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Role of feed additives on production performance of Giriraja chicks

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Abstract

The Present study was conducted to evaluate the production performance of Giriraja chicks. The experiment was carried out with 160 Giriraja chicks (day old) distributed randomly into eight groups of two replicates and each replicate with ten chicks for the duration of six weeks. The feed additives like probiotics, prebiotics and acidifiers were supplemented with different combinations through water to improve the performance and livability of Giriraja chicks. The cumulative body weight gains in various treatment varied significantly ($P<0.05$) from 862.5 g (T-1) to 956 g (T-8). The cumulative feed consumption varied non significantly from 1877.5 g (T-1) to 2002.5 g (T-5). The cumulative feed conversion ratio varies significantly ($P<0.05$) from 2.06 (T-2) to 2.18 (T-1). The livability percent was 96.7% in T-1 and 100% in all other treatment groups. The net returns per bird between treatment varied significantly ($P<0.05$) from Rs 51.36 (T-1) to Rs. 63.49 (T-8). Highest body weight gains, feed intake, FCR was noticed in all probiotic supplemented groups. Hence, it is concluded that use of probiotics as feed additive through water or feed can improve overall production performance and livability of Giriraja chicks.

Keywords: Giriraja chicks, body weight, feed consumption, FCR

1. Introduction

The demand for backyard chick is high in Gulbarga and Yadgir district of Karnataka, India, when compared to hybrids of broiler and layer, this might be due to taste of meat, flavour and low inputs to rear chicks at their backyard. The high demand for meat and egg is supplied by neighbouring districts; farmers were not interested to rear hybrid strains for meat and egg due to lack of knowledge, increased mortality due to infectious diseases and high environmental temperature during summer. Therefore, to increase the productivity and health of backyard poultry farming, the improved strains that appear as indigenous chickens or phenotypic replica of indigenous fowl can be introduced for the benefit of the needy farmers (Singh *et al.* 2002). Giriraja is a breed of chicken developed by Karnataka Veterinary Animal and Fisheries Sciences University in Bangalore, Karnataka, India, which is resistant to many diseases except need to vaccinate against Ranikhet disease and to prevent early chick mortality. Antibiotics are used in poultry industry as growth promoter consequently chances of development of microbial drug resistance therefore there is ban on use of antibiotics in poultry industry in developed countries hence, alternative to antibiotics are probiotics which improve growth performance by competitive exclusion of pathogens, stimulate intestinal immune response and maintain the balance of micro-organisms in the gastrointestinal tract of birds (Wenk 2000, Kobayashi *et al.*, 2004, Koraoglu and Durdag, 2005) [18, 8, 9]. Therefore, various probiotic cultures may be provided through feed or water to improve bird performance. Now a day's use of probiotics, prebiotics, symbiotic, acidifiers, herbs and spices products in commercial poultry farms is common to improve nutrients digestion, absorption, metabolism, performance and health (Saad *et al.*, 2016) [13]. Therefore to encourage Giriraja chick rearing the present study was conducted with the objectives; to assess the synergistic effects of feed additives probiotics, prebiotics and acidifier, for better body weight gains, feed consumption and feed conversion ratio, and also to evaluate the mortality and livability per cent under various treatments.

2. Materials and Methods

The experiment was conducted at Agricultural Research Station, Bheemaryanagudi, University of Agricultural Sciences, Raichur, Karnataka, India. Fourty two days trail was carried out to study the effect of various feed additives (Probiotics, Prebiotics and Acidifiers) supplemented

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for better body weight gains, feed consumption and FCR. To achieve the objectives of the trail one hundred and sixty day old Giriraja chicks were procured from a reputed source. The chicks were individually weighted, distributed randomly into eight groups of two replicates and each replicate contains ten chicks. The treatments were as follows: T-1: control without feed additives, T-2: Probiotics was supplemented through drinking water, T-3: Prebiotics through water, T-4: Acidifier through water, T-5: Probiotics with Prebiotics, T-6: Probiotics with Acidifiers, T-7: Prebiotics with Acidifiers, T-8: the combination of Probiotics, Prebiotics and Acidifier. The birds were under common management practice with deworming (Albendazole) and vaccination (against Ranikhet disease and Gumboro disease). Weekly feed consumption and body weight was recorded to calculate feed conversion ratio and body weight gain.

