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Effect of probiotic cultured whey on broiler growth performance

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Abstract

The investigation was carried out on “Studies on feeding of probiotic cultured whey on growth performance of broilers”. The research was conducted at Mulani Poultry Farm, Gadegaon Tq. Barshi, Dist. Solapur. During the year 2020-2021. The experimental trial of six weeks was undertaken for forty-two, day old, broiler chicks divided in four treatments with 40 chicks in each treatment with four replications of ten chicks. The control group (T0) was fed without probiotic cultured whey and T1, T2, and T3 groups were provided with 10 per cent, 20 per cent, and 30 per cent probiotic cultured whey, respectively in drinking water. It was observed that the average cumulative body weights of broiler birds in treatment group T1 (2583.72) was significantly (P) higher as compared to T0 (2381.68 g), T2 (2540.00 g) and T3 (2445.01 g). At the end of sixth week significantly highest gain in weight was observed in T1 (2556.51 g) as compared to T0 (2334.86 g) and does not differ significantly with T2 (2493.34 g) and lowest in T3 (2334.85 g). The highest percent of gain was in first week and lowest in sixth week. The addition of 10 per cent probiotic cultured whey in broiler drink is beneficial by improving growth performance.

Keywords: Gadegaon Tq, drinking water, probiotic cultured

Introduction

Poultry is one of the fastest growing segments of Agriculture and Animal Husbandry sector. Feed is one of the largest items of expenditure in poultry and it alone accounts 70 per cent of total production (Thirumalaisamy *et al.*, 2016) ^[12]. The constant increase in cost of poultry feed ingredients and compounded feed is making less profit to poultry farmers. To minimize the cost of feeding several feed additives have been extensively used for enhancing poultry production in recent years. Many feed additives like growth promoters including synthetic hormone and antibiotic have been used for increasing poultry production but due to development of antibiotic resistant bacterial strains and residual effects of these feed additives in eggs and meat, they lead to various health hazards to consumers (Bidarkar *et al.*, 2014) ^[3]. The different herbals and beneficial microbes especially prebiotics and probiotics are observed to be beneficial and found alternative for antibiotics and chemicals Poultry probiotics are live micro-organism causing no pathological disorders and promoting enteric microbiota balance (Ohimain and Ofango *et al.*, 2012) ^[11]. Probiotics refer to a group of non-pathogenic organisms that when administered in sufficient amount, are known to have beneficial effects on health of host (Mountzouris *et al.*, 2010) ^[10]. There is an interest in recent years to utilize the locally available agro- industrial and dairy waste materials, with rich nutrient as alternative source of carbon and other mineral etc. for production of probiotic. This will not only result in reduction of cost of production of probiotic but also helps in providing a solution to the disposal of huge quantities of such byproducts of dairy industry contributing to environmental pollution. After considering this one of the option that has attracted much attention is use of whey in combination of probiotic culture as a poultry drinks may helpful to sort out this problem and help for poultry industry.

Materials and Methods

One hundred and sixty, day old, commercial broiler chicks (vencobb-400) were selected from host poultry farms Mulani Poultry Farm Gadegaon Tq. Barshi, Dist. Solapur The wing banded

experimental chicks were individually weighed and then randomly distributed into four treatments each treatment consist 40 chicks and every treatment had four replication each replication consists 10 chicks Experimental design The treatment combination for feeding probiotic cultured whey through drinking water were finalized as follows.

T0 - Normal Water (Control)

T1- Normal Water + 10 per cent probiotic culture whey

T2- Normal Water + 20 per cent probiotic culture whey

T3- Normal Water + 30 per cent probiotic culture whey

Weekly growth of chicks and daily feed consumption and water intake in each group were recorded up to six week period.

