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Assessment of Probiotic Supplement to Enhance Performance of TANUVAS Aseel Chicken

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ABSTRACT

Background: The present study was undertaken to assess the probiotic supplement through feed to enhance performance of TANUVAS Aseel chicken.

Methods: Three hundred one month old TANUVAS Aseel chicks were supplied to the farmers of three groups (T1, T2 and T3), (Irrespective of number of birds seven replication in each treatment) under backyard system of rearing, all the chicks were fed concentrate feed along with foraging. T1 was control, T2 was Probeads EC supplement (5 beads/day/bird/oral) and T3 was probiotic supplement (1 g per kg of body weight).

Result: The average body weight, daily weight gain, feed conversion efficiently, livability, cost benefit analysis were significantly higher in T2 (Probeads EC supplement) ($P<0.05$) compared to T3 and control (T1) groups.

Key words: Performance, Probiotic, Supplement, TANUVAS Aseel.

INTRODUCTION

Backyard poultry production is one of the most important aspects in integrated farming system, this sector plays a major role in livelihood of poor farm families. Though, agriculture is the major activity, the income derived from agriculture is not so needed due to climate change and high input cost. So, the farmers turned to allied activities like Dairy farming, Sheep and Goat farming and Backyard poultry farming *etc*. The consumption of chicken meat and eggs among people is increasing trend, hence great scope for landless and small farmers to start backyard poultry farming in rural and semi-urban areas.

Superior variety of TANUVAS Aseel developed by Poultry Research Station, TANUVAS using strains of Aseel from Central Poultry Development Organization (CPDO), Bhubaneswar (Base population), Directorate of Poultry Research (DPR), Hyderabad and from a private entrepreneur and champion breeders. All the birds were brought into the genetic pool and random breeding was carried out. Later on, individual selection was carried out in the male for higher body weight and family selection was done in female for more egg number (Part time egg production). A dual-purpose native variety of Aseel with all the characteristic features of the breed was evolved for table purpose with continuous selection and breeding for six generations, which is maintained at Poultry Research Station, Tamil Nadu Veterinary and Animal Sciences University, Chennai (Vasanthakumar *et al*., 2021) Poultry biotechnology in field condition has made a great impact upon poultry nutrition. Appreciable effort has been made to strengthen the better and economic feed. Not only a good feed but also its better utilization is essential to improve production. Dietary changes as well as lack of a healthy diet can catapult the balance of gut microflora thus predisposing to digestive disturbances.(Lutful Kabir, 2009) A well balanced ration sufficient in energy and nutrients is thus of paramount importance in maintaining in maintaining a healthy gut. Antibiotic have been used as growth promoters in poultry to provide protection against some disease, toxins and for increasing nutrient absorption in the intestine. However due to development of resistance by pathogenic bacteria against antibiotics, their efficacy has reduced besides the public health concern due to their residue. In egg and meat (Christy Manyl-Loh *et al*., 2018). Alternatively there was need to find out addition to antibiotic to reduce incidences of diseases and infections and to improve the feed utilization efficiency. One of such alternative is the use Probiotic supplement.

The major advantages of using probiotic is that it will enhance nutrition utilization, feed conversion and health

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status of the host (Onifade *et al*., 1999 and Murugan *et al*., 2022). They were used two ways either through feed or water. Supplementation of Lactobacillus sporogenes at 100 mg/kg diet increased body weight gain, feed efficiency and humoral immune response in broiler chicks during 0-6 weeks of age (Panda *et al*., 2005). The reason for better body weight gain and feed conversion has been attributed to improve gut health leading to enhanced digestion, absorption and utilization of nutrient. Supplementation of Probiotic mixture @ 0.5 g/kg of feed improved growth, feed conversion ration and carcass traits in Vanaraja chicks (Swain *et al*., 2016) Keeping the views of above facts, the present study has been designed to assess the effect Probeads EC on backyard poultry rearing.

