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Dietary Supplementation of Probiotic and Prebiotic Combination (Combiotics) on Performance, Carcass Quality and Blood Parameters in Growing Quails

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Abstract: This study was carried out to determine the effect of dietary supplementation of combiotics (probiotic+prebiotic, *Makroton®*) on body weight gain, feed consumption, feed conversion rate, carcass quality and serum biochemical parameters. A total of 264 daily Japanese quail chicks *(Coturnix coturnix japonica)* were used in this experiment. They were divided into 1 control and 3 treatment group each containing 66 chicks. Each group was divided into 3 subgroups each containing 22 chicks. The experimental period lasted 35 days. Control group was fed with unsupplemented basal diets. 0.5, 1.0 and 1.5 g kg^{-1} combiotic was added to diets of treatment groups 1, 2 and 3, respectively. At the end of the experiment, the effect of combiotic supplementation to diet on the BWG, FC, carcass yield of and serum biochemical parameters of quail were not statistically significant among the groups ($p>0.05$). FCR rate was determined as 3.19, 3.15, 3.14 and 2.87, respectively.

Key words: Quail, carcass, performance, prebiotics, probiotic, serum biochemical parameters

INTRODUCTION

Antibiotics have been used to stimulate growth in poultry and to avoid of infectious disease in animal nutrition for years. But by long term use, side effects of them occur like residues in meat. Many countries are either regulating the use of antibiotics in feed or setting up programs to reduce the overall use of antibiotics (Convay and Wang, 1997; Cavazzoni *et al*., 1998).

Therefore, the uses of probiotics and prebiotics in poultry diets have become popular as an alternative to antibiotics for animal production and health worldwide in recent years. Prebiotics are product containing carbohydrates, which component mannose. Probiotics are mainly represented by Mannanoligosaccharides (MOS), present in the cell wall of yeast, such as *Saccharomyces cerevisiae* (Santin *et al*., 2001). These oligosaccharides are usually represented by the mannanoligosaccharides. *Saccharomyces cerevisiae* and a *Mannan oligosaccharide* are probiotic and prebiotic used in poultry as growth promoters (Hooge, 2004; Flemming *et al*., 2004). It was reported that, these products display favorable effects on intestinal microflora and improve immun response of poultry by showing antagonist to effect pathologic microorganisms (Sarica 1997; Santin *et al*., 2001).

This research was carried out to determine the use of combination probiotic and prebiotic (combiotics) on Body Weight (BW), Body Weight Gain (BWG), Feed Consumption (FC), Feed Conversion Rate (FCR), carcass yield and serum biochemical parameters.

MATERIALS AND METHODS

A total of 264 daily Japanese quail chicks (*Coturnix coturnix japonica*) were used in this experiment. They were divided into 1 control group and 3 treatment groups each containing 66 chicks. Groups were divided into three subgroups with 22 chicks in each.

The control and experiment groups were fed with a basal diet of corn and soybean including 21.75% CP and 3043 kcal kg^{-1} ME. Diets were formulated to meet NRC (1994) nutrient requirements. Control group was fed with unsupplemented basal diets. 0.5, 1.0 and 1.5 g kg^{-1} combiotic (Makroton®, Vetas A.S, Istanbul/Turkey) were added to diets of treatment groups 1, 2 and 3, respectively. The composition of diets is shown in Table 1. Makroton® used as a combiotic in this investigation is consisted of *Saccharomyces cerevisiae* 1026 and *Mannan oligosaccharide* derived from the yeast cell wall. Feed and water were supplied for *ad-libitum*. The experimental period lasted 35 days.

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At the beginning (0) and 7, 14, 21, 28 and 35 days of the study were determined the body weight and body weight gain of the quails. At the same time all the subgroups feed residues were weekly weighed to measure feed consumptions and feed conversion ratio. Five male and 5 female birds from each the subgroups, a total of 120 chicks were randomly chosen and slaughtered for determining the carcass yield.