Procedure for preparation of probiotic cultured whey

Paneer whey was collected from Department of Animal Husbandry and Dairy Science College of Agriculture, Latur. This paneer whey was boiled for 5 minutes for sterilization and kept for cooling upto 37°C at this temperature probiotic culture (*Lactobacillus acidophilus*, *Lactobacillus rhamnosus*) added at the rate of 2 per cent then it kept for incubation at 37 °C for 24 hrs. Prepared probiotic culture stored at 50C. For every 3 days fresh probiotic culture whey was prepared

Cumulative body weight of broiler birds fed on probiotic cultured whey

Table 1: Average weekly cumulative body weight (g) per bird.

Treatment	Weight of Broiler Birds at Weekend (Weighted days from 1 st day)						
	Initial (1 st)	1 st (8 th)	2 nd (15 th)	3 rd (22 th)	4 th (29 th)	5 th (36 th)	6 th (43 th)
T ₀	46.82	158.95	355.71	710.9 ^a	1110.02 ^a	1907.27 ^a	2381.68 ^a
T ₁	46.81	197.37	396.95	750.5 ^b	1309.89 ^b	2061.33 ^b	2583.72 ^b
T ₂	46.67	180.94	363.58	745.22 ^{bc}	1222.25 ^{bc}	1971.88 ^{bc}	2540.00 ^b
T ₃	46.83	164.66	358.76	723.5 ^c	1180.05 ^{bc}	1950.01 ^c	2445.01 ^c
SE±	0.08	9.53	10.67	7.36	21.29	10.86	19.31
CD at 5%	NS	NS	NS	22.69	65.62	33.48	59.50
GM	46.78	175.48	368.75	732.53	1205.55	1972.62	2487.59

(Means connected with similar superscript do not differ significantly from each other.)

The initial body weight of broiler birds of treatments T₀, T₁, T₂ and T₃ were 46.82, 46.81, 46.67 and 46.83 g/bird, respectively. The non-significance difference were maintained at the time of grouping of birds for treatments and hence all treatments were at par with each other initially. The average cumulative body weight of birds in first week was 158.95 g, 197.37 g, 180.94 g and 164.66 g in treatment of T₀, T₁, T₂ and T₃, respectively. In second week the average cumulative body weight for birds in treatment of T₀, T₁, T₂ and T₃, were 355.71 g, 396.95 g, 363.58 g and 358.76 g, respectively. During third week average cumulative body weight were 710.9 g, 750.5 g, 745.22 g, and 723.5 g for birds in treatment of T₀, T₁, T₂ and T₃, respectively. The average weekly cumulative body weight of birds in fourth week were 1110.02 g, 1309.89 g, 1222.25 g and 1180.05 g for birds in treatment of T₀, T₁, T₂ and T₃, respectively. In fifth week the average cumulative body weight for birds were 1950.01, 2061.33, 1971.88 and 1907.27 g per bird. In Sixth week the average cumulative body weight for birds were 2381.68, 2583.72, 2540 and 2445.01 g per bird in treatment of T₀, T₁, T₂ and T₃, respectively.

The experimental groups, fed with whey drinks was observed for weekly body weight gain maximum time at par, except T₃ in 5th week. The highest cumulative body weight was obtained in T₁ treatment of broilers by feeding of 10 per cent probiotic cultured whey which was 2583.72 g per bird. Followed by T₂ treatment of broiler by feeding of 20 per cent probiotic cultured whey which was 2540 g per bird followed by T₃ treatment of broilers by feeding of 30 per cent probiotic cultured whey which was 2445.01 and lowest cumulative body weight was in control (T₀) group which was 2381.68 g per bird at the end of sixth week. But when the final weight of each treatment were compared it was noticed that T₁ treatment had maximum weight (2583.72 g), indicate that 10 per cent probiotic whey was optimum for encouraging weight gain in broiler as compared to 20 and 30 per cent. This may be due to the extra dose of probiotic whey in case of treatments T₂ and T₃ fed with 20 and 30 per cent probiotic whey.

