The Effect of Feeding Primalac Probiotics on Growth Performance and Blood Parameters of Ostriches

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Abstract

This study investigated the effect of feeding primalac probiotics on growth performance and some blood parameters of ostriches from hatch until 8 wk of age. A total of 48 day-old ostriches were randomly divided into 4 equal treatment groups: 1) Control group fed with a basal diet, 2) 0.035% Primalac group: a basal diet supplemented with 0.035% primalac probiotic, 3) 0.095 % Primalac group fed a basal diet supplemented with 0.095 % primalac probiotic and 4) 0.135% Primalac group fed a basal diet supplemented with 0.135 % primalac probiotic. The results showed that inclusion of the primalac probiotics added to the basal diet improved body weight, FCR and blood parameters (glucose, cholesterol, uric acid and urea) with the 0.135% Primalac group registering the highest body weight, lowest FCR and lowest amounts of blood cholesterol, uric acid and urea (all $p<0.05$).

Keywords: primalac probiotics, ostrich, growth performance, blood parameters.

Introduction

In modern poultry production, different types of growth promoters are being applied. The public concern about pathogenic resistant bacteria in humans (Langhout, 2000) has led to increasing pressure by the consumers for a reduction or ban on the use of nutritive antibiotics. This situation then calls for active research for alternative products that would replace the antibiotic growth promoters. Some of these new products including probiotics are live microbes which grow in the gastrointestinal tract (Havenear *et al.,* 1992) and create beneficial conditions for nutrient utilization (Nahashon *et al.,* 1996; Jin *et al.,* 1996), inhibit pathogenic bacteria (Fuller, 1997; Ghachban *et al.,* 1998; Schwab *et al.,* 1980). Probiotics are organisms and substances which help to improve the environment of the intestinal tract (Green and Sainbury, 2001). Studies with broiler chickens indicated a positive response to dietary supplementation of probiotics (Modilli and Tuncer, 2001; Mohan *et al.,* 1996). Probiotics reduce the production of toxic components by bacteria and create a change in the morphology of the intestinal walls and reduce colonization of pathogens on the intestine walls, thus preventing damage to the epithelial cells (Longhout, 2000). Most investigations suggest the usefulness of probiotics and prebiotics in the production of commercial chickens. An experiment was therefore conducted to further elucidate the role of probiotics by investigating the effect of different levels of primalac probiotics, a commercial probiotic, on the growth performance and blood profile of ostriches.

Materials and Methods

Birds and diets

This study examined the effect of primalac probiotics on growth performance and blood parameters of ostriches in a private ostrich farm at Amol city, Mazandaran, Iran. A total of 48 one-day old ostriches were randomly divided into four equal treatment groups. Each treatment comprised of 4 replicates and 3 animals in each replicate. The experiment was arranged in a completely randomized design. The composition and chemical analysis of the basal diet are presented in Tables 1 and 2.

Table 1: Composition of the basal diet

Ingredient	Starter feed (0-4 weeks)	Grower feed (4-8 weeks)
Maize	49	42
Alfalfa	0	8
Soybean meal	38	34
Wheat barn	8	11
Palm oil	1	1
D.C.P	0.98	0.95
L-Lysine	0.16	0.13
DL-Methionine	0.21	0.19
Vitamin and mineral supplement[1]	0.70	0.50
$CaCO_3$	0.4	0.6
NaCl	0.34	0.38
Enzymes	0.7	0.7
Total	100	100

[1]Vitamin and mineral supplement: Vitamin A, 1000u; D3,1000u; E,50mg, K3, 3mg; Riboflavin, 4mg; Ca pantothenate, 10mg; Nicotinic acid, 40mg; Choline HCL, 150mg; B12, 6mg; B6, 4mg; Biotin, 0/10mg; Thiamine, 1mg; Mn, 50mg; Zn, 45mg; Fe, 30mg; Cu, 4mg; Se, 1mg; DCP, dicalcium phosphate. Vitamin A and D3 in i.u. (international units)

Throughout the 60-day experimental period, the birds had free access to feed and clean drinking water. The ostriches were randomly allocated to the following treatment groups:

Treatment 1 (Control): Basal diet without supplementation.

