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ORIGINAL ARTICLE

Effect of Feeding Different Levels of Escherichia Coli Phytase and Buttiauxella Phytase on the Growth and Digestibility in Broiler

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ABSTRACT

The effect of feeding different levels of bacterial phytase enzymes on the growth performance of broiler was examined using 250 Hubbard broilers, kept at the Poultry Experimental Station, Sindh Agriculture University Tandojam. The products of bacterial phytase enzymes were incorporated in the basal ration at different levels consisted of 0mg/kg (control), 50 mg/kg (group B), 100 mg/kg (group C) E. coli phytase and 50 mg/kg (group D), 100 mg/kg (group E) Buttiauxella spp. phytase. The birds were studied for live body weight, feed and water intake, feed conversion efficiency, carcass weight, dressing percentage, weight of internal edible and non-edible parts, digestibility and economics. The difference in live body weight among treatment and control group was significant ($P<0.05$). The significantly higher live body weight (2160.00g/bird) was observed in group E (fed 100mg/kg Buttiauxella phytase) and lower (2060g/bird) in group A (control). The effect of treatment on feed and water intake was significant ($P<0.05$), Feed (3800.00g/bird) and water (3800.00 ml/bird) intake was significantly higher in group A (control) than other treatment groups. Better feed conversion ratio (1.74) was noticed in group E followed by group C, B, D and A respectively. Carcass weight was significantly higher in group E (1350.60) and lower in control group (1219.71), the influence of feeding different sources and levels of bacterial phytase enzymes on dressing percentage was non-significant ($P>0.05$).Significant ($P<0.05$) difference was noted for heart weight among the groups and non-significant ($P>0.05$) difference were examined for gizzard, liver, spleen and proventiculus weight among the groups. The data showed that higher percentage of crude protein digestibility was recorded in group E (75%), then C (72%), B (71%), D (70.8%) and A (70%) respectively. Similarly M.E (kcal) was greater in group E (30.5%), then C (30%), B (29%), D (29%) and A (28.5%) respectively. The comparative net profit among all groups demonstrated that group E generated better net profit (48.70) followed by group C (47.88), B (41.50), D (40.30) and A (35.20) Rs/bird respectively.From the current findings, it was concluded that the supplementation of feed with 100mg/kg Buttiauxella spp phytase enzyme resulted in higher live body weight gain, better FCR and improved digestibility of nutrients.

