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Effect of dietary supplementation ofliquid distillery stillage on growth performance of Rajasri chicks

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ABSTRACT

The present study was conducted at institutional poultry farm of Krishi Vigyan Kendra, Nandyal District, Andhra Pradesh, India to evaluate the effects of dietary liquid distillery stillage (LDS) supplementation on the growth performance of the Rajasri chicks. A total of 60 one-week-old Rajasri chicks were divided into three groups, and each group supplemented a different dietary treatment: T_0 (basal diet without antibiotic), T_1 (70% basal diet + 30% LDS), and T_2 (50% basal diet + 50% LDS).The results indicated significant differences in growth among the dietary treatments. The highest average feed intake was observed in T_2across all four weeks. Similarly, T_2 showed the highest average body weight gain, suggesting better growth compared to T_0 and T_1. Moreover, T_2 consistently exhibited the lowest FCR across all four weeks, indicating better feed efficiency compared to the other treatments. On the other hand, T_1 showed intermediate performance in all three parameters, while T_0 had the least favourable outcomes. From the experiment, it was concluded that, the supplementation of LDS in the diet of Rajasri chicks at 50% have resulted in improved feed intake, body weight gain, and feed efficiency, indicating enhanced growth performance. These findings underscore the significance of optimizing feed formulations to support better growth and productivity in poultry production systemsto achieve optimal growth and profitability in poultry farming.

INTRODUCTION

Rajasri poultry breed is a good layer developed for backyard poultry. The body weight at six months age is reported 1.89 kg in cocks and 1.37 kg in hens with egg production in ninety days of 54 eggs per hen (Krishna Murthy *etal* 2013). Brooding management of these chicks is very important for better growth rate and egg production. Pre-starter feed is being supplemented along with scheduled vaccinations during brooding from day one to four weeks age.

Liquid Distillery Stillage (LDS) is the second largest by-product from the brewing process (Huige, 2006). LDS is formed in the mashing process and removed before the boiling step of the brewing process. This solid residue from wort production is composed of barley grain husks (Kerby andVriesekoop, 2017). LDS is a heterogeneous material

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consisting of lignocellulosic biomass and is rich in proteins (20-30%),lipids, vitamins, and minerals. It contains Calcium, 12–28% of lignin, 12–25% cellulose, and 28% non-cellulosic polysaccharides, mainly arabinoxylans (Mussatto and Roberto, 2005; Lynch *et al.*, 2016). To reduce the cost of feeding during nursery period, LDS can be supplemented along with the basal diet. Hence the present study was conducted to study the effect of supplementation of LDS on growth performance of Rajasri chicks.

MATERIALS AND METHODS

The study was conducted at institutional poultry farm,SHE & CS Krishi Vigyan Kendra, Yanagantipalle village, Banaganapalle mandal of Nandyal District, Andhra Pradesh. A total of 60 Rajasri birds aged around 1 week were randomly distributed into 3 groups (T_0, T_1, T_2) with 20 birds in each group. The birds were housed under deep litter.Similarly the birds were provided with similar management conditions throughout the experimental period. The nutritive value of basal diet and LDS given in table 1.

Table 1.composition of basal feed and LDS

S.No	Nutrient	Basal Feed	LDS
1	Moisture (%)	12.6	76.62
2	Crude Protein (%)	22.0	27.23
3	Ether Extract (%)	5.08	0.58
4	Crude Fibre (%)	2.93	0.2
5	Total ash (%)	7.8	6.9

The birds were fed **with** the following experimental diets.
T_0: Basal diet without antibiotic
T_1: 70% Basal diet + 30% LDS
T_2: 50% Basal diet + 50% LDS

The data on body weight and feed intake were collected and feed conversion ratio was calculated. The data was statistically analysed as per Snedecor and Cochron,1989.

RESULS AND DISCUSSION

Average feed intake

The average feed intake values for each treatment during different weeks of the growth period is presented in Table 2. The data allows us to compare the feed consumption of the birds under the three dietary treatments over time.
Perusal of the table 2revealed thatT_2 consistently had the highest average feed intake across all four weeks, indicating that birds under this treatment consumed more feed compared to the other treatments. T_1group also showed relatively similar feed intake values as observed in T_2group.. T_0 had the lowest average feed intake throughout the four weeks, with slightly lower values compared to T_1 and T_2.

Table 2. Average feed intake (g/bird) during different growth periods under different dietary treatments.

