



Effects of dietary inclusion of protexin (probiotic) on hatchability of Japanese quails

TUGAY AYASAN¹

Cukurova University Agricultural Faculty Department of Animal Science, Adana, Turkey

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ABSTRACT

The present study was conducted to determine the effects of 3 different levels of probiotic on hatchability of Japanese quail (*Coturnix coturnix japonica*). In this study, 225 female Japanese quails were used. The experimental quails were divided into 3 dietary treatment groups of similar mean weight comprising 75 birds each, which was divided into 3 subgroups of 25 birds each. Treatment groups were assigned control group A (unsupplemented diet), group B (0.5 kg/tonne commercial probiotic supplemented diet) and group C (1.0 kg/tonne commercial probiotic supplemented diet) for 5 weeks.

After 5 weeks, probiotic treatment was ceased and then all groups were allowed to nourish standard layer diet. Results showed that protexin supplementation to the diet did not affect hatchability of total eggs set, hatchability of fertile eggs set and fertile egg%.

Key words: Hatchability, Japanese quail, Probiotic

Probiotics are live microbial feed supplements, which improve the intestinal microbalance. The commercial probiotics used in poultry feed is a multi-strain probiotic containing live microbes to establish, enhance or re-establish essential microflora in the gut. The commercial probiotics used in the study is a highly concentrated pre-mix containing 7 strains of bacteria and 2 yeasts (*Lactobacillus plantarum* 1.89×10^{10} cfu/kg, *Lactobacillus delbrueckii* subsp. *Bulgaricus* 3.09×10^{10} cfu/kg, *Lactobacillus acidophilus* 3.09×10^{10} cfu/kg, *Lactobacillus rhamnosus* 3.09×10^{10} cfu/kg, *Bifidobacterium bifidum* 3.00×10^{10} cfu/kg, *Streptococcus salivarius* subsp. *thermophilus* 6.15×10^{10} cfu/kg, *Enterococcus faecium* 8.85×10^{10} cfu/kg, *Aspergillus oryza* 7.98×10^9 cfu/kg, *Candida pintolopesii* 7.98×10^9 cfu/kg) (Anonymous 2001, Anjum *et al.* 2005, Ayasan *et al.* 2006, Babazadeh *et al.* 2012, Samani *et al.* 2012).

Japanese quail (*Coturnix coturnix japonica*) are widely used for biological and genetic studies (Tsudzuki 1994, Narayan *et al.* 1998) because it has a small body size, it is easily handled, and a large number of birds can be kept in a limited space. Fertility and hatchability are affected by sex ratio, genotypic factors, traits of eggs, age, nutrition and live weight of parent in quail breeding. Hence optimum conditions before or after hatching should be provide to reach the highest percentage of fertility and hatching in quail breeding (Seker

2003, Güclü 2011).

Several studies showed that probiotics have no positive effects on broilers and layers (Goodling *et al.* 1987, Maiolino *et al.* 1992). Experimental studies with new probiotic cultures, either alone or in combination, under different conditions, demonstrated that probiotics may have beneficial effects on layer hens (Yörük *et al.* 2004, Bozkurt *et al.* 2011). In addition, Balevi *et al.* (2000) indicated that supplementation of diets with commercial probiotics at 500 g/tonne improved feed intake and feed conversion as well as broken egg ratio. These decreases were statistically different while effects on egg production, egg weight and specific gravity were not. Güclü (2011) also found that commercial probiotics and prebiotic supplementation slightly but not significantly increased percentage of fertile egg and hatchability. Vahdatpour *et al.* (2011) found that using synbiotics had positive effects on performance and normal activity of enzymes.

As seen in the previous studies, there has been limited information in the literature on the effect of dietary protexin supplementation on hatchability of Japanese quail. Therefore, the present study was conducted to investigate the effects of protexin on hatchability of Japanese quails.

