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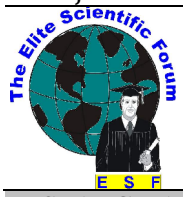

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RESEARCH ARTICLE

Effect of Econase, Avizyme and Zympex Enzymes on the Performance of Broiler Chicks

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ABSTRACT

The study was conducted to determine the effect of different enzymes on the performance of broiler chicks. For this purpose, one hundred and twenty day-old broiler chicks were purchased from a local hatchery and were randomly divided into 12 experimental units of ten chicks each. These experimental units were further divided into 4 groups in such a way that each group has 3 replicates. Each experimental unit (replicate) of the chicks was randomly placed in a separate pen. Group (A) served as control and was fed only commercial broiler ration without any enzyme. While Group B, C and D were fed commercial broiler ration plus Econase, Avizyme and Zympex enzymes @ 5, 10 and 25 g/bag of feed, respectively (as recommended by manufacturers). The results revealed significant effect of enzymes supplementation on weight gain, feed consumption and feed conversion ratio. The data revealed that the over all performance of broilers improved significantly with enzyme supplementation. The broiler fed different enzymes significantly gained 10-13.9% more weight; consumed 5.9-9.9 % more feed and improved 3.5-7.5% feed conversion ratio as compared to control. It is concluded from this study that enzymes supplementation significantly improved dressing percentage, while it did not reveal any significant effect on relative weights of liver, gizzard, heart and spleen. Net profit per bird also improved in enzymes groups as compared to control.

INTRODUCTION

The main objective of commercial poultry farm enterprise is to get high productivity, which can be achieved by obtaining maximum nutrient utilization from feedstuffs. In Pakistan, broiler feed is based primarily on cereal grains and vegetable protein meal, which are supplied for meeting most of energy and protein requirements in the poultry diet. Primary dietary energy source in poultry diet are cereal grains mainly corn, wheat, and rice etc. Cereal grains are rich in starch and non- starch polysaccharides. Poultry feeds are commonly composed of feedstuffs of plant origin having anti-nutrition factor, non-starch polysaccharides (NSP) (Jacob et al., 2000). NSP's (fibers) are indigestible to monogastrics like pigs and poultry as they lack enzymes necessary to digest the "beta" type of linkages (Vooren, 2012). Broiler diet is predominantly composed of plant materials, mainly cereals and vegetable proteins plus little amount of animal protein. Many cereals and their by products contain non-starch polysaccharides (NSP) such as cellulose, xylose, arabinose, galactonic acid which are not easily digested by poultry. Due to lack of sufficient enzyme and high molecular weight, soluble non starch polysaccharides dissolve within the gut of young poultry; increase the intestinal viscosity which slows down the migration and absorption of nutrients (Vooren, 2012). The degradation of non-starch polysacchride (NSP) has been proposed as the underlying mechanism to improve bird performance by releasing nutrients trapped within the cell and lowering digesta viscosity to enhance nutrient digestion and subsequent absorption (Bedford and Schulze, 1998). Enzymes are proteins; increase the rate of reactions without being consumed in the process as catalysts. Enzyme occupy a central role in health and diseases, without them life would not be possible. They are biocatalysts and regulate the rates at which all physiological processes take place in the body (Murray et al., 2003). Enzymes are sensitive to environmental conditions and have the best performance at moderate

temperature with 6-8 pH ranges. Addition of enzymes into mixtures for broiler nutrition is applied with purpose to increase the efficiency of production of poultry meat. Wheat is a common source of energy and an excellent ingredient for poultry, but its high dietary inclusion have resulted consistently poor chick performance (Friesen et al., 1992). Enzymes eliminate the effects of the non-nutritive, non-starch, water-soluble polysaccharides. Addition of exogenous enzymes to the ration resulted in increased efficiency of feed utilization and growth rate while it reduced environmental pollution due to a decreased output of manure and gases such as ammonia (Zhang et al., 1997). Enzymes are added to animal ration with the goal of increasing its digestibility, removing anti-nutritional factors, improving nutrient availability and digestibility, as well as for environmental issues (Fernando et al., 2008). More than 550 Millions rupees are invested for the import of enzyme to use in poultry feed in Pakistan. Thus a project was planned to see the real effect of different enzymes i.e. Econase, Avizyme and Zympex on the performance of broilers in terms of weight gain, feed consumption, feed conversion ratio and economics.