Keywords: phytase enzymes, Buttiauxella spp., E. coli, broiler,

INTRODUCTION

Poultry division is an important and vital section of agriculture in Pakistan. Poultry field creates occupation for more than 1.5 million people directly or indirectly. In Pakistan about 28.0 percent of the total meat produced is provided by Poultry sector. The current investment made in poultry business counts about Rs. 200.00 billion. Poultry sector displayed a strong development of 8-10 percent annually which reveals its essential potential [1] .Poultry division has played a vital contribution of 1.3 percent in GDP during 2014-15 whereas it contributed 6.3 percent in agriculture and 11.3 percent in livestock value added, which improved from Rs. 130.7 billion (2013-14) to 140.5 billion (2014-15) presenting rise of 7.5 percent in comparison to last year. Feed is the largest particular cost which accounts for 70% in the production expenses of cost incurred on per bird [2].Certain enzymes are produced in poultry birds for digestion of nutrients but they lack special enzymes to break fiber completely, therefore birds need some types of exogenic enzymes added in feed to help them in digestion [3]. Due to the continuous rise in prices of feed constituents enzymes are considered to be the most important factor and its usage is highly significant [4, 5] having organic association among them therefore, are not finely digested by poultry. Plants possess few compounds that either are not digested or obstruct the digestion of animals due to the reason that animals are unable to produce such enzymes responsible to break these complexes. Nutrition experts are able to assist the animals to find out such complex compounds and serving a right enzyme. For this purpose bacteria are wisely selected and developed in controlled circumstances [6]. In poultry business enzymes and supplements are seemed as a typical nutritional constituent, particularly in the wheat and barley rations. The poultry industry readily accepts enzymes as a standard dietary component, especially in wheat and barley-based rations. But still many questions are partially answered. For example, how do enzymes work? Do growth rates reflect differences in the potency of different enzyme preparations? What is the link between gut viscosity, enzyme action and growth rates? And are enzymes necessary in all poultry rations? This review article aims to supply some background information about enzyme and its usage in poultry nutrition and also help to answer some of commonly asked questions regarding enzymes [7]. Many types of enzymes are used in poultry feed, among these enzymes phytase is of excessive significance in poultry ration. Phytase enzymes split phosphorus and the related bound nutrients from the phytate molecule decreasing its anti-nutrient properties. It is very essential for phytase to start functioning quickly at low pH levels which are found in the upper digestive system of broilers, e.g. poultry gizzard. This decreases the anti-nutrient properties of phytate in the digestive system and maximizes the time for the birds to absorb the released nutrients, [8]. The ability of phytase enzymes to hydrolyze phytate has been shown to be negatively affected by high levels of dietary Ca or a high ratio of Ca:AvP [9]. As Ca-phytate complexes were formed at pH ≥5 [10] similar to the conditions in the small intestine, rapid phytate degradation in the proximal gut where the digesta was more acidic (gizzard + proventriculus) using phytase enzymes has been proposed to mitigate the negative effect of Ca on phytate degradation and increase nutrient availability for the bird. However, phytases have been suggested to vary in their pH optima with efficiency and speed of hydrolyzing phytate depending on their source [11]. The Supplementation of phytase enzyme to broiler feeds has been

proved to effectively increase the phytate Phosphorus digestibility in commercial broilers. Phosphorus is one of the great importance and vital element for broilers because it is concerned with development of bone, nucleic acids structure and maintenance, phospholipids bindings and formation, cell membrane permeability and functionality and the maintenance of acid-base balance and energy transfer mechanism [12]. To support the increased broiler growth the rations of broiler are added with phytase, however phytase enzyme is deactivated by increasing the temperature during pelleting process. Phytase enzymes were usually supplemented post-pelleting to reduce the influence of pelleting heat on phytase action [13]. The usage of phytase enzyme in broiler feed rises the consumption of phosphorus present in phytate form. Phytase enzyme has proved to be very effective in the degradation of phosphorus in phytate form but also to reduce the environmental organic phosphorus due to which it has attracted the scientific and marketing attentions. The usage of enzyme phytase in poultry has been stated to diminish phosphorus defecation by as much as forty percent in case of broilers. The addition of phytase to layer ration reported to improved egg production and positive effects on the weight of egg and the ash of tibia were too prominent [14, 15]. The present experiment is planned to examine the influence of feeding different bacterial sources and levels of phytase enzymes on the growth and digestibility in broiler.

MATERIALS AND METHODS

The experiment was conducted during the year 2016 at Poultry experimental station, Sindh Agriculture University Tando Jam. 250 day-old broiler chicks were purchased from a chick distributor in Hyderabad. These chicks were initially weighed and randomly divided into five groups A, B, C, D and E. Each group consisted of 50 chicks having replicates of 25 chicks. Feed was offered ad libitum and supplemented with different levels and sources of bacterial phytase enzymes (Table-1). Group A was kept as control with 0mg/kg phytase enzyme, group B and C were introduced to phytase supplemented feed produced by E.coli bacteria while group D and E were supplemented with phytase enzyme produced by Buttiauxella spp. and incorporated in the broiler feed according to the following protocol.