Treatment 2 (0.035% P) : Basal diet + primalac probiotic at a level of 0.035%

Treatment 3 (0.035% P): Basal diet + primalac probiotic at a level of 0.095%

Treatment 4 (0.135% P): Basal diet + primalac probiotic at a level of 0.135%

Table 2: Chemical composition (%) of the basal diet from 1 d to 8 wk of age of ostriches

Ingredient (%)	0-8 wk
Crude protein	18-20
Crude fiber	6
Crude fat	3
Calcium	1.05
Available phosphorus	0.72
Salt	0.90
Linoleic Acid	1.2
Metabolizable Energy, kcal/kg	2600-2800

Measurements

Performance data were recorded for the period from 1 to 60 d of age. Feed intake was determined as the difference between the amount of feed given and the residual feed at the end of each experimental day. Feed conversion was determined as the ratio between feed intake and body weight gain at each week of the experimental period. At the end of the experiment blood samples from the wing vein were sampled randomly from 5 birds of each treatment using sterile syringes. Serum samples were analyzed for blood glucose, blood uric acid, blood urea, blood cholesterol and total protein by diagnostic kits (Roche diagnostics GmbH, Manheim Germany) using an automated biochemical analyzer (Reflotron Manual, Germany).

Statistical analysis

The data obtained were analyzed using SAS (9.1) with a General Linear Model procedure for ANOVA. Differences between means were analyzed with Duncan's multiple range test. The significant difference statements were based on the probability of $p<0.05$, unless explained in another way.

Results and Discussion

Performance results from 1 to 60 days of age are presented in Tables 3, 4 and 5. There were significant differences between feed intake among treatment groups and the control group ($p<0.05$).

Table 3: Feed intake (means± SE) in grams of control and probiotic supplemented ostriches from 1 day to 8 weeks of age

Week	Treatment			
	Control	0.035% P	0.095% P	0.135% P
1	153± 11.76[b]	117±11.76[b]	184±8.07 [c]	163±29.13[a]
2	1200± 59.48[a]	1250±85.02[a]	1400±39.48[b]	1100±42.50[c]
3	2250± 115.44[a]	2050±75.60[b]	2200±69.77[a]	1950±124.01[c]
4	5700± 220.35[a]	4150±159.32[b]	4461±113.90[b]	3800±88.95[c]
5	7327± 105.46[a]	6950±226.48[b]	6605±361.19[b]	5620±429.61[c]
6	9650± 140.08[a]	7970±508.43[b]	7850±436.98[b]	8315±514.61[c]
7	12500±331.79[a]	10500±486.47[b]	10220±212.61[b]	11220±716.15[c]
8	15165±520.79[a]	13030±403.91[b]	11280±163.57[c]	14200±728.85[d]

[1]0.035% Primalac probiotic with level of 0.035% , 0.095%P: Primalac probiotic with level of 0.095%, 0.135%P: Primalac probiotic with level of 0.135%.

[abc]Means in the same row with the different letter superscripts are significantly different at $p<0.05$.

The group fed with the 0.095% perimalac probiotic showed the highest body weight (Table 4), and was significantly different to the other treatment groups. The group fed with 0.095% primalac probiotic had the lowest FCR (Table 5), which was significantly different to those of the other groups. In addition, the results of this experiment showed that the control group (without any probiotic) had the highest FCR during the first week compared to the other treatment groups.

Table 4: Body weight (means ±SE) in grams of the control and probiotic treated in ostriches from hatch to 8 weeks of age

Week	Treatment			
	Control	0.035% P	0.095% P	0.135% P
1	750± 13.82[a]	790±76.87[a]	811±7.64[b]	882±37.66[b]
2	920± 16.87[a]	1110±29.17[b]	1340±34.88[c]	1030±42.47[d]
3	1350± 24.92[a]	1352±33.94[a]	1920±40.20[b]	1200±48.47[c]
4	2820± 39.66[a]	2340±69.47[b]	3250±84.16[c]	2025±48.89[d]
5	3430± 77.52[a]	3620±86.58[a]	4420±237.66[b]	2820±147.59[c]
6	4430± 53.41[a]	4820±88.46[b]	5730±296.90[c]	4160±150.05[a]
7	5900±40.07[a]	6342±227.86[b]	7260±156.79[c]	5530±250.63[d]
8	6700±102.79[a]	7303±229.65[b]	9140±174.60[c]	6300±244.09[a]

[1]0.035%P: Primalac probiotic with level of 0.035% , 0.095%P: Primalac probiotic with level of 0.095%, 0.135%P: Primalac probiotic with level of 0.135%.

[abcd]Means in the same row with the different letter superscripts are significantly different at $p<0.05$.

