. Poult. Sci. 2008; 10:109-115
6. Doley S, Gupta JJ, Reddy PB. Supplementation of ginger, garlic and turmeric in broiler chicken. In. Vet. J., 2009;86:644-645
7. Elmakki AM, Abdelatti KA, Dousa BM. Effect of dietary ground ginger (*Zingiber officinale*) root additive on broiler performance. 2013; 1(1):76-83
8. Khan RU, Naz S, Nikousefat Z, Tufarelli V, Javdani M, Qureshi MS *et al*. Potential Applications of Ginger (*Zingiber officinale*) in Poultry Diets. World's Poultry Science Journal. 2012; (68):245-252
9. Kikuzaki H, Nakatani N. Cyclic Diarylheptanoids from rhizomes of *Zingiber officinale*. Phytochemistry. 1996; (43):273-277
10. Kulka K. Aspects of functional groups and flavour. J. of Agric. Food Chem. 1967; 15:48-57.
11. Nidaullah H, Durrani FR, Ahmad S, Jan IU, Gul S. Aqueous extract from different medicinal plant as anticoccidial, growth promotive and immunostimulant in broilers. ARPN journal of agricultural and biological science. 2010; 1(5):53-55.
12. Wafaa BZ, Khadiga AA, Bakheit MD, Ahmed GM. The effect of ginger root powder (*Zingiber officinale*) supplementation on broiler chicks performance, blood and serum constituents. Online Journal of Animal and Feed Research. V. 2012; 1(6):457-460.
13. Zomrawi WB, Abdelatti KHA, Dousa BM, Mahala AG. The effect of ginger root powder (*Zingiber officinale*) supplementation on broiler chicks performance, blood and serum constituents. Online J. of Anim. and Feed Research. 2012; 1(6):457-460.
14. Zomrawi WB, Abdelatti KAA, Dousa BM, Mahala AG. The effect of dietary ginger root powder (*Zingiber officinale*) on broiler chicks performance, carcass characteristic and serum constituents. J. Anim. Sci. Adv., 2013; 3(2):42-47.