Effect of Cereal Grains on the Growth Rate and Feed Efficiency of Broiler Chicks

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An experiment involving 300 day-old Starbro chicks was made at the West Pakistan Agricultural University, Lyallpur to study the effect of maize and sorghum grain on rate of growth and feed efficiency when incorporated into the broiler ration as a single and mixed source of energy at a level as high as 64 per cent of the total ration. The comparative nutritional value of the Lever Brother's Feed Formula (broiler's ration) and some of the locally prepared rations for growing chicks was also investigated.

Chicks fed either ration A, C, D or Lever Brother's gained significantly more weight than those fed ration B. Birds fed ration A were significantly more efficient in feed utilization than those fed ration C. Chicks fed Lever Brother's ration had significantly better feed efficiency as compared to those fed either ration B, C or D.

The results of this study indicated that maize and sorghum grain can be used as source of energy in broiler ration. Undecorticated cottonseed cake can serve as a source of protein in growing chick rations. As feed cost exceeds 50 per cent of the total cost of producing poultry products, broiler production can only be a paying proposition if cost on feeding could be minimized through use of cheaper rations. Thus, more endeavour needs to be made to work out the most economical and cheaper rations for growing chicks.

INTRODUCTION

Increasing interest in research on energy nutrition of poultry and progressive increase in the energy concentration of rations used for the poultry production has been observed during the past several years. The report of Scott *et al.* (1947) stimulated a great deal of work on the utilization of high energy rations for the production of broiler. Bolten (1962) stated that as cereal grains form the main source of readily available energy in most poultry rations, hence an estimate of the feeding value of grain is essentially an assessment of its energy value. According to Morrison (1959), high energy mashes for chicks and broilers generally provide 900 or more calories of productive energy pound. He further stated that in order to secure this high energy content 60 per cent or more of the mash usually consists of maize or wheat,

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and that grain sorghum can safely be used in place of these grains with suitable vitamin-A supplementation.

The term "Broiler" is commonly used for chickens of either sex which are finished for marketing at 8 to 12 week age when they have attained a live weight of 3 to 4 pounds. Since feed costs constitute a relatively large portion of all costs of producing poultry products, efforts are continually made to formulate poultry feeds which are more efficient and economical.

Thus, a study was planned to achieve the following objectives: (*a*) To study the effect of cereal grains on the rate of growth and feed efficiency when incorporated into the broiler ration as a single and mixed sources of energy. (*b*) To compare the Levers Brother Limited Pakistan Formula feed (Broiler's ration) with that prepared at West Pakistan Agricultural University, Lyallpur. (*c*) To evolve an economical and efficient ration for growing chicks.

PROCEDURE

The experiment was made at the West Pakistan Agricultural University, Lyallpur. A total of 300 day-old Starbro chicks were used in this study. The chicks were kept in a five-deck starter battery fitted with waterers and feeders for the first 4 weeks and then were transferred to a larger battery. The birds were fed a complete ration for six days prior to randomization and putting on experiment. The chicks were weighed at the seventh day of age and randomized into five groups of 60 birds each. The different compartments of the starter battery were allotted to the five groups at random. The experimental rations were also assigned randomly to different groups. Room temperature was maintained between 70° to 75°C. by electric heaters. Lighting was continuous. The composition of the rations is presented in Table I. Maize and sorghum grains were the main sources of energy. The chicks were fed the allotted rations *ad libitum* and weighed once a week. Fresh rations were put into feeders 4 to 6 times a day in order to minimize the waste. Feed consumption was recorded at each weigh day. Fresh and clean water was available to chicks at all times. Due to some unavoidable circumstances, the experiment was terminated at the end of 7th week. Data on weight gain and feed efficiency were subjected to statistical analysis using Analysis of Variance (Snedecor, 1956).

RESULTS AND DISCUSSION

The growth data and feed efficiency is shown in Table 2 and Fig. 1, and their statistical analysis in Table 3 to 4.