The result of present study is also similar with Hrnear *et al.*, (2014), who reported body weight of broiler chickens for control group was 2070.65 ± 180 g, *Lactobacillus fermentum* was 2294.59±196.34g and *Enterococcus faecium* was 2263.16 ± 188.67 g. That is addition of *L. fermentum* and *Enterococcus faecium* in drinking water statistically significantly increased as compared to control.

Borghain *et al.*, (2017) ^[4], who reported the final body weight of birds fed with garlic powder as prebiotic was significantly higher as compared to other group.

But Sarangi, found different finding than present that the day old vencobb broilers with diets supplemented with probiotics and prebiotics. The body weight of broilers was lower in treatment group supplemented with probiotics and prebiotics than those fed control diets. It might be due to the other factors i.e. selection of pre and probiotic materials, environmental effect and management of birds.

Gain in body weight of broiler birds fed on Probiotic Cultured Whey

The average weekly gain in body weight fed with probiotic cultured whey in first week were 112.13, 150.56, 134.27 and 117.83 g/bird for birds in treatment group T₀, T₁, T₂ and T₃, respectively. In second week weekly gain in body weight of group of birds in treatment T₀, T₁, T₂ and T₃ were 196.76, 199.58, 182.64 and 194.10 g per bird, respectively. In third week average weekly gain in body weight were 355.19, 353.55, 381.64 and 364.74 g per bird in treatment of T₀, T₁, T₂ and T₃, respectively. During fourth week average gain in body weight 399.13, 559.38, 477.03, 456.55 g per bird in treatment T₀, T₁, T₂ and T₃, respectively. The corresponding values of average weekly gain in body weight of broiler birds were 797.25, 751.38, and 749.63, 769.96 g per bird in treatments T₀, T₁, T₂ and T₃, respectively in fifth week. During sixth week the average weekly gain body weight of broiler birds were 474.41, 542.26, 568.13, 431.67 g per bird in treatments T₀, T₁, T₂ and T₃, respectively. The total average weekly gain body weight were 2334.86, 2556.51, 2493.34 and

2334.85 g per bird in treatment T₀, T₁, T₂ and T₃ respectively. As regards to impact of age the weekly trend in weight gain was almost similar as observed in cumulative body weight.

The lowest value of average weekly weight gain was 112.13 ± 29.44 g in first week and highest in sixth week that was 568.13 ± 29.79 g.

Table 2: Average weekly gain in body weight of experimental broiler birds

Treatment	Weight of Broiler Birds at Weekend (Weighted days from 1 st day)						
	1 st (8 th)	2 nd (15 th)	3 rd (22 th)	4 th (29 th)	5 th (36 th)	6 th (43 th)	Total
T ₀	112.13	196.76	355.19	399.13 ^a	797.25	474.41 ^a	2334.86 ^a
T ₁	150.56	199.58	353.55	559.38 ^b	751.38	542.26 ^{ab}	2556.51 ^b
T ₂	134.27	182.64	381.64	477.03 ^{bc}	749.63	568.13 ^b	2493.34 ^b
T ₃	117.83	194.10	364.74	456.55 ^{ac}	769.96	431.67 ^{ac}	2334.85 ^{ac}
SE±	9.55	12.22	13.01	22.78	22.57	29.79	28.89
CD at 5%	NS	NS	NS	70.20	NS	91.70	89.01
GM	128.698	193.27	363.78	473.02	767.05	504.11	2429.89

(Means connected with similar superscript do not differ significantly from each other.)

highest gain in body weight of broilers obtained in T₁ group which was 2556.51 g per bird receiving 10 per cent probiotic cultured whey followed by 2493.34 g/bird with 20 per cent probiotic cultured whey (T₂), 2334.85 g/bird with 30 per cent probiotic cultured whey (T₃) and lowest body weight gain was 2334.86 g per bird in control group (T₀) at the end of sixth weeks.

This result is similar with Jin *et al.*, (1998) [7] who reported that higher and improved weight gain was in probiotic group and this could be due to better digestive or microbial enzymatic activity.

