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THE USE OF RAGI IN BROILER DIETS

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RINGKASAN

Sebanyak 550 ekor ayam daging yang berumur empat minggu telah digunakan di dalam dua percubaan untuk mengkaji kesan ragi ke atas kelakuan ayam daging. Percubaan ini termasuk satu percubaan permulaan dan percubaan kedua yang mengandungi tiga gandaan (replicates) untuk tiap-tiap makanan percubaan. Lima makanan percubaan yang mengandungi 60% jagung sebagai kawalan dan 15%, 30%, 45% dan 60% ragi terus mengganti jagung telah diberi kepada ayam-ayam itu dari minggu kelima sampai ke minggu dua belas. Keputusan menunjukkan bahawa tidak ada apa-apa perbezaan di atas jumlah banyak makanan dimakan, jumlah tambahan berat badan dan dasar makanan ditukar kepada daging sungguhpun kelakuan ayam yang diberi 60% jagung lebih baik sedikit dari ayam yang diberi ragi. Perbezaan ini mungkin diakibatkan oleh hazaman ragi tidak berapa baik kerana biji ragi belum dihancurkan, ataupun kurang tenaga unkaibina di dalam biji ragi. Adalah didapati bahawa warna kulit, mulut dan kaki ayam lebih pucat dari ayam yang memakan ragi kerana kekurangan carotenoid di dalam biji ragi. Walaubagaimanapun, kekurangan warna ini boleh diperbaiki jikalau carotenoid buatan digunakan dalam makanan ragi.

INTRODUCTION

Ragi or finger millet *(Eleusine coracana),* belonging to millet family, is one of the important carbohydrate sources in human as well as animal nutrition in southern Asia, especially India and South East Asia. Its nutritive value is apparently variable from one variety to the other. KURIAN *et al.* (1959) reported that whole grain ragi contained 7.03% crude protein, 0.35% calcium and 0.24% phosphorus. RAO *et al.* (1973) analysed nutrient content of fifteen new varieties of ragi and found that the moisture content of ragi ranged from 4.95% to 7.8%, crude protein 4.71% to 9.9%, crude fibre 3.08% to 5.72%, ash 2.0% to 4.13%, calcium 0.2% to 0.69% and phosphorus 0.23% to 0.47%.

Trials on ragi to replace rice for weanling rats were reported by KURIEN *et al.* (1958). These workers found that the rats fed higher ragi diets had heavier body weight gain than those fed higher rice diets. JOSEPH *et al.* (1959) used ragi to replace rice partially or completely in vegetarian rice diet for eight healthy girls aged 9 or 10 years for 15 days. They found that there was more significant positive nitrogen retention in ragi diets than in rice diet. AYYALUSWAMI *et al.* (1967) conducted trials with White Leghorn chicks from day-old to 8 weeks of age with diets composed of 45% maize or ragi or mixture of both ingredients and found no significant difference in feed efficiency and average body weight gain among the treatments. REDDY and REDDY (1970) compared maize with ragi in layer diets, in which 32% maize or ragi were used as carbohydrate source together with rice polishings, groundnut cake to give protein content of 18.4%, to 18.9%. No significant difference in hen-day egg production was found. However, pullets which were given maize laid slightly heavier eggs and those given ragi had slightly better feed efficiency.

This study was to compare the effect of maize with ragi in diets on the performance of broiler chickens. Whole grain local ragi with crude protein content 9.4%, crude fibre 4.8%, calcium 0.34% and phosphorus 0.2% was used as the testing ingredient.

MATERIALS AND METHODS

This experiment composed of a preliminary trial and a second trial. In the preliminary trial,.250 four-week-old commercial broiler chicks were allotted into 5 treatment groups so that each group contained 50 chickens. The initial body weight of each group was adjusted as close to the average body weight of all the chickens as possible. Each group of chickens were reared on raised wire mesh floor of dimension 3.0 m. x 3.7 m. (10' x 12'). Five experimental rations including a control ration with 60% maize and 4 rations containing 15%, 30%, 45% or 60% ragi to substitute maize directly *(Table 1)* were given to the respective groups of chickens. Feed in suspending cylinder feeders and water were provided *ad libitum.* Body weight and feed intake were recorded weekly. Mortality was noted daily. The trial lasted for a period of 8 weeks (5th to 12th week).

