

The effect of probiotic supplementation on productive traits, egg quality and plasma cholesterol of broiler breeder hens

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The present study was conducted to investigate the effects of four different levels of dietary probiotic (protexin) on productive traits and egg quality of broiler breeder hens. One hundred sixty female 64-week-old broiler breeders (Hubbard classic) were involved in this experiment. The birds were randomly assigned to control Group A (unsupplemented diet), Group B (0.25% protexin supplemented diet), Group C (0.5% protexin supplemented diet) and Group D (0.75% protexin supplemented diet) for 10 weeks. Results showed that addition of probiotic had not any significant effect on egg production, egg mass and feed conversion ratio but effect of probiotic on egg weight was significant ($P < 0.05$), The egg weight of control group was the highest and was higher ($P < 0.05$) than group B but was not statistically different from group C and group D. Furthermore supplementation of probiotic had no significant effect on percentage of egg shell, shell thickness, egg shell strength, specific gravity and haugh unit. Overall, it was concluded that dietary supplementation of probiotic had no effect on productive traits, egg quality and plasma cholesterol of 64-week-old broiler breeder hens.

Keywords: broiler breeder; probiotic; productive trait; egg quality; plasma cholesterol

Introduction

The egg shell quality is an important factor to poultry industry due to reproduction and economic implications. However, egg shell quality is related with bird age (Peebs and Brake, 1987). Mcdaneil *et al.*, (1979) observed a decline in shell gravity in older breeders, also nicely has been found that addition of probiotic the diet, has been improved egg production, food conversion ratio (Nahashon *et al.*, 1996 a; Mohan *et al.*, 1995; Abdulrahim *et al.*, 1996), food consumption (Nahashon *et al.*, 1994a), egg weight (Nahashon *et al.*; 1996a) in the layers. But there are few reports concerned with the effect of probiotic on broiler breeders performance, this research was undertaken to asses the effects of probiotic (protexin) on productive traits (egg production, egg weight, egg mass, food conversion ratio), egg quality (thickness, egg shell, strength egg shell, haugh unit, egg shell weight) and plasma cholesterol in 64-week-old broiler breeder hens.

Material and methods

One hundred sixty female and sixteen male 64-week-old broiler breeder hens (Hubbard classic) were involved in this experiment for 10 week at 64-week of age. The animals were randomly divided into 16 groups and each of groups was randomly housed in 16 different pens. The diets were formulated to meet or exceed the requirement for broilers as recommended by National Research Council (1994). The basal diet was supplemented with a commercial probiotic (protexin® probiotic

International Limited, Uk) at levels of 0, 0.25%, 0.5% and 0.75%. The treatments were assigned as completely randomized design. Egg production was recorded daily per replicate. Mean egg weight were determined for two consecutive day every week. Egg shell thickness was determined using a mitutoyo caliper 7313 micrometer with 0.01 mm (0.01- 10 mm) precision (Nahashon *et al.*, 1994a). Egg mass was calculated by method as described by North and Bell (Nahashon *et al.*, 1994b). Food consumption (FC) and food conversion ratio (FCR) were determined at 14 d interval. Egg quality characteristics (egg shell thickness, egg shell weight, egg shell strength, haugh unit) in each replicate measured during the experimental period. Albumen height measured using a micrometer and haugh units calculated using the formula described by Roush (1981). Differences among experimental treatments were tested by analysis of variance using the General Linear Model (GLM) procedures of Statistical Analyses System (SAS, 1988) and considered significant at a probability $p \leq 0.05$. Differences between treatments were tested using Duncan's multiple range tests.

Results and discussion

The addition of probiotic did not have any significant effect on egg production, egg mass and feed conversion ratio but the effect of probiotic on egg weight was significant ($p \leq 0.05$), (Table 1). The birds on probiotic diets showed an improving in egg production, egg mass and feed conversion ratio. Although these improvements was not significant among treatments but the highest egg production and egg mass obtained for treatment 2 (0.25% protexin®). However in the case of egg weight the results was different and highest egg weight obtained with control diet (without protexin®) and was higher ($p \leq 0.05$) than treatment 2 (0.25% protexin®) but not different with the treatment 3 and 4 (0.5% and 0.75% protexin® respectively).