MATERIALS AND METHODS

The experiment was conducted at Poultry Research Centre, University of Agriculture Faisalabad. Pakistan.
The broiler house (29x25 sq. ft), comprising of 12 pens (4x3 sq ft/pen) was thoroughly cleaned, white washed, fumigated and disinfected before the initiation of experiment. The temperature of the house was kept at 95 °F before the arrival of chicks. The pens were allotted at random to different experimental units; Chicks in each replicate were kept in separate pens. One hundred and twenty (120) day old broiler chicks were purchased from a local hatchery. Ten chicks in each experimental unit were placed in separate pen. These experimental units were further randomly allotted to four experimental rations in such a way that each ration was fed to 3 experimental units (replicates).
Four broiler starter ration were prepared and designated as A, B, C and D. The formulation was done in such a way that ration A served as control (without any enzyme). Ration B, C and D contained enzyme Econase, Avizyme and Zympex at the rate of 5, 10 and 25 g/bag of feed (50 kg), respectively. These rations were fed to 12 replicates of 10 chicks each. Main ingredients of the ration were maize, corn, wheat, sunflower meal and wheat bran. The birds were vaccinated according to the recommended vaccination schedule and kept under uniform managemetal conditions. Each experimental ration was allotted to three experimental units (replicates). Broilers were fed for 0-42 days. Broiler chicks were fed ad-libitum all the time. Fresh and clean water with 24 hours light was made available throughout the experimental period.
Proximate analysis of experimental rations for dry matter, crude protein, crude fiber, ether extract and nitrogen free extract was done by the methods of Association of Official Analytical Chemists (AOAC) 2006, in the laboratory of Institute of Animal Nutrition and Feed Technology, University of Agriculture Faisalabad, Pakistan. The nutrient composition of broiler ration used has been shown in Table 1.

Table 1: Nutrient Composition of Broiler Rations

Nutrient Composition	Broiler Starter Ration	Broiler Finisher Ration
	A	B
Crude Protein %	21.5	19.5
Metabolizable Energy(Kcal/Kg)	2980	3020
Crude Fiber (%)	4.15	4.15
Ether Extract (%)	2.1	2.1
Ash (%)	4.5	3.9
Available Phosphorus (%)	0.69	0.54
Lysine (%)	1.2	1.2
Methionine (%)	0.54	0.52
Calcium (%)	1.49	1.41

Day-old chicks were individually weighed at the start of the experiment. Then weight of individual chicks was recorded at the end of each week. A measured amount of feed was offered daily and left over feed was weighed at the end of each week. From this data average weight gain, feed consumption and feed conversion ratio per bird of each replicate was calculated. At the end of the experiment, three birds from each replicate were picked up randomly and slaughtered for live and dressed weight. Dressing percentage was calculated accordingly. Liver, gizzard, heart and spleen were weighed. Relative weight of these organs was calculated. At the end of experiment economics of the project was calculated.
The data obtained was subjected to statistical analysis. For the interpretation of results, analysis of variance technique was used with completely randomized design. Treatments means were compared by least significant difference test (Steel et al., 1996).

RESULTS

The performance of broiler chickens was calculated in terms of weight gain, feed consumption, feed conversion ratio, slaughter data and economics. Statistical analysis revealed that enzymes have significant effect ($P < 0.01$) on weight gain (Table 2) and resulted 10-13.9 % more weight gain. Maximum weight gain was in-group C (Avizyme) followed by B (Econase), D (Zympex) and minimum in control (A).

There was significant increase in weight gain by enzymes however, there were non-significant differences among different enzymes.

Broiler fed different enzymes consumed 5.9-9.9 % more feed. Statistical analysis revealed that enzyme supplementation has significant effect on feed consumption (Table 2). Maximum feed was consumed by group C (Avizyme) followed by D (Zympex), B (Econase) and minimum in control (A) group. There was significant increase in feed consumption by the enzymes however; there was a non-significant difference between B and D groups. Enzyme supplementation improved the feed conversion ratio by 3.5-7.5 % as compare to control. Statistical analysis revealed significant effect of enzymes on feed conversion ratio (Table 2). Best-feed conversion ratio was in-group B (Econase) followed by C (Avizyme), D (Zympex) and control (A). There was significant improvement in FCR by the use of enzymes. However, there were non-significant differences between C and D groups.

At the end of experiment three birds from each experimental unit (replicate) were picked up randomly and then slaughtered. The data regarding live and dressed weights were recorded to calculate dressing percentage. Relative weights of liver, gizzard, heart and spleen were also calculated. The average values for slaughter data have been summarized in Table 3.

The average dressing percentage under different treatments A (control), B (Econase), C (Avizyme) and D (Zympex) were 57.7, 59.8, 60.2, 64.5, respectively. Statistical analysis of data for dressing percentage revealed significant ($p<0.05$) effect of enzymes (Table 3). The maximum average dressing percentage was observed in treatment D followed by C, B and A, respectively. The data revealed that the addition of enzyme statistically increase-dressing percentage as compared to control (without enzyme addition). There was non-significant effect of enzyme treatments on relative weights of liver, gizzard, heart and spleen (Table 3).

The net profit per bird was found to be 15.58, 25.8, 23.84 and 21.81 rupees in the treatments A, B, C and D respectively (Table 2). The enzyme supplementation improved the profit.

DISCUSSION

The results of present study indicated that addition of enzyme significantly increased weight gain, feed consumption, and improved feed conversion ratio as compared to non supplemented group. Significant improvement in weight gain and feed conversion ratio showed positive effect of enzymes on digestion and availability of nutrients.