TABLE I. *Composition of Experimental Rations*

Rations	A	B	C	D	Lever Brothers Broiler rations[1]
Ingredients	lb	lb	lb	lb	—
Ground yellow maize ..	32	64	27	54	—
Ground Jowar ..	32	—	27	—	—
Berseem leaf meal ..	3	3	3	3	—
Blood meal ..	10	10	5	5	—
Fish meal ..	5	5	—	—	—
Undecorticated Cotton Seed cake ..	—	—	20	20	—
Wheat bran ..	13.5	13.5	12	12	—
Bone meal ..	2	2	3.5	3.5	—
Molasses cane ..	2	2	2	2	—
Cod liver oil ..	1	1	1	1	—
Pulvarized salt ..	0.5	0.5	0.5	0.5	—
Crude protein (per cent) ..	21.2	19.0	17.4	16.4	—
Crude fibre (per cent) ..	2.9	3.9	7.9	8.4	—
Calcium (per cent) ..	1.2	1.2	1.4	1.4	—
Phosphorus (per cent) ..	1.3	1.3	1.8	1.8	—
Energy (Calories) ..	944	936	981	915	—
Energy/Protein ratio ..	1 : 45	1 : 49	1 : 56	1 : 56	—

[1]The composition is not known.

TABLE 2. *Average initial weight, final weight, weight gain and feed efficiency of chicks fed different experimental rations for a period of 49 days*

Rations	A	B	C	D	Lever Brother's Broiler rations
Number of chicks ..	60	60	60	60	60
Average initial weight per group (grams) ..	4610	4534	4554	4570	4600
Average final weight per group (grams) ..	51116	39988	49793	49648	57443
Total Number of chicks	(59)	(58)	(59)	(58)	(59)
Average weight grain per chick (grams) ..	789.54	13.70	764.59	779.84	896.94
Average weight gain per chick per day (grams) ..	16.11	12.53	15.50	15.91	18.30
Feed efficiency (grams feed/gram of weight gain) ..	3.53	4.54	5.11	4.79	3.10

TABLE 3. *Analysis of variance of weight gain*

Source of Variation	Degrees of Freedom	Sum of squares	Mean sum of squares	'F' ratio
Groups ..	4	6047.41	1511.85	5.871**
Weeks ..	6	20433.38	3405.56	13.248
Error ..	24	6180.26	257.51	
Total ..	34	32661.05		

**P < 0.01.

TABLE 3a. *Comparison of treatments*

Comparison	Difference between means	Level of significance
A VS B ..	26.90	[1]P/0.01
A VS C ..	2.46	N.S)
A VS D ..	2.61	N.S
A VS Lever's ..	13.89	N.S
B VS C ..	24.43	P<0.01
B VS D ..	24.29	P<0.01
B VS Lever's ..	40.79	P<O.01
C VS D ..	0.14	N.S
C VS Lever's ..	16.36	N.S
D VS Lever's ..	16.50	N.S

[1]N.S—Non-significant.

TABLE 4. *Analysis of Variance of feed efficiency*

Source of variation	Degrees of Freedom	Sum of squares	Mean Sum squares	'F' ratio
Groups ..	4	20.65	3.16	3.766*
Weeks ..	6	22.44	3.74	2.729
Error ..	24	32.98	1.37	
Total ..	34	76.07		

*P<0.05

TABLE 4a. *Comparison of treatments*

Comparisons	Difference between group means	Level of significance
A VS B ..	1.10	N.S[1]
A VS C ..	1.58	P<0.05
A VS D ..	1.26	N.S.
A VS Lever's ..	0.40	N.S.
B VS C ..	0.57	N.S.
B VS D ..	0.25	N.S.
B VS Lever's ..	1.44	P<0. 25
C VS D ..	0.32	N.S
C VS Lever's ..	2.01	P<0.01
D VS Lever's ..	1.69	P<0.05

[1]N.S=Non-Significant.

