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Distillers Dried Grains with Solubles (DDGS) – Alternate Feed Resource for Native Chicken Production

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Abstract

Distillers Dried Grains with Solubles (DDGS) are nutrient rich co-product of ethanol production industry. High protein (45 – 50 %), as well as medium energy content (2400 - 2800 kcal/kg ME) with low fiber (5-9 %), attracts the DDGS as an alternative to commonly used oil cakes such as soybean meal and groundnut cake in poultry feeds. The price difference between DDGS and soybean meal varies between Rs.7.0 and Rs. 10.0/- per kg. A total of 10 progressive native chicken rearing farmers located in Karur District of Tamil Nadu holding more than 40 birds were selected for conducting this trial. A group of 20 birds were offered rice DDGS whereas another 20 birds served as control for comparison purpose. A total of 200 kgs of rice DDGS was distributed to 10 farmers (@ 20 kg per farmer). Each bird was offered one kg of DDGS as a supplementary feed for 90 days period along with conventional feeding schedule already adopted by the farmers. The DDGS used in this trial contained (% as fed basis) 45.87 crude protein, 9.14 crude fibre, 7.63 ether extract, 4.37 total ash, 2.01 sand and silica, 0.25 calcium, 0.6 phosphorus. The palatability of rice DDGS was satisfactory as perceived by the farmers. The body weight gain of growing birds (g), livability (%), egg production (% hen day), mean egg weight (g), hatchability of eggs (%) and the cost of egg production (in Rs. per egg) were better ($P \leq 0.05$) *in group fed rice DDGS as compared to the control. The cost of production (in Rs.) per kg live weight did not vary significantly. The cost of egg production (in Rs. per egg) was Rs.0.50 lower in DDGS fed group. From this study, it can be inferred that supplementation of rice DDGS in the ration of native chicken improves* ($P \leq 0.05$) *the production performance in terms of weight gain, egg production, hatchability and livability.*

Keywords: *Rice DDGS, Native chicken, Tamil Nadu*

The ethanol blending in petrol program is an ambitious initiative of the Government of India aiming at achieving 20 per cent ethanol blending with petrol by the year 2025-26. Distillers Dried Grains with Solubles (DDGS) are non-fermentable components of the grains which are rich in nutrients like protein, fat, fiber, vitamins, and minerals and are recovered in a highly concentrated form during ethanol production. Since ethanol producing distillery units are coming up in large numbers across the country, it is expected to produce more than 3.0 MMT of DDGS by 2025-26 in India. Dinani *et al*. (2019) reported that DDGS is an attractive alternative to commonly used oilcakes like soybean meal and groundnut cake in poultry feeds due to its high protein content (43–46%), moderate energy levels (2400–2800 kcal/kg

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ME), and low fiber content (5–9%). In poultry diets, DDGS are also a valuable source of linoleic acid (Purdum *et al*., 2014; Abd El-Hack *et al*., 2015). The price difference between DDGS and soybean meal ranges from Rs.7/- to Rs. 10/- per kg, making it a cost-effective option. However, native chicken production in India often suffers from limited use of protein sources, resulting in low productivity, high mortality, and reduced meat and egg yields. This issue is particularly acute in growing chicks, which require higher protein levels in the ration as compared to adult birds. A lack of knowledge about the nutritional value of DDGS, as well as limited awareness on its availability in local markets motivated this study to promote DDGS as a sustainable and affordable feed resource for poultry.

Materials and methods

A total of 10 progressive native chicken-rearing farmers from Karur District, Tamil Nadu, each holding a minimum of 40 birds, were selected for this experiment. Preference was given to farmers who were either using compounded feed or exclusively feeding cereal grains to their birds. In each location, a group of 20 birds was supplemented with rice DDGS, while another 20 birds served as a control group for comparison. A total of 200 kg of rice DDGS was distributed to 10 farmers (@ 20 kg rice DDGS per farmer). Each bird was provided with one kg of DDGS as supplementary feed over a period of 90 days, along with their regular feeding practices (% as fed basis). The rice DDGS contained (%) 45.87 crude protein, 9.14 crude fiber, 7.63 ether extract, 4.37 total ash, 2.01 sand and silica, 0.25 calcium, 0.6 phosphorus. Multi-mycotoxin analyses revealed that aflatoxins, ochratoxin, T_2 toxin, citrinin and zearalenone could not be detected. The rice DDGS was used as a replacement for oil cakes @ 10 per cent replacing ground nut cake in the compounded feed or as a super dosing supplement along with conventionally used grains such as maize, broken rice, bajra, jowar etc. The experiment was conducted at farmer's field comprising both growers (n=10) and laying hens (n=10). The parameters such as body weight gain, mortality rates, and egg production performance (egg weight, number, and hatchability) in laying hens were recorded. Feed cost per kg live weight as well as feed cost per egg produced were calculated and compared. Data were analysed by 'T' test (Snedecor and Cochran, 1989).