Table-1: Phytase inclusion rates

A (Control)	B E. coli phytase	C E. coli phytase	D Buttiauxella spp phytase	E Buttiauxella spp phytase
0mg/kg of feed	50mg/kg of feed	100mg/kg of feed	50mg/kg of feed	100mg/kg of feed

Table-2: Composition of Commercial Ration (%)

S.No	Material	Group A 0 mg/ kg	Group B 50 mg/kg	Group C 100mg/kg	Group D 50 mg/kg	Group E 100 mg/kg
		CONTROL	E coli Phytase		Buttiauxella spp Phytase	
1	Rice	25	25	25	32.49	28
2	Maize (corn)	25	25	25	15	15
3	Rice polish	3.5	3.5	3.5	3	3
4	Fish meal	8	8	8	6.5	6.5
5	Soybean meal	9.1	9.41	9.51	8.3	7
6	Guar meal	3	3	3	2.5	2.5
7	Canola meal	15	15	15	15	14
8	Sunflower meal	4	4	4	4	5
9	Wheat bran	0	0	0	8	12.86
10	C.G 30%	3	3	3	2	3
11	C.G 60%	2	2	2	1	1
12	L-lysine	0.25	0.25	0.25	0.305	0.33
13	DLM	0.15	0.135	0.13	0.2	0.2
14	Lime stone	1	1	1	1	1
15	DCP	0.6	0.3	0.2	0.3	0.2
16	Premix	0.4	0.4	0.4	0.4	0.4
	Total	100	100	100	100	100
Proximate Analysis of nutrients (%)						
	Crude Protein	22	22	22	22	22
	Metabolizable energy	2800	2800	2800	2800	2800
	Lysine	1.15	1.15	1.15	1.15	1.15
	Methionine	0.88	0.88	0.88	0.88	0.88
	L Threonine	0.8	0.8	0.8	0.8	0.8
	Fat	2.5	2.5	2.5	2.5	2.5
	Calcium	1	1	1	1	1
	Phosphorus	0.45	0.45	0.45	0.45	0.45

Management

Housing: Floor housing systems was provided to experimental birds, in which one square feed space was given to each chick. Before the arrival of birds the Poultry house was entirely cleaned, washed with fresh water and disinfectant. Entire shed was coated with limestone and allowed to dry for 24 hours.

Brooding: Artificial brooding preparation was completed one day before arrival of day old chicks. One brooder was provided to each group. In first week, brooding temperature was maintained between 90^0F and about 5^0F was reduced each subsequent week till 70^0F as house temperature. During brooding 40/60 watt electric bulbs was fitted into electric brooder and placed in center of each allocated area. One thermometer was placed at the height of 6-12 inches near brooder to maintain brooding temperature.

Lighting: Lighting was provided by using 60 watt bulbs, fitted with roof at the height of 8 feet. However, rechargeable light/tube was kept and used during electric failure.

Litter Management: Rice husk was used as litter it was dried under sunlight for 12 hours and checked for thick particles, which was taken out to maintain litter quality. 2 inches deep layer of litter was provided for each group of broiler. Limestone was mixed with litter to check any sort of infection and litter turning was practiced daily to minimize gas production in the shed.

Vaccination: The broilers of all groups were vaccinated against various diseases protection according to schedule recommended by Pakistan Poultry Association, Hyderabad/Tandojam.

Table 3: Vaccines and vaccination schedule for the experimental broiler

Sr. #	Vaccines	Age of birds (days)	Route of administration
1.	N.D+I.B	7 days	Intraocular (E/D)
2.	I.B.D	10 days	Intraocular (E/D)
3.	H.P.S	17 days	Subcutaneous
4.	1.B.D	28 days	Drinking water
5.	N.D. LaSota	21 days	Drinking water

Parameters Recording Procedure

Live body weight gain: After arrival of day old broiler at Poultry Experimental Station, individual chicks were weighed by using electric weighing scale and later broilers was weighed at the completion of each week.