MATERIALS AND METHODS

This field trial was conducted at Farmers field of Dharmapuri district, Tamil Nadu, India during April 2022 to March 2023. TANUVAS Aseel chicks were purchased from TANUVAS, Chennai, India and Kept brooding for 15 days at KVK Dharmapuri, India. TANUVAS Aseel is a new variety of native chicken developed at Poultry Research Station, TANUVAS. The special features of TANUVAS Aseel are multi-colored plumage, good disease resistance, adaptability to substandard management condition and massive appearance male. The production performance of local chicken are low and high incidence of diseases. The backyard poultry production can be enhanced with improved strains such as ANUVAS Aseel. The experiment was conducted for a period of eight weeks and the diet was formulated based on the commercial desi chick mash (Maize-50-60%, Soya-25-30% , DCP-1-2% (di calcium phosphate), LSP-1% (Limestone powder) , Mustard-1-3%, MBM-1-5% (Meat bone meal), Premix-2-4%) formulated as per BIS specifications (1992) containing 23 per cent crude protein and 2800 kcal per kg metabolisable energy.

Three hundred day old one month old TANUVAS Aseel chicks were purchased and they were divided into three groups of 100 chicks each irrespective of number seven replication were conducted in each group. Control group 1 (T1) were fed with commercial available feed without any feed supplement. Birds in group II (T2) were fed with commercial available feed with Probeads EC (10^5 cfu)/ beads: *Enterococcus faecalis*, *Saccharomyces cervisae*, *Bacillus subtilis*, *Bacillus firmus* and *Enterococcus farcium*) which was developed at TRPVB, Constituent unit of Tamil Nadu Veterinary and Animal Sciences University, Chennai, India. Pro beads EC is an enteric coating technology, to ensure the targeted delivery of probiotics in the targeted area of action ie. small intestine which maintains gut health in chicken by competitive exclusions of pathogenic bacteria in the intestine. Dose is 5 beads/bird/day (oral route of administration and can be used continuously by replacing antibiotics or other growth promoters.

Birds in group III (T3) Probiotic (1% body weight as feed supplement. First 2 weeks chicks in all the groups were fed with commercial poultry feed for adaptation. From 2nd week onwards, T1 was given only commercial feed, T2 was fed Probeads EC (5 beads/day through feed) and T3 was Probiotic (1 % of the body weight through feed). Dietary use of Probiotics (*Lactobacillus sporogenes* is preferred to antibiotic to enhance nutrient utilization, feed conversion and Health status the trial period was conducted for a period of 12 weeks. During trial period, average fortnightly body weight, average daily feed intake, average daily weight gain and feed conversion ration were recorded.

Individual body weight of chicks and feed intake was recorded every fortnight replicate wise and feed conversion ration was calculated utilizing the data on body weight gain and feed intake. The results up to Ten weeks (After adaptation period of 2 weeks) were calculated for body weight, body weight gain, feed intake and feed conversion ratio. Mortality was recorded replicate wise during the entire experimental period.

Cost benefit analysis

Cost benefit analysis were calculated based on primary data collected from the trial area through survey. Data collected through structured questionnaires were inputted in MS Excel each replication of the treatment was taken as study sample. Secondary data has been collected from, books, journals, newspapers and various search engines, are also used (Junaid and Avneesh, 2021).

Statistical analysis

The data collected on various parameters were statistically analysed as per the methods described by Gomez and Gomez (1984). The values were compared with F test. The statistical design followed Randomized block design with three treatment and seven replication irrespective of number of birds in each replicates.

RESULTS AND DISCUSSION

The Mean body weight of chicks for the different periods revealed that there was a significant differences between supplement group and control group.

Effects on body weight

Assessment of dietary supplementation of Probeads-EC and probiotic in TANUVAS Aseel chicks are shown in table. The mean body weight of chicks for the different period revealed that there was a significant difference ($P<0.05$) between the groups (Table 1). It was 620 g in control group compared to 754 g in T2 and 724 g in T3 respectively. The results indicated that probiotic supplement has a significant role in improving digestion and thereby better absorption for higher growth rate in TANUVAS Aseel chicks. Yan *et al.* (2017) reported that chicken supplemented with Bacillus species showed beneficial effects in body weight. Likely Supplementation of Probiotics mixture (Lactobacillus supergenes, Lacto bacillus acidophilus and Saccharomyces cerevisae) @ 0.5 g/kg feed had improved growth in broilers (Kaoud, 2010). In cross bred cockerels, supplementation of 2-3 ml of probiotics protexin/

L in drinking water had improved performance of chicken as reported by (Khan *et al*., 2013).

