

DIRECT SUBSTITUTION OF MAIZE WITH BROKEN RICE IN THE BROILER DIET

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Ringkasan

Tiga percubaan telah dilaksanakan di atas tiap-tiap lima kumpulan ayam untuk mengetahui samada beras hancur dapat digunakan mengganti jagung di dalam campuran makanan ayam daging. Lima jenis makanan percubaan yang mengadungi jagung sekadar 60, 45, 30, 15 dan 0% (peratus) telah digantikan dengan kadar 15, 30, 45 dan 60% (peratus) beras hancur bagi memenuhi 60 bahagian daripada campuran makanan itu. Yang 40% (bahagian) lagi adalah campuran makanan yang sama bagi semua jenis makanan percubaan. Pada masa empat minggu pertama anak-anak ayam dari semua kumpulan memakan "proprietary starter mash" dan makanan percubaan telah diberi dari umur lima sehingga dua belas minggu. Keputusan menunjukkan bahawa tidak ada beza yang "significant" di dalam banyak makanan yang dimakan, kenaikan berat badan dan ratio penukaran makanan kepada daging, bagi semua lima kumpulan itu. Cuma satu kemusykilan sahaja didapati iaitu kekurangan "xanthophyll" di dalam beras hancur menyebabkan kulit dan kaki ayam nampak pucat dan ini adalah kurang menarik bagi pembeli-pembeli tempatan.

Introduction

In 1971 West Malaysia produced 1,489.6 million kilos of padi or an equivalent of 990,000 tons of milled rice accounting for about 88 percent of the total local requirements. With the rapid expansion of double cropping areas and the improvements in the padi yields, it is expected that Malaysia will be able to produce sufficient rice for her own requirement and perhaps may even have a surplus (Van, 1972). Besides whole grain rice the by-products obtained during the milling process are rice polishing, broken rice, bran and husk. It has been estimated that broken rice forms about 6 percent of total padi milled (89,340,000 kilos or 89,340 metric tons). It has been observed that poultry consume padi, whole grain rice and broken rice readily. Broken rice can be a useful source of poultry feed in Malaysia, if it is available in large quantities and at a sufficiently low price.

Rice is rich in carbohydrates. The metabolizable energy value for chicks was found to be approximately 3,600 Kcal/Kg. (Ahmad and Jalaluddin, 1971) and 3,100 Kcal/Kg. for chicken (NRC 1971). The latter value is comparatively higher than most of the cereal grains except for maize and sorghum vulgare which have metabolisable energy value of 3,400 Kcal/Kg. and 3,250 Kcal/Kg. respectively (NRC 1971).

Juliano *et al.* (1968) reported crude protein values ranging from 5.0 to 17.0 percent for 7,760 varieties of rice analysed at the International Rice Research Institute, Philippines. Quah and Mohan Rao (1972) found that the mean crude protein content for three popularly grown varieties, Bahagia, Mahsuri and Ria were 8.4, 8.79 and 8.06 percent respectively.

Palafox *et al.* (1952) reported that there was no significant difference in the growth rates of chicks fed 73 percent rice, wheat or maize in the rations. Feed conversion efficiency for the rice ration was found to be the best among the three grains. Moromoto *et al.* (1963) also found that rice and maize gave comparable body weight gains in the chicken.

The objective of this experiment was to evaluate the feeding value of broken rice as a direct substitute for maize in broiler diets.

Materials and Methods

Each trial consisted of five treatment groups and altogether three trials were conducted in 1972 using commercial broiler chicks from local hatchery. In each trial the chicks were first brooded together from day-old to the end of the fourth week. Proprietary broiler starter mash was fed until they reached the age of four weeks. Ranikhet F vaccination and Fowl Pox vaccination were given at day-old and three weeks old respectively.

Each trial lasted for eight weeks, starting from the fifth to the twelfth week. On the first day of the fifth week 70 chicks were allotted at random to 4 meter x 3.5 meter pen. The initial body weight of chicks for each group was adjusted as close and as uniform as possible. Five experimental diets (Table 1) were prepared and allocated at random to each group in the pen. The feed was given in suspended cylindrical feeders and feeding space provided was the same for all the pens.

Weekly feed intake, body weight gain and feed conversion efficiency of each group were taken until the end of the twelfth week. All the data were statistically analysed.