Feed intake: Feed was provided ad libitum to the broiler twice daily and refusal of feed was collected from feeders of each group and weighed and finally consumed feed was calculated daily. For this practice, the following formula was used:

Feed intake (g/b/d) = Total feed offered – Total feedrefused
Total broiler (#)

Water intake (ml): Fresh water was provided to the broiler twice daily. Refusal of water was collected, measured and subtracted from the water offered and finally consumed water was recorded by using the following formula:

Water intake (ml/b/d) = Total water offered (ml) – Total water refused (ml/group/d)
Total broiler (#)

Feed conversion ratio (FCR): Feed conversion ratio was calculated on the basis of total feed consumed by a broiler bird for gaining one kg weight. Thus, the feed conversion ratio is actually the feed consumed by the average broiler for achieving one kg live body weight.

FCR = Total feed intake x 100
Total live body weight

Dressing percentage: On the completion of experimental period of 42 days, 5 broilers from each group was weighted and slaughtered. After dressing, the carcass weight was recorded and its dressing percentage was calculated by the following formula.

Dressing (%) = Total Carcass weight (kg) X 100
Total Live body weight (kg)

Weight of internal edible and non-edible organs: After slaughtering of 5 broilers from each group, the liver, heart, gizzard, spleen and proventiculus was removed/separated with the help of scalpel and scissor from each broiler and was weighed by electric weighing balance separately and recorded.

Digestibility: The sample of bird feces of each group was collected, dried, weighed and later milled to pass through a 1.0 mm sieve and Digestibility Analysis (crude protein, metabolized energy and ether extract) was performed by the method of AOAC (2000).

Crude Protein: Nitrogen of protein in the sample was determined by Kjeldhal method. A known amount of oven dried sample (W_2) was taken in a long necked Kjeldhal flask, 3.5 grams of a catalyst mixture (0.2 gram copper sulphate ($CuSO_4$) and 2 grams potassium sulphate (K_2SO_4) and 35 ml of concentrated sulphuric acid (H_2SO_4) as an oxidizing agent. The sample was boiled in a digestion rack, initially at a low temperature and then with vigorous boiling till the content become clear. After cooling the contents of the flask, mixed with the distilled water in a 250 ml volumetric flask. A 5ml of this solution was transferred to the Markham still apparatus. The ammonia so liberated was collected in a flask containing 5 ml of 2% boric acid solution having two drops of indicator. The distillate was titrated against 0.1 N H_2SO_4 to light pink color end point. Nitrogen and crude protein was calculated by following formula:

Crude Protein % = R−B×W×1.4 × D × F
Sample
Or N % = R−B x Standard acid 1.4
Sample

Note: **R=** reading, **B=** blank, **N=** normality of standard H_2SO_4, **D=** dilution, **F=** N factor 6.25

Ether Extract: A known weight of oven dried sample was taken in an extraction thimble it was plugged with absorbent cotton. The sample was extracted with petroleum ether at 40-60 °C Soxhlet apparatus by fixing the condensation rate at 3-4 drops per second. The process was continued for about 10 hours. Either was evaporated by placing it in an oven at 105 °C till the extract attained a constant weight W_2). Performance of the ether extract was calculated with the following formula:

E.E (%) = Weight of ash__ × 1
Weight of sample

Mortality: Dead birds were collected when observed; mortality was recorded and finally, the mortality %was calculated by the following formula:

Mortality (%) = Total No. of broiler died (#) X 100
Total reared broiler (#)

Economics: Economics of ration was worked to ascertain the effect of citric acid on growth performance and nutrient retention of cobb broiler of each group was recorded separately and at the end of experiment weight gain of each group were recorded and economic was obtained by calculating kg feed fed for one kg live body weight gain.

Formula: net returns = income - expenditure

Data analysis: Data analyzed by statistical tool 'Statistix ver.8.1'. Analysis of variance (ANOVA) at α = 0.05 (level of significance), Further more if significant difference noticed among the means then least significance difference (L.S.D) performed.

RESULTS

The birds were studied for the treatment effect on feed consumption, water intake, live body weight, feed conversion efficiency, carcass weight, dressing percentage, weight of internal edible and non-edible organs, digestibility, mortality and finally the economics of the experiment was worked out.

