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Article

Comparative study on feeding of growth promoter (Aviator™) and enzymes (Acinor™) on growth performance of broiler

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Abstract: The experiment was conducted to evaluate the effects of growth promoter (Aviator™) and enzymes (Acinor™) with basal feed. A total of 40 Cobb-500 Broiler day old chicks were reared in an open sided gable type house for a period of 5 weeks from 24th september to 28th october, 2017. Body weight and feed intake were recorded on day 0, 7, 14, 21, 28 and 35. The experiment was conducted in a Completely Randomized Design (CRD). Birds were randomly distributed into four dietary groups i.e control (T_0) with basal diet, T_1 with basal diet and growth promoter (GP) @ 2 gm/kg of feed; T_2 with basal diet and enzymes (EZ) @ 0.4 gm/kg of feed and T_3 with basal diet and GP plus EZ (2 gm/kg + 0.4 gm/kg). The records were kept on body weight, feed intake and mortality while weight gain, feed conversion ratio (FCR) and survivability were calculated. Broiler chicks that received GP and a combination of GP+EZ treatments showed significant improvement in performance ($p<0.05$) over control with respect to body weight gain, feed conversion ratio, carcass yield. Cost-effectiveness of GP+EZ treatment higher than all other treatments but GP and EZ had almost similar cost-effectiveness. Feeding EZ alone had comparatively less weight gain and almost similar feed conversion ratio compared with GP groups but it's performance was significantly better than that of control group. This study indicated that the diet containing GP+EZ offered slightly increased benefits to the growth performance of broilers and these benefits were almost equal to the GP. It is revealed that growth promoter (Aviator™) supplementation with enzymes (Acinor™) is beneficial for broiler production.

Keywords: broilers; growth promoter (aviator™); enzymes (acinor™); dietary groups; growth performance

1. Introduction

Broiler chicks have been shown to profit from immediate access to feed. Although the focus of nutrition has been on provision of energy, chicks would profit from a more balanced nutrient profile, particularly protein and amino acids. To cope with market demand for protein (meat), modern broilers are reaching market age sooner each year (Kleyn and Chrystal, 2008). The extensive uses of antibiotics in animal farms to enhance growth rate, increasing feed efficiency and prevention of intestinal infections have led to the development of antibiotic-resistant bacteria in the gastrointestinal tract and drug residuals in meat. The use of probiotics in order to competitively prohibit the colonization of intestinal microorganisms has been proposed for poultry, especially after some countries banned certain antibiotics being frequently included in rations as growth promoters. Probiotics are defined as viable microorganisms (bacteria or yeasts) that shows a beneficial effect on the health of the host when they are ingested (Khaksefidi and Rahimi, 2005). One of such classes of alternatives is prebiotic, which includes fructooligosaccharide, galactoligosaccharide, transgalactooligosaccharide, and mannan-oligosaccharide (MOS). The MOS is derived from the outer cell wall of yeast, and its evaluation in diets for breeders is of particular interest because it not only shifts gastrointestinal microflora balance toward beneficial organisms (Spring *et al*., 2000; Fairchild *et al.*, 2001) but it has also immunomodulatory properties (MacDonald, 1995; Savage *et al.*, 1996; Cotter, 1997; Cotter *et al*., 2002). The yeast cell wall has strong antigenic stimulating properties, and it is well recognized that this property is a characteristic of the mannan chain (Ballou, 1970). Supplementation of poultry diets with MOS results in improved production in terms of body weight gain and feed conversion (Parks *et al.*, 2001), partly because of its hypothesized nutrient sparing effect but primarily due to its effects on nutrient utilization in the gastrointestinal tract (Kumprecht *et al*., 1997; Savage *et al.*,1997; Sonmez and Eren, 1999). The effect of MOS on growth performance have been analyzed in several studies with chickens, prevalence and concentration of different strains of *Salmonella* as well as *E. coli*, is found to reduce, (Spring *et al*., 2000). However, reported effects on enhancing beneficial bacteria, such as lactobacilli and bifidobacterial are more variable (Baurhoo *et al*., 2007). β-1, 3-Glucan is a functional polymer consisting of glucose with β-1,3 linkage and can be derived from various sources, including grains, mushrooms and bacteria. β-1, 3-Glucan is known to enhance immunity and bioactivity by enhancing secretion of cytokines, activating macrophages, natural killer cells and neutrophils, and have antitumor, antibacterial and antiviral effects (Brown and Gordon, 2005). Enzymes are biological catalysts that perform some vital functions in living organisms. They are naturally present in living organisms and can be produced through the aerobic or anaerobic cultures of bacteria and fungi (Partridge and Wyatt, 1995). In recent decades, much research has been performed in the study of chicken nutrition to investigate the use of exogenous enzymes to enhance nutrient utilization (Campbell *et al*., 1992; Leeson *et al*., 1996; Leeson *et al*., 2005; Seskeviciene *et al*., 1999; Smits *et al*., 1996) and many commercial enzyme products are currently available for use in chicken nutrition. Several previous studies have shown that a wide range of endogenous proteases are synthesized and released in the gastrointestinal tract. These proteases are considered sufficient to optimize feed protein utilization (Le Heurou-Luron *et al*.,1993; Nir *et al*.,1993). The β -mannans are highly viscous, water soluble and heat-resistant compounds (Dale, 1997). The β -mannans have capability to bind water molecules in large quantity which ultimate results in increased digesta viscosity. This higher viscosity of digesta results a reduction in the diffusion of digestive enzymes and stimulates prolife diet of bacteria inside the gastrointestinal tract (Bedford *et al*., 1998; De Barros *et al*., 2015).