Serum total cholesterol, triglyceride and glucose were assayed calorimetrically according to the standard procedures using commercially available diagnostic kits obtained from Diasis Diagnostic Systems (Holzheim, Germany). Total protein and albumin concentrations were determined with the aid of commercial kits (bioMérieux, Marcy I'Etoile, France). Crude nutrients in feeds were analyzed by methods of AOAC (1990). The levels of Metabolize Energy were calculated with the formula developed by Carpenter and Clegg (1956). BW, BWG, carcass weight, carcass yield and blood parameters statistical analyses and the significance of the difference of the mean scores between the groups were determined by variance analysis method. The significance between the groups was stated by Duncan test. Because of the number in subgroups (n = 3) non parametric Kruskall Wallis and Mann Withney test were employed to determined effects of groups on FC and FCR. The statistical analysis was made according to SPSS 10.0 (Inc. Chicago. IL. USA) program.

Table 1: The composition of experimental ration

Feeds matter	(%)	Analyzed contents of nutrients
Maize	60.50	Dry matter, 90.07%
Soybean meal	29.50	Crude protein, 21.75%
Fish meal	4.00	Crude extract, 5.98%
Oil	3.30	Crude fiber, 3.25%
Limestone	1.20	Crude ash, 3.22%
Dicalcium phosphate	0.50	N-free extract, 55.87%
Salt	0.30	ME, kcal kg^{-1} 3043
DL-Methionine	0.10	
L-Liyzine	0.10	
Vitamin-mineral premix*	0.50	
Total	100.00	

*: Provides per kg of diet: 20 000 000 IU Vit. A, 3 000 000 IU Vit. D_3, 25 g Vitamin E, 4 g Vitamin B_1, 8 g Vitamin B_2, 5 g Vitamin B_6, 20 mg Vitamin B_{12}, 20 g Nikotinamit, 12 g Calcium –D- Pantotenat, 200 g Cholin cholorid, 50g Mn, 50 g Fe, 50 g Zn, 10 g Cu, 0.8 g I,0.15 g Co, 0.15 g Se

RESULTS

Measured body weights are shown in Table 2. Body weight of quail chicks in this study was not significantly influenced by the addition combiotic. BWG, FC and FCR are shown in Table 3. The carcass yield values and blood parameters were not statistically significant in all groups (Table 4 and 5).

Table 2: Mean body weights of groups (g)

Week	Control group	Group 1	Group 2	Group 3	p-value
0	6.94±0.07	7.00±0.08	6.95±0.08	6.96±0.08	-
1	21.87±0.54	21.84±0.48	21.61±0.32	21.18±0.46	-
2	48.51±1.17	49.13±1.00	49.65±0.77	48.83±0.90	-
3	77.95±1.51	80.38±1.43	80.11±1.17	78.47±1.09	-
4	119.89±1.69	122.07±1.50	119.74±1.65	123.04±1.56	-
5	148.72±1.97	151.68±1.71	152.30±1.89	153.32±1.80	-

Differences among the groups were not statistically significant (p>0.05)

Table 3: Mean weekly BWG (g), FC (g) and FCR values of groups

Weeks		Control group	Group 1	Group 2	Group 3	p-value
1	FC	20.97±0.19	21.24±0.11	20.97±0.46	20.50±0.27	-
	BWG	14.93±0.38	14.83±0.11	14.66±0.05	14.19±0.66	-
	FCR	1.40±0.03	1.43±0.008	1.43±0.03	1.45±0.09	-
2	FC	59.90±0.33	61.23±0.18	61.20±0.53	61.15±0.79	-
	BWG	26.64±0.19	27.01±1.19	28.03±0.36	27.63±0.49	-
	FCR	2.25±0.02	2.27±0.07	2.18±0.04	2.21±0.06	-
3	FC	86.29±1.17	84.16±1.18	85.91±0.71	85.16±0.61	-
	BWG	29.45±1.01	31.57±0.43	30.47±0.99	29.74±1.59	-
	FCR	2.94±0.10	2.67±0.03	2.83±0.11	2.88±0.13	-
4	FC	122.86±1.29	124.85±2.37	123.31±2.67	111.17±2.03	-
	BWG	40.36±2.03	39.68±0.85	39.60±1.80	44.07±1.26	-
	FCR	3.06±0.17	3.15±0.03	3.13±0.17	2.53±0.09	-
5	FC	162.56±1.66	161.84±1.89	164.45±3.15	143.28±3.14	-
	BWG	30.37±0.66	30.64±2.05	32.56±0.98	30.79±1.38	-
	FCR	5.36±0.08	5.32±0.31	5.06±0.21	4.66±0.15	-
1-5	FC	452.58±4.20	453.33±4.16	455.84±6.96	421.26±6.28	-
	BWG	141.75±1.05	143.74±1.20	145.32±1.32	146.42±0.89	-
	FCR	3.20±0.04	3.16±0.03	3.14±0.07	2.87±0.03	-

