

A comparison between the effects of probiotic and enzyme on the performance of broiler chicks

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ABSTRACT

An experiment was conducted to evaluate the effects of dietary supplementation of probiotic combined with enzyme and separately on the performance of broiler chicks. Day-old broiler chicks (160) randomly divided into 4 equal groups with 4 replicates were kept up to 42 days. The groups A and B received diet with 0.1% probiotic (*Bacilluse subtilis* and *Bacillus licheniformis*) and 0.05% enzyme (amylase, protease and xylanase) respectively. The group C received both probiotic and enzyme, and group D received diet without any supplementation and kept as control. The results showed that both probiotic and enzyme significantly improved feed conversion ratio. These effects in probiotic treatments (A and C) were more than group B chicks, especially at first 3 weeks of age. It was concluded that supplementation of broiler ration with probiotic combined with enzyme had better effects compare to only enzyme (not probiotic) and addition of enzyme to high digestible diets supplemented with probiotic could not have improve performance of broiler chicks.

Key words: Broiler chicks, Enzyme, Performance, Probiotic

Probiotics are live microbial feed supplements which beneficially affect the host animal by improving its intestinal balance (Ahmad 2006). Treatment with probiotics moderated growth retardation in chickens and the probiotic protection occurs whether the disease is induced by an environmental, microbial or nutritional stressor (Dunham *et al.* 1998). However, results from trials conducted with broiler fed various probiotics have generally been inconsistent. Some researchers reported positive responses of weight gain and feed conversion ratio in chickens due to consumption of probiotics (Fritts *et al.* 2000, Cmiljanic *et al.* 2001, Kim *et al.* 2001, Abdollahi *et al.* 2002, Khan *et al.* 2007, Awad *et al.* 2009), while others reported no beneficial effects on performance (Panda *et al.* 1999, Patidar and Prajapati 1999, Fasenko *et al.* 2006, Junq *et al.* 2008). In past, use of enzymes was restricted to low digestible diets containing wheat or barley, but nowadays researchers believe that it is possible to increase the digestibility of presumed high digestible diets (corn-soybean meal) with addition of distinctive enzymes (Kocher *et al.* 2002, Mathlouthi *et al.* 2003). The present study was conducted to compare the effect of probiotic and enzyme on the performance of broiler chicks fed with corn soybean meal based diet.

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MATERIALS AND METHODS

Day-old broiler chicks (160) were divided randomly into 4 equal groups of 40 chicks and each group with 4 replicates. Each group was kept in separate room under similar conditions and fed with corn-soybean meal based diet that adjusted for broiler chicks by NRC (1994). Group A and B chicks fed a diet supplemented with 0.1% probiotic and 0.05% enzyme respectively. Group C chicks fed a diet supplemented with 0.1% probiotic and 0.05% enzyme. Group D chicks only fed with basic diet without any supplementation and kept as control. Chicks had free access to diet and water all over the experiment (42 days). Feed intake, body weight gain and feed conversion ratio (FCR) were calculated for each group at the end of 21 and 42 days of old. The probiotic used in this experiment was a commercial probiotic containing 2 strains of bacteria namely, *Bacillus subtilis* CH₂₀₁ and *Bacillus licheniformis* CH₂₀₀ containing 3×10⁹ colony forming units as spore per gram of the product. The enzyme used in this experiment was a commercial multi-enzyme containing amylase, protease and xylanase which formulated for corn-soybean meal based diets of broilers and layers.

Statistical analysis: The one-way Anova and least significance difference (LSD) test were used to compare means for feed intake, body weight gain and FCR.

Table 1. Mean±SE of feed intake, body weight gain and feed conversion ratio (FCR) of a chick in each group for 1–3, 4–6 and 1–6 weeks periods

Group	1–3 week			4–6 week			1–6 week		
	Feed intake	Body weight	FCR	Feed intake	Body weight	FCR	Feed intake	Body weight	FCR
A	725 ±17.16cd	360.27 ±9.35bd	2.02 ±0.09d	2324 ±83.44	1094.4 ±77.88	2.15 ±0.18	3049 ±82.19d	1454.68 ±75.1	2.11 ±0.13d
B	705.5 ±37.26cd	298.5 ±8.54ac	2.37 ±0.18c	2158.5 ±120.64d	1054 ±57.48	2.06 ±0.14	2864 ±98.91d	1352.5 ±50.85	2.12 ±0.09d
C	613.75 ±46.43abd	334.75 ±7.18b	1.83 ±0.14bd	2335.25 ±126.65	1048.1 ±15.1	2.23 ±0.12	2948.75 ±133.37d	1382.75 ±14.65	2.13 ±0.08d
D	836.75 ±6.79abc	324.75 ±10.28a	2.58 ±0.09ac	2599.5 ±110.34b	1066.1 ±30.19	2.44 ±0.11	3436.25 ±104.85abc	1390.83 ±34.16	2.47 ±0.09abc

The letters a, b, c and d indicate each group and group with other group character differ significantly ($P < 0.05$).

RESULTS AND DISCUSSION

Group A (probiotic): Supplementation of diet with probiotic significantly decreased feed intake and improved FCR at the end of the experiment specially during 1–3 weeks period (Tables 1), but in case of body weight gain, a significant increase occurred only at first 3 weeks of age ($P < 0.05$). Concomitant to the finding of the experiment, Sabatková *et al.* (2008) showed that addition of probiotic to the chicken diet significantly improved chicks performance as compared to control chicks. In contrast, Abdollahi *et al.* (2002) reported a significant improvement in the mean weight gain, but not in feed intake and FCR, by dietary supplementation with probiotic. However, in this study, the positive effect of probiotic was seen only during the starter phase.

The significant effect of probiotic at first 3 weeks could be attributed to alleviation of the stressors in this period (such as transportation and vaccination) by early establishment and maintenance of a favourable microbial population in the digestive tract, which in turn improve the assimilation of the food particles and performance. The positive effects of probiotics on the performance of broiler chicks under heat stress condition has been reported by Zulkifli *et al.* (2000) and Rahimi and Khaksefidi (2006).

Addition of enzyme had no positive effect on weight gain, but it decreased the feed intake compare to group D (control) throughout the experiment significantly ($P < 0.05$). It could be attributed to this fact that enzymes can increase the digestibility of indigestible particles such as non-starch proteins resulting in decreased feed intake. In case of FCR, although the effect of enzyme was not significant at 1–21 and 21–42 days of old ($P > 0.05$), but it significantly improved FCR at the end of the experiment compared to control. Concomitant to this finding, Douglas *et al.* (2000) and Graham *et al.* (2002) showed that enzyme supplementation of broiler diet based on corn-soybean meal improved ileal digestible energy with no effect on weight gain and growth performance. Douglas *et al.* (2000) also found that the

addition of an enzyme was affective in improving the IDE and growth performance in soybean meals with lower digestible energy, so ineffectiveness of enzyme on weight gain could be attributed to variety of soybean meal and may be corn which were used in present experiment.

Addition of probiotic combined with enzyme had significant better effects on performance of broilers compare to group B at first 3 weeks of age ($P < 0.05$), but compare to group A, these effects were seen only for feed intake in this period (Table 1). Midilli and Tuncer (2001) reported that the addition of enzyme and probiotic individually or in combination to diets based on barley and wheat improves the performance of broilers, but it was significant only for enzyme and enzyme + probiotic group not for probiotic individually.

The present study also indicated that supplementation of broiler ration with probiotic combined with enzyme had better effects compare to only enzyme. So, it was concluded that addition of enzyme to high digestible diets supplemented with probiotic could not improve performance of broiler chicks.

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