Table 1, effect of probiotic (protexin®) on broiler breeder productivity traits

Variables	Probiotic level (%)				SE
	0	0.25	0.5	0.75	
Egg production percentage (%)	57.14	61.15	59.09	59.42	1.12
Egg weight (gr)	68.24 ^a	65.42 ^b	67.36 ^{ab}	66.81 ^{ab}	0.37
Egg mass (gr)	38.96	40.09	39.81	39.68	0.75
Feed conversion ratio	3.01	3.03	3.02	3.04	0.06

^{a-b} Means within a column no common superscript differ significantly ($p \leq 0.05$)

Nahashon *et al* (1994 b) have also reported that no differences were seen between treatments with or without probiotic. Our findings are consistent with these works. But obtained data in this experiment was different with those reported by others (Nahashon *et al*, 1994a) for feed conversion ratio, (Balevi *et al.*, 2001) for feed consumption, feed conversion ratio and proportion of damaged eggs, (Mohan *et al.*, 1995) for egg production. Overall, the reason of these inconsistency and lack of any effect of probiotic on performance traits except egg weight may be due to that probiotic supplementation was done on the older (after the 64-week of age) broiler breeders. Naqi *et al* (1984) cited that the lack of effect of lactobacillus on hen-day egg production and feed conversion ratio may be explained by lactobacilli become established ideal the gut of most species of animal soon after birth. So, these differences between the previous study and our work may be related to that we evaluate the effect of probiotic on broiler breeder hens but all of the above researchers used layer hens in their works. As shown in table 1, the effect of supplementation of probiotic on egg weight was significant among treatments but contrary with these results. The effects of supplementation of diet with probiotic on egg weight, would be said to be variable since Nahashon *et al* (1994 a) found that supplementation of probiotic significantly increased the egg weight But Balevi *et al* (2001) reported that use of probiotic did not have any significant effect on egg weight. All of these results were different with our results; however the result of egg weight was not reasonable for us.

The results of egg quality characteristic are shown in table 2, there were no statistically significant differences in percentage of egg shell, shell thickness, egg specific gravity, egg shell strength and haugh unit among treatments with respect to whole period of the experiment.

Table 2, the effect of probiotic supplementation on egg quality characteristics

Variables	Probiotic level (%)				SE
	0	0.25	0.5	0.75	
Egg specific gravity	1.09	1.08	1.09	1.08	<0.01
Egg shell percentage	9.26	9.13	9.29	9.21	0.09
Egg shell strength (kg/cm ²)	2.26	2.08	2.25	2.16	0.05
Egg shell thickness (mm)	0.32	0.31	0.32	0.31	<0.01
Haugh unit	84.86	85.57	83.4	85.64	0.66

Nahashon *et al* (1994a) have found that addition of lactobacillus cultures to maize/soybean diets increased calcium retention in layers. Lactobacillus supplementation also produced eggs with higher specific gravity than the unsupplemented in layer hens (Nahashon *et al.*, 1994a). Also indicated that lactobacillus supplementation (1100 mg/kg) to diets including low available phosphorous improved the specific gravity, but did not have significant effect on internal egg quality and egg specific quality (Nahashon *et al.*, 1994b). The effect of supplementation of diet with probiotic could be said to be variable in layer hens since Nahashon *et al* (1994a) found supplementation significantly increased the egg weight whilst Nahashon *et al.* (1994b) reported no significant effects. This inconsistency between this work and another's may be due that here we used the probiotic in broiler breeder hens but others used the probiotic and some specific bacteria such lactobacillus in layer hens in their works.

The level of blood plasma cholesterol between treatments was not different (data unpublished). But other works founded that food supplementation of probiotic (Mohan *et al.*, 1995) and lipid culture of lactobacillus acidophilus (Abdulrahim *et al.*, 1996) has significantly reduced the plasma cholesterol. So the results of recent work are inconsistent with the above works, these differences may be due to period of probiotic consumption. In this work we use the probiotic in a 10 week period while it noted that the decrease of serum cholesterol only became significant after 12 weeks of culture administration, an observation that suggests that it takes several weeks for the ingested culture to exert an influence on the native micro flora (Abdulrahim *et al.*, 1996).

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