Live body weight (g/bird): The influence of feeding different sources and levels of bacterial phytase enzymes on the live body weight gain are presented in Table 3. Statistically, the difference in live body weight between treatment and control group were significant (P<0.05). The significantly higher live body weight (2160.00 g/bird) was observed for birds in group E (fed 100 mg/kg Buttiauxella spp phytase) and lower in group A (control), where phytase enzyme was not included in the diet. However it was non-significant effect with groups B, C and D respectively. It was seen that inclusion of Buttiauxella spp phytase at the level of 100 mg/kg in broiler ration resulted significantly improved live bodyweight.

Table-3: Influence of feeding different sources and levels of bacterial phytase enzymes on the live body weight (g/bird) of broiler.

Parameter	Groups					P-value
	Group A (0mg/kg) (control)	Group B (50mg/kg) E.coli Phytase	Group C (100 mg/kg) E.coli phytase	Group D (50 mg/kg) Buttiauxella Phytase	Group E (100 mg/kg) Buttiauxella phytase	
Live body weight (Average)	2060.00 c	2090.00 b	2123.00 a	2066.70 bc	2160.00 ab	0.0303

SE± = 46.171
LSD @ 0.05) = 65.296

Feed intake (g/bird): Data on the feed intake of broiler chicks to the experimental diets are shown in Table-4. Higher feed intake of 3800.00 g/bird was noted in group A (control), while lower feed intake of 3605.00 g/bird was noted in group D (fed 50 mg/kg

Buttiauxella spp phytase). The effect of treatment on feed intake was significant (P<0.05). Broilers in control group consumed significantly higher (P<0.05) amount of feed than group B (3700.00 g/bird), D (3605.00 g/bird) and E (3780.00 g/bird) respectively. However group A was non-significant with group C (3740.00 g/birds).

Table-4: Influence of feeding different sources and levels of bacterial phytase enzymes on the feed intake (g/birds) of broiler.

Parameter	Groups					P-value
	Group A (0mg/kg) (control)	Group B (50mg/ kg) E.coli Phytase	Group C (100 mg/kg) E.coli Phytase	Group D (50mg/ kg) Buttiauxella Phytase	Group E (100 mg/ kg) Buttiauxella Phytase	
Feed Intake (Average)	3800.00 b	3700.00 c	3740.00 ab	3605.00 d	3780.00 a	0.0001

SE± = 36.477
LSD @ 0.05) = 51.587

Water intake (ml/bird): The influence of feeding different sources and levels of bacterial phytase enzymes on water intake are presented in Table 5. The results indicated that broilers in control group consumed greater volume of water (8000.00 ml/bird) followed by group E (7920.00 ml/bird),C (7840.00 ml/bird), B (7781.00 ml/bird) and D (7636.00 ml/bird) respectively. Statistical analysis shows significant (P< 0.05) difference in water intake between groups. All treatment groups were significantly different from each other. Group A consumed significantly higher volume of water from group B,C,D and E. Lowest water intake of 7636.00 g/bird was noted in group D (fed 50 mg/kg Buttiauxella spp phytase).

Table-5: Influence of feeding different sources and levels of bacterial phytase enzymes on the water intake (ml/birds) of broiler.

Parameter	Groups					P-value
	Group A (0mg/kg)	Group B (50mg/ kg) E.coli Phytase	Group C (100 mg/kg E.coli Phytase	Group D (50 mg/kg) Buttiauxella Phytase	Group E (100 mg/ kg) Buttiauxella Phytase	
Water Intake (Average)	8000.00 a	7781.00 d	7840.00 c	7636.00 e	7920.00 b	0.0000

SE± = 24.616
LSD @ 0.05) = 34.812

Table-6: Influence of feeding different sources and levels of bacterial phytase enzymes on the feed conversion ratio of broiler.