2. Materials and Methods

The experiment was conducted in Nadim poultry farm at saidpur upazila under Nilphamari district. A gable type open sided house was used for experimental purpose. The experimental room was thoroughly brushed, swiped and properly washed by water after that bleaching powder @ 1kg/500 sq. ft. was spread over the floor and it was kept 24 hours without any further attention. In addition to maintain bio-security visitors were not allowed to enter into the house, all equipment used in the experimental house was kept clean, dead birds were disposed of properly. The chicks were collected from the dealer of Nourish Poultry and Hatchery Limited. Bangladesh. The trade name of the growth promoter product used in the experiment was “Aviator™” It was manufactured by one of the USA Company named “Varied Industries Corporation (VICOR)” and imported in Bangladesh (Wilts Marketing Co., Ltd.). According to manufacturer’s instruction theinclusion rate of the product for commercial broiler was 2kg/ton of feed. It contains Yeast culture, MOS (Mannan Oligosaccharide), D-Mannose, Galactosamine, Yeast Glucans, β- Glucans. The trade name of the enzymes used in this study was “Acinor™” and manufactured by one of the Indian company named “B.S. Biotech Pvt. Ltd.” and marketed by “Square Pharmaceuticals Ltd.” It contains protease, mannanase enzyme and also protein enhancing factor. The experimental broiler chicks were equally and randomly distributed into 4 dietary groups, T_0 = Basal diet only, T_1 = Basal diet + Growth Promoter (Aviator™ @ 2 gm/kg of feed), T_2 = Basal diet + Enzymes (Acinor™ @ 0.4 gm/kg of feed), T_3 = Basal diet + Growth Promoter (Aviator™ @ 2 gm/kg of feed) + Enzymes (Acinor™ @ 0.4 gm/kg of feed). Commercially available poultry feed (Nourish poultry and hatchery ltd.) was collected and used throughout the experimental period. The broiler chicks were fed with standard broiler pre-starter for the first 16 days and broiler starter for 17 to 35 days of age, as formulated by Nourish poultry and hatchery Ltd. Bangladesh. Routine management includes Litter management, Floor space management for birds, Temperature management (Lighting for broiler), Feed and water management. Fresh and dry rice husk was used as litter materials at a depth of about 2 cm. After 14 days, all old litter was replaced by fresh rice husk. The floor space allowed for each bird was 1 sq. ft. to ensure comfort of the birds. Broilers were exposed to 24 hours continuous light in first 14 days. Next 9 days 1-hour dark then next 6 days 2 hrs. dark and last 6 days 4 hours dark was provided. The experimental birds were vaccinated at 5, 10, 17, 21 days of age with ND + IB, IBD, IBD, ND. At the end of the trial, to determine meat yield characteristics of the birds, 12 broilers; three broilers from each group weighing average of pen weight were selected to facilitate processing. All broilers feed was withdrawn 12 hours prior to killing the birds. The birds were killed and allowed to bleed for 2 minutes and immersed in hot water (51-55^{0}C) for 120 seconds in order to lose the feathers. Dressed broilers were cut into different parts such as breast, thigh, drumstick, wing and back. Finally, every cut-up part was weighed and recorded for broiler of all replications. Following parameters were recorded in the record book-Body weight of the broiler (in each week), Body weight gain, Daily supplied amount of feed and feed residue, Feed Conversion Ratio (FCR), No. of dead birds (mortality), Temperature and humidity (on regular basis), Record of vaccination, Any disease or abnormal condition of the broiler, Cost of production. Data on body weight, body weight gain, feed intake, Feed Conversion Ratio (FCR), livability and edible meat characteristics of broilers were subjected to analysis of variance (ANOVA) in a completely randomized design (CRD) employing Statistical Package for the Social Sciences (SPSS, version, 22) for descriptive analysis.