These results are in accordance with Bhatt et al. (1991) and Nian et al. (2011) who reported significant improvement in performance of broilers by the addition of enzyme. The results of present study are also in line with Matosic et al., (1990), Qian and Sun (2009), Arora et al. (1991), Brenes et al. (1993) Viveros et al. (1993) and Richter et al. (1999) who studied the individual and combined effect of enzymes supplementation on broiler performance and found significant improvement in the performance. Later work of Ermakova et al. (1992); Viveros et al. (1993), Broz *and* Perrin- Voltz (1994) and Ravindran et al. (1999) also showed significant improvement in the performance of the broilers. This improvement may be due to enzyme supplementation, which improved energy digestibility in diet. Zhou et al. (2009). The results of feed intake in the present study are in line with the Brenes et al. (1993) who observed that the addition of Roxazyme to diets improved feed intake by 8 and 16 % respectively. Enzyme may have promoted growth of useful bacteria, it effected on digestive tract environment of birds (Viveros et al. (1993). Improvement in broiler performance may be due to degradation of non-starch polysaccharides (NSP) by releasing nutrient trapped within the cell and lowering digesta viscosity which may have enhance nutrient digestion and subsequent absorption (Bedford and Schulze, 1998). Use of fiber degrading enzyme to the broiler feed significantly improved performance of chicks which might be due to decreased viscosity resulting increase in bioavailability of vitamin A and better utilization of dietary fats (Esmail, 2012). Moreover enzymes may have eliminated the effects of non-starch, water soluble polysaccharides (Zang et al. 1997). However the results of Pillai et al. (1995), Naqvi 1996, and Samarasinghe et al. (2000) do not agree with our findings. Zaghari et al. (2008) reported that when multi enzymes are fed to chicks they could not restore chicks' performance. They reported that Natuzyme did not liberate nutrient equivalency values recommended by the producer for broiler chicks when fed corn-soybean meal based diet. Supplementation of the nutrient reduced diet with the enzyme complex, significantly affected weight gain, feed consumption and feed conversion ratio (Francesch and Geraert, 2009). The difference in the results might be due to different enzymes, environment and management. The dressing percentage of groups under different treatments B, C and D were more as compared to the control group (A). The supplementation of the enzymes significantly improved the dressing% age. These results are in accordance with (Creswell, 1995) who reported that Kemzyme supplementation had significant effect on dressing percentage. The relative weights of the abdominal organs (Liver and gizzard) in the enzyme supplemented groups B, C and D were apparently more than the control group (A). However, the results were non significant by addition of enzyme.

Table 2: Average weight gain, feed consumption and feed conversion ratio of broilers under different experimental treatments during (0-6 Weeks)

Parameters	A (Control)	B (Econase)	C (Avizyme)	D (Zympex)
	Without enzyme	5g/50 Kg of feed	10g/50 Kg of feed	25g/50 Kg of feed
Average total weight gain per chicks (g)	1819.0[b]	2059.0[a]	2072.0[a]	2000.7[a]
Average. total feed Consumption per Chicks (g)	3421.3[c]	3623.3[b]	3758.3[a]	3647.3[b]
Average feed Conversion ratio	1.88[a]	1.75[c]	1.81[b]	1.82[b]
Economics net profit (Rs.)	15.58	25.8	23.84	21.81

Same superscript in rows shows non-significant differences

Table 3: Average dressing percentage, liver, gizzard, heart and spleen relative weights under different treatments

Treatments	Average Dressing percentage	Relative Liver Weight (g)	Relative Gizzard Weight (g)	Relative Heart Weight (g)	Relative Spleen Weight
A (control) Without enzyme	57.7[b]	2.72	1.51	0.54	0.18
B (Econase), 5g/50 Kg of feed	59.8[b]	2.65	1.64	0.52	0.19
C (Avizyme), 10g/50 Kg of feed	60.2[ab]	2.95	1.62	0.49	0.21
D (Zympex) 25g/50 Kg of feed	64.5[a]	3.26	1.77	0.47	0.15

Same superscript in columns shows non-significant differences.

The results of present study are in line with Abbas (1995) who reported that addition of enzyme at 5% level significantly improved the dressing percentage. These results are also in accordance with Aslam (1995) and Naqvi (1996) who reported that kemzyme supplementation had significant effect on dressing percentage.

The enzyme supplementation improved the dressing percentage while it has non significant effect on spleen and Giblet weight (liver, gizzard and heart). The results are not in line with the findings of Brenes et al., (1993) who reported that enzyme reduced the size of gastrointestinal tract, pancreas and liver in birds, fed barley-based diets, whereas a similar treatment of wheat based diets resulted in less dramatic changes in performance and had no effect on organ size. The results of this study are also not in accordance with the findings of Viveros et al. (1993) who reported that weight of gizzard significantly increased 10% by feeding bean hulls but it significantly decreased by the enzyme supplementation.

Conclusion

Results of this experiment showed that the cheaper feed ingredients having the problem of high fiber content can be used successfully in broilers ration by the addition of enzymes. Enzyme improved overall performance of the broilers.

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