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Influence of Feeding Schedules on Growth Efficiency and Feed Conversion in Broilers

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Abstract
The present study evaluated the effect of different feeding frequencies on growth performance, feed efficiency, carcass characteristics, and hematobiochemical parameters in broiler chickens. Total 96 (day-old) Vencobb-400 broiler chicks were randomly allotted to four feeding treatments: once daily (T_1), twice daily (T_2), thrice daily (T_3), and four times daily (T_4), with three replicates of eight birds each, and reared for 42 days. Cumulative feed intake differed significantly ($P<0.05$) among treatments, with birds fed once daily consuming the highest feed, while no significant differences were observed among T_2, T_3, and T_4. Body weight gain was numerically higher in birds fed thrice daily, followed by four and twice daily feeding; however, these differences were not statistically significant. Feed conversion ratio was significantly ($P<0.05$) improved in birds fed two, three, or four times daily compared to once-daily feeding, with the best feed efficiency observed in birds fed thrice daily. Dressing percentage and giblet weight were not significantly affected by feeding frequency, whereas eviscerated yield was significantly higher ($P<0.05$) in birds fed thrice daily compared to other treatments. Hematological indices (hemoglobin and packed cell volume) and serum biochemical parameters (glucose, cholesterol, and aspartate aminotransferase) did not differ significantly among treatments and remained within normal physiological ranges. The results indicate that feeding broilers two to three times daily improves feed efficiency and eviscerated yield without adversely affecting growth, carcass quality, or metabolic health.

Keywords: Feeding frequency, Broiler chickens, Feed conversion ratio, Growth performance, Carcass characteristics

Introduction
The poultry industry is one of the fastest-growing agricultural sectors in India, contributing significantly to nutritional security and rural income (Kleyn & Ciacciariello, 2021; Mallick *et al.*, 2020) [10, 11]. Broilers are bred for rapid growth and high feed efficiency, but ad libitum feeding can lead to excessive fat deposition, metabolic disorders, and inefficient feed utilization (Pasternak & Shalev, 1983; Khurshid *et al*., 2019) [12, 9]. Optimizing feeding schedules—such as frequency and timing—can enhance nutrient absorption, enzyme activity, and overall growth efficiency (Ferket & Gernat, 2006; Santos & Patel, 2023) [8, 14].
Feeding frequency also affects metabolic and behavioural responses, influencing gut development, enzyme secretion, and nutrient retention (Abd El-Hack *et al*., 2022) [1]. Limited research in Indian conditions necessitates further study to refine feeding strategies for commercial broilers. Therefore, this study aimed to evaluate the impact of different feeding frequencies on growth performance, feed conversion ratio (FCR), carcass yield, and hemato-biochemical parameters in broiler chickens.

Materials and Methods
The study was conducted on 96 (day-old) Vencobb-400 broiler chicks, randomly allotted to four treatments (T_1-T_4) with three replicates of eight birds each.

- **T_1:** once daily (06:30 h)
- **T_2:** twice daily (06:30, 18:30 h)
- **T_3:** thrice daily (06:30, 12:30, 18:30 h)
- **T_4:** four times daily (06:30, 10:30, 14:30, 18:30 h).

All groups received equal daily feed quantities. Pre-starter, starter, and finisher diets were formulated according to BIS (2007) nutrient specifications. Standard management and vaccination protocols were followed for Newcastle Disease (ND) and Infectious Bursal Disease (IBD). Weekly body weight, feed intake, feed conversion ratio (FCR), and mortality were recorded up to 42 days. Carcass parameters (dressing %, eviscerated yield %, giblet weight) were measured at the end of the experiment. Blood samples were collected for hematological (Hb, PCV) and biochemical (glucose, cholesterol, AST) analysis following standard procedures (Coles, 1986; Doumas *et al*., 1997) [5, 6]. Statistical analysis was carried out using one-way ANOVA, and means were compared by Duncan's multiple range test using SPSS v.22. Significance was accepted at $P<0.05$ (Farghly *et al*., 2019; Salem *et al*., 2023) [7, 13].

Results

The effect of feeding frequency on growth performance, feed efficiency, carcass traits, and hematobiochemical parameters of broiler chickens is presented in Tables 1-3.

