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COMPARISON OF THE NUTRITIVE VALUE OF CORN WHEAT AND MILLET IN BROILER DIET[1]

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ABSTRACT

To compare the effect of corn, wheat, millet and their combination in broiler performance, 576 hybrid male broiler chicks were used for a period of nine weeks (2nd to 11th week). The experiment was conducted in a completely randomized block design with six treatments, using corn, wheat, millet and their combinations as the main source of energy in the diets. Individual body weight gain and group feed conversion were determined for all the treatments. There was no significant difference between the above mentioned cereals in regard to body weight gain. However, chicks showed a better feed conversion with corn and wheat than millet ($P < 0.05$). The proximate analysis of cereal grains and calculation of their metabolizable energy (ME) demonstarted that the ME of corn, wheat and millet were 3454, 3064 and 2895 kcal/kg, respectively.

Broiler production is rapidly expanding in Iran. Since use of fats are not economically advised in broiler diets in this country, cereals form the main sources of feeds to supply energy. Wheat is the main cereal which is available to poultry producers of Iran. In some areas of this country millet is produced in large quantities, and is cheaper than wheat. Thus it is possible to substitute it for wheat in poultry diets.

There are some reports showing that the metabolizable energy (ME) of corn is more than wheat (1,5) and the nutritive value or ME of millet is close to that of wheat (4, 8, 9). However, the reported nutritive values of feeds of foreign origins may not be exactly the same as those of local feeds.

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This experiment was conducted to compare the performance of broilers which were fed diets containing local wheat, millet and corn as the major source of energy.

MATERIALS AND METHODS

Six hundred day-old cockerels (white plymouth Rock X Cornish) were obtained from a commercial hatchery in January 1968. The chicks were kept on deep litter and fed a regular broiler starter diet up to 14 days of age. At this age, 576 healthy chicks were selected, weighed, leg banded and randomly distributed into 12 groups of 48 chicks each. Six dietary treatment were compared using a complete randomized block design with two replications. The composition of the experimental diets were identical with the exception that corn, wheat, millet and their combination were the major sources of the energy of the diets (Table 1).

The chicks were raised under continuous light system using artificial white light at night for nine weeks. Feed and water were supplied *ad libitum* throughout the experimental period. The chicks were weighed individually every three weeks and group feed consumption was determined. Proximate analyses were conducted on all the components of the diets (Table 2) as outlined by Horwitz (3). The data obtained were used for calculation of the ME of the ingredients (with the exception of dried yoghurt) using the percentage multiplier method suggested by Titus (8). The ME of dried yoghurt was assumed to be about 4000 kcal/kg, as reported by Simhaee (6). The obtained ME values of the ingredients were used for the estimation of the ME of experimental diets.

The experimental data were analyzed statistically by the analysis of variance (7) and the means were compared by Duncan's Multiple Range Test (2).

RESULTS AND DISCUSSION

The results of proximate analyses (Table 2) demonstrated that the percentage of crude fiber in millet is quite higher than wheat or corn. Calculated ME of these cereals showed that corn had the maximum value, followed by wheat and millet. The low ME content of millet may be partially due to its higher fiber content. The calculated ME values for corn and wheat were close to those reported by Titus (8). However, the calculated ME of millet was 117 kcal/kg lower than that reported by the same author. This difference could be due to the high fiber content of millet used in this investigation.

The results of the present experiment showed that there were no significant differences ($P < 0.05$) between the dietary treatments in regard to body weight gain

Table 1. Composition of Experimental Diets (%)

Ingredients	TREATMENTS					
	1	2	3	4	5	6
Ground corn	60.0	-		30.0	30.0	
Ground millet		60.0	-	30.0	-	30.0
Ground wheat			60.0	-	30.0	30.0
Ground barley	9.5					
Cottonseed meal	14.0					
Fish meal	5.5					
Dried yoghurt (kashk)	5.0					
Bone meal	1.5			Similar to treatment 1		
Oyster shell	1.6					
Salt	0.2					
Alfalfa leaf meal, sun cured	2.0					
Vitamins and minerals premix[1]	0.7					
Crude protein[2] (%N X 6.25)	21.8	21.0	22.0	21.4	21.9	21.5
ME (kcal /kg)[2]	3100	2765	2865	2931	2982	2813