TABLE 1. EXPERIMENTAL BROILER FINISHER DIETS FOR TRIAL 1 AND TRIAL 2 (ON FRESH BASIS)

Ingredients	Experimental rations (%)				
	1	2	3	4	5
Maize	60	45	30	15	–
Ragi[+]	–	15	30	45	60
Rice bran	3	3	3	3	3
Soybean meal	20	20	20	20	20
Fish meal	11	11	11	11	11
Grass meal	1.75	1.75	1.75	1.75	1.75
Palm oil	3	3	3	3	3
Mineral-vitamin mix*	1	1	1	1	1
Salt	0.25	0.25	0.25	0.25	0.25
Calculated constituents:					
Crude Protein	20.7	20.5	20.5	20.6	20.6
Crude Fat	7.0	7.0	7.0	7.0	7.0
Crude Fibre	3.3	3.3	3.4	3.4	3.5
Calcium	0.97	1.00	1.04	1.07	1.11
Phosphorus	0.76	0.77	0.78	0.78	0.79
Metabolizable Energy[++] (Kcal/kg.)	3165	3080	2994	2909	2823
Lysine	1.32	1.33	1.34	1.34	1.35
Methionine	0.48	0.50	0.52	0.53	0.55

[+]For ragi, ether extract 3.9%, lysine 0.25%, methionine 0.3% and metabolizable energy 2.860 Kcal/kg. according to McDONALD *et al.*, 1973.

[++]Metabolizable energy (MJ/Kg.) for each treatment: 13.2, 12.9, 12.5, 12.2 and 11.8 respectively.

*Mineral-vitamin mix: Commercial premix was used.

A subsequent trial was conducted with 300 broiler chickens of the same strain. Same experimental diets were given to the chickens in 3 replicates of 20 chickens each. The chickens

were grouped as in the previous trial. Boxes with raised wire floor of dimension 0.9 m. x 1.8 m. (3' x 6') were used for each replicate group. A total of 15 boxes were used for this trial. Water and feed were supplied by trough *ad libitum* around the boxes. Same parameters were recorded as in the preliminary trial. Final data were analysed statistically.

RESULTS AND DISCUSSION

The total feed intake, body weight gain and feed conversion efficiency for different treatments from the two trials were shown in *Table 2.* In both trials, there was a trend showing that the chickens fed diets with higher ragi consumed more feed than those on high maize groups, although the difference was not quite consistent in the second trial. From the feed efficiency, it was observed that a slightly better efficiency was found as the level of maize in the diets increased in both of the two trials. However, the differences in all the three parameters were not significant. The slightly inferior results obtained from the high ragi diets might be caused by poor digestibility of ragi in chickens, especially when whole grain ragi with a tough cuticular outer coat was used. This was indicated by the presence of some ragi grains in the faeces. This defect could probably be remedied by grinding the ragi grains before mixing with other ingredients so as to improve the digestibility in the chickens. Lower content of metabolizable energy in ragi might also affect the feed intake. No difference in mortality was observed among the treatments.

TABLE 2. TOTAL FEED INTAKE, BODY WEIGHT GAIN AND FEED CONVERSION EFFICIENCY PER BIRD FROM 5TH TO 12TH WEEK

Trial[+]	Treatments[++]	Total Feed Intake (g.)	Total Body Weight Gain (g.)	EFC
1.	60% maize	4513	1413	3.19
	45% maize + 15% ragi	4910	1512	3.25
	30% maize + 30% ragi	4874	1381	3.53
	15% maize + 45% ragi	4935	1585	3.11
	60% ragi	5158	1525	3.32
2.	60% maize	4097	1492	2.75
	45% maize + 15% ragi	4186	1483	2.75
	30% maize + 30% ragi	4147	1462	2.84
	15% maize + 45% ragi	4401	1503	2.93
	60% ragi	4309	1477	2.92

+Figures in Trial 2 were the average of 3 replicates.

++No significant difference in the three parameters either with Trial 2 alone or combination of both trials.

A paler colour on the skin, shank and beak was noticed among the ragi treated chickens. This was caused by the lack of carotenoid pigments in ragi. However, supplementation of artificial carotenoid in the feed could remedy this defect.

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SUMMARY

Two feeding trials involving 550 four-week old commercial broiler chickens were conducted to compare the effect of ragi on their performance. The trials included a preliminary and a second trial with three replicates for each treatment. Five experimental diets with 60% maize as control and four others with 15%, 30%, 45% or 60% ragi to replace maize directly were fed to the respective groups of chickens in both trials from 5th to 12th week. The results indicated that there was no significant differences in total feed intake, total body weight gain and feed efficiency, although a trend showed that the performance of chickens fed high maize diets were generally better than those fed high ragi diets. This could be due to lower metabolizable energy in ragi or poorer digestibility of ragi in chickens when fed in the form of whole grain. It was observed that the colour of skin, beak and shank was paler in chickens fed high ragi rations due to the lack of carotenoid in ragi. However, this defect could be remedied by supplementing artificial carotenoid into the diets.

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