Body weight and average daily weight gain revealed that there was significant difference (P<0.05) from 4th weeks to 10th weeks of trial between control and treated groups. It was 107 g, 118 g and 114 g respectively, for the control (T1) and Treatment (T2 and T3) groups for the 4th week and similar trends were noticed up to 10th week in TANUVAS Aseel chicks. Probeads Ec supplement (*Enterococcus faecalis*, *Saccharomyces cervisae*, *Bacillus subtilis*, *Bacillus firmus* and *Enterococcus farcium*) in this feeding trails favored better nutrient utilization and thereby significant (P<0.05) increase in body weight and body weight gain in TANUVAS Aseel chicks compared to probiotic supplementation and control group. These finding are agreement with Murugan *et al*., 2022 and Wondimu and Yonad, 2020. They observed that feed supplementation had improved body weight gain in TANUVAS Aseel chicken. This could be due to probiotic supplement has a significant role in improving digestion and thereby better absorption.

Khan *et al*. (2019) studied birds were supplemented with corn-based diet. On day 35, birds were slaughtered to determine the relative weights of heart, liver, kidneys, spleen, gizzard and intestines. Results showed that supplementation of phytase enzymes affected the weight and length of small intestine and feed conversion ratio (FCR) and did not affect the other zoo technical variables like body weight, feed consumption and weight gain during the whole experimental period. Application of phytase failed to exert any influence on the weights of gizzard, provetriculus, heart, liver, spleen and empty intestine. The weights and lengths of the small intestine were highly significant (P>0.05) in the treatment groups. This study showed the potency of phytase to enhance the growth performance in broilers and it will lay foundation for future research on poultry feed in Pakistan.

Effects on daily feed intake

Average daily feed intake (Table 1) of TANUVAS Aseel chicks fed with probiotic supplemented diet and un supplemented diet as control from 2th to 10th week revealed that there was a significant difference (p<0.05) during 2h to 10th week like

Table 1: Dietary supplementation of probeads-EC and probiotic on production performance in TANUVAS Aseel chicks.

Parameter	2nd week	4nd week	6nd week	8nd week	10nd week
Body weight (g)					
T1 (Control)	92.00	195.00	320	480	620
T2 (Probeads EC)	96.00	200.00	360	520	754
T3 (Probiotic)	93.00	198.00	350	510	724
S.Ed	1.04	1.85	3.28	4.77	6.79
CD (0.05)	2.30*	4.09*	7.23*	10.52*	14.98*
F value	8.6	4.0	82.1	39.1	216.9
Body weight gain (g)					
T1	42	107.00	118.00	190	206
T2	58	118.00	125.00	210	210
T3	51	114.00	118.00	206	205
S. Ed	0.58	1.26	1.34	2.25	2.72
CD (0.05)	1.27*	2.77*	2.95*	4.96*	5.99*
F value	386.6	39.1	18.2	44.33	23.6
Feed consumption (g)					
T1	22	40	45	60	70
T2	21	36	43	58	65
T3	23	38	42	59	67
S.Ed	0.241	0.417	0.479	0.651	0.742
CD (0.05)	0.533*	0.921*	1.057*	1.435*	1.635*
F value	34.2	45.5	20.3	4.7	23.0
Feed conversion ratio (FCR)					
T1	2.21±2.26	3.11±2.66	3.13±0.91	3.51±0.55	3.52±0.30
T2	2.58±1.26	2.78±3.84	3.33±0.87	3.26±0.64	3.28±0.35
T3	2.61±3.26	2.17±2.76	3.25±0.62	3.48±0.72	3.35±0.45
Livability (%)					
T1	95.40±3.36	92.21±3.25	92.45±3.24	92.78±2.54	91.87±2.31
T2	93.30±2.21	100.00±0.0	100.00±0.0	100.00±0.0	100.00±0.0
T3	95.10±1.57	100.00±0.0	100.00±0.0	100.00±0.0	100.00±0.0

*Means within a column were differ significantly (P<0.05).

Table 2: Cost benefit analysis of probeads-EC and probiotic supplement in TANUVAS Aseel chicks.