Ashayerizaden, who reported that birds fed with Primalac (probiotic) and Biolex-MB (prebiotic) had increased body weight gain.

Kaushal *et al.*, (2019) [9], who reported the better body weight gain of probiotic groups compared with control group.

But contradict results were obtained by Hossain (2004) [5], who fed diet supplemented with yoghurt and protexin boost found no significant effect of probiotic on live weight gain of broiler, might be due to sex effect, weather condition, infection diseases etc.

Percent weekly gain in body weight

The percent gain in body weight of first week was found more i.e. 239.49 per cent, 321.64 per cent, 287.70 per cent and 251.61 per cent for treatment T₀ (control group), T₁ (fed with 10 per cent probiotic cultured whey), T₂ (fed with 20 per cent probiotic cultured whey), T₃ (fed with 30 per cent probiotic cultured whey) and then continually decreased in successive week. In second week the per cent gain in body weight was 123.79 per cent, 101.12 per cent, 100.94 per cent and 117.88 per cent for treatment T₀, T₁, T₂ and T₃, respectively. In third week the per cent gain in body weight was 99.85 per cent, 89.07 per cent, 104.96 per cent and 101.67 per cent for treatment T₀, T₁, T₂ and T₃, respectively. Fourth week the per cent gain in body weight was 56.14 per cent, 74.53 per cent, 64.01 per cent and 63.10 per cent for treatment T₀, T₁, T₂ and T₃, respectively. The corresponding values of in Fifth week the per cent gain in body weight were 71.82 per cent, 57.36 per cent, 61.33 per cent and 65.25 per cent for treatment T₀, T₁, T₂ and T₃, respectively. In sixth week the per cent gain in body weight were 24.87 per cent, 26.31 per cent, 28.81 per cent and 22.14 per cent for treatment T₀, T₁, T₂ and T₃,

respectively. The highest per cent of gain was in first week and lowest in sixth week. From third week significant decreased in per cent gain in body weight was observed. This might be the effect of age observed in all livings and classified as weight growing age, weight stationary age and weight declined age.

Table 3: Percent weekly gain in body weight

Treatment	Percent gain in body weight at the weekend						
	Initial (1 st)	1 st (8 th)	2 nd (15 th)	3 rd (22 th)	4 th (29 th)	5 th (36 th)	6 th (43 th)
T ₀	0.00	239.49	123.79	99.85	56.14	71.82	24.87
T ₁	0.00	321.64	101.12	89.07	74.53	57.36	26.31
T ₂	0.00	287.70	100.94	104.96	64.01	61.33	28.81
T ₃	0.00	251.61	117.88	101.67	63.10	65.25	22.14

The result of present study is supported by, Ashayerizaden, who reported that birds fed with Primalac (probiotic) and Biolex-MB (prebiotic) had increased body weight gain by 7.4 per cent compared to control diet.

Abdel-hafeez *et al.*, (2017) [1] who showed that the effect of probiotic additives on body weight started at fifth week with increase of 10 per cent compared with control

Water intake of broiler birds fed on Probiotic Cultured Whey

The average weekly water intake in ml of broiler birds. Average weekly water intake in first week was 184.88, 182.38, 185.62 and 185.38 ml per bird in treatment T₀, T₁, T₂ and T₃, respectively. Average weekly water intake in second week was 425, 420.13, 393 and 378.66 ml per bird for treatment T₀, T₁, T₂ and T₃, respectively. In third week average weekly water intake were 937.47, 924.41, 899.5 and 857.5 ml per bird in treatment T₀, T₁, T₂ and T₃, respectively. In fourth week average weekly water intake were 1156, 1139.13, 1083.78 and 1056.75 ml for treatment T₀, T₁, T₂ and T₃, respectively. The corresponding value of average weekly water intake of broiler birds in fifth week as 1823.88, 1756.62, 1713.75 and 1649.13 ml per bird in treatment T₀, T₁, T₂ and T₃, respectively. In sixth week the average weekly water intake in ml of broiler birds as 2444.13, 2378, 2310.38 and 2184.13 ml per bird in treatment T₀, T₁, T₂ and T₃, respectively.