Differences among the groups were not statistically significant (p>0.05), FC: Feed Consumption, BWG: Body Weight Gain, FCR: Feed Conversion Rate

Table 4: Mean carcass weight and yield of experimental groups

	Control group	Group 1	Group 2	Group 3	p-value
Female (n = 15)					
Body weight (g)	142.04±2.80	149.57±2.86	148.84±2.63	149.94±3.12	-
Carcass (g)	95.63±2.18	101.58±2.29	102.79±1.91	102.46±2.45	-
Dressing percentage (%)	67.0±0.4	68.0±0.8	69.0±0.4	68.0±0.5	-
Male (n = 15)					
Body weight (g)	144.50±2.62	149.04±1.92	144.07±2.36	148.02±3.18	-
Carcass (g)	99.65±2.24	102.53±1.94	98.46±1.57	101.64±1.77	-
Dressing percentage (%)	69.0±0.3	69.0±0.7	68.0±0.4	68.0±0.4	-

Differences among the groups were not statistically significant ($p>0.05$)

Table 5: Some serum biochemical values

n = 15	Control group	Group 1	Group 2	Group 3	p-value
Total cholesterol (mg dL^{-1})	185.44±4.76	184.38±7.52	184.10±13	183.50±5.95	-
Total Protein (g dL^{-1})	3.20±0.17	3.33±0.15	3.04±0.17	3.18±0.17	-
Triglyceride (mg dL^{-1})	175.30±14.4	183.60±9.05	188.10±15.0	183.80±15.9	-
Albumin (g dL^{-1})	1.49±0.04	1.51±0.05	1.57±0.07	1.57±0.05	-
Glucose (mg dL^{-1})	315.10±12.2	337.30±14.1	362.80±15.3	341.70±12.6	-

Differences among the groups were not statistically significant ($p>0.05$)

DISCUSSION

When the results related BW were evaluated, it was seen that the highest body weight gain ($p>0.05$) occurred in the third treatment groups. The BWG values calculated in this study are consistent with the previous findings in quail and turkey (Fritts and Waldroup, 2003; Guclu, 2003). On the other hand, there are literatures reporting the improving effect of MOS on body weight significantly in broilers (Parks *et al*., 2001; Flemming *et al*., 2004).

Feed consumption and Feed conversion rate are determined as 452.58, 453.33, 455.84, 421.26 g and 3.19, 3.15, 3.14 and 2.87, respectively. There were not significantly differences among the groups. In the present study, it might be said that the group 3 consumed less feed than that of the treatment groups for one kg body weight gain. Guclu (2003) reported that addition of MOS to quail diets at the level of 0.75 and 1 g kg^{-1} reduces FC significantly ($p<0.01$) and enhances feed conversion ratios. The FCR values calculated in this study are consistent with the previous findings (Iji *et al*., 2001; Flemming *et al*., 2004). According to Savage and Zakrzewska (1997) and Waldroup *et al*. (2003) manna oligosaccharides improved feed conversion rate significantly in broilers and in turkey.

There were not statistically significant differences among the groups on carcass yields and blood parameters. In other words, it can be said that combiotics does not affect carcass yield and serum biochemical parameters in quails. This study also supports, the literature reports Fritts and Waldroup (2003) and Guclu (2003).

CONCLUSION

It is concluded that the 1.5 g kg^{-1} supplementation of combiotic is optimum for quail to positively effect performance.

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