3. Results and Discussion

The weekly body weight gains of the Giriraja chicks were presented in Table 1. The cumulative body weight gains varies significantly ($P<0.05$) from 862.5 g (T-1) to 956 g (T-8). Body weight gain was improved in all supplemented groups when compared to control group. This might be due to improved gut health leading to enhanced digestion, absorption and utilization of nutrients. Probiotics do produce certain

nutrients *in vivo* which contribute for body weight gain. Similarly increased body weight gain observed by Ignatova *et al.* (2009) [4] when the diet supplemented with probiotics containing *Lactobacillus* and *Bifidobacterium* strains in the chicken than control group. Chae *et al.* (2012) [2] reported that the supplementation of *Lactobacillus acidophilus*, *Bacillus subtilis* and *Saccharomyces cerevisiae* at 0.30% to broilers diets improved ($P<0.05$) body weight gain. Abudabos *et al.* (2015) reported that broiler birds supplemented with antimicrobial growth promoter (Neoxyval), prebiotic (TechnoMos) and probiotic (GalliPro) gained more body weight and good feed efficiency than control and symbiotic (Techno Mos and GalliPro) from 0 to 42 days of age. Roozbeh Shabani *et al.* (2012) [12] reported feeding broilers with probiotics (Protexin, Primalac and Calciparine) significantly ($P<0.05$) improved average daily gain and feed conversion ratio. The broilers administered with probiotics by intermittent drinking water application had increased ($P<0.05$) body weight and improved FCR (Eckert *et al.*, 2010) [3]. Addition of probiotics in drinking water at a rate of 1.5 g/L has been reported to improve live weight gain in Gramapriya chicks (Swain *et al.*, 2011) [15]. The addition of lysine producing probiotics in various dietary treatments significantly improved the production parameters of broilers (Jaishankar *et al.*, 2012) [5].

Table 1: Weekly And Cummulative Body Weight Gain (G)

Treatment	I Week	II Week	III Week	IV Week	V Week	VI Week	Cummulative
T-1	35.5±0.5	76.0±3.0	121.5 ^{bc} ±3.5	138.0±6.0	287.0±7.0	205.5 ^e ±5.5	862.5 ^e ±3.5
T-2	40.0±2.0	85.0±3.0	126.0 ^{abc} ±2.0	147.0±0.0	311.0±1.0	223.0 ^{cde} ±4.0	932.0 ^b ±0.0
T-3	40.5±0.5	82.5±0.5	117.5 ^{bcd} ±1.5	146.0±1.0	300.5±0.5	210.5 ^{de} ±2.5	898.0 ^d ±2.0
T-4	40.0±1.0	81.0±0.0	119.5 ^{bc} ±4.5	141.0±2.0	295.5±1.5	230.5 ^{cd} ±8.5	907.5 ^{cd} ±5.5
T-5	40.5±0.5	86.5±0.5	127.5 ^{ab} ±2.5	139.0±2.0	296.5±0.5	257.0 ^a ±7.0	946.5 ^a ±6.5
T-6	42.5±0.5	80.5±2.5	117.0 ^{cd} ±4.0	148.0±4.0	301.0±0.0	242.0 ^{abc} ±3.0	930.5 ^b ±1.5
T-7	41.5±2.5	86.0±4.0	108.5 ^d ±0.5	147.5±1.5	299.0±1.0	235.5 ^{bc} ±0.5	918.5 ^c ±1.5
T-8	41.5±0.5	86.0±2.0	133.5 ^a ±4.5	139.0±3.0	305.5±14.5	251.0 ^{ab} ±11.0	956.0 ^a ±2
C.D.	N/A	N/A	10.409	N/A	N/A	20.103	11.370
SE(m)	1.25	2.365	3.192	3.005	5.745	6.164	3.487
SE(d)	1.768	3.345	4.514	4.25	8.124	8.718	4.931
C.V.	4.392	4.033	3.719	2.968	2.713	3.76	0.537

Mean values in the same column with different superscripts are significantly different ($P<0.05$)

The weekly Feed consumption of chicks was presented in Table 2 and the cumulative feed consumption for six weeks varies non significantly from 1877.5 g (T-1) to 2002.5 g (T-5). The cumulative feed consumption was improved in probiotics supplemented groups than control and the highest feed consumption was noticed in probiotics and prebiotics

supplemented group. This might be due to enhanced proliferation of probiotics upon utilization of prebiotics and intern probiotics do produce enzymes for better digestion and utilization of nutrients. Therefore feed consumption and efficiency of feed was increased.