MATERIALS AND METHODS

The experiment was carried out at the quail unit of the University. The experimental quails (225) were divided into 3 dietary treatment groups of similar mean weight comprising

Present address: ¹East Mediterranean Agricultural Research Institute, Adana, Turkey (tugay-ayasan@yahoo.com).

Table 1. Ingredients and chemical composition of the experimental diet

Ingredients	g/kg	Nutrient contents	
Corn	300.00	Dry matter,%	88.22
Barley	198.82	ME (Kcal/kg)	2605
Wheat bran	109.54	Crude protein,%	17.00
Sunflower meal, 33%	80.73	Ether extract,%	4.70
Limestone	71.52	Crude fibre,%	6.00
Poultry offal meal	60.00	Crude ash,%	13.00
Full-fat	43.88	Lysine,%	0.76
Meat and bone meal	41.29	Threonine,%	0.61
Wheat middlings	43.43	Methionine + cystine,%	0.66
Soybean	30.08	Isoleucine,%	0.62
Corn gluten meal, 56%	10.00	Leucine,%	1.35
Soda	2.50	Valine,%	0.80
Vitamin premix*	2.00	Phenylalanine,%	0.79
Bentonite	2.00	Ca,%	3.50
Toksisep	2.00	Available P,%	0.48
Mineral premix**	1.50	Sodium,%	0.15
Alimet	0.70	Potassium,%	0.69

* Each kg of vitamin premix contains 6000000 IU vitamin A; 800000 IU vitamin D₃; 14 000 mg vitamin E; 1 600 mg vitamin K₃; 1 250 mg vitamin B₁; 2 800 mg vitamin B₂; 8 000 mg niacin; 4 000 mg Ca-D-pantothenate; 2 000 mg vitamin B₆; 6 mg vitamin B₁₂; 400 mg folic Acid; 18 mg D-biotin; 20000 mg vitamin C; 50 000 mg choline chloride.

** Each kg of mineral premix contains 80 000 mg manganese; 60 000 mg iron; 60 000 mg zinc; 50 00 mg copper; 200 mg cobalt; 1 000 mg iodine; 150 mg selenium.

75 birds each, which was divided into 3 subgroups of 25 birds each.

Treatment groups were assigned control group A (unsupplemented diet), group B (0.5 kg per tonne commercial probiotics supplemented diet and group C (1.0 kg/tonne commercial probiotics supplemented diet) for 5 weeks. After 5 weeks, commercial probiotics treatment was stopped and then all groups were allowed to nourish standard layer diet (170 g/kg CP and 2605 kcal ME per kg diet, Table 1).

The diets were formulated to meet or exceed NRC (1994) specifications. Feed and water were supplied *ad lib.* and light was provided 16 h (from 8.00 to 24.00) each day. The experiment was conducted for 8 weeks following standard conditions.

Determination of hatchability: The eggs that have the suitable characteristics for the brooding were placed at a brooder on the group basis. The number of the hatched chicks were recorded for 3 days after 18th days of brooding. Then the remaining non-hatched eggs were cracked, and the fertile and unfertile eggs were recorded (Güclü 2011). The hatchability characteristics were calculated by the following formulas (Sari *et al.* 2010, Bozkurt *et al.* 2011, Daikwo *et al.* 2011, Güclü 2011).

Fertility P%-number of fertile eggs/number of total eggs set the brooder × 100

Hatchability (fertile egg set)- P% number of hatched chicks/ number of fertile eggs set the brooder × 100

Hatchability (total egg set)- P% number of hatched chicks/ number of total eggs set the brooder × 100

Statistical analysis: All data were subjected to analysis of variance using GLM procedure of SAS (1997) and means were separated using Duncan's new multiple range test.

RESULTS AND DISCUSSION

The effects of different commercial probiotics levels on hatchability are shown in Table 2. The results showed that protexin supplementation to the diet did not affect hatchability.

The reproductive performance of Japanese quail is important in the overall management of the flock. Fertility, hatchability and embryo mortality are important indices for producing chicks from a breeding flock. Fertility is affected by different factors such as mating ratio, parental age, rate of laying, climatic and environmental (Daikwo *et al.* 2011).

