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FEEDING VALUE OF RICE WASTE FOR LAYERS AND ITS EFFECT ON EGG QUALITY*

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Rice waste, a rice milling by product contains mostly broken rice along with polishings, bran and husk. The annual availability in India was estimated as 5 million tonnes (Devandra ,1978). Rice waste with a crude protein level ranging from 7% (Ravindran and Blair, 1991) to 9.4% (Crampton and Harris, 1969) and low fibre level of 3.14% (Singh and Marwha, 1968) and ME above 3200 Kcal/Kg (Hubbell, 1991; Ravindran and Blair,*loc.cit.*) can be considered as a potential energy source for chicken. Further the low cost and continuous availability throughout the year, makes rice waste as an ideal substitute for maize in the diet of chicken. To arrive at an optimal level of inclusion of rice waste in the diet of layers, a biological trial was conducted in layers during early stage and egg quality studies were carried out at 22nd week.

Materials and Methods

Two hundred and fifty two 17 weeks old commercial hybrid female pullets (O-17 weeks subjected to same treatment with chick starter and grower ration) were transferred to isocaloric and isonitrogenous layer rations containing 0, 10, 20 and 40% rice waste (Dry matter, 90.53%; Crude protein ,7.8%; Crude fibre, 0.96%; Ether extract ,2.78%; Total ash, 3.2%, and NFE, 85.26%) replacing maize (w/w) and the biological trial was conducted in a completely randomised design with four replicates for each treatment from 18-22 weeks of age. The proximate composition (AOAC, 1990), Calcium (Talapatra *et al.*, 1940) and phosphorus (Fiske and Subbarow, 1925) of the ration were estimated. The ingredient and chemical composition. of the rations are given in Table 1. The effect of including rice waste in layer ration was assessed in terms of mean body weight at housing and at 20 weeks of age, age at first egg, age at 5 and 50% egg production, feed consumption (g/day), feed efficiency, (kg/dozen eggs), hen day egg production and production at 154th day and these values are given in Table 2. Egg quality studies were carried out during the last three days of 22nd week.

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Table 1. Ingredient and chemical composition (%) of the diets

Ingredients		Level of rice waste: 0	10	20	40
Maize		40	30	20	0
Rice waste		0	10	20	40
Sorghum		0	7	3	9
Wheat		4	0	7	7
De-oiled rice bran		27	22	19	10
De-oiled groundnut cake		10	11	10	13
Soyabean meal		3	4	5	5
Fish meal		8	8	8	8
Shell grit		6	6	6	6
Mineral mixture[1]		2	2	2	2
Vitamin premix[2] (g)		80	80	80	80
Nutrient (analysed)	**Rice waste**				
Dry matter	90.53	92.70	93.10	93.25	92.86
Crude protein	7.80	16.95	17.10	17.10	17.18
Crude fibre	0.96	7.01	6.73	5.99	4.32
Ether extract	2.78	3.70	3.20	3.10	4.50
Ash	3.20	12.96	13.45	12.85	13.17
NFE	85.26	59.38	59.52	60.96	60.83
Acid insoluble ash	1.25	3.26	2.91	2.91	3.11
Calcium	0.39	3.06	3.12	3.13	3.20
Phosphorus	0.22	0.65	0.63	0.61	0.60
Lysine*	-	0.7572	0.7791	0.8070	0.8302
Methionine*	-	0.3210	0.3270	0.3285	0.3326
ME* Kcal./Kg.	3219	2484	2488	2484	2488

1. Supplied per Kg. feed calcium 6.4g, phosphorus 1.2g, manganese 55mg, iodine 2mg, zinc 52mg. copper 2mg, iron 20mg.
2. Supplied per Kg. feed Vitamins A 8250iu, D 1200iu, K 1mg., E 8mg.. $B_1$04mg., $B_2$5mg., $B_6$0.08mg., B_{12}04mcg:, Niacin 12mg., Calcium D Pantothenate 8mg., Di Nitro-Tolumide 125mg,

*Calculated value

Table. 2 Effect of feeding rice waste on the performance of layers (18-22 weeks)

