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Effects of Probiotics Supplementation on Growth Performance of Japanese quail (*Coturnix coturnix japonica*)

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ABSTRACT: Japanese quail is one of the popular livestock for being used as animal protein by the society. Farmers use the antibiotics as a feed additive as a growth promoter in a small amount which can improve feed efficiency. The overuse of antibiotics may be harmful, which can cause resistance to pathogenic microorganisms and residues in meat and eggs. Probiotics are non-pathogenic microorganisms which provide health benefits Rahayu and Purwandhani (2007). With this view, this study was carried out to assess the effects of supplementation of probiotics (Probeads EC®) on growth traits in Japanese quail. A total of 240 Nandanam quail III day old chicks were weighed individually, then randomly assigned to two treatment groups of 120 chicks each. There were 24 chicks per replicate and five replicate per treatment group. A total of 96 Probeads EC®/replicate/days were given to the treatment groups, and empty beads (without probiotics) were given to the control groups, up to 5 weeks. Weekly body weight and body weight gain, feed consumption, feed conversion ratio (FCR), percent livability and carcass characteristics were recorded. There was a significant difference (P ≤ 0.01) in body weight and body weight gain during 1st week to 5th week of age between treatment and control groups. Similarly, the feed consumption and FCR also showed significant difference (P ≤ 0.01) among the treatment and control groups. The percent livability showed no significant difference between treatment and control groups. The pre slaughter live weight showed significant difference (P ≤ 0.01) among treatment and control groups; however the other carcass characteristics such as eviscerated weight, ready to cook yield, giblets yield, breast yield, and thigh yield showed no significant difference among treatment and control groups. The above study concluded that supplementation of Probeads-EC® had improved the growth performance of Nandanam quail III without negatively influencing the carcass characteristics.

Keywords: Growth performance, Japanese quail, Probiotic Supplementation.

INTRODUCTION

The poultry industry is one of the most important agriculture sectors in many countries. In large-scale commercial poultry farming, the birds are affected with various biotic stressors mainly associated with bacterial, viral and fungal pathogens which lead to severe economic losses. Further, the major constraints in poultry industry are the emergence of pathogens and bacterial resistance. These impacts are mainly due to indiscriminate use of antibiotics for prevention and control of poultry diseases. Further, antibiotic misuse in poultry farms leading to multi-drug resistance properties in bacteria because of unsafe disposal of poultry litter. Probiotics are the alternate to antibiotics, which balance the gut bacteria to promote better benefits mainly for weight gain, digestion and absorption of nutrients and improve the immune status of poultry. Hence most of the farmers are using them in preference to antibiotics. Probiotics include viable microbial and microbial fermentation products which are beneficial by decreasing the undesirable microflora population in the gastrointestinal tract of chicks and build-up resistance against disease by stimulating the immune system (Grajek *et al.*, 2005). Majority of the probiotic products are combination of Lactobacillus *acidophilus*, *Streptococcus faecium*, *Bacillus subtillis* and yeast (Patterson and Burkholder, 2003).

Lactobacillus casei has both probiotic and antibacterial activity against different pathogens (Amaravadhi *et al*., 2012). Probiotic treatment may be given through feed and water, thereby can improve the feed efficiency, and then increase egg production which reduce the cost of production (Lokapirnasari *et al.*, 2017). Only few probiotics studies are available in Japanese quail. With these view the following study was carried out to assess the effects of supplementation of probiotic (Probeads – EC®) on growth performance in Nandanam quail III.

MATERIAL AND METHODS

The study was conducted up to 5 weeks to evaluate the effect of probiotics supplementation on growth performance in Nandanam quail III strain at Poultry Research Station, TANUVAS, Chennai in the year 2020. Nandanam quail III is a dual type Japanese quail strain developed by Tamil Nadu Veterinary and Animal Sciences University, Chennai -51 during the year 2004. Totally 240 Nandanam quail III day old chicks were weighed individually, then randomly assigned to two treatment groups of 120 chicks each. There were 24 chicks per replicate and five replicate per treatment group. The chicks in each replicate were housed in colony cages with standard floor space. An isonitrogenous and isocaloric experimental feeds were prepared and fed *adlibitum* under standard managemental conditions.