3. Results

3.1. Productive performance of broiler

The productive performances of broiler after feeding growth promoter with or without enzymes are studied.

3.1.1. Effects of growth promoter (GP) and enzymes (EZ) and their combination on body weight of birds

The body weight of different treatment groups and age of broilers shown in Table 1. At the end of the trial, GP+EZ containing groups (1791.21±0.784 gm/bird) resulted in significantly highest ($p<0.05$) body weight followed by GP (1723.41±0.763 gm/bird), EZ (1697.64±0.638 gm/bird) and control (1596.03±1.056 gm/bird) respectively whereas initial body weight was similar in all groups.

Table 1. Body weight of the birds.

Parameters	Body weight (gm/wks/bird)					
	Day old	**1st week**	**2ndweek**	**3rd week**	**4th week**	**5th week**
Control (T_0)	44.89±0.094	126.69^d±0.415	421.25^d±0.385	774.71^d±0.792	1131.25^d±0.446	1596.03^d±1.056
GP (T_1)	44.94±0.074	151.24^b±0.665	438.30^b±0.736	797.44^b±0.685	1155.27^c±0.741	1723.41^b±0.763
EZ (T_2)	44.86±0.100	138.25^c±0.516	426.38^c±0.532	785.74^c±0.760	1174.55^b±0.794	1697.64^c±0.638
GP+EZ (T_3)	44.89±0.114	160.56^a±0.315	454.59^a±0.702	812.98^a±0.553	1201.90^a±0.647	1791.21^a±0.784
Level of Significance	NS	*	*	*	*	*

Legends: GP= Growth promoter, EZ=Enzymes.
* = Significant at 5% level of probability
NS = Not significant
In a column figures with same letter or without letter do not differ significantly whereas figures with dissimilar letter differ significantly (as per DMRT)

3.1.2. Effects of growth promoter (GP) and enzymes (EZ) and their combination on body weight gain of birds

The body weight gain of different treatment groups and age of broilers shown in Table 2. At the end of the trial, Significant difference ($p<0.05$) in body weight gain was observed among the groups. The significantly highest body weight gain was found in GP+EZ containing groups (1746.32±0.757 gm/bird), intermediate in GP (1678.56±0.817 gm/bird) and EZ (1652.90±0.530 gm/bird), as well as lowest in control group (1551.14±1.016 gm/bird).

Table 2. Body weight gain of the birds.

Parameters	Body weight gain (gm/wks/bird)					
	1st week	**2ndweek**	**3rd week**	**4th week**	**5th week**	**Total**
Control (T_0)	81.80^d±0.463	294.56^a±0.480	353.46^b±0.829	356.54^b±0.413	464.78^d±0.920	1551.14^d±1.016
GP (T_1)	106.30^b±0.613	287.16^b±1.309	359.14^a±0.899	357.83^b±0.942	568.14^b±1.006	1678.56^b±0.817
EZ (T_2)	93.39^c±0.522	288.25^b±0.245	359.36^a±0.846	388.81^a±0.873	523.09^c±0.397	1652.90^c±0.530
GP+EZ (T_3)	115.67^a±0.381	294.03^a±0.821	358.40^a±0.283	388.92^a±0.788	589.31^a±0.813	1746.32^a±0.757
Level of Significance	*	*	*	*	*	*

Legends: GP= Growth promoter, EZ=Enzymes.
* = Significant at 5% level of probability
In a column figures with same letter or without letter do not differ significantly whereas figures with dissimilar letter differ significantly (as per DMRT)