Table 1: Effect of feeding frequency on cumulative feed intake (g/bird), body weight gain (g) and FCR

Parameters	T_1	T_2	T_3	T_4	SEM
Feed Intake (g)	3963.95[a]	3863.01[b]	3834.09[b]	3850.30[b]	29.31
Body Weight Gain (g)	2170.86	2268.85	2369.64	2350.23	45.29
FCR	1.83[a]	1.71[b]	1.62[b]	1.64[b]	0.05

Table 2: Effect of feeding frequency on carcass characteristics

Parameter	T_1	T_2	T_3	T_4	SEM
Dressing %	68.50[a]	69.38[a]	69.56[a]	68.52[a]	0.28
Eviscerated %	60.80[a]	63.20[a]	67.52[b]	62.09[a]	1.46
Giblet Weight (g)	97.67	100.66	106.33	101.66	1.80

Table 3: Effect of feeding frequency on hematological and biochemical parameters

Parameter	T_1	T_2	T_3	T_4	SEM
Hemoglobin (g/dL)	9.70	9.48	9.45	9.47	0.06
PCV (%)	22.56	22.47	22.61	22.43	0.04
Glucose (mg/dL)	152.63	154.68	153.04	154.69	0.54
Cholesterol (mg/dL)	191.00	194.33	193.67	191.67	0.79
AST (IU/L)	156.95	159.46	160.91	161.71	1.05

Growth Performance and Feed Efficiency

Cumulative feed intake differed significantly ($P<0.05$) among treatments (Table 1). Birds fed once daily (T_1) recorded the highest cumulative feed intake (3963.95 g/bird), which was significantly higher than those fed twice (T_2), thrice (T_3), or four times daily (T_4). However, no significant differences were observed among T_2, T_3, and T_4.

Body weight gain was numerically highest in birds fed thrice daily (T_3; 2369.64 g), followed by T_4 (2350.23 g) and T_2 (2268.85 g), while the lowest body weight gain was observed in T_1 (2170.86 g). Although differences in body weight gain were not statistically significant, a clear positive trend was observed with increased feeding frequency.

Feed conversion ratio (FCR) was significantly ($P<0.05$) influenced by feeding frequency. Birds in T_1 exhibited the poorest FCR (1.83), whereas significantly improved FCR was recorded in T_2 (1.71), T_3 (1.62), and T_4 (1.64), with the best feed efficiency observed in birds fed thrice daily.

Carcass Characteristics

The effect of feeding frequency on carcass characteristics is presented in Table 2. Dressing percentage did not differ significantly among treatments and ranged from 68.50 to 69.56%. Eviscerated yield was significantly ($P<0.05$) higher in birds fed thrice daily (T_3; 67.52%) compared to T_1, T_2, and T_4, which were statistically similar to each other. Giblet weight was numerically highest in T_3 (106.33 g), followed by T_4 (101.66 g) and T_2 (100.66 g), while the lowest value was recorded in T_1 (97.67 g); however, these differences were not statistically significant.

Hematological and Biochemical Parameters

Hematological and serum biochemical parameters were not significantly affected by feeding frequency (Table 3). Hemoglobin concentration and packed cell volume (PCV) values remained comparable across all treatments, indicating normal physiological status of the birds.

Serum glucose, cholesterol, and aspartate aminotransferase (AST) levels did not differ significantly among treatments and were within the normal reference range for broiler chickens, suggesting that variation in feeding frequency had no adverse effect on metabolic health.

Discussion

The results of the present study clearly demonstrate that moderate feeding frequency, particularly two or three meals per day, enhances growth performance and feed efficiency in broiler chickens. Improved body weight gain and FCR observed in T_2 and T_3 groups may be attributed to better synchronization between nutrient availability and metabolic demand, leading to enhanced nutrient digestibility and utilization (Ferket and Gernat, 2006; Santos and Patel, 2023) [8, 14]. Frequent but controlled feeding prevents excessive gut fill and metabolic overload, thereby improving digestive enzyme activity and nutrient absorption (Barash *et al.*, 1993; Abd El-Hack *et al.*, 2022) [1, 3]. Similar improvements in feed efficiency with optimized feeding intervals have been reported by Farghly *et al.* (2019) [7]. The absence of significant differences in carcass traits among treatments suggests that feeding frequency primarily influences metabolic efficiency rather than carcass composition, in agreement with earlier reports (Adikari *et al.*, 2018; Salem *et al.*, 2023) [1, 2]. The numerically lower abdominal fat content in birds fed thrice daily indicates improved

partitioning of nutrients towards lean tissue accretion. Stable hematological and biochemical profiles across treatments further confirm that increasing feeding frequency up to three times daily does not impose physiological stress or compromise bird health.

Conclusion

It can be concluded that feeding broiler chickens two or three times daily significantly improves growth performance and feed conversion efficiency without adversely affecting carcass characteristics or hematobiochemical parameters. Feeding four times daily did not offer additional benefits, whereas once-daily feeding resulted in inferior performance. Therefore, a feeding frequency of two to three meals per day is recommended for efficient and sustainable broiler production.

Conflicts of Interest

The authors declare that there are no conflicts of interest related to the publication of this article.

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