Parameter	T1	T2	T3
Total feed intake (kg/bird)	5.98±1.78	5.12±1.45	5.23±1.23
Cost of supplement/bird (Rs.)	0	5.45	6.85
Total feed cost/bird supplement	190.45±5.78	184.23±3.45	188.89±5.45
Cost of chicks (Rs./no)	35	35	35
Total production cost (Rs./bird) including maintenance	240.32±10.89	210.56±7.23	220.12±6.38
Body weight gain (kg)	1.32±0.38	2.10±0.48	1.98±0.84
Income from sale of bird	420.89±10.89	470.52±10.18	450.58±8.95
Total income	180.56±5.48	260.48±1.32	230.58±5.24
Net profit per bird (Rs)/month	30.12±2.56	43.33±2.18	38.45±1.98

Means within a column were differ significantly.

22 g, 40 g, 45 g, 60 g and 70 g in control group respectively for the T2and T3. It was observed that control group consumed more feed than probeads EC and Probiotic supplement group. These findings were accordance with the finding of Khan *et al.* (2013) who reported that Probiotic feeding at a level of 2 and 3 ml/l of drinking water decreased the feed intake significantly but Swain *et al*. (2016) reported that feed intake was not affected by the supplement of probiotic. In the present study significant decrease of feed intake could be due to feed supplement promoted efficient development of muscle and weight gain results in improving digestion and thereby better absorption of essential nutrients and less feed intake.

Effect on feed conversion ratio

The average feed conversion ratio of chicks (Table 1) fed with Probeads Ec and Probiotic supplement revealed that significant feed efficiency noticed compared with control group (3.28±0.35 Vs 3.52±0.30). This could be due to alteration in the intestinal flora, enhancement of growth of non-pathogenic facultative anaerobic and gram positive bacteria forming lactic acid and hydrogen peroxide, suppression of growth of intestinal pathogens and enhancement of digestion and utilization of nutrients (Yeo and Kim, 1997, Shibi and Jayalalitha, 2022 and Thangadurai and Venilla, 2022). These finding in accordance Swain *et al*. (2016) reported that improvement in body weight gain and FCR of TANUVAS Aseel chicks fed Probeads Ec and Probiotic supplement through feed might be due to *Lactobacillus* spp, *Bifidobacterium, Streptococcus faecium*, *Aspergillusoryzae* used in the supplement.

Effect on livability

In the present study no significant difference in mortality pattern (Table 1) was observed between the supplement and control group. This results in contrast with finding of (Panda *et al*., 2000). Probiotic play a role in altering the balance of the gut microorganism thereby increasing the health and production performance of the birds apart from reducing in the incidence of disease who recorded lower mortality rate in desi birds as the intestinal immunity of the birds was boosted due to probiotic supplementation in feed (Malik *et al*., 2008). Yadav and Jha (2019) reported use of probiotics, prebiotics, organic acids and exogenous enzyme, among others. Gut microbiota and their metabolic products improve nutrient digestion, absorption, metabolism and overall health and growth performance of poultry whereas Yan *et al*. (2019) observed stronger chicken-fatty or fatty odour which directly improved the flavor. His finding suggested that probiotics can improve chicken meat flavor and increase gut microbiota diversity.

Effect on cost benefit analysis

Cost benefit analysis was presented in Table 2. The cost of production per bird for T1 is Rs.240.32±10.89 was lower than Rs.210.56±7.23 in T2 whereas Rs.220.12±6.38 in T3. The net profit per bird per month was higher in T2 compared to T3 and T1 were 43.33±2.18, 38.45±1.98 and 30.12±2.56 respectively as reported by Swain *et al*. (2016) this could be due to higher weight gain and higher feed conversion efficiency of TANUVAS Aseel chicks.

CONCLUSION

The present study revealed that a supplementation of Probeads EC improved body weight, body weight gain, feed consumption, better feed efficiency and livability percentage in TANUVAS Aseel chicks compared to Probiotic supplement and control groups. The effect of Probeads EC supplement to TANUVAS Aseel chicks improved body weight, body weight gain, better feed efficiency, feed consumption and livability.

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Conflict of interest: None.

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