3.1.3. Effects of growth promoter (GP) and enzymes (EZ) and their combination on Feed intake of birds

The result of feed intake at different ages of broilers with different treatments shown in Table 3. Feed intake of GP+EZ group was higher than all other groups till 2nd week where the values were significantly ($p<0.05$) varied with those of GP, EZ and control group. At 3rd week, GP (595.46±0.602 gm/bird) and GP+EZ (592.72±0.512 gm/bird) supplemented groups consumed significantly higher ($p<0.05$) amount of feed compared to EZ (581.93±0.651 gm/bird) and control (566.58±1.091 gm/bird). EZ group took significant increased ($p<0.05$) amount of feed during 4th week compared to other groups. The cumulative feed intake was highest for GP+EZ group (3029.41±1.010 gm/bird), which varied significantly among control (2940.83±1.016 gm/bird), EZ (3003.59±2.170 gm/bird) and GP (3016.88±1.495 gm/bird) for the whole experiment period.

Table 3. Feed intake of the birds.

Parameters	Feed intake (gm/wks/bird)					
	1st week	2ndweek	3rd week	4th week	5th week	Total
Control (T_0)	135.43^d±0.357	329.72^d±0.567	566.58^d±1.091	786.55^a±0.657	1121.33^d±0.900	2940.83^d±1.016
GP (T_1)	142.85^b±0.387	371.21^b±0.573	595.46^a±0.602	781.18^b±0.752	1126.19^c±0.659	3016.88^b±1.495
EZ (T_2)	140.12^c±0.598	363.57^c±0.461	581.93^c±0.651	786.91^a±0.717	1131.04^a±0.857	3003.59^c±2.170
GP+EZ (T_3)	147.70^a±0.696	379.59^a±0.426	592.72^b±0.512	780.77^b±0.576	1128.56^b±0.595	3029.41^a±1.010
Level of Significance	*	*	*	*	*	*

Legends: GP= Growth promoter, EZ=Enzymes.
* = Significant at 5% level of probability
In a column figures with same letter or without letter do not differ significantly whereas figures with dissimilar letter differ significantly (as per DMRT)

3.1.4. Feed conversion ratio (FCR)

The feed conversion ratio (feed intake in gm / weight gain in gm) of broilers having different dietary treatments shown in Table 4. During 1st week of trial, the FCR was significantly higher ($p<0.05$) in control group than other groups. In 2nd and 3rd week of trial, GP+EZ and GP group had similar FCR which was significantly higher ($p<0.05$) than other two groups. During 4th and 5thweek of trial control group had significantly highest ($p<0.05$) FCR than all other groups.

3.1.5. Survivability

GP, EZ and GP+EZ receiving groups had no mortality while the survivability of the control group was 90%. However, it is clear that the control group suffered much as compared to remaining groups.

Table 4. Feed conversion ratio (FCR) of the birds.

Parameters	Feed conversion ratio (FCR /wks/bird)					
	1st week	2ndweek	3rd week	4th week	5th week	Total (Avg.)
Control (T_0)	1.65^a±0.013	1.12^c±0.003	1.61^c±0.004	2.20^a±0.002	2.41^a±0.005	1.80^a±0.005
GP (T_1)	1.34^c±0.007	1.29^a±0.007	1.66^a±0.005	2.18^b±0.007	1.98^c±0.004	1.69^c±0.006
EZ (T_2)	1.50^b±0.008	1.26^b±0.000	1.62^b±0.005	2.02^c±0.005	2.16^b±0.002	1.72^b±0.004
GP+EZ (T_3)	1.28^d±0.011	1.29^a±0.005	1.66^a±0.002	2.00^d±0.004	1.91^d±0.002	1.63^d±0.005
Level of Significance	*	*	*	*	*	*

Legends: GP= Growth promoter, EZ=Enzymes.
* = Significant at 5% level of probability
In a column figures with same letter or without letter do not differ significantly whereas figures with dissimilar letter differ significantly (as per DMRT)

3.2. Edible meat yield characteristics

Edible meat yield characteristics of broiler receiving growth promoter supplemented diet with or without enzymes are shown in Table 5.

Table 5. Some edible meat yield characteristics of broilers fed on Growth promoter (Aviator™) with or without enzymes (Acinor™).