A total of 96 Probeads EC®/replicate/days were given to the treatment groups, and empty beads (without probiotics) were given to the control groups, up to 5 weeks. Probeads EC® is a mixed culture of probiotics having *Bacillus subtilis, Bacillus firmus, Enterococcus faecalis* and *Enterococcus faecium* and it contains 10^5cfu/beads. Probeads EC® is developed by Translational Research Platform for Veterinary Biologicals, TANUVAS, Chennai-51. The parameters such as hatch weight, weekly body weight and body weight gain, feed consumption, feed conversion ratio (FCR), livability, and carcass characteristics were recorded.

Statistical analysis: The data were analyzed as per standard statistical procedure described by Snedec or and Cochran (1994).

RESULTS AND DISCUSSION

Body weight and body weight gain (g): The effect of supplementation of probeads on mean body weight (g) and body weight gain (g) of Nandanam quail III are presented in Table 1 and 2. The body weight showed significant ($P \leq 0.01$) difference among treatment and control groups. The body weight (g) between treatment and control groups during 1st, 2nd, 3rd, 4th and 5th week of age were 58.87 and 50.49, 100.39 and 92.56, 149.21 and 141.20, 181.31and172.94 and; 210.19 and 201.34 respectively.

Table 1: Effect of probeads on body weight (Mean ± SE)(g) of Nandanam quail III.

Week	Treatment (n=120)	Control (n=120)	P-Value
Hatch weight	9.20±0.01	9.21±0.01	0.95^{NS}
1st week	58.87±0.72	50.49±0.84	0.00*
2nd week	100.39±1.20	92.56±1.29	0.00**
3rd week	149.21±1.27	141.20±1.45	0.00**
4th week	181.31±1.65	172.94±1.73	0.00**
5th week	210.19±1.78	201.34±1.81	0.00**

**Highly significant (P<0.01); * Significant (P<0.05); NS – Non significant (P> 0.05)

Table 2: Effect of probeads on body weight gain (Mean ± SE)(g/bird) of Nandanam quail III.

Week	Treatment (n=120)	Control (n=120)	P-Value
1st week	49.67±0.01	41.28±0.02	0.00**
2rd week	91.19±0.39	83.35±0.35	0.00**
3th week	140.01±1.10	131.99±1.01	0.00**
4th week	172.11±1.20	163.73±1.15	0.00**
5th week	200.99±1.34	192.13±1.20	0.00**

**Highly significant (P<0.01)

Similarly, there was a significant difference in body weight gain between treatment and control group was observed from 1st to 5th week of age. The body weight gain between treatment and control group during 5th week of age was 200.99 (g) and 192.13 (g) respectively. The body weight gain in Japanese quail reflects similar trends related to bodyweight. This may due to stimulating effect of probiotics which lead to better digestion and absorption of nutrients helps to improve the body weight. Banna *et al.*, (2010) observed better body weight (2.185 kg) on probiotic supplemented diet than control diet (2.15kg) in broiler at 42 days. Wenk (2000) reported that probiotics supplementation had more pronounced effect in young growing animals which substantiates the findings of our study.

Feed consumption and feed conversion ratio (FCR): Effect of supplementation of probeads on mean feed consumption (g/bird/week) of Nandanam quail III is presented in Table 3. There was a significant difference ($P \leq 0.01$) in feed consumption was observed between treatment and control group, until 5th week of age. The treatment group was consumed significantly ($P \leq 0.05$) less feed than control group during entire 5 weeks study periods.

Table 3: Effect of probeads on weekly feed consumption (Mean ± SE) of Nandanam quail III.

Week	Treatment (n=120)	Control (n=120)	P-Value
1st week	32.22±1.54	36.10±1.12	0.03*
2rd week	75.11±1.67	78.20±1.75	0.02*
3th week	117.31±2.10	122.01±2.16	0.03*
4th week	153.74±2.89	156.38±2.58	0.02*
5th week	201.25±3.68	210.58±2.89	0.00**

**Highly significant (P<0.01); * Significant (P<0.05)

The effect of supplementation of probeads on weekly feed conversion ratio (Mean±SE) of Nandanam quail III is presented in Table 4. Similar to the feed consumption, the FCR also showed significant difference among the treatment and control group during the study (1st to 5th week). The cumulative FCR of 2.75 and 2.99 was observed in treatment and control group respectively, till the end of trail period. Improvement in growth performance and feed conversion ratio of Japanese quail may be attributed to the total effects of probiotic action including the maintenance of beneficial microbial population, improving feed intake and digestion and more efficient utilization of feeds.