Groups	Group A (0mg/kg) (Control)	Group B (50mg/ kg) E.coli Phytase	Group C (100 mg/kg) E.coli Phytase	Group D (50 mg/kg) Buttiauxella Phytase	Group E (100mg/kg) Buttiauxella Phytase	P-value
FCR	1.84	1.76	1.75	1.77	1.74	0.0503

Feed conversion rati: The influence of feeding different sources and levels of bacterial phytase enzymes on feed conversion ratio are presented in Table 6. The results indicated that birds in group E (fed 100 mg/kg Buttiauxella spp phytase) and C (fed 100 mg/kg E. coli phytase)

had more ability to convert feed to body mass due to their low feed conversion ratio of 1.74 and 1.75 respectively. Birds in group B (fed 50 mg/kg E. coli phytase) and D (fed 50 mg/kg Buttiauxella spp phytase) have less ability to turn feed into body mass because of higher feed conversation ratio of 1.76 and 1.77. Highest feed conversion ratio (1.84) was observed in group A (control).

Carcass Weight and Dressing Percentage: Performance traits of broiler chickens such as carcass weight and dressing percentage are presented in Table-7. Group E was significantly different with higher values of carcass weight than group A, B and D. Furthermore the results of trial showed that carcass weight was significantly (P<0.05) higher in group E (fed 100 mg/kg Buttiauxella spp phytase) followed by C (fed 100 mg/kg E. coli phytase) compared to B (fed 50 mg/kg E. coli phytase), D (fed 50 mg/kg Buttiauxella spp phytase) and A (control) respectivelyThe average carcass weight of 1219.71 g/bird, 1295.60 g/bird, 1306.00 g/bird, 1280.51 g/bird and 1350.60 g/bird was recorded in groups A, B, C, D and E, respectively. Dressing dressing percentage was calculated in broilers of groups B, C, D and E with average value of 62.68%, 61.23%, 60.27% and 62.53%, respectively, numerically Lower dressing percentage was examined in group A (59.21%). Non-significant difference was analyzed in dressing percentage between the groups.

Weight of heart, gizzard, liver, spleen and proventiculus of broiler: The influence of the feeding different sources and levels of bacterial phytase enzymes on the organs weight are presented in Table 8. There were non-significant differences (P>0.05) in internal organs among the groups. Average highest heart weight (12.40 g/bird), gizzard weight (43.40 g/bird), liver weight (58.20 g/bird), spleen weight (3.02 g/bird) and proventiculus weight of (12.04g/bird) were recorded in broilers of group E (fed 100mg/kg Buttiauxella phytase) then all treatment groups

Table-7: Influence of feeding different sources and levels of bacterial phytase enzymes on the carcass weight and dressing percentage of broiler.

Parameter	Groups					P-value
	Group A (0mg/kg) (Control)	Group B (50mg/ kg) E.coli Phytase	Group C (100 mg/kg) E.coli Phytase	Group D (50 mg/kg) Buttiauxella Phytase	Group E (100 mg/ kg) Buttiauxella Phytase	
Carcass weight	1219.71 c	1295.60 b	1306.00 ab	1280.51 bc	1350.60 a	0.0017
Dressing percentage	59.21	62.68	61.23	60.27	62.53	0.0644

Table-8: Influence of feeding different sources and levels of bacterial phytase enzymes on the weight of heart, gizzard, liver, spleen and proventiculus of broiler

Edible / non edible parts	Groups					P-value
	Group A (control) (0mg/kg)	Group B (50mg/ kg)	Group C (100 mg/kg)	Group D (50 mg/kg)	Group E (100 mg/ kg)	

Heart	10.40	11.40	10.60	11.14	12.40	0.0731
Gizzard	40.60	42.40	41.20	40.10	43.40	0.1457
Liver	50.14	55.40	54.10	52.18	58.20	0.3428
Spleen	2.04	2.10	2.04	2.06	3.02	0.1892
Proventiculus	10.10	11.00	10.32	10.10	12.04	0.5540

	Carcass weight	Dressing percentage
SE±	24.599	1.3655
LSD @ 0.05	34.789	1.9311

Mortality: The influence of feeding different sources and levels of bacterial phytase enzymes on mortality are presented in Table 9. During 42 days of experiment; out of 250 broilers chicks; only 09 chicks were died which is the under the normal range of mortality.