Table 2: Weekly and Cummulative Feed Consumption (G)

Treatment	I Week	II Week	III Week	IV Week	V Week	VI Week	Cummulative
T-1	76.5 ^b ±0.5	162.5±7.5	257.5 ^{abc} ±7.5	302.5 ^{ab} ±7.5	632.5±32.5	446.0 ^d ±6.0	1,877.50 ^c ±31.5
T-2	86.0 ^a ±4.0	180.0±5.0	257.5 ^{abc} ±2.5	300.0 ^{ab} ±5.0	637.5±7.5	454.5 ^d ±0.5	1,915.50 ^{bc} ±5.5
T-3	88.5 ^a ±0.5	175.0±0.0	243.5 ^{cd} ±1.5	305.0 ^{ab} ±0.0	652.0±2.0	450.0 ^d ±5.0	1,914.00 ^{bc} ±2.0
T-4	86.0 ^a ±1.0	172.5±2.5	250.0 ^{bc} ±10.0	292.5 ^{bc} ±2.5	640.0±0.0	482.5 ^c ±12.5	1,923.50 ^{bc} ±3.5
T-5	87.5 ^a ±0.5	185.0±0.0	270.0 ^{ab} ±10.0	297.5 ^{abc} ±2.5	627.5±17.5	535.0 ^a ±5.0	2,002.50 ^a ±15.5
T-6	91.5 ^a ±1.5	172.0±3.0	245.0 ^{cd} ±5.0	317.5 ^a ±7.5	635.0±5.0	524.0 ^{ab} ±4.0	1,985.00 ^a ±0.0
T-7	90.0 ^a ±5.0	185.0±10.0	225.0 ^d ±0.0	310.0 ^{ab} ±10.0	645.0±15.0	505.0 ^b ±5.0	1,960.00 ^{ab} ±25.0
T-8	90.0 ^a ±0.0	177.5±2.5	275.0 ^a ±5.0	277.5 ^c ±7.5	649.5±29.5	517.5 ^{ab} ±7.5	1,987.00 ^a ±22.0
C.D.	7.761	N/A	20.456	20.178	N/A	21.252	56.344
SE(m)	2.372	5.034	6.272	6.187	17.829	6.517	17.277
SE(d)	3.354	7.12	8.871	8.75	25.214	9.216	24.434
C.V.	3.855	4.041	3.507	2.914	3.94	1.883	1.256

Mean values in the same column with different superscripts are significantly different ($P<0.05$)

Based on the body weight gains and the feed consumption, the Feed conversion ratio was calculated and the cumulative feed conversion ratio varies significantly ($P<0.05$) from 2.06 (T-2) to 2.18 (T-1) and presented in Table 3. Similar results were reported by several authors, as supplementation of probiotic mixture (*Lactobacillus sporogenes*, *Lactobacillus acidophilus* and *Saccharomyces cerevisiae*) @ 0.5 g/ kg feed improved feed conversion ratio and carcass traits in broilers (Kaoud, 2010) [6]. Feed intake and feed conversion ratio improved when probiotics was provided through drinking water compared to the control and probiotics added groups of broilers (Karimi Torshizi *et al.*, 2010) [7]. Supplementation of

probiotics (Prosol) @ 0.2 g/L of drinking water improved feed conversion ratio in Gramapriya backyard chicks. (Swain *et al.*, 2016) [16]. (Nagaraj *et al.*, 2014) [10] reported that supplementation of methionine producing probiotics improves feed intake, feed conversion, livability% and better economic returns when supplementation of methionine producing probiotics through drinking water (1g/l H₂O).

The results shows that addition of probiotics, prebiotics and acidifiers improved body weight gains, Feed consumption and Feed conversion ratio. Out of eight treatments probiotics supplemented groups performed better than other groups.