Banna (2010) observed better feed conversion ratio (1.77) for birds supplemented with probiotics than control birds (1.87) in broiler up to 42 days. The result of the presents study is similar to the findings of Subhashini *et al.,* (2018) who reported a feed efficiency of 2.77 during 5th week in Japanese quail.

Livability (%): The effect of supplementation of probeads on Nandanam quail III observed 95.20 per cent livability in treatment group during 5th weeks, which was numerically higher when compare with control group (94.50%) is presented in Table 5. The mortality observed in the treatment and control group was non-specific. Our results agree with Subhashini *et al.,* (2018) observed 94.40 % livability during 5th week days in Japanese quail. Similarly, Samanta and Biswas (1995) ; Awad *et al.,* (2009) found that a significant effect of probiotic on livability in broilers. This may be due to the beneficial effect of probiotics on modulation of intestinal microflora and pathogen inhibition leads to better livability.

Table 4: Effect of probeads on weekly feed conversion ratio (Mean ± SE) of Nandanam quail III.

Week	Treatment (n=120)	Control (n=120)	P-Value
1st week	0.64±0.32	0.71±0.38	0.01*
2rd week	1.07±0.39	1.23±0.42	0.00**
3th week	1.51±0.46	1.67±0.50	0.00**
4th week	2.09±0.58	2.27±0.62	0.00**
5th week	2.75±0.62	2.99±0.74	0.00**

**Highly significant (P<0.01); * Significant (P<0.05)

Table 5: Effect of probeads on percent livability (Mean ± SE)(%) of Nandanam quail III.

Week	Treatment (n=120)	Control (n=120)	P-Value
1st week	98.60±0.32	98.50±0.38	0.51 NS
2rd week	97.50±0.39	97.10±0.42	0.75 NS
3th week	97.10±0.46	97.20±0.50	0.59 NS
4th week	95.30±0.58	95.20±0.62	0.72 NS
5th week	95.20±0.62	94.50±0.74	0.81 NS

NS – Non significant (P> 0.05)

Probeads intake (No.): The mean number of probeads and empty beads intake/bird/day in treatment (3.0, 4.0, 4.0, 4.0 and 4.0) and control group (3.0, 4.0, 4.0, 4.0 and 4.0) during 1st to 5th weeks of age showed no significant difference and all the beads provided to the birds were consumed without waste. The probeads which was provided to the birds were granules and pink colour, which was attractive to the birds to consume comfortably without any wastage.

Carcass yields: The effect of supplementation of probeads on slaughter performance of Nandanam quail III is presented in Table 6.

Table 6: Effect of probeads on carcass characteristics (Mean ± SE) of Nandanam quail III.

Parameters	Treatment (n=120)	Control (n=120)	P-Value
Pre slaughter live weight (g)	210.19±1.78	201.34±1.81	0.00**
Eviscerated weight (g)	137.61±1.10	130.04±1.13	0.32 NS
Ready to cook yield %	65.47±1.10	64.59±1.10	0.52 NS
Giblets yield %	5.39±0.20	5.20±0.11	0.39 NS
Breast yield %	45.58±2.59	45.06±2.10	0.25 NS
Thigh yield %	14.50±0.91	14.33±0.85	0.84 NS

**Highly significant (P<0.01); NS – Non significant (P> 0.05)

The pre slaughter live weight showed significant difference ($P \leq 0.01$) among treatment and control groups; however the other carcass characteristics such as eviscerated weight, ready to cook yield, giblets yield, breast yield, and thigh yield showed no significant difference among treatment and control groups. The present findings were in agreement with the report of Sahin *et al*., (2008) ; Sarangi *et al.*, (2016) who reported that the prebiotic, probiotic, and synbiotic had no significant ($P>0.05$) positive effect on carcass yields of quails and broilers.

CONCLUSION

The above study concluded that, supplementation of Probeads EC® had improved the body weight and body weight gain in Nandanam quail III. Similarly, supplementation of probeads on Nandanam quail III showed less feed consumption, better feed efficiency and livability than control group.

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Conflict of Interest. Nil.

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