Variable	Dietary treatments				Level of significance
	Control (T_0)	GP (T_1)	EZ (T_2)	GP+EZ (T_3)	
Dressing weight (g)	$1056.95^{d}\pm7.419$	$1231.65^{b}\pm9.753$	$1156.33^{c}\pm15.351$	$1280.39^{a}\pm12.730$	*
Dressing percentage (%)	$66.22^{b}\pm0.465$	$71.47^{a}\pm0.566$	$68.11^{b}\pm0.904$	$71.48^{a}\pm0.711$	*
Thigh (g)	116.90±0.827	118.35±0.559	117.80±0.836	120.21±1.010	NS
Drumstick (g)	58.50±1.026	61.09±1.429	59.37±1.549	62.20±1.331	NS
Breast meat (g)	$310.78^{c}\pm0.990$	$382.33^{a}\pm1.242$	$371.47^{b}\pm1.282$	$380.67^{a}\pm0.962$	*
Wing meat (g)	$73.33^{b}\pm0.797$	$70.36^{b}\pm1.159$	$71.89^{b}\pm1.242$	$77.67^{a}\pm1.342$	*
Head (g)	$35.20^{b}\pm0.358$	$36.98^{a}\pm0.478$	$35.91^{ab}\pm0.503$	$37.26^{a}\pm0.399$	*
Neck (g)	$41.05^{c}\pm0.398$	$45.58^{b}\pm0.662$	$42.88^{c}\pm0.804$	$48.33^{a}\pm0.588$	*
Heart (g)	$8.90^{c}\pm0.332$	$11.08^{a}\pm0.539$	$10.35^{bc}\pm0.430$	$11.80^{a}\pm0.663$	*
Liver (g)	$38.91^{c}\pm0.836$	$42.33^{b}\pm0.388$	$40.88^{b}\pm0.704$	$44.67^{a}\pm0.551$	*
Gizzard (g)	$21.23^{c}\pm0.501$	$23.73^{b}\pm0.619$	$24.52^{b}\pm0.799$	$27.08^{a}\pm0.488$	*
Abdominal fat (g)	$16.45^{a}\pm0.626$	$8.07^{c}\pm0.466$	$11.25^{b}\pm0.605$	$8.58^{c}\pm0.653$	*

Legends: GP= Growth promoter, EZ=Enzymes.* = Significant at 5% level of probability, NS = Not significant, In a row figures with same letter or without letter do not differ significantly whereas figures with dissimilar letter differ significantly (as per DMRT).

The analyzed data in the table indicates that the treatments had no significant effect ($p>0.05$) on thigh and drumstick of the experimental birds. On the other hand, significant ($p<0.05$) differences were obtained in dressing weight, dressing percentage, breast meat, wing meat, head, neck, heart, liver, gizzard, abdominal fat content among different treatments. Highest and lowest breast meat weight was recorded in GP and GP+EZ respectively. There was a tendency of increased breast meat content among GP, GP +EZ and EZ groups which had significant ($p<0.05$) effect compared to control group. Dressing percent, liver and gizzard weight was higher in GP+EZ group than the control group. Abdominal fat was higher in control group than others.

3.3. Cost-effectiveness of production

The total cost of production in terms of per bird and per kg broiler was TK. 187.85 and TK. 117.70 for control diet, TK. 194.37 and TK. 112.81for growth promoter (GP) group, TK.191.33 and TK. 112.68 for enzymes (EZ) group, TK. 194.96 and TK. 108.86 for (GP+EZ) group respectively as shown in Table 6. The profit in terms of per bird and per kg of broiler were highest in GP+EZ group followed by enzymes (EZ), growth promoter (GP) and control group respectively. It is therefore clear that additional supplementation of GP+EZ, EZ and GP is profitable over control group.

Table 6. Cost of production and profit in different dietary treatment groups of broilers.

Variables	Dietary treatments			
	T_0	T_1	T_2	T_3
Feed intake (gm/broiler)	2940.83	3016.88	3003.59	3029.41
Final weight (kg/broiler)	1.596	1.723	1.698	1.791
Feed price TK. 40 per kg	40	40	40	40
GP (Aviator™) @ Tk.550/-per kg, @ 2 gm/kg	---	1.10	---	1.10
EZ (Acinor™) @ Tk.900/-per kg, @ 0.4g/kg	---	---	0.36	0.36
Feed cost (with or without test ingredients)/kg	40	41.10	40.36	41.46
Feed cost/bird	117.60	124.12	121.08	124.71
Others (Chicks, vaccines, disinfectants, transport, bedding materials, labor etc.)	70.25	70.25	70.25	70.25
Total cost of production /bird	187.85	194.37	191.33	194.96
Total cost of production Tk. /kg	117.70	112.81	112.68	108.86
Sale price Tk.120/- per kg	191.52	206.76	203.76	214.92
Profit Tk./broiler	3.67	12.39	12.43	19.96
Profit Tk./kg	2.30	7.19	7.32	11.14
Profit Tk. /kg (over control)	--	4.89	5.02	8.84

T_0= Control with Basal diet, T_1= Basal diet + Growth promoter, T_2= Basal diet + Enzymes,T_3= Basal diet + growth promoter + Enzymes.

