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Growth performance of Giriraja poultry birds fed diets containing graded levels of Banana (*Musa paradisiaca*) peel meal

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ABSTRACT

The present study was conducted to evaluate the effect of banana (*Musa paradisiaca*) peel meal supplementation on the growth performance of Giriraja poultry birds. Five dietary treatments were evaluated, viz., T₁ (control), T₂ (5% Banana peel meal), T₃ (10% Banana peel meal), T₄ (15% Banana peel meal) and T₅ (20% Banana peel meal). Growth performance was assessed based on body weight gain during the experimental period. The body weight gain recorded in T₁, T₂, T₃, T₄ and T₅ were 232.78, 199.36, 221.32, 238.65 and 226.04 g, respectively. Among the dietary treatments, T₃ (10% banana peel meal) was considered the optimum treatment based on the overall evaluation of growth performance. The study indicated that banana peel meal could be utilized as alternative feed ingredients in Giriraja poultry diets. Its incorporation may provide an economical and sustainable approach for utilizing agricultural by products and reducing feed resource costs. The findings suggest that appropriate supplementation of banana peel meal has potential for maintaining satisfactory growth performance in Giriraja poultry birds.

Keywords: Banana peel meal, Giriraja birds, Body weight gain, Poultry feed, Growth performance

Introduction

Poultry production is one of the fastest growing sectors of Indian agriculture and contributes significantly to food security, employment generation, rural income and the supply of high-quality animal protein. According to the 20th Livestock Census (2019) [1], India had 851.81 million poultry birds, an increase of 16.8% over the previous census. Of this population, 534.74 million (62.8%) were commercial poultry and 317.07 million (37.25%) were backyard poultry, demonstrating the importance of both commercial and small-scale poultry production systems in India (Department of Animal Husbandry and Dairying, 2019) [1]. The poultry sector has continued to expand, with egg production reaching 149.11 billion eggs during 2024-2025, making India the second largest egg producing country globally. Egg production increased by 4.44% compared with 2023-24, while per capita availability reached 106 eggs per annum (Department of Animal Husbandry and Dairying, 2025) [2]. Increasing poultry production has consequently increased the demand for economical and sustainable feed resources.

Feed constitutes a major component of poultry production costs, creating a need for locally available, inexpensive and nutritionally suitable alternative feed ingredients. Agricultural and agro-industrial by products are increasingly being investigated for this purpose. However, the utilization of fruit and vegetable peels in poultry diets may be limited by high fibre content, low nutrient density and anti-nutritional factors; their feeding value is also influenced by cultivar, maturity, processing method and bird characteristics (Dairra, 2018).

Banana peel is an abundant agricultural by product with considerable nutritional and functional potential. Banana peel represents approximately 30-40% of the total fruit weight and contains dietary fibre, carbohydrate, minerals, fatty acids and several bioactive compounds, including pectols, flavonoids and carotenoids (Happi Emaga *et al.*, 2007, 2008; Padam *et al.*, 2014) [3, 4]. Its nutrient composition varies considerably, with reported crude fibre, crude fat, ash and protein contents differing according to variety, maturity and processing conditions (Dairra, 2018) [5].

Banana processing waste therefore represents a potential low cost feed resource while its utilization may contribute to waste reduction and environmental sustainability. (Mohapatra *et al.*, 2010; Padam *et al.*, 2014) [6, 7].

Giriraja is dual purpose poultry bird known for its adaptability and sustainability for both backyard and intensive production systems. Hence, incorporation of banana

(*Musa paradisiaca*) peel meal in Giriraja diets may provide a sustainable approach for utilizing agricultural by products while maintaining productive performance. The present study was therefore undertaken to evaluate the effect of banana peel meal supplementation on the growth performance of Giriraja poultry birds.

Materials and Methods

A total of 150 day old Giriraja chicks were obtained from a government hatchery to investigate the potential of banana peel meal as a feed additive. The chicks were supplemented with different concentrations of banana peel meal supplementation on the growth performance and general health of the birds. Each treatment consisted of three replications, with 10 birds assigned to each (e.g. T₁R₁, T₂R₂, T₃R₃), totaling 30 birds per treatment. The experiment was designed following a Completely Randomized Design (CRD). Feed and water were provided ad libitum throughout the 7-week duration. Weekly

measurements of live body weight and body weight gain were taken for all birds. Commercially available standard feed was used for feeding to the experimental chicks. All the chicks were fed with pre-starter ration up to 0-7 days, starter ration up to 7-21 days and finisher ration from 22 to 60 days of age as per BIS (2007) specification.

Table 1. Diet composition and feeding practices

Treatments	Basal Diet	Banana peel meal (%)
T ₁ (control)	Basal Diet	-
T ₂	Basal Diet	5
T ₃	Basal Diet	10
T ₄	Basal Diet	15
T ₅	Basal Diet	20

Table 2. Assignment of birds to treatments

Treatments	Replications			Total
T ₁	10	10	10	30
T ₂	10	10	10	30
T ₃	10	10	10	30
T ₄	10	10	10	30
T ₅	10	10	10	30
				150

The data collected on live body weight and weekly weight gain were statistically analyzed using the Completely Randomized Design (CRD) method, as outlined by Ample (1975), to determine the significance of treatment effects.