Results and discussion

The voluntary feed intake was not affected by the inclusion of DDGS in the ration of native chicken. The farmers reported that DDGS was well accepted by the birds and palatability was not affected since there was no leftover feed after one hour of feeding. The results pertaining to the production performance of native chicken comprising both growers and laying hens are given in Table 1. The DDGS-fed group showed improved ($P \leq 0.05$) body weight gain in growing birds, higher livability percentages and better egg production (% hen-day). Additionally, the mean egg weight and hatchability of eggs (%) were superior ($P \leq 0.05$) when compared non-DDGS group. Better ($P \leq 0.05$) egg production has been reported by Hassan and Al Aqil (2015) in laying hens. Attia *et al*. (2024) also reported that corn DDGS could be included in dual-purpose breeding hen's diet up to 20 per cent without any adverse effects on the sustainability of the quality of eggs and semen, fertility and hatchability, and blood biochemistry. The improved production performance observed in this study could be due to the addition of rice DDGS rich in microbial phytase, which might have improved the phosphorus bioavailability as reported by Elbaz *et al*. (2022b). DDGS also contains yeast biomass (4-6%) which helps in building the immune system stimulation and gut development as reported by Reddy *et al*. (2020) in pigs and Kumar *et al*. (2023) in broiler chicken. DDGS is a good source of riboflavin and thiamine and most of the riboflavin in DDGS comes from the soluble fraction. DDGS also contain some biologically active substances such as nucleotides, mannan oligosaccharides, β-1, 3 or 1, 6 glucan, inositol, glutamine, and nucleic acids, which have a beneficial effect on immune responses and the health of animals as observed by Elbaz *et al*. (2022 a & b). The livability of birds was higher ($P \leq 0.05$) in the rice DDGS added group indicating that DDGS is safe for feeding poultry without affecting the health of birds and might be the probable reason for higher livability in DDGS fed group as reported by Patel *et al*. (2024) in broiler chicken. Soybean meal has more lysine and low methionine whereas rice DDGS contains more methionine

Table 1. Performance of native chicken (Aseel) fed Distillers Dried Grains with Soluble

Group	Mean body weight at 30 days of age	Mean body weight at 120 days of age	Body weight gain (g)	Livability (%)	Egg production (% Hen day) (n=60)	Mean egg weight (g)	Hatchability of eggs (%) (n=180)	Feed cost for weight gain (in Rs. per kg live weight)	Feed cost for egg production (in Rs. per egg)
DDGS fed	90.5 ± 5.5	1236^{b} ± 14.9	1146^{b} ± 10.2	91.7^{b} ± 4.16	62.5^{b} ± 4.9	48.2^{b} ± 2.2	61.3^{b} ± 5.1	102 ± 9.1	4.39^{b} ± 0.51
Control	87.6 ± 7.3	1017^{a} ± 16.6	928^{a} ± 12.9	86.8^{a} ± 7.3	56.3^{a} ± 6.7	44.7^{a} ± 3.4	53.8^{a} ± 4.2	119 ± 7.7	4.89^{a} ± 0.65

Each value is the mean of 100 observations

(except hatchability of eggs and hen day egg production)

Means with at least one common superscript in a column do not differ significantly ($P > 0.05$).

and low lysine. So, both are complementary to each other which might have helped to achieve better performance as observed by Singh *et al.* (2020) and Patel *et.al* (2024) in broiler chicken.

The study on economics revealed that the feed cost per kg live weight was relatively low, though statistically not significant, in grower chicken. Kaninde *et al*. (2023) reported that the inclusion of rice DDGS up to 5.0 per cent in the diet of commercial broiler chicken did not affect the body weight gain, dressing percentage, carcass traits as well as chemical composition, and fatty acid profile of meat and was found to be economical in commercial broiler chicken production.

Similarly, the feed cost for egg production was also low ($P \leq 0.05$) in rice DDGS fed group. Biswas *et al*. (2020) observed that the inclusion of 5 per cent rice DDGS in the duck's diets significantly ($P \leq 0.05$) increased egg production, egg number, egg weight and egg mass when compared to the control group as observed in this study. Relatively reduced cost of feed for egg production is due to better egg production with large egg size reflecting higher egg weight as observed by Dinani *et al*. (2018).

The inclusion of DDGS in the diets of native chickens did not adversely affect the utilisation of nutrients as observed by Elbaz *et al*. (2022a). The cost of egg production (in Rs. per egg) was Rs. 0.50 lower in the DDGS fed group. Dinani *et al.* (2018) reported that rice DDGS can safely be incorporated at the level of 10% for egg production.

Conclusion

From this study, it can be inferred that supplementation of rice DDGs along with locally available feed resources improved ($P \leq 0.05$) the growth and egg production performance of native chicken. The cost of egg production (in Rs. per egg) was fifty paise lower in DDGS fed group than un-supplemented group.

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Conflict of interest

No conflict of interest

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