4. Discussion

4.1. Effects of growth promoter (GP) and enzymes (EZ) and their combination on body weight and body weight gain

The research results obtained in this study are consistence with Victor *et al*. (1993) found that MOS supplementation in aflatoxin contaminated feed significantly improved body weights as compared with control. Pupovac *et al*. (1998) reported that introduction of Bio-Mos (mannan-oligosaccharide) in broiler diet increased daily gain by 7-12%. Similar observations were reported by Xing *et al*. (1999), Rawashdeh *et al.* (2000) for growth performance at lower level of prebiotic viz, FOS. Xu *et al*. (2003). Iji *et al*. (2001) found non-significant effects of mannan-oligosaccharide (at 0, 0.1,0.3,0.5g/kg diet) on weight gain when fed to broiler chickens during a 28-day trial. These results corroborate those obtained by Zou *et al*. (2006) and Albino *et al*. (2006), who tested antibiotics and MOS-based prebiotics in broiler diets and saw an improvement in the broilers' weight gain.

4.2. Effects of growth promoter (GP) and enzymes (EZ) and their combination on Feed Intake

Similar results were observed by Spais *et al*. (2003) who have reported that addition of prebiotic (mannan-oligosaccharide) showedsignificant differences in feed intake. Parks *et al*. (2001) observed improved feed consumption with MOS feeding for 0-3 weeks in male turkey. Upendra and Yathiraj (2003) observed minor improvement in feed consumption as compared to control by feeding mannan-oligosaccharide (3.68 Vs 3.71kg) broiler chicks.

4.3. Effects of growth promoter (GP) and enzymes (EZ) and their combination on Feed Conversion Ratio (FCR)

The results of present study are in agreement with Maiorka *et al*. (2001) tested the substitution ofantibiotics with prebiotic, probiotic and symbiotic in the diet of broiler chickens up to 45 days of age and reported that the FCR in treatment groups were improved as compared with the control group. The beneficial improvement in feed conversion ratio by feeding MOS observed in the present study is in close agreement with Ceylan *et al.* (2003).

4.4. Livability

In contrast to the present results, Hooge *et al*. (2003) reported that mortality percentages were lowered by inclusion of Bio-Mos@, with the relative reductions compared to negative control i.e. antibiotic fed group being -21.78% for averages by treatment and -21.95% averaged by trial ($P<0.017$). Spais *et al*. *(*2003) showed that mortality rate was lower in Bio-Mos fed group compared tocontrol (2.5 Vs 2.9), however, the difference was statistically ($p > 0.05$) non- significant. Upendra and Yathiraj (2003) reported that lowered mortality in broilers supplemented with *S. cerevisiae, L. acidophilus* and mannan-oligosaccharide.

4.5. Edible meat yield characteristics

These results corroborate those obtained by Albino *et al*. (2006), who tested antibiotics and MOS-based prebiotics in broiler diets and observed better broiler carcass yield. And also assessing the addition of MOS in broilers at 42 days of age, found significant differences in the breast yield of the broilers. Basal feed without growth promoter + MOS (T4) produced the best yield for drumsticks (13.64%), thighs (11.24%), and wings (8.08%), while treatment 5 (basal feed without growth promoter + β-mannanase + MOS) had the lowest values, of 12.14%, 10.42%, and 7.52% for drumsticks, thighs, and wings, respectively.

4.6. Cost effectiveness of production

These results are partially in agreement with Gunes *et al*. (2001) who have reported that broiler production is more economical with Fermeacto-5OO. Hooge *et al.* (2003) reported increased feed expenses per bird and net income per bird as compared to control group with prebiotic feeding at 500-4000ppm.

5. Conclusions

The supplementation of growth promoter and enzymes in broiler diets has improved the performance. These supplementation of growth promoter and enzymes in broiler diets showed the best results on body weight, body weight gain, feed intake, feed conversion ratio, livability, edible meat yield characteristics and cost-effectiveness of production. But best results were obtained by the combination of growth promoter and enzymes in broiler diets.

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Conflict of interest
None to declare.

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