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Effect of Replacing Maize with Graded Level of Paddy on the Performance of Broilers

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Abstract This experiment was planned to evaluate the use of graded levels paddy instead of maize on the performance of broiler production. In broilers, 108 day old chicks were randomly distributed into 06 dietary treatments where treatment one (T_1) acted as control. The control diet contained 2800 Kcal ME/kg and 22% CP and remaining 05 treatments were formulated using different levels of paddy replacing maize. Thus, dietary treatments T_2, T_3, T_4, T_5 and T_6 were formulated using 20, 40, 60, 80 and 100% paddy, respectively, replacing maize in the diet. Results indicated that 60% paddy instead of maize produced significantly (p<0.05) higher weight gain in broilers. Feed intake was significantly higher in broilers allotted T_4 diet. The FER was highest in broilers assigned T_2 diet. The PI was maximum and significantly higher in broilers allotted T_4 diet.

Keywords Paddy, Maize, Broiler, Graded, Performance.

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Introduction

Feed costs form more than 60% of costs for a poultry farm with maize and soybean meal being the key feed ingredients. Adequate feed availability and feed prices are very crucial in sustainable operations of a poultry farm. Maize is the primary source of energy for the Indian poultry industry and constitutes 60% of compound feed. Maize is primarily rain-fed and competes with crops such as wheat and paddy which has assured prices from the Government. India is the second largest producer of rice in the world next to China. Paddy which is available in rural areas at bulk in economical rates, on an average contains 7-8% crude protein, 12-14% crude fiber, 2-3% ether extract, 74-75% NFE, 36-38% available carbohydrates and is a good source of energy. The steeply increasing price of maize, its less production and availability to livestock feed has created increased interest in alternate feedstuffs for poultry feeding. Hence,

use of paddy can be an economical alternate to maize [1]. In our effort at revealing the potentials of paddy which could replace popular energy source like maize in poultry ration, we report in this work utilization of paddy by replacing maize at graded levels in broiler rations with respect to weight gain, feed intake and feed efficiency ratio (FER) and performance index (PI).

Materials and Methods

The experiment was planned to evaluate the response of broiler chickens to use of paddy instead of maize at graded level.

Housing

The experimental chicks were reared in the battery brooder house. Randomly distributed chicks were placed in separate tiers of the battery brooders in order to provide equal floor space for each replicate. Separate feeder, water and faecal tray, were used in this experiment. The battery brooders were kept side by side in clean well ventilated room. Provision was also made for the supply of light with the help of tube lights. Experiment was conducted for a period of five weeks.

Experimental diet

Diets were formulated as per ICAR feeding standards. Control diet (T_1) was containing 2800 Kcal ME/kg and 22% CP for 5 weeks (Table 1). Rest of the diets were formulated using whole paddy instead of maize @ 20%, 40%, 60%, 80% and 100% by weight. Mineral mixture was added @ 3% of the diet.

Table 1. Composition of broiler control diet.

Ingredients	Control diet (T_1)
Maize	59.50%
Soybean meal (SBM)	37.00%
Mineral mixture (MM)	03.00%
Methionine	00.50%
Vitamin (B complex)	+
Total	100.00%

Dietary treatments

The detail description of various dietary treatments is as follows :

1. Control diet$_1$ (T_1) = The control diet for broilers was formulated as per ICAR specifications (Table 1), 2. T_2 = Control deit$_1$ (T_1) + 20% paddy instead of maize, 3. T_3 = Control diet$_1$ (T_1) + 40% paddy instead of maize, 4. T_4 = Control diet$_1$ (T_1) + 60% paddy instead of maize, 5. T_5 = Control diet$_1$ (T_1) + 80% paddy instead of maize, 6. T_6 = Control diet$_1$ (T_1) + 100% paddy instead of maize.

Experimental birds

Duly vaccinated against Marek's disease broiler chicks were purchased from the reputed hatchery. Out of which, 108 chicks were selected for experiment. During the experiment, all the chicks were vaccinated against Ranikhet disease (F_1 strain), IBD and Ranikhet disease (Lasota strain).

Experimental designs

The design of experiment was completely randomized design. All the day old broiler chicks were individually weighed at the start of the experiment and 108 birds of identical weight were selected. The chicks were randomly assigned to various groups so that weight of the chicks in any two groups did not differ significantly ($p<0.05$). Overall, there were six treatments. Each treatment consisted of three replicates of six chicks in each replicate.

Feeding and watering

The feed was offered *ad-libitum* in feeders. All mash system of feeding was practiced during the experiment. Fresh and clean drinking water was made available to birds all the time. Thus, in the entire study uniform condition of housing, brooding, feeding and watering was maintained for all the groups of the experiment.

Measurement and observations

The following observations were recorded during the

Table 2. Effect of graded levels of paddy replacing maize on the performance of broilers (05 weeks). Means bearing different superscript differ significantly ($p<0.05$).

