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Efficacy of probiotic supplementation on growth performance and carcass traits in Japanese quails

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ABSTRACT

This study aimed to evaluate the effects of probiotics on fattening performance and carcass parameters in 1– to 35–day-old Japanese quails. Day-old male Japanese quail chicks (288) were randomly divided into 4 treatments with 3 replicates of 24 / pen (mean body weight 8.39 g). The dietary treatments were as follows: Group A, basal diet; group B, basal diet supplemented with 0.5 kg/tonne protexin; group C, basal diet supplemented with 1.0 kg/tonne protexin; and group D, basal diet supplemented with 1.5 kg/tonne protexin. The study lasted for 5 weeks. Results showed that probiotic did not influence body weight gain (BWG), feed intake (FI), feed conversion ratio (FCR), and carcass traits of 35–d-old broilers (P> 0.05). Inclusion of 1.5 kg/tonne probiotic in the diet of quails decreased average weekly body weights, compared with those fed with basal diet and another groups (P< 0.05).

Key words: Carcass, Japanese quail, Performance, Probiotic

The Japanese quail has become a very important species in Turkey in recent years, not only as laboratory animals for breeding and bio medical research but also because of its value for egg and meat production. Japanese quail embraces high juvenile growth rate, high rate of egg production, high rate of reproduction ability to produce 3 to 4 generations in a year, early sexual maturity, and less space and feed reguirement (Narayan *et al*. 1998, Curry 2009).

Probiotic is defined as a live microbial feed supplement which beneficially affects the host animal by improving its intestinal balance (FAO 2002, Gado *et al.* 2013, Nasehi *et al.* 2015). Protexin is a multi-strain probiotic used in poultry feed. Protexin is a blend of live viable microbes which benefits the host animal by improving the intestinal microbial balance (Anonymous 1996, Anonymous 2001, Anjum *et al.* 2005).

Probiotic supplementation showed improvements in live WG and FCR (Anonymous 1996). Parreira (1998) indicated that protexin supplementation in the ration of broilers improved fattening performance and decreased mortality.

Rajmane and Sonawane (1998) showed a significant increase in body weight, feed conversion ratio and decrease in mortality. Kavyani *et al.* (2012) investigated the effect of probiotics on fattening performance, carcass characteristics and organ weights of broilers. Carcass yield increased in broiler's fed diets containing probiotic (P<0.05). Yazdani *et al.* (2014) indicated that cone flower and protexin may be used as ingredient in quails ration without harmful effect on performance of the birds. In this study, the effects of using different levels of probiotics on growth performance and carcass traits of Japanese quails were evaluated.

MATERIALS AND METHODS

Day-old male Japanese quail chicks (288) were randomly divided into 4 treatments with 3 replicates of 24/ pen (mean body weight 8.39 g). Quails were housed in fattening cages (100 cm ×50 cm ×17cm). The dietary treatments were as follows: Group A, basal diet; group B, basal diet supplemented with 0.5 kg/tonne protexin; group C, basal diet supplemented with 1.0 kg/tonne protexin; and group D, basal diet supplemented with 1.5 kg/tonne protexin. The study lasted 5 weeks.

The diet was formulated according to National Research Council (1994) guidelines and nutrient contents of the diet are presented in Table 1. The common diet contained 240 g/kg protein and 3,080 kcal/kg ME.

The room temperature was controlled at 32±1°C in the first week and then decreased to 24°C until the end of the experiment. The experiment was carried out from 0 to 35 days, feed and water were provided *ad lib.* and a continuous lighting schedule was used all throughout the experimental period. Feed ingredients (corn, soybean meal, fish meal and meat-bone meal, were analyzed for all nutrient contents.

Weight gain (WG) and feed intake (FI) were measured weekly and feed conversion ratio (FCR) was calculated accordingly. Mortality was recorded on a daily basis. At the end of the experimental period, 6 birds for each dietary

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Table 1. Ingredients and chemical composition of the experimental diet

Ingredients	%	Nutrient contents	%
Corn	58.70	Dry matter, %	88.00
Soybean meal, 48% CP	27.55	ME (Kcal/kg)	3080
Fish meal	3.00	Crude protein, %	24.00
Meat-bone meal	3.70	Calcium, %	1.00
Fat	6.10	Phosphorus,%	0.76
Vitamin*	0.20	Sodium, %	0.16
Mineral**	0.20		
Methionine	0.17		
Salt	0.25		
Anticoccidial	0.13		

* Each kg of vitamin premix contains 6,000,000 IU vitamin A; 800,000 IU vitamin D_3; 14,000 mg vitamin E; 1,600 mg vitamin K_3; 1,250 mg vitamin B_1; 2,800 mg vitamin B_2; 8,000 mg Niacin; 4,000 mg Ca-D-pantothenate; 2,000 mg vitamin B_6; 6 mg vitamin B_{12}; 400 mg folic acid; 18 mg D-biotin; 20,000 mg vitamin C; 50,000 mg choline chloride.