	Body weight at housing (18th wk)	Body weight at 20th week1	Age at first egg[2]* (days)	Weight of first egg[2] (g)	Age at 5% egg production (days)	Age at 50% egg production (%)*	Hen day egg production 2 (%) *	Production at 154th day[2] (%)*	Feed Consumption (g/day)	Feed efficiency Kg/Dozen eggs) at 154th day
Control	$1133^{a}\pm53$	$1239^{a}\pm47$	$129^{b}\pm1.5$	31.08±0.55	131	$141.5^{b}\pm0.65$	$30.32^{a}\pm12.36$	$88.5^{a}\pm1.7$	81.8±1.38	$1.29^{a}\pm0.08$
10% rice waste	$1140^{a}\pm47$	$1225^{a}\pm51$	$125^{a}\pm0.8$	30.95±0.42	131	$144.0^{a}\pm0.57$	$30.65^{a}\pm3.09$	$83.2^{a}\pm4.7$	78.0±2.85	$1.33^{a}\pm0.09$
20% rice waste	$1109^{a}\pm33$	$1237^{a}\pm26$	$128^{ab}\pm0.7$	29.67±0.30	131	$145.0^{a}\pm0.20$	$27.28^{a}\pm1.78$	$81.9^{a}\pm4.3$	78.8±2.02	$1.35^{a}\pm0.02$
40% rice waste	$1028^{b}\pm39$	$1132^{b}\pm43$	$134^{c}\pm0.6$	31.65±0.40	136	$147.8^{c}\pm0.025$	$17.24^{b}\pm1.19$	$64.5^{b}\pm1.6$	73.8±1.03	$1.74^{b}\pm0.02$

1. Mean value of 60 observations
2. Mean value of 4 observations

*Values were subjected to arc sine angles and analysed for statistical significance. Means with same superscript in the same column do not differ significantly (9<0.05).

Results and Discussion

Body weight at housing and 20 weeks did not differ significantly in 0, 10, and 20% rice waste fed groups but there was significant reduction in body weight in 40% rice waste fed group. Inclusion of rice waste at 40% level significantly delayed the age at maturity compared to the rest, which in turn was influenced by lower feed intake in that group. Similar delayed maturity was observed by Karunajeewa and Tham (1984) in paddy rice based diets compared to wheat or millet based diets. There was no significant difference in the weight of first egg between treatments. Age at 5% egg production was delayed by 5 days in 40% rice waste group. As the level of rice waste increased in the ration,a linear increase in age at 50% egg production was observed. Feed intake among different treatments (though lower in rice waste groups) was non -significant. In 40% rice waste group, there was significant reduction in hen day egg production compared to the rest and a similar trend was observed at 154th day production. It could be possibly due to the significantly lowered body weight at housing and delayed age at maturity in 40% rice waste fed groups. Feed efficiency (kg/dozen eggs) was significantly poor in 40% rice waste fed groups and this was corroborated by Thakur *et al.* (1992) when paddy replaced maize in laying hens and rice kani replaced maize (Tyagi *et al.*, 1994). No significant difference was observed in various egg quality traits between control and the rice waste fed groups but in the case of yolk colour, a significant progressive decline in yolk colour was observed as the level of rice waste in the ration increased. The colour of yolk was proportional to the level of inclusion of maize in the ration. Such reduction in yolk colour was observed by Abubakar *et al.* (1975) in birds receiving 60% broken rice. Similar progressive decreasing trend in yolk colour was reported by Thakur *et al.* (*loc.cit.*). when paddy replaced maize in 40 to 56 weeks old layers and Tyagi *et al.(loc. cit.)* when rice kani replaced maize in 20 to 36 weeks old layers. There was no mortality of layers during 18 to 22 weeks in different treatment groups, indicating that rice waste did not have any deleterious effect for layers. Feed cost per egg produced at 154th day was Rs. 0.51, 0.53, 0.52 and 0.54 for 0, 10, 20 and 40% rice wasted fed groups respectively. Marginal increase in feed cost per egg production in the rice waste fed groups was due to the delay in attaining peak production The results of the present study indicates that rice waste upto 20% level replacing maize can be included in layer ration with comparable performance with that of maize. However, the duration of study being short, further studies are required to conclusively indicate the maximum level of inclusion of rice waste.

Summary

Rice waste, a rice milling by-product is a potential energy source for chicken. To arrive at an optimal level of inclusion in the diet of layers a biological trial was conducted from 18-22 weeks using commercial hybrid pullets with three replicates and four treatments. Each group was fed with isocaloric and isonitrogenous diets containing 0, 10, 20 and 40% rice waste replacing maize (w/w). Egg production (hen day, 5% and 50%), feed efficiency and egg qualities were studied. Rice waste could be substituted for maize upto a maximum level of 20 per cent , but further studies are needed to assess the effect on total production pattern.

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