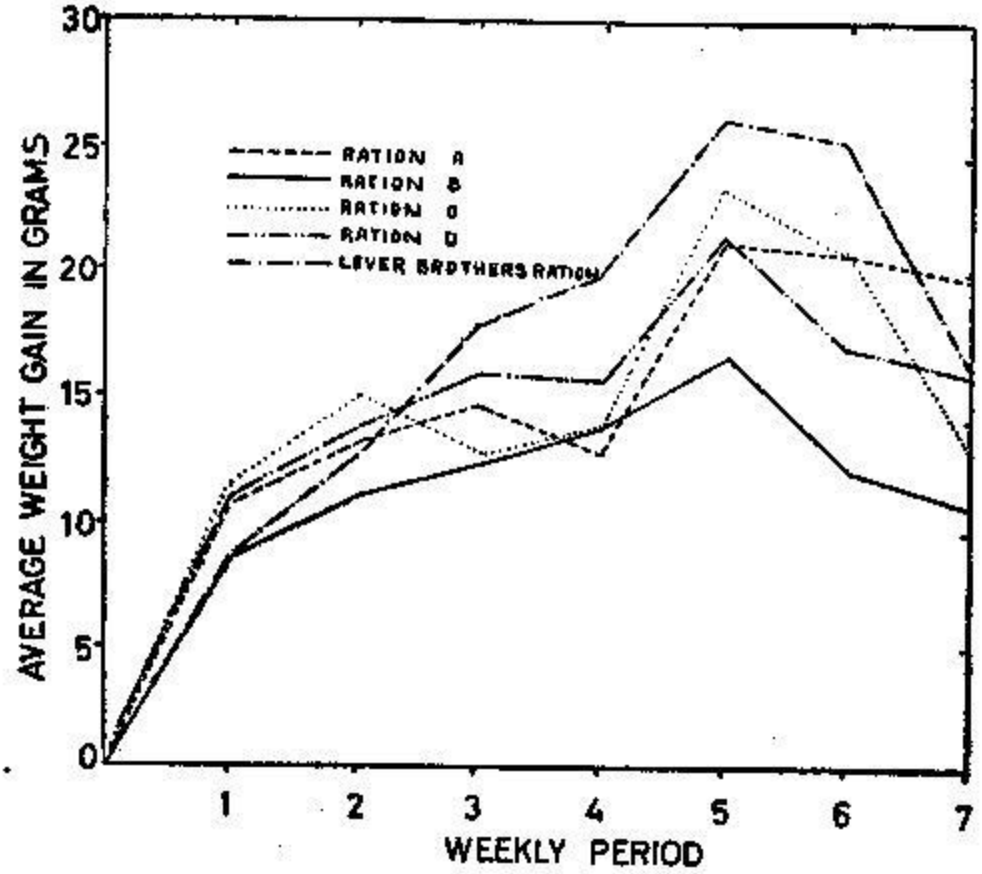

Fig. 1. Growth of experimental chicks given different rations

Weight Gain

Chicks fed ration A gained more weight than those fed ration B, and the differences were highly significant ($P < 0.01$). The birds fed ration. A were slightly heavier than those fed ration C and D, but the differences in weight gain were statistically non-significant. Chicks fed ration C or D gained significantly ($P < 0.01$) more weight than those fed ration B. Statistically non-significant differences were observed among groups of chicks fed ration C or D. The birds fed Lever Brother's ration were heavier than those fed either ration A, B, C or D. But the differences in weight were highly significant ($P < 0.01$) only among the groups of chicks fed ration B and Lever Brother's ration. Ration A when compared to Lever Brother's did not show any significant differences. In spite of the fact that ration C and D continued 20 per cent undecorticated cotton-seed cake, they were lower in protein content (16.4—17.4 VS 21.2 per cent), and had nearly three times as much crude fibre (7.9 to 8.4 VS 2.9 per cent) as was present in ration A, but were not significantly different from that ration

The chicks fed different experimental rations, exhibited deficiency diseases like perosis and curled toe-paralysis. The incidence of those diseases was observed to be 13.56, 17.24, 13.56, 6.90 and 15.25 per cent in groups of birds fed ration A, B, C, D and Lever Brother's, respectively.

The mortality recorded during the test period among chicks fed ration A, B, C, D and Lever's Brother's was 1.67, 3.33, 1.67, 3.33 and 1.67 per cent, respectively.

Feed Deficiency

Chicks fed ration A had significantly ($P<0.05$) better feed utilization than those fed ration C. Non-significant differences in feed efficiency were observed among groups of birds fed either ration A, B or D. Again chicks fed ration C or D did not differ significantly in feed utilization. But chicks fed ration B, C or D had significantly ($P<0.05$, $P<0.01$ and $P<0.05$ respectively), lower feed efficiency than those fed Lever's ration.

Economics of Broiler Production

Calculated on the basis of assumed market rates (Table 5) of various feed ingredients used in the experimental rations, the cost per lb of ration A, B, C, D and Lever Brothers was 24 paisa, 25 paisa, 19 paisa, 20 paisa and 25 paisa, respectively. The total cost incurred on the purchase of 300 day-old chicks and on feed to raise them up to seven week period was Rs. 822.69, and the amount expected to be released from the sale of the