** Each kg of mineral premix contains 80,000 mg mangan; 60,000 mg iron; 60,000 mg zinc; 5,000 mg copper; 200 mg cobalt; 1,000 mg Iod; 150 mg selenium.

treatment were slaughtered to determine carcass characteristics and weight of internal organs.

Statistical analysis

The data were analyzed using the general linear (GLM) procedure of SAS (SAS Institute 1996) and Duncan's Multiple Range test was used to detect differences among treatment means (P<0.05).

RESULTS AND DISCUSSION

The data related to performance parameters and carcass traits as affected by treatment are given in Tables 2–5. In this study, probiotic supplementation to the diet affected average weekly feed consumption (first week, second week and fourth week) and average weekly body weights (P<0.05). However, supplemental probiotic did not affect cumulative feed consumption (P>0.05). None of the carcass traits measured were significant (P>0.05)..

Probiotic supplementation to the diet affected feed consumption (first week, second week and fourth week) and body weights (P<0.05). In other hand, supplemental probiotic did not affect cumulative feed intake (P>0.05). The higher feed intake (group B) might be due to the increased rate of appetite and enzymatic activity in the digestive tract in those treatments.

Khosravi *et al.* (2008) showed that dietary probiotic supplementation did not affect BW, FC and FCR at 42 days of age. In another study, Rajmane and Sonawane (1998) investigated the effects of dietary probiotics on the performance of broilers and found no significant differences in FC among the treatments.

Similarly, Maiolino *et al.* (1992) showed that probiotic dietary supplementation in broiler diets did not improve FCR, BW and FCR .

The results showed that BWG and FCR improved (P<0.05) in chicks fed on probiotic supplemented diets compared to control diets (Anjum *et al.* 2005, Ghahri *et al.* 2013, Roul *et al.* 2015).

The effects of probiotics on body weights were statistically insignificant (P>0.05). In the following weeks, the effect of probiotics on daily body weight values was statistically important. The greatest increase in body weight gain was achieved by probiotic supplementation (group C), while the highest feed consumption was observed in group B. The results are similar with the findings by Sarica *et al.*

Table 2. Average weekly feed consumption (g)

Weeks	A	B	C	D	P Values
1	61.57±0.26 c	72.47±0.48a	72.70±1.17a	64.27±0.86b	*
2	79.47±2.44 b	78.20±1.27bc	74.40±0.35c	84.77±0.56a	*
3	126.67±1.85	129.33±13.71	119.13±1.08	114.57±6.05	n.s
4	170.87±14.90 ab	202.00±5.28a	181.53±6.83a	166.03±6.84b	*
5	245.00±17.38	219.80±20.03	200.17±8.00	209.93±8.19	n.s
Cumulative	683.57±30.26	701.80±29.08	647.93±11.71	639.57±10.29	n.s

* a, b; means in the same rows for the same parameter are significantly different (P<0.05). n.s; not significant.

Table 3. Average weekly body weights (g)

Weeks	A	B	C	D	P Values
Days	8.38±0.10	8.33±0.11	8.44±0.12	8.41±0.11	n.s
1	30.11±0.52b	33.03±0.47a	33.29±0.62a	30.59±0.60b	*
2	46.23±1.11b	50.00±0.92a	47.93±1.15ab	47.15±1.03ab	*
3	89.46±1.94bc	100.83±1.76a	104.05±2.13a	82.78±1.81c	*
4	156.09±2.81bc	164.03±2.34ab	164.27±3.26a	149.28±2.66c	*
5	199.14±3.31a	201.54±3.41a	206.62±3.87a	188.56±3.37b	*

* a, b; means in the same rows for the same parameter are significantly different (P<0.05). n.s; not significant.