Treatments	Weight gain (g)	Feed intake (g)	FER	PI
T_1	$1570.63^b \pm 8.69$	$2714.13^b \pm 27.42$	$0.58^a \pm 0.01$	$908.9^b \pm 10.82$
T_2	$1502.1^c \pm 2.75$	$2557.03^d \pm 6.55$	$0.59^a \pm 0.00$	$882.23^c \pm 1.66$
T_3	$1498.67^c \pm 12.42$	$2623.43^c \pm 24.05$	$0.57^b \pm 0.01$	$856.33^d \pm 14.60$
T_4	$1661.7^a \pm 7.65$	$2879.63^a \pm 34.09$	$0.58^a \pm 0.00$	$958.73^a \pm 2.46$
T_5	$1574.47^b \pm 13.46$	$2762.3^b \pm 12.43$	$0.57^b \pm 0.00$	$897.57^b \pm 14.62$
T_6	$1494.07^c \pm 7.28$	$2609.03^c \pm 16.36$	$0.57^b \pm 0.00$	$855.6^d \pm 5.20$
CD	23.69	54.66	0.01	24.78

experimental period to evaluate performance of broilers.

(a) *Body weight* : The birds were weighed individually on weekly basis to know the body weight gain of broilers till five weeks of age. Weight gains in different groups of broilers were calculated on weekly basis considering the body weights of broilers, recorded during different interval.

(b) *Feed intake* : Weekly feed consumption of broilers was recorded replicate wise on the basis of feed offered and left over feed recorded at the end of that week. Separate record of feed consumption and left over feed was maintained to know the actual quantity of feed consumed by the bird in a particular group.

(c) *Feed efficiency ratio (FER)* : To calculate FER, the body weight gain and feed consumption in each week of experiment were used. FER was calculated using following formula :

FER = Body weight gain (g)/ Feed consumption (g)

(d) *Performance index (PI)* : It was calculated as per the formula :

PI = Body weight gain (g) × FER

Statistical analysis

Data obtained during the experiment were analyzed statistically and the differences among the treatments were tested for significance.

Results and Discussion

Performance of broilers in terms of weight gain, feed intake, feed efficiency ratio (FER) and performance index (PI) on diets containing paddy instead of maize is presented in Table 2. The treatment means of their weight gain indicated maximum and significantly ($p<0.05$) higher weight gain in broilers assigned T_4 diet. It was followed by T_5 and T_1 diet. Lowest weight gain was obtained in broilers assigned T_2, T_3 and T_6 diet. The feed intake was also highest in broilers assigned T_4 diet followed by T_5 and T_1 diet. Significantly ($p<0.05$) lower feed intake was registered in groups assigned T_2 diet. Incorporation of different levels of paddy instead of maize (Table 2) revealed that inclusion of higher levels of paddy reduced the weight gain of broilers except at 60% level of inclusion where maximum and significantly ($p<0.05$) higher weight gain was recorded. Feed intake reduced with the incorporation of paddy at 20%, 40% and 100% level instead of maize but it was significantly higher at 60% level of inclusion. At 80% inclusion of paddy instead of maize, feed intake had increased but it was statistically non-significant. Increase in the feed intake might be due to energy dilution by the presence of higher level of NSP in high crude fiber rations. Improved feed intake with the increase in the crude fiber level was observed under the study [2]. Probably, this combination of maize and paddy (40 : 60) gave appropriate fiber content (6.12%) in the diet which led to increase in the feed intake. Higher feed intake resulted in to higher nutrient intake reflecting in to higher body weight gain. More availability of nutrients might be because of increased digestibility of NDF when the maize was partilly replaced by paddy. It was most likely a result of bacterial fermentation that the fibrous component of feed negatively affected chick growth. It was also

indicated that an adequate amount of fiber might improve adaptation of the gastrointestinal tract of poultry to current productive system and reduced digestive disturbances [3, 4].

The FER was highest in broilers assigned T_2 diet. However, statistically it was similar to those fed T_1 and T_4 diet. Significantly (p<0.05) lower FER was registered in groups assigned T_3, T_5 and T_6 diet. The PI was maximum and significantly higher in broilers allotted T_4 diet. It was minimum in groups assigned T_6 diet. However, statistically it was comparable (p<0.05) to those offered T_3 diet. No specific trends were recorded due to use of varying levels of paddy instead of maize in the diet. Inclusion of paddy instead of maize reduced the FER significantly (p<0.05) but this reduction was noticed only with 40%, 80% and 100% level of incorporation of paddy. The PI had reduced significantly due to incorporation of paddy instead of maize except with 60% level of incorporation where significantly higher PI was recorded. Incorporation of 40% paddy did not show significant reduction in the performance of broilers. Similar findings have been reported in another study [5]. In other groups of broilers fed diets containing higher level of paddy, growth retardation was recorded. No significant effect on the growth performance in broilers while paddy grain was replaced with corn in different rations. However, better FER and body weight in paddy grain group [6]. Scientists observed that increasing the dietary fiber in the diet increased feed consumption which might be due to energy dilution by the presence of high level of non-starch polysaccharides in high crude fiber rations [2, 7]. Better performance of broilers with 60% paddy instead of maize might be because of optimal level of fiber in the diet.

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