Table 5: FCR (means ±SE) of the control and probiotic treated in ostriches from hatch to 8 weeks of age

Week	Treatment			
	Control	0.035% P	0.095% P	0.135% P
1	0.68±0.03 [d]	0.98±0.15 [c]	0.72± 0.01 [b]	1.14± 0.05 [a]
2	1.06±0.02 [c]	1.04±0.02 [c]	1.12± 0.04 [b]	1.30± 0.04 [a]
3	1.62±0.04 [d]	1.40±0.01 [c]	1.51± 0.04 [b]	1.67± 0.06 [a]
4	1.87±0.05 [d]	1.14±0.02 [c]	1.77± 0.03 [b]	1.67± 0.06 [a]
5	1.98±0.07 [b]	1.37±0.06 [c]	1.92± 0.03 [b]	2.02± 0.07 [a]
6	1.99± 0.07 [b]	1.49±0.03 [c]	1.65± 0.07 [b]	2.14± 0.02 [a]
7	2.02±0.05 [d]	1.34±0.02 [c]	1.66± 0.08 [b]	2.19±0.03 [a]
8	2.25±0.04 [d]	1.41±0.02 [c]	1.83± 0.09 [b]	2.06±0.04 [a]

0.035%P: Primalac probiotic with level of 0.035% , 0.095%P: Primalac probiotic with level of 0.095%, 0.135%P: Primalac probiotic with level of 0.135%.

[abcd]Means in the same row with the different letter superscripts are significantly different at $p<0.05$.

The results of blood parameters are given in Table 6. The group fed with a dose of 0.095% primalac probiotic showed the highest glucose concentration which was significantly different from those of the other treatment groups. The present study also showed that blood cholesterol, blood uric acid and blood urea decreased upon the addition of different levels of primalac probiotic to the diet. The group fed with a dose of 0.095% perimalac probiotic showed the lowest cholesterol content which was significantly different to the control and 0.035% primalac group. Results also showed that the highest total protein concentration was observed in the control group.

Table 6: Some blood biochemical parameters (mean ±SE) of the control and probiotic treated groups in ostriches from hatch to 8 weeks of age

Week	Treatment			
	Control	0.035% P	0.095% P	0.135% P
Glucose, mm/l	11.09±0.23[a]	11.68±0.24[a]	11.32±0.27[b]	11.36± 0.16[a]
Cholesterol, mm/l	5.78± 0.28[a]	5.46±0.48[a]	4.65±0.83[b]	4.96±0.29[b]
Total protein, g/L	24.03±0.28[a]	23.51±0.56[b]	23.16±0.43[b]	23.50±0.59[b]
Uric acid, mg/dl	11.26±0.23[a]	10.87±0.25[b]	10.14±0.75[b]	10.93±0.36[b]
Urea, mg/dl	0.93±0.05[a]	0.90±0.04[a]	0.85±0.02[a]	0.99±0.03[a]

0.035%P: Primalac probiotic with level of 0.035% , 0.095%P: Primalac probiotic with level of 0.095%, 0.135%P: Primalac probiotic with level of 0.135%.
[ab]Means in the same row with the different letter superscripts are significantly different at $p<0.05$.

The addition of probiotic to diets may influence broiler weight gain (Langhout, 2000). The mechanism that explained the action of probiotics was probably focused on gastro intestinal tract, as most of these products are not absorbed and had been shown to be not efficient as growth promoters in germ-free animals (Coates *et al.,* 1995). Currently, the use of these products is being debated due to the possible relationship with resistance to antibiotics used in human antibiotic therapy (Maiorka *et al.,* 2001). Edens (2003) reported that the addition of probiotic, did not affect weight gain of broilers at 42 d of age; however, it improved feed conversion ratio. Shamsshargh *et al.* (2008) studied probiotics effect on blood uric acid of broilers and they found that uric acid concentration significantly decreased in comparison with the control group. Jin *et al.* (1998) studied the effect of prebiotic containing *Lactobacillus* cultures on broilers and they found that body weight significantly increased in comparison with the control group. The use of probiotics causes sugar degrading bacteria to overcome the protein degrading bacteria resulting in a reduction in the rate of digestion of protein (Haddian *et al.,* 1996; Mohan and Andjames,1998). However the efficiency of probiotics will depend on the quantitative and qualitative characteristics of the microorganisms used in the production (Tournuyt,1998).

Conclusion

In this experiment feeding primalac probiotic at the level of 0.095% in diets showed the greatest effect on growth performance and concentrations of blood cholesterol, protein, uric acid and urea of ostriches.

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