Results and Discussion

Weekly live body weights of Giriraja poultry birds

The average weekly live body weight data of Giriraja poultry birds, recorded from day- old to seven weeks of age across all treatment groups, were statistically analyzed, summarized in Table 3, and illustrated graphically in Figure 1.

The data presented in the table indicate that the average initial (day-old) live body weights of Giriraja chicks were 40.05, 39.94, 40.71, 40.10, and 40.0 grams for treatments T₁, T₂, T₃, T₄, and T₅, respectively. From first to seventh week of age, the average body weights of chicks differed significantly among the treatment groups. However, a numerical reduction in body weight was observed in the group supplemented with 20% banana peel meal, as compared to the control group, although the difference was statistically significant.

At the end of the 7th week, the average live body weights of Giriraja poultry birds were recorded as 1000.53 g (T₁), 1132.26 g (T₂), 1219.09 g (T₃), 1070.08 g (T₄), and 1043.9 g (T₅). Statistically signif-

icant differences in weekly body weight emerged from the second week onwards. The birds in T₃ exhibited the highest final body weight (1219.09 g), followed by T₂ (1132.26 g), with both groups showing significantly better growth performance during the fifth to seventh weeks. In contrast, the lowest final body weight was observed in T₅ (1043.90 g).

The findings reported by Diarra (2018) [5], who indicated that banana peel meal can be used as a feed ingredient in poultry diets and may support growth when included at an appropriate level. Similarly, Abel *et al.* (2015) [8] reported that the inclusion of banana peel meal at suitable levels did not adversely affect broiler growth performance.

Huong *et al.* (2026) [9] reported comparable findings, indicating that supplementation with 10% banana peel powder could support growth performance in broiler chickens. Birds in treatment T₃ received 10% banana peel meal, recorded the highest body weight (1219.09 g/bird), whereas T₁ showed the lowest body weight (1000.53 g/bird). The comparatively higher body weight observed in T₃ may be associated with the inclusion of banana peel meal at an appropriate dietary level. Similarly, the present findings are in accordance with Abel *et al.* (2015) [8] for live body weights are higher in treatment T₃ (10%). Banana peel meal powder could be suitable for inclusion in the diet of Giriraja poultry birds. This might be due to low level of crude fiber in diet.

Table 1. Live body weight response of Giriraja birds to Banana peel meal (g/bird)

Treatments	Weeks							
	initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th
T ₁	40.05	94.97	170.81	312.48	417.82	585.48	767.75	1000.53
T ₂	39.94	96.78	171.12	313.65	468.44	676.88	880	1132.26
T ₃	40.71	103.75	182	335.4	490.14	709.36	830	1219.09
T ₄	40.1	101.68	177.87	328.25	447.66	634.57	831.46	1070.08
T ₅	40	91.16	155.44	291.62	424.61	605.2	817.86	1043.9
SE(m)±	0.22	0.506	0.501	0.54	2.4	3.64	7.28	6.51
CD @ 5%	NS	1.146	1.402	1.51	6.71	10.18	20.35	18.22
F test	NS	Sig	Sig	Sig	Sig	Sig	Sig	Sig

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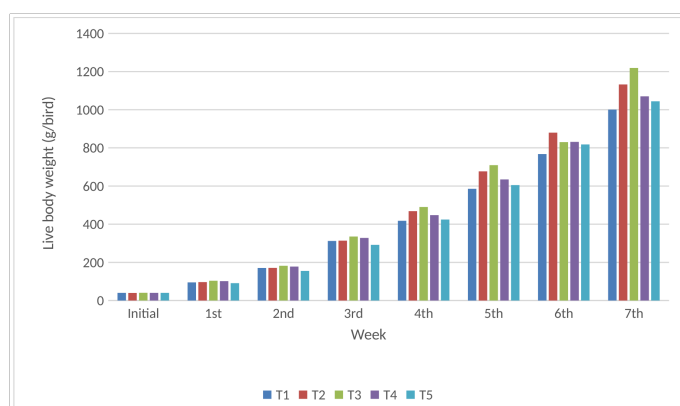


Figure 1. Live body weight (g/bird) response of Giriraja birds to Banana peel meal

Weekly body weight gain of Giriraja poultry birds

The average weekly body weight gain of Giriraja poultry birds from the first to the seventh week across all treatment groups is summarized in Table 4 and visually represented in Figure 2. statistically significant difference in weekly body weight gain was observed starting from the second week. During the sixth week, the weight gain of Giriraja birds under treatments T₁, T₂, T₃, T₄ and T₅ were 182.27, 256.04, 288.41, 196.89, and 212.66 g/bird, respectively. The highest weight gain was recorded in birds fed T₃ (10% banana peel meal), with a value of 288.41 g/bird. The weight gain of the birds differed significantly among the treatment groups from the first to the seventh week of the experiment. During the seventh week, the highest weight gain were recorded in T₃ (389.09 g/bird), followed by T₂ (252.26 g/bird), T₄ (238.65 g/bird), T₁ (232.78 g/bird) and T₅ (226.04 g/bird) respectively.