TABLE 1
Experimental Broiler Rations

	TREATMENT GROUPS				
	A	B	C	D	E
1. Maize meal	60	45	30	15	0
2. Broken rice	0	15	30	45	60
3. Rice bran	9	9	9	9	9
4. Fish meal	8	8	8	8	8
5. Soybean meal	19	19	19	19	19
6. Grass meal	2	2	2	2	2
7. Tricalcium phosphate	1	1	1	1	1
8. Mineral & Vitamin mix	0.5	0.5	0.5	0.5	0.5
9. Common salt	0.5	0.5	0.5	0.5	0.5
Total:	100.0	100.0	100.0	100.0	100.0
Calculated values:-					
Metabolisable energy					
Kcal/kg.	2,870	2,895	2,921	2,941	2,972
Crude protein%	21.7	21.5	21.1	20.8	20.5
Crude fibre%	4.5	4.2	4.0	3.7	3.5
Calcium%	1.3	1.3	1.3	1.3	1.3
Phosphorus%	.9	1.0	1.0	1.0	1.0

As complete analytical facilities were not available, samples of broken rice and maize were only analysed for crude protein and crude fibre content.

	Mean Crude protein %	Mean Crude fibre %
Rice	7.8	0.20
Maize	8.4	1.65

Results:

TABLE 2

Mean Feed Intake, Body Weight Gain and Feed Conversion Efficiency of Broilers from the 5th to 12th week of age.

Treatment	Feed intake (g) 5th to 12th week	Body weight gain (g) 5th to 12th week	Feed conversion effic 5th to 12th week
A	4049.0	1281.6	3.19
B	3961.0	1261.3	3.17
C	4051.0	1259.6	3.23
D	4054.0	1316.6	3.08
E	3848.0	1277.6	3.04
MEAN	3999.5 \pm 96.5	1227 \pm 64.9	3.14 \pm 0.18
CVx (between treatment)	2.42%	5.08%	5.8%

Average body weight of birds at the end of 4th week was 312g., and the feed conversion efficiency was 2.09.

No significant differences $P < 0.05$ were observed between treatments for the 3 parameters measured.

Discussion

The result of the body weight gain between the 60 percent basal maize and broken rice rations were comparable and this finding was in agreement with the results obtained by Moromoto *et al.* (1963). Since the feed intake of birds fed broken rice ration was lower than the intakes of the other maize groups (not statistically significant $P < 0.05$), the feed conversion efficiency of birds on the broken rice group was found to be the best compared to other groups. This result was in accordance with the finding reported by Palafox *et al.* (1952). The possible factor which influences the feed intake and increased feed efficiency in birds fed broken rice could be the adequacy of energy as contributed by rice. The inconsistency in the metabolisable energy values as reported by Ahmad and Jalaluddin (1971) and NRC (1971) could be due to the different varieties of rice used in Malaysia and America or probably also the ages of birds used at the time of determination. It is justifiable that further trials to determine the metabolisable energy values of chicken at different ages with different varieties of rice be conducted.

A concomittant observation was made during the trial on the palatability of maize and broken rice rations, but no marked difference in the feed intake or in the choice of feed by birds was noted. It was also observed that the colour of the skin and shank of birds fed high levels of broken rice was paler than those fed on maize. This was due to deficiency of xanthophyll in rice. However, the yellow colour can be restored by supplementing artificial xanthophyll (commercially available) in the ration.

From the viewpoint of chemical composition, palatability, growth rate and feed conversion efficiency broken rice could therefore replace maize in the diet of broilers. In this experiment it was only found that 60-70 percent of broken rice could be incorporated in

the broiler ration provided that other nutrient requirements are also satisfied to constitute a balanced diet. If Malaysia is self sufficient and efficient in the production of padi the surplus broken rice could in future be utilised by poultry for conversion into good quality animal protein. It is the price that will become the determining factor.

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Summary

Three trials were conducted on five treatment groups to determine the performance of commercial broiler birds fed broken rice as a substitute for imported maize. Five experimental rations containing varying percentages of maize viz. 60, 45, 30, 15, 0%, were used which were directly replaced by local broken rice. The composition of the other 40 percent of the ration was constant for all the rations. The chicks were initially fed with proprietary broiler starter mash in the first four weeks, and the experimental rations were provided from the fifth to the end of twelfth week. The results indicated that there was no significant difference in feed intake, growth rate and feed conversion efficiency between the five groups. The only defect in the broken rice was the lack of xanthophyll which caused the skin and shank to appear paler and less attractive to the local consumer.

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