Table 4: Average weekly water intake (ml) of experimental birds

Treatment	Water intake at Weekend (Weighted days from 1 st day)						Overall
	1 st (8 th)	2 nd (15 th)	3 rd (22 th)	4 th (29 th)	5 th (36 th)	6 th (43 th)	
T ₀	184.88	425.00	937.47	1156.00 ^a	1823.88 ^a	2444.13 ^a	6971.25 ^a
T ₁	182.38	420.13	924.41	1139.13 ^b	1756.62 ^b	2378.00 ^b	6800.62 ^b
T ₂	185.62	393.00	899.50	1083.78 ^c	1713.75 ^c	2310.38 ^c	6586.02 ^c
T ₃	185.38	378.66	857.50	1056.75 ^d	1649.13 ^d	2184.13 ^d	6311.53 ^d
SE±	2.065	12.99	18.88	0.164	0.634	0.30	27.53
CD at 5%	NS	NS	NS	0.51	1.95	0.94	84.84
GM	184.56	404.195	904.71	1108.91	1735.84	2329.15	6667.36

(Means connected with similar superscript do not differ significantly from each other.)

The total water intake at the end of sixth week were 6971.25, 6800.62, 6586.02 and 6311.53 ml per bird in treatment T₀, T₁, T₂ and T₃, respectively.

Water intake in first three weeks had non-significant differences in all treatments. In fourth, fifth and sixth week average weekly water intake of control group i.e. T₀ was significant higher and goes on decreasing when supplemented with probiotic cultured whey. On the perusal of table 4.7 it could be seen that highest total water intake was obtained in group T₀ (6971.25 ml) which was not supplemented with probiotic cultured whey, followed by T₁ (6800.62 ml) which was supplemented with 10 per cent probiotic cultured whey, followed by T₂ (6586.02 ml) which was supplemented with 20 per cent probiotic cultured whey and lowest water intake i.e. 6311.53 ml per bird in T₃ group which was supplemented with 30 per cent probiotic cultured whey. It may be due to the taste of water changed due to probiotic cultured whey. It is revealed from Table 4.7 that there was significant difference among the treatment group T₃ over T₂, T₁ and T₀. The broiler chicks in T₀ group consumed significantly ($p < 0.05$) higher total water intake (6971.25 ml) as compared to T₁ (6800.62 ml) and T₂ (6586.02 ml), T₃ (6311.53 ml). The total water intake among treatment T₁, T₂, T₃ and T₄ were differed significantly with each other at 5 per cent level of significant. Temperature and relative humidity also important factor for water consumption, during experimental period minimum temperature recorded as 10.2°C and maximum temperature recorded as 32.5°C and relative humidity recorded as minimum 30 percent and maximum 77 per cent.

The result of present study is supported by Torshizi *et al.*, (2010) [13], who reported that water intake was not influenced by probiotic provision during first three weeks (21 days). While water intake was influenced by probiotic supplementation in broiler over 22-42 and 1-42 days periods. The present result is also contrast to Kalia *et al.*, (2017) [8] who reported that the water intake did not differ between the groups.

Conclusion

As poultry is one of the fastest growing segments and best option for chief protein source need to minimize the cost of feeding in poultry business. From the present investigation it is observed that the use of probiotic cultured whey in broiler rearing improved body weight by more feed and water intake and obtained best feed conversion ratio. The inclusion of 10 per cent probiotic cultured whey in broiler drink is beneficial in poultry business. The weight of birds fed with 10 per cent probiotic cultured whey increased up to 2583 g whereas the weight of birds reared without use of probiotic cultured whey was 2381.68 g within 42 days. This helps in providing a solution for disposal of byproducts of dairy industry.

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