The birds exhibited varying growth responses to the dietary treatments throughout the experimental period. T₃ showed comparatively better performance during the initial weeks and recorded the highest weight gain in the sixth week (288.41 g/bird) and in the seventh week (389.09 g/bird). The significant differences observed among the treatments indicate that the dietary treatments influenced the growth per-

formance of the birds, although the response varied at different stages of growth. Diarra (2018) [5] reported that banana peel meal has potential as an alternative feed ingredient in poultry diets when incorporated at an appropriate level. Similarly, Abel *et al.* (2015) [8] reported that banana peel meal could be incorporated into broiler diets at suitable levels without adversely affecting growth performance. The decline in weight gain at the 20% inclusion level may be related to the higher fibre content of banana peel meal, which can potentially limit nutrient digestibility and utilization at higher inclusion levels (Diarra, 2018) [5].

Overall, the present findings suggest that moderate supplementation, particularly at 10%, may be more favourable for body weight gain in Giriraja birds under the conditions of the present study. Similar findings were reported by Huong *et al.* (2026) [9], who observed comparatively higher body weight and weight gain in broiler chickens fed a diet containing 10% banana peel powder. In the present study, birds receiving 10% banana peel meal (T₃) recorded the highest body weight gain of 219.22 g/bird during the fifth week. This comparatively better response may be associated with the inclusion of banana peel meal at an appropriate dietary level.

Likewise, Abel *et al.* (2015) [8] reported that banana peel meal could be incorporated into broiler diets up to 10% without adverse effects on growth performance. Atapattu *et al.* (2013) [10] further reported that higher levels of banana meal may reduce growth performance, indicating that the response to banana-based feed ingredients can vary with the level of inclusion and processing method.

The week to week variation in weight gain may be associated with differences in feed consumption, nutrient utilization, and the response of birds to dietary banana flour at different growth stages. A similar variation in daily weight gain at different stages of the growth period was reported by Dumorné *et al.* (2020) [11] in broilers fed diets containing different levels of banana flour. Their findings suggest that the response to banana flour supplementation may vary depending on the stage of growth and level of inclusion. Therefore, the effectiveness of the dietary treatments in the present study would be better assessed by considering the overall growth performance throughout the experimental period rather than relying on the results of any single week

Table 2. Average weekly gain gain(g) of Giriraja birds as affected by Banana peel meal

Treatments	Week							
	initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th
T ₁	40.05	54.92	75.84	141.67	105.34	167.66	182.27	232.78
T ₂	39.94	56.88	74.34	142.53	154.79	208.44	256.04	252.26
T ₃	40.71	63.06	78.25	153.44	154.74	219.22	288.41	389.09
T ₄	40.1	61.58	76.19	150.38	119.41	186.91	196.89	238.65
T ₅	40	51.16	64.28	136.58	132.99	180.59	212.66	226.04
SE(m)	0.22	0.528	1.004	1.691	2.745	4.505	8.448	9.556
CD@5%	NS	1.477	2.808	4.728	7.675	12.593	23.615	26.771
F-test	NS	Sig	Sig	Sig	Sig	Sig	Sig	Sig

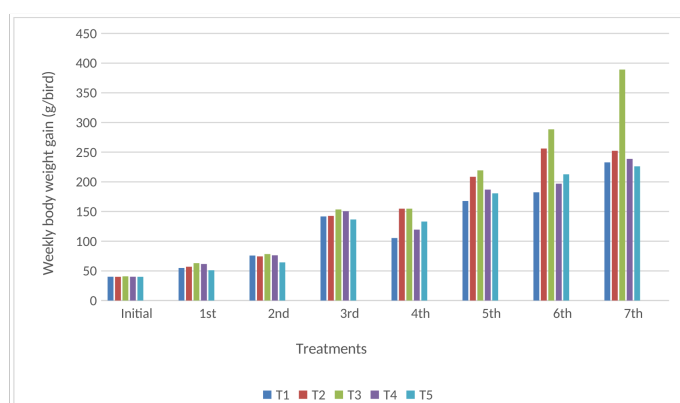


Figure 2. : Weekly body weight gain (g) of Giriraja birds as affected by Banana peel meal

Conclusion

The findings of the study show that banana peel meal (BPM) can be safely included

in the diet of Giriraja birds without negatively affecting their growth performance. Among the different levels tested, 10% BPM was found to be the most suitable, as the birds at this level showed better body weight gain. Birds in this group showed higher weekly weight gain and final live body weight compared to both the control and higher supplementation levels.

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Conflict of interest

The author declares that they have no conflict of interest.

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