In different researches reported on 8 to 52 weeks of ages Japanese quail the fertility, hatchability of fertile eggs, hatchability of eggs set were between 48.00 and 94.00%, 40.00 and 70.34% and 69.44 and 74.42% (Kumar *et al.* 1990, Erensayın and 2002, Seker *et al.* 2004).

In this study, no positive effect of commercial probiotics on hatchability of total eggs set was determined. The average hatchability of total eggs set was 66.75% for control group (group A), 67.17% for 0.5 kg per tone protexin supplement group (group B) and 68.25% for 1.0 kg/tonne commercial probiotics supplemented group (group C). Screenivasaiah and Joshi (1987) reported a range of 63.0–79.0% for hatchability percentages in Japanese quail. Farooq *et al.* (2001) and Khurshid *et al.* (2004) reported lower percentage hatchability on the basis of total eggs set (58.8% and 55.14%, respectively) than the values estimated in this study. The higher hatchability in the present study could be due to better fertility than that reported by Farooq *et al.* (2001) and Khurshid *et al.* (2004). This is in contrast with Bozkurt *et al.* (2011), who reported that hatchability of total eggs set increased probiotic supplementation (P<0.05). In addition, Hassan (2011) also found that hatchability of total eggs set was significantly increased for quails (P<0.05).

No effects of probiotic supplementation on hatchability

Table 2. Effects of different probiotic levels on hatchability,%

Parameters	Groups		
	A	B	C
Hatchability of total eggs set,%	66.75±3.33*	67.17±2.18	68.25±3.81
Hatchability of fertile eggs set,%	75.85±2.50	76.36±2.48	76.45±1.36
Egg fertilization,%	88.00±0.67	87.96±0.85	89.27±1.55

*Not significant (P>0.05)

was consistent with the results of the studies conducted on laying quails by Güclü (2011). Nickolova and Penkov (2004) reported no effects of probiotic supplementation on fertility and hatchability in muscov ducks. Güclü (2011) also found that although statistically not significant, probiotic and MOS supplementation slightly increased percentage of fertile egg and hatchability.

Hatchability of fertile eggs set in group A was 75.85% and in group B was 76.36% and in group C was 76.45%. No significant difference was observed among groups ($P>0.05$). Sari *et al.* (2010) also found that effect of sire and dam age was statistically significant on fertility, hatching performance, embryonic dead ($P<0.05$). Considering dietary probiotic supplementation, in agreement with our results, Güclü (2011) reported that hatchability of fertile eggs set was not affected by protexin supplementation. In contrary with Bozkurt *et al.* (2011), the addition of probiotic supplementation to diets affected hatchability of fertile eggs set ($P<0.05$). Silici *et al.* (2011) found that hatchability of fertile eggs set was changed between 79.50 and 83.3%.

Quail given diet containing 0 kg/tonne commercial probiotics (group A), attained greater percentage of fertility than the group B numerically but not significant ($P>0.05$). The highest mean values (89.27%) for percentage of fertility was achieved by the group of birds fed on the 1.0 kg/tonne commercial probiotics supplemented diet (group C).

The reproduction potential of Japanese quails is apparently not only in the number of laid eggs by also in their high fertilization as well as very good egg hatchability results (Adamski 2008, Nowaczewski *et al.* 2010). The egg fertilization in this study was by 5.24% points lower than in studies by Nowaczewski *et al.* (2010).

According to Bozkurt *et al.* (2011), no additional benefit to fertility was obtained with any of the different probiotic feeding regimens ($P>0.05$). Güclü (2011) found that fertile egg was changed between 76.15 and 89.86%.

Hassan (2011) reported that fertility was found between 85.50 and 92.56%. Silici *et al.* (2011) found that fertile egg was changed between 90.74 and 96.67%. As a result of this study, protexin supplementation did not affect hatchability of total eggs set, hatchability of fertile eggs set and fertile egg ($P>0.05$).

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