Table 4. Cumulative feed consumption, cumulative gain and feed conversion ratio

	Groups				P values
	A	B	C	D	
Cumulative feed consumption, g/bird/35days	683.57±30.26	701.80±29.08	647.93±11.71	639.57±10.29	n.s
Cumulative gain, g/bird/35 days	190.76±2.10	193.21±1.85	198.18±1.90	180.15±0.45	n.s
Feed conversion ratio (Feed: Gain)	3.58±0.64	3.63±0.62	3.27±0.62	3.55±0.59	n.s

n.s: not significant.

Table 5. Carcass parameters of quails

	Groups				P Values
	A	B	C	D	
Slaughter weight, g	227.36±6.95a	204.26±5.64b	227.85±8.88a	205.63±5.45b	*
Hot carcass weight, g	164.26±5.62a	143.90±4.84b	158.85±9.48b	144.93±3.17ab	*
Carcass yield, %	72.24±1.13	70.44±1.15	69.88±2.06	70.56±1.63	n.s
Liver weight, g	5.28±0.55	5.04±0.22	6.10±0.29	5.75±0.53	n.s
Heart weight, g	2.08±0.11	2.28±0.15	2.65±0.17	2.55±0.39	n.s
Gizzard weight, g	4.72±0.29	4.52±0.19	5.03±0.18	4.53±0.41	n.s
Breast weight, g	73.14±3.38	64.44±4.19	75.15±6.99	67.60±1.65	n.s
Thigh weight, g	60.14±3.50	56.06±2.65	61.20±4.73	55.15±2.49	n.s

* Different letters in the same row show significant differences between groups for the same parameter (P<0.05). ns: not significant.

(2009). This result contrasts with those of Rajmane and Sonawane (1998) where protexin supplementation caused increase in body weight gain.

This study finding is in line with those of El-Nagmy *et al.* (2007), Babazadeh *et al.* (2011), Ghahri *et al.* (2013), Roul *et al.* (2015) with inclusion of probiotics.

Probiotics did not significantly improve (P>0.05) feed conversion ratio (Table 4). The feed conversion ratio was the best in protexin group (group C) in the overall period. The results are similar with the findings by Yazdani *et al.* (2014), Mohan *et al*. (1996), Aftahi *et al.* (2006). Shabani *et al.* (2012) also showed that the chicken broilers fed with protexin had the lowest feed conversion ratio.

Although the slaughter and carcass weights varied by treatment group (Table 5), none of the carcass traits measured were significant (P>0.05). Vali (2009) similarly observed a lack difference in slaughter performance of hens fed probiotics. Carcass yields were not affected by probiotics in this study. This is in agreement with the findings of Anjum *et al.* (2005), in which the carcass yields had not significantly increased respectively with the probiotic inclusion levels in the diets. This result is in disagreeement with that of Kavyani *et al.* (2012) who indicated that carcass yield increased in broilers fed with diets containing probiotic (P<0.05).

Heart weight did not change by probiotics (P>0.05). This result is consistent with that of Azadegan Mehr *et al.* (2014). Liver weights did not get affected by probiotics. This result is in contrast with the finding (Ghahri *et al.* 2013) which indicated that the supplementation of protexin in broilers diet had significant effects on liver weight. Azadegan Mehr *et al.* (2007) have demonstrated significant decrease in liver relative weight in male broilers receiving diets supplemented with probiotics.

According to this study, probiotic supplementation did not affect performance and carcass characteristics of Japanese quails.

REFERENCES

Aftahi A, Munim T, Hoque M A and Ashraf M A. 2006. Effect of yoghurt and protexin boost on broiler performance. *International Journal of Poultry Science* **5**(7): 651–55.

Anonymous. 1996. Broiler trial in August 1996. Ciba-Geigy (Bangladesh) Ltd, 1996. Accessed: 10.12. 2014.

Anonymous. 2001. Instructions for the inclusion of protexin in feed. Probiotics International, Matts Lane, 2001. Accessed: 10.12. 2014.

Anjum M I, Khan A G, Azim A and Afzal M. 2005. Effect of dietary supplementation of multi-strain probiotic on boiler growth performance. *Pakistan Veterinary Journal* **25**(1): 25–29.

Azadegan Mehr, Shargh M S, Dastar B H, Akbari M R. 2007. Effect of different levels of protein and protexin on broiler performance. *International Journal of Poultry Science* **6**(8): 573–77.

Azadegan Mehr, Hassanabadi A, Nassiri Moghaddam N, Kermanshahi H. 2014. Supplementation of clove essential oils and probiotic to the broiler's diet on performance, carcass traits and blood components. *Iranian Journal of Applied Animal Science* **4**(1): 117–22.