Mortality rate of 8%, 2%, 2%, 4% and 2% was recorded in group A, B, C, D and E, respectively. This indicates that bacterial enzymes feeding to broilers chicks did not influence the mortality rate of broiler.

Table 9: Influence of feeding different sources and levels of bacterial phytase enzymes on the mortality of broiler

Parameters	Group				
	Group A (control) (0mg/kg)	Group B (50mg/ kg)	Group C (100 mg/kg)	Group D (50 mg/kg)	Group E (100 mg/ kg)
No. of dead birds	4	1	1	2	1
Mortality %	8%	2%	2%	4%	2%

Digestibility: Proximate analysis of fecal samples of broiler fed with various levels and sources of bacterial phytase enzymes was performed and the results presented in Table-10. The data showed that higher percentage of crude protein were recorded in group E (75%), then C (72%), B (71%), D (70.8%) and A (70%) respectively. Similarly M.E (kcal) were greater in group E (30.5%), then C (30%), B (29%), D (29%) and A (28.5%) respectively.

Economics: The economics of rations were calculated and presented in Table-11. It was noted that the net income from the birds in groups A, B, C, D and E was Rs. 35.20, 41.50, 47.88, 40.30 and 48.70/bird. It was noted that broiler in group E and C were economically more profitable due to higher live body weight as compared to broilers of group B, D and A, respectively.

Table-10: Proximate analysis of fecal samples of broiler.

Groups	Crude protein	M.E (kcal)
A	70%	28.5%
B	71%	29.%
C	72%	30%
D	70.8%	29%
E	75%	30.5%

Table-11: Economics of broilers fed on ration containing different sources and levels and of bacterial enzymes

Particulars	Group A (control) (0mg/kg)	Group B (50mg/ kg)	Group C (100 mg/kg)	Group D (50 mg/kg)	Group E (100 mg/ kg)
Day-old chicks (Rs/chick)	50	50	50	50	50
Feed consumed (kg/chick)	3.70	3.80	3.60	3.78	3.74
Rate of feed(Rs/kg)	46	46	46	46	46
Feed cost (Rs/bird)	170.20	174.80	165.83	173.88	172.04
Cost on clay (Rs/bird)	14.80	0	3.60	15.12	3.75
Medication(Rs/bird)	5	5	5	5	5
Litter cost(Rs/bird)	7	7	7	7	7
Limestone(Rs/bird)	2	2	2	2	2
Brooding costs	15	15	15	15	15
Labor cost(Rs/bird)	12.50	12.50	12.50	12.50	12.50
Miscellaneous(Rs/bird)	10	10	10	10	10
Total cost(Rs/bird)	236.50	226.30	220.70	240.50	227.29
Net profit (Rs/bird)	35.20	41.50	47.88	40.30	48.70

