Journal of the Andaman Science Association Vol. 28(2):198-202 (2023)
ISSN 0970-4183, Printed in India

Effects of Feeding Different Levels of Rice Distillers Dried Grains with Soluble on Growth Performance and Carcass Characteristics of Japanese quail *(Coturnix coturnix japonica)*

C. Pandian[1]*, A. Ashok[2], S. Ezhil Valavan[3] and R. Richard churchil[2]
[1] *Veterinary University Training and Research Centre, TANUVAS, Vellore-632 009*
[2] *Department of Poultry Science, Madras Veterinary College, TANUVAS, Chennai-600 007*
[3] *Poultry Research Station, TANUVAS, Chennai-600 051*
***Corresponding author's E-mail:** chinnaduraipandian75@gmail.com*

Abstract

The present study was carried out to determine the effects of incorporation of Rice Distillers Dried Grains with Solubles (DDGS) on growth performance in Japanese quail. A total of 300 Nandanam quail-3 day old chicks were weighed individually, then randomly assigned to three treatment groups of 100 chicks each. They were 25 chicks per replicate and four replicate per treatment group. Experimental diets were prepared with incorporation of Rice DDGS at 0% (T_1: control), 5% (T_2) and 10% (T_3) levels by marginal adjustment of other feed ingredients. The birds were housed in cages during the experiment period of 0-5 weeks. The parameters such as weekly body weight and body weight gain, feed consumption, feed conversion ratio (FCR), liveability and carcass characteristics were recorded. There was a significant difference ($P \leq 0.01$) in body weight and body weight gain was observed during 1st week to 5th week of age between treatment groups. The 5th week body weight in T_1, T_2 and T_3 group were 192.41, 195.23 and 204.06 g respectively. Similarly, the 5th week cumulative feed consumption (T_1-535.21, T_2-532.63 and T_3-527.97 g) and FCR (T_1-2.78, T_2-2.72 and T_3-2.58 g) showed significant difference ($P \leq 0.05$) among the treatment groups. The per cent livability showed no significant difference between treatment groups. The pre slaughter live weight showed significant difference ($P \leq 0.01$) among treatment groups; however the other carcass characteristics such as eviscerated weight and ready to cook yield showed no significant difference among treatment groups. The above study concluded that Rice DDGS can be incorporated at 10 % level in Japanese quail diet to improve body weight, body weight gain and FCR.

Key words: *Growth performance, japanese quail, rice DDGS.*

Introduction

Feed is the single largest expense in poultry production, accounting up to 70 % of total cost (Filgueira *et al*., 2014). Availability of soya and corn for feed could be a major challenge for the poultry industry (Mark and Vijay, 2016). Soybean meal is the major protein ingredient utilized in poultry diet. Due to scarcity of soybean, there is a need to utilize locally available alternate protein ingredients. The ingredient that gained importance in recent times is Distiller's Dried Grain with Solubles (DDGS). The DDGS is co-product of the ethanol industry produced during the dry milling process. Availability of DDGS is increasing as ethanol is used as biofuel. The DDGS contain all the nutrients from grain in a concentrated form except starch, which has been utilized in the fermentation process during ethanol production. Rice DDGS also have yeast enzyme which increases the level of production (Gupta *et al*., 2017). Rao *et al*. (2016) and Gupta (2016) found diets with 10% Rice DDGS was safe for broilers and layers respectively. Most of the researches are limited to feeding value of corn, wheat, sorghum, barley based DDGS with very scanty reports on Rice DDGS in Japanese quails. Hence, the present study was conducted to assess the efficiency of Rice DDGS by incorporating in the diets of Japanese quails.

Material and Methods

The study was conducted up to 5 weeks to evaluate the effects of incorporation of Rice Distillers Dried Grains with Solubles (DDGS) on growth performance in Nandanam quail 3 strain at Poultry Research Station, TANUVAS, Chennai in the year 2022. Nandanam quail

3 is a dual type Japanese quail strain developed by Tamil Nadu Veterinary and Animal Sciences University, Chennai -51 during the year 2004. Totally 300 Nandanam quail 3 day old chicks were weighed individually, then randomly assigned to three treatment groups of 100 chicks each. They were 25 chicks per replicate and four replicate per treatment group. The chicks in each replicate were housed in colony cages with standard floor space. Experimental diets were prepared with incorporation of Rice DDGS at 0 % (T_1: control), 5 % (T_2) and 10 % (T_3) levels by marginal adjustment of other feed ingredients. Rice DDGS were analyzed for proximate principles, amino acid profile and mycotoxin besides calcium, phosphorus, salt and gross energy by calculation. The value were presented as (% dry matter) mean ± S. E, moisture content 17.14 ± 0.62, crude protein 43.57 ± 1.04, crude fiber 2.85 ± 0.53, ether extract 4.69 ± 0.50, total ash 4.51 ± 0.60, calcium 0.21 ± 0.01, phosphorus 0.75 ± 0.05, salt 0.35 ± 0.05 and gross energy kcal/kg 4091 ± 26.46. An Iso nitrogenous and iso caloric experimental feeds were prepared and fed *adlibitum* under standard managemental conditions. The parameters such as weekly body weight and body weight gain, feed consumption, feed conversion ratio (FCR), livability and carcass characteristics were recorded. The data were analyzed as per standard statistical procedure described by Snedecor and Cochran (1994).