Babazadeh D, Vahdatpour T, Nikpiran H, Jafargholipour M A, Vahdatpour S. 2011. Effects of probiotic, prebiotic and synbiotic intake on blood enzymes and performance of Japanese quails (*Coturnix japonica*). *Indian Journal of Animal Science* **81**(8): 870–74.

Curry B B. 2009. Animal models used in identifying gender-related differences. *International Journal of Toxicology* **20**(3): 153–60.

El-Nagmy K Y, Ghazalah A A, Bahakim A S. 2007. The effect of probiotics supplement on performance of broiler chicks fed diets varying in protein content. *Proceedings of the 4th World Poultry Conference.* March 27–30, Sharm El-Sheikh, Egypt.

FAO/WHO. 2002. Joint FAO/WHO (Food and Agriculture Organization/World Health Organization) working group report on drafting guidelines for the evaluation of probiotics in food. London, Ontario: 1–11.

Gado S M, El-Gendi G M, Mohamady T F, El-Garhy O H, El-Khalea M E. 2013. Effect of probiotic supplementation on productive performance of quail chicks. *Annals of Agricultural Science* **51**(2): 107–16.

Ghahri H, Toloei T, Soleimani B. 2013. Efficacy of antibiotic, probiotic, prebiotic and synbiotic on growth performance, organ weights, intestinal histomorphology and immune response in broiler chickens. *Global Journal of Animal Science Research* **1**(1): 25–41.

Kavyani A, Farivar F, Mokhtari Karchegani S H, Land Y N. 2012. Efficiency of a multi-strain probiotic (protexin) on performance and carcass traits in broiler chicks. *International Conference on Life Science and Engineering. IPCBEE* **45**(23): 113–16.

Khosravi A, Boldaji F, Dastar B, Hasani S. 2008. The use of some feed additives as growth promoter in broilers nutrition. *International Journal of Poultry Science* **7**(11): 1095–99.

Maiolino R, Fioretti A, Menna L P and Meo C. 1992. Research on the efficiency of probiotics in diet for broiler chickens. *Nutrition Abstract and Reviews Series B* 62, 482.

Mohan B, Kadirevel R, Natarajan A, Bhaskaram B. 1996. Effect of probiotic supplementation on growth, nitrogen utilization and serum cholesterol in broilers. *British Poultry Science* **37**(2): 395–401.

Narayan R, Agarwal S K, Singh B P, Singh D P, Majumdar S, Singh R V. 1998. Development of specialized strains of meat and egg type Quails in hot climate. *WPSA-Israel Branch. 10th European Poultry Conference* 21–26 June, Jerusalem-Israel.

Nasehi B, Chaji M, Ghodsi M, Puranian M. 2015. Effect of diet containing probiotic on the properties of Japanese quail meat during the storage time. *Iranian Journal of Nutrition Science and Food Technology* **9**(4): 77–86.

NRC, 1994. *Nutrient Requirements of Poultry.* (9th rev.). National Research Council, National Academy Press, Washington, D.C., USA.

Parreira D. 1998. Trial Results. Provimi Company. Portugal.

Rajmane B V, Sonawane N S. 1998. Efficacy of probiotics on performance of broilers in hot climate. WPSA-Israel Branch. *10th European Poultry Conference*, 21–26 June, 559–62.

Roul G, Panda N, Mishra P K, Behera P C, Panigrahi B, Pati P K. 2015. Effect of supplementation of probiotics and prebiotics on growth, lipid profile and slaughter traits of coloured broilers during heat stress. *Indian Journal of Animal Sciences* **85**(1): 72–76.

Sarica M, Corduk M, Yarim G F, Yenisehirli G, Karat U. 2009. Effects of novel feed additives in wheat based diets on performance, carcass and intestinal tract characteristics of quail. *South African Journal of Animal Sciences* **39**(2): 144–57.

SAS,1996. SAS user's guide, statistics. SAS Institute Inc., Cary, NC.

Shabani R, Nosrati M, Javandel F, Alaw Gothbi A A, Kioumarsi H. 2012. The effect of probiotics on growth performance of broilers. *Annals of Biology Research* **3**(12): 5450–52.

Vali N. 2009. Probiotic in quail nutrition: A review. *International Journal of Poultry Science* **8**(12): 1218–22.

Yazdani M R, Kheiri F, Faghani M. 2014. The effect of use cone flower and protexin on performance and some blood parameters in Japanese quail. *Cibtech Journal of Zoology* **3**(3): 35–42.