1. The vitamins and minerals premix furnishes the following quantity per kg of diet: Vitamin A, 10000 I.U; vitamin D_3, 2500 I.C.U.; vitamin E, 15 mg; Riboflavin, 6 mg; thiamin, 0.2 mg; niacin, 30 mg calcium pantothenate, 9 mg; vitamin K,2 mg; vitamin B_{12}, 3 mcg; pyridoxin, 0.1 mg; choline cholride, 350 mg; folic acid, 0.1 mg; inositole, 3.5 mg; terramycine, 245 mg; neomycine 220 mg; 3-5 dinitro-Toluamide 125 mg; manganese, 70 mg; iron 15 mg; copper 2 mg; zinc, 25 mg; cobalt, o.4 mg and iodine 1.2 mg.
2. Crude protein and ME of diets were calculted from the data given in Table 2.

Table 2. Proximate analysis and Calculated Metabolizable Energy of Feed Ingrdients

Ingredients	Proximate analysis[1]							
	Moisture %	Ash %	Protein (NX6.25) %	Ether Extract %	Fiber %	N.F.E. %	Salt %	ME[2] kcal/ kg
Ground corn	10.83	1.40	10.87	4.47	1.89	70.54	-	3454
Ground wheat	11.62	1.79	11.20	1.64	2.32	71.43	-	3065
Ground millet	11.37	3.40	9.56	3.79	10.89	60.99	-	2895
Ground barley	11.22	2.50	10.19	2.59	6.32	67.18	-	2776
Cottonseed meal	7.41	6.35	48.94	4.28	10.77	22.25	-	2578
Fish meal	7.79	16.48	69.13	5.30	0.20	0.92	0.32	3087
Dried yoghurt (kashk)[3]	7.30	13.80	62.16	12.16	-	4.32	3.72	4000
Alfalfa leaf meal, sun-cured	8.80	10.50	25.23	2.90	11.95	40.57		1503

[1] The figures are the mean of three analyses.
[2] The ME of all the ingredients (with the exception of dried Yoghurt) were calculated by using Titus'percentage multiplier (8).
[3] Simhaee's report (6) was used for ME of dried yoghurt (kashk).

Table 3. Performance of Chicks on Experimental Diets[1]

Treatments	Aver. initial weight at 2nd week (g)	Aver. final weight at 11th week (g)	Aver. body gain (g)	Aver. feed conversion
1	175.0	2366.4	2191.4[a]	2.69[a]
2	171.3	2382.1	2210.8[a]	2.87[b]
3	174.5	2400.5	2226.0[a]	2.75[a]
4	172.3	2344.8	2172.5[a]	2.79[a]
5	175.0	2379.1	2204.1[a]	2.73[a]
6	172.7	2383.2	2210.5[a]	2.75[a]
Standard error	±0.45	±17.11	±16.45	±0.025

[1] Means followed by the same letter, in each column, are not significantly different at the 5% level; determined by Duncan's Multiple Range Test (2).

(Table 3). These data indicate that although substitution of millet or wheat for corn decreased the ME of their corresponding diets, chicks, however, were able to increase their daily feed consumption without any restriction in capacity for obtaining maximum gain as compared with corn. A significant ($P < 0.05$) higher feed conversion with the diet containing 60 per cent millet, as compared with the other dietary treatments, may be due to its low level of ME. It was also shown that the replacement of 30 per cent of wheat or corn in the diet with millet did not produce an adverse effect on feed conversion. Similar results have been also reported by Zohari (9).

According to the results, wheat is as valuable as corn in performance of broiler chicks. Although, millet at a level of 60 per cent did not produce any adverse effect in terms of gain or health of the chicks, the feed conversion data suggested that millet should be used at a level of 30 per cent to be as efficient as wheat or corn.

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