DISCUSSION

Supplementation of feed with 100 mg/kg bacterial enzyme furnished higher effects for FCR. The phytase supplementation had significant result on feed and water intake. Wang et al., (2005) [16] described that feed enzyme to broiler diets improved digestion and absorption of nutrients particularly fat and protein, enhanced Apparent Metabolizable Energy value of the diet, increased feed intake, weight gain, and feed–grain ratio. Odetallah, et al., (2005) [15] determined that phytase enzyme consequently improved the feed conversion ratio. Atencio et al. (2001) [17] evaluated the effect of phytase improved feed conversion ratio by 3%. McMullen et al. (2006) [18] concluded that phytase addition to broiler diets reduced the amount of phosphorus in the manure and improved the growth rate of birds and positive influence on feed conversion ratio.The outcomes of current study shown that a level of 100 mg/kg bacterial enzyme in broiler diet resulted in increased body weight gain of trial birds. The results further showed that increasing level of phytase enzyme @ 100 mg/kg bacterial enzyme in broiler diets promoted the body weight gain of experimental birds. These results are further supported by many previous researchers who carried out related studies in different parts of the world. Timmons et al. (2008) [13]stated that feed supplemented with phytase enzyme enhanced phytate P digestibility in commercial broilers and therefore the live body weight of the broiler improved fast. Odetallah, et al., (2005) [15] determined that phytase enzyme added in broiler feed improved the utilization of phytate phosphorus, increased the digestion of phytate phosphorus and consequently increased the weight gain. Atencio et al. (2001) [17] assessed the results of phytase on the performance of the birds and concluded that the phytase as feed supplement enhanced the weight gain by 3.4%. Rutherfurd, et al., (2004) [19] determined that phytase enzyme increased growth and digestibility in broiler and microbial phytase improved phytate P. Silversides et al. (2008) [20] concluded that broiler feed added with phytase enzyme resulted in increased digestibility and improved live body weight, consequently increased feed conversion ratio. Supplementation of feed with 100 mg/kg bacterial enzyme resulted in improved feed and water consumption. Hussein (2005) [21] evaluated the effect of different levels of phytase enzyme on the growth of broilers and determined that this effect was variable it was concluded that

supplementation of phytase to P deficient diets increased feed intake and general performance of broilers with live feed intake. Rezaei et al. (2007) [22] stated that feed supplementation of phytase enzyme resulted in increased feed intake, body weight gain, and feed conversion ratio (FCR) and low mortality; however significant effect on blood parameters of broiler. Sabha (2008) [23] examined the effect of phytase supplementation on broilers performance and revealed that addition of phytase to P-deficient diets increased (P<0.5) broilers performance with influence starting from the beginning of the fourth week of the feeding experiment and no effect on feed intake. Supplementation of feed with 100 mg/kg bacterial enzyme gave superior results for carcass weight & dressing percentage, heart weight, gizzard weight, liver weight with maximum net profit. Shaw (2005) [24] examined the effects of phytase enzyme on live performance of broiler. He determined that phytase supplementation of low and marginal np P diets may lead to advances in growth and skeletal performance and may have a positive effect on incidence of infection and immune function in growing broiler chickens. Khattak et al. (2006) [3] concluded that benefits of using enzyme in poultry diets include not only enhanced bird performance and feed conversion but also less environmental harms due to reduced output of excreta. Plumstead et al. (2007) [25]revealed that phytase inclusion in a broiler laying diet at the expense of all added P from dicalcium phosphate reduced the manure total P and WSP concentrations by 42%, without effect on the number of chicks produced per hen housed and increased bird growth as compared to control. Ghorbani et al. (2009) [23, 26] recommended that enzyme and Phytase may be added in broiler diet for economical production. Omar and Sabha (2009) [23] stated that phytase supplementation had significant effect on carcass and dressing percent compared to birds fed the low P diets. Also, results of this study revealed that phytase enzyme increased (P<0.05) the digestibility of dry matter, crude protein and ash. Yang et al. (2010) found that the enzyme complex used in broiler diet had the thermo-tolerance to resist the heat treatment process of broiler and improved body weight.

CONCLUSION

he addition of bacterial phytase enzymes at the level of 100 mg/kg in broiler ration resulted significant improvement in the live body weight and efficient feed and water intake. The birds had the superior feed conversion as a result of incorporation of bacterial phytase enzymes @ 100 mg/kg in broiler ration.The results further indicated that carcass weight of broiler was improved when 100 mg/kg of bacterial phytase enzymes were added in basal ration. While dressing .Percentage of broilers was higher when 100 mg/kg of E. coli phytase were added in broiler ration Addition of 100 mg / kg of bacterial phytase enzymes significantly improved th digestibility of feeds.

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