	Treatments		
Weeks	**T_0**	**T_1**	**T_2**
1st week	763.61	758.57	769.27
2nd week	894.81	970.14	964.16
3rd week	978.65	982.19	980.28
4th week	981.41	986.71	988.86
Mean	901.37±49.57	923.15±54.93	925.64±52.37

Table 3. Average weekly body weight gain (g) under different dietary treatments

	Treatments		
Weeks	**T_0**	**T_1**	**T_2**
1st week	257.66	246.84	281.07
2nd week	295.48	350.01	372.19
3rd week	305.12	393.25	403.52
4th week	312.47	416.18	455.57
Mean	**292.68±12.18**	**351.57±37.51**	**378.09±36.62**

These findings align with the expected outcomes of dietary treatments on feed intake in poultry. The observed trend of T_2 having the highest feed intake is consistent with previous research that highlights the influence of certain dietary components on the palatability and attractiveness of the feed, leading to increased consumption in birds (Ahmed *et al.*, 2020). Similarly a relatively higher feed intake T_1could be attributed to a balanced nutrient composition and formulation that supports the birds growth and performance (Amad *et al.*, 2019). Conversely, a slightly lower feed intakein T_0 may be associated with certain feed characteristics that are less appealing to the birds or suboptimal nutrient levels (Vieira and Moran, 2017).

Average weekly body weight gain

Perusal of table3allows us to compare the growth performance of the three dietary treatments over time.
It was observed that T_2group consistently had the highest average body weight gain across all four weeks, indicating that it promoted better growth compared to the other treatments. T_1had intermediate average body weight gain values, falling between $T_0$and T_2. T_0showed the lowest average body weight gain throughout the four weeks, with lower values compared to $T_1$and T_2.
These findings are in agreement with previous research in poultry nutrition, which highlights the significant impact of dietary composition on growth and body weight gain in birds.

The higher average body weight gain in T_2 can be attributed to its optimized nutrient profile, including essential amino acids and energy sources, which promote enhanced growth and efficient feed utilization (Gous*et al.*, 2016). Intermediate performance in T_1may indicate that its dietary formulation still provided adequate nutrients for growth, but perhaps not to the same extent as T_2. Conversely, the lower average body weight gain in T_0 may be associated with imbalanced or deficient nutrients, hindering the birds growth potential (Khalique *et al.*, 2019).

Feed conversion ratio

The FCR values for each treatment at different weeks were presented in table 4. The data allows us to compare the feed efficiency of the three dietary treatments over time. A lower FCR indicates that less feed is required to produce a unit of body weight gain, which is generally desirable in animal production systems.

Table 4. Feed conversion ratio under different dietary treatments

Weeks	Treatments		
	T_0	T_1	T_2
1st week	2.96	3.10	2.74
2nd week	3.03	2.77	2.59
3rd week	3.21	2.50	2.43
4th week	3.14	2.37	2.17
Mean	**3.085±0.06**	**2.69±0.16**	**2.48±0.12**

It was observed that T_2consistently had the lowest FCR across all four weeks, indicating better feed efficiency compared to the other treatments. T_1had the highest FCR during the 1st and 2nd weeks but showed improvement in feed efficiency during the 3rd and 4th weeks, achieving lower FCR values. T_0had intermediate FCR values, falling between $T_1$and T_2. These findings are in agreement with previous research in poultry nutrition, which emphasizes the significant impact of dietary composition on feed efficiency and FCR in birds. T_2had consistently lower FCR which may be attributed to its optimized nutrient profile, including well-balanced essential nutrients, which promote efficient utilization of feed for growth (Hetland *et al.*, 2003). The initial higher FCR in T_1 during the 1st and 2nd weeks could be due to certain dietary factors influencing feed intake or nutrient utilization during that period. However, the subsequent improvement in feed efficiency suggests that the diet's formulation might have been adjusted to support better nutrient utilization and growth (Beyki*et al.*, 2016). T_0has intermediate FCR values which indicate that the diet provided sufficient nutrients for growth but was not as efficiently utilized as the diet in T_2.

CONCLUSION

The results consistently indicates that T_2(50% Basal diet + 50% LDS) outperformed the other treatments in terms of feed intake, body weight gain, and feed efficiency. It provided the most attractive and supportive diet for the birds, resulting in better growth performance and feed utilization. T_1(70% Basal diet + 30% LDS)showed intermediate performance, while T_0 (Basal diet without antibiotic) had the least favourable outcomes in terms of feed intake, body weight gain, and feed efficiency. These findings have practical implications for poultry nutritionists and farmers, emphasizing the critical role of balanced and optimized feed formulations in achieving optimal growth and productivity in poultry production systems.

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