Table 3: Weely and Cummulative Feed Conversion Ratio

Treatment	I Week	II Week	III Week	IV Week	V Week	VI Week	Cummulative
T-1	2.15±0.03	2.145±0.025	2.12±0.00	2.195a±0.035	2.205±0.055	2.175±0.085	2.18±0.045
T-2	2.15±0.01	2.12±0.01	2.045±0.005	2.04cd±0.03	2.05±0.02	2.035±0.035	2.06±0.005
T-3	2.185±0.015	2.125±0.005	2.07±0.01	2.085bcd±0.015	2.17±0.000	2.135±0.005	2.13±0.00
T-4	2.145±0.015	2.13±0.03	2.095±0.005	2.08bcd±0.05	2.16±0.01	2.095±0.025	2.12±0.01
T-5	2.15±0.01	2.14±0.01	2.115±0.035	2.145ab±0.015	2.12±0.06	2.085±0.035	2.12±0.005
T-6	2.14±0.01	2.14±0.02	2.095±0.025	2.145ab±0.005	2.115±0.015	2.17±0.01	2.14±0.005
T-7	2.17±0.00	2.145±0.015	2.075±0.005	2.1bc±0.04	2.16±0.04	2.145±0.015	2.14±0.025
T-8	2.16±0.03	2.075±0.075	2.06±0.03	2.0d±0.01	2.125±0.005	2.065±0.065	2.08±0.02
C.D.	N/A	N/A	N/A	0.095	N/A	N/A	N/A
SE(m)	0.018	0.032	0.019	0.029	0.033	0.043	0.02
SE(d)	0.025	0.045	0.027	0.041	0.047	0.061	0.028
C.V.	1.171	2.102	1.298	1.965	2.216	2.886	1.341

Mean values in the same column with different superscripts are significantly different ($P<0.05$)

The experiment was conducted for the duration of 42 days, throughout the period observed for mortality of chicks, livability percent was calculated and presented in Table 4. The livability percent was 96.7% in T-1 and 100% in all other treatment groups. This may be due to improvement of immune health by probiotics as various author reported that probiotics improve health of poultry by competitive inhibition for adhesion in the gastro intestinal tract Wenk 2000 [18], Kobayashi *et al.*, 2004 [8], Koraoglu and durdag, 2005 [9]. Increase in livability per cent and reduction in mortality was observed by in probiotics supplemented groups than control

by several authors. Shome *et al.* (2000) [14] reported zero mortality in broilers fed *Lactobacillus acidophilus* and *Lactobacillus salvarius* and 12.7% mortality in control, mostly due to bacterial entero pathogens. Upendra and Yatiraj (2002) [17] recorded significant ($P<0.05$) reduction (54.25%) in chick mortality when chicks were fed diets supplemented with *Lactobacillus* and *Saccharomyces*. Dietary supplementation of *Lactobacillus sporogenes* at 100 mg/kg diet increased body weight gain, improved feed efficiency and humoral immune response in broiler chicks during 0-6 weeks of age (Panda *et al.*, 2005) [11].

Table 4: Livability % And Economic Return Per Chick

Treatment	Livability %	Net Returns/chick (Rs)
T-1	96.7±3.3	51.36 ^e ±1.7
T-2	100.0±0.0	62.73 ^a ±0.19
T-3	100.0±0.0	56.03 ^d ±0.30
T-4	100.0±0.0	58.29 ^c ±0.95
T-5	100.0±0.0	61.76 ^{ab} ±0.78
T-6	100.0±0.0	59.66 ^{bc} ±0.31
T-7	100.0±0.0	58.02 ^{cd} ±0.51
T-8	100.0±0.0	63.49 ^a ±0.33
C.D.	N/A	2.57
SE(m)	1.2	0.788
SE(d)	1.7	1.115
C.V.	1.7	1.892

Mean values in the same column with different superscripts are significantly different ($P<0.05$)

The chicks were sold after completion of the experiment (42 days) for Rs 200 per bird, the economic returns was calculated and presented in Table 4. The net returns varies significantly ($P<0.05$) from Rs 51.36 (T-1) to Rs. 63.49 (T-8). Higher net returns were noticed in all probiotics supplemented groups due to higher body weight gains achieved.

4. Conclusion

Supplementation of probiotics, prebiotics and acidifiers through water improved body weight gain, feed consumption, feed conversion ratio, livability of Giriraja chicks than control group. The cumulative body weight gains in various treatment varied significantly ($P<0.05$) from 862.5 g (T-1) to 956 g (T-

8). The cumulative feed consumption for six weeks varied non significantly from 1877.5 g (T-1) to 2002.5 g (T-5). Feed conversion ratio was calculated and the cumulative feed conversion ratio varies significantly ($P<0.05$) from 2.06 (T-2) to 2.18 (T-1). The livability percent was 96.7% in T-1 and 100% in all other treatment groups. The net returns per bird between treatment varied significantly ($P<0.05$) from Rs 51.36 (T-1) to Rs. 63.49 (T-8). Highest body weight gains, feed intake, FCR was noticed in all probiotic supplemented treatment groups. Hence, it is concluded that use of probiotics as feed additive through water or feed can improve overall production performance and livability of Giriraja chicks.

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