Results and Discussion

Body weight and body weight gain (g)

The effect of incorporation of Rice DDGS on mean body weight (g) of Nandanam quail 3 is presented in Table 1. The body weight (g) using graded level of Rice DDGS at 0 %, 5 % and 10 % level during 1st, 2nd, 3rd, 4th and 5th week of age showed significant ($P \leq 0.01$) difference. The 5th week body weight of Japanese quail fed with 0 %, 5 % and 10 % inclusion level were 192.41, 195.23 and 204.06 g respectively. Talsani *et al.* (2021) conducted an experiment in quails by feeding Rice DDGS from 0 to 20% levels and recorded improvement of body weights at 20 % Rice DDGS level (198.50 g) when compared with the control (185.75 g). Similarly, Karadagoglu *et al.* (2015) conducted an experiment in quails by feeding corn DDGS from 0 to 15 % levels and recorded improvement of body weight. In contrast, Dingore (2015) reported significantly lowest ($P<0.05$) body weight difference during finisher phase in case of broilers when fed with Rice DDGS.

Table 1. Effect of incorporation of Rice DDGS on body weight (Mean ± SE) of Nandanam quail-3 (n=100)

Week/Body weight	T1-Control	T2 (5 %)	T3 (10 %)	F-Value
Hatch weight	9.20±0.01	9.18±0.01	9.19±0.01	0.00^{NS}
1st week	31.63^{b}±0.74	32.51^{b}±0.65	34.48^{a}±0.76	8.78**
2nd week	62.57^{b}±1.47	66.54^{a}±1.58	67.06^{a}±1.70	7.06**
3rd week	102.46^{b}±2.24	104.21^{b}±2.84	115.48^{a}±2.65	44.14**
4th week	140.39^{b}±2.61	141.87^{b}±3.80	162.06^{a}±3.67	65.98**
5th week	192.41^{c}±3.84	195.23^{b}±4.21	204.06^{a}±4.20	78.21**

***Highly significant (P<0.01)*

In the present study, the cumulative body weight gain was (Table 2) significantly ($P<0.01$) higher at 10 % Rice DDGS inclusion level in comparison to control. The body weight gain between graded level of Rice DDGS at 0, 5, 10 % inclusion level during 5th week of age was 185.21, 186.05 and 194.87 (g) respectively. Similarly, Talsani *et al.* (2021) observed significantly higher body weight gain at 20 % Rice DDGS level (189.63 g) than control (176.95 g). El-Abd (2013) and Karadagoglu *et al.* (2015) reported significant improvement in body weight gain in quails by offering diets with corn DDGS. This improved body weight gain in quails fed diets incorporated with Rice DDGS could be related to more available protein or amino acid and concentrated nutrients of DDGS, which have come from grain (Babcock *et al*., 2008).

Table 2. Effect of incorporation of Rice DDGS on body weight gain (Mean ± SE) of Nandanam quail-3 (n=100)

Week/ Body weight gain	T1-Control	T2 (5 %)	T3 (10 %)	F-Value
1st week	22.43^{c}±0.23	23.33^{b}±0.21	25.29^{a}±0.20	27.24**
2rd week	53.37^{b}±0.42	57.36^{a}±0.35	57.87^{a}±0.31	24.51**
3th week	93.26^{c}±0.51	95.03^{b}±0.51	106.29^{a}±0.42	60.36**
4th week	131.19^{b}±0.74	132.69^{b}±0.52	152.87^{a}±0.67	77.23**
5th week	183.21^{c}±0.60	186.05^{b}±1.20	194.87^{a}±1.31	68.94**

***Highly significant (P<0.01)*

Feed consumption and feed conversion ratio (FCR)

Effect of incorporation of Rice DDGS on mean feed consumption (g/bird/week) of Nandanam quail 3 is presented in Table 3. There was a significant difference (P < 0.05) in feed consumption between treatment groups, until 5th week of age. The treatment group feed with 10 % inclusion level of Rice DDGS was consumed significantly (P ≤ 0.05) less feed (527.97 g) than 5 % (532.63 g) and 0 % (535.25 g) inclusion level during entire 5 weeks study periods.

Table 3. Effect of incorporation of Rice DDGS on weekly feed consumption (g) (Mean ± SE) of Nandanam quail-3 (n=100)

Week /Feed consumption	T1-Control	T2 (5 %)	T3 (10 %)	F-Value
1st week	26.10^{b}±1.29	26.22^{b}±1.54	25.13^{a}±1.12	4.12*
2rd week	66.20^{b}±1.38	65.11^{a}±1.67	65.01^{a}±1.75	3.58*
3th week	109.01^{b}±2.20	107.31^{a}±2.10	106.12^{a}±2.16	3.89*
4th week	142.32^{b}±2.51	142.74^{b}±2.89	141.28^{a}±2.58	4.18*
5th week	191.58^{b}±3.89	191.25^{b}±3.68	190.43^{a}±2.75	4.56*
Cumulative feed consumption (g)	535.21	532.63	527.97	

** Significant (P<0.05)*

The effect of incorporation of Rice DDGS on weekly feed conversion ratio (Mean±SE) of Nandanam quail 3 is presented in Fig.1. Similar to the feed consumption, the FCR also showed significant difference among the treatment group during the study (1st to 5th week). The cumulative FCR of 2.78, 2.72 and 2.58 was observed in 0 %, 5 % and 10 % Rice DDGS inclusion levels respectively, till the end of trail period. Similarly, Talsani *et al.* (2021) and Mikhail *et al.* (2013) recorded significantly (P<0.05) better FCR in quails at 20 % DDGS level. In contrast, Dinani *et al.* (2019) reported significantly (P>0.05) poor FCR in broilers when Rice DDGS was included at 15 % level in the diet.

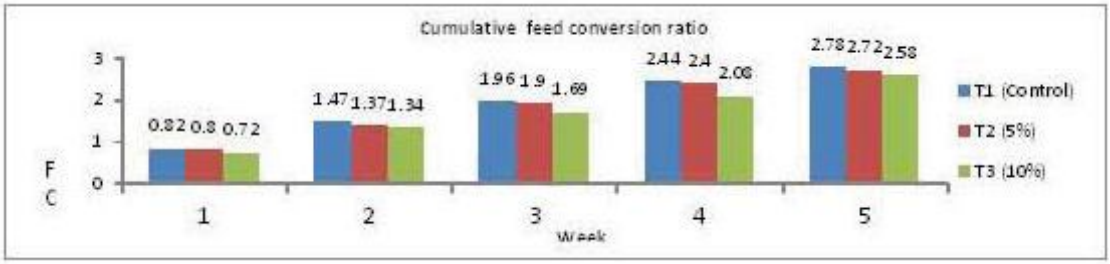

Fig.1. Effect of incorporation of Rice DDGS on weekly feed conversion ratio of Nandanam quail-3

Liveability (%)

The present study revealed that incorporation of 0, 5 and 10 % Rice DDGS in Japanese quail showed non-significant effect on per cent liveability (Fig 2). The mortality observed in the treatment group was non-specific.

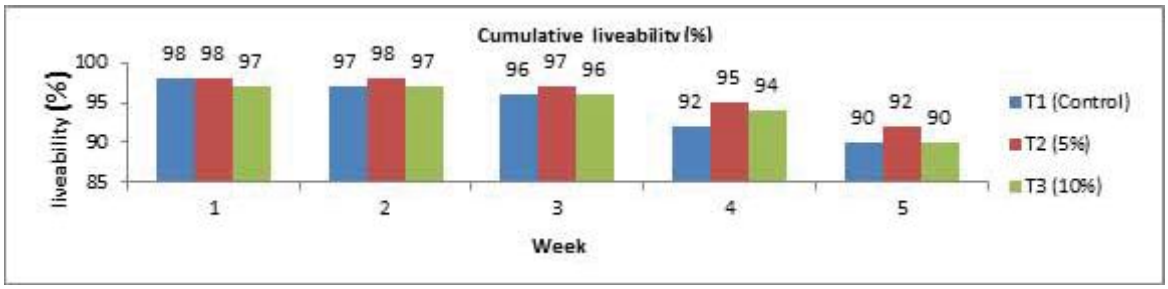

Fig.2. Effect of incorporation of Rice DDGS on liveability (%) of Nandanam quail-3

Carcass yields

The effect of incorporation of Rice DDGS on slaughter performance of Nandanam quail 3 is presented in Table 4. The pre slaughter live weight showed significant difference ($P \leq 0.01$) among treatments; however the other carcass characteristics such as eviscerated weight and ready to cook yield showed no significant difference among treatment and control groups.

Table 4. Effect of incorporation of Rice DDGS on carcass characteristics of Nandanam quail-3 (n=12)

Parameters	T1 (Control)	T2 (5 %)	T3 (10 %)	F-Value
Pre slaughter live weight (g)	192.41^{c}±3.84	195.23^{b}±4.21	204.06^{a}±4.20	78.21**
Eviscerated weight (g)	127.61±1.10	127.04±1.13	128.04±1.13	1.90^{NS}
Ready to cook yield %	64.47±1.10	64.59±1.10	64.72±1.10	0.54^{NS}

***Highly significant (P<0.01); NS – Non significant (P> 0.05).*

Conclusion

The above study concluded that, Rice DDGS can be incorporated at 10 % level in Japanese quail diet to improve body weight, body weight gain and FCR without any adverse effect on liveability and carcass characteristics.

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Received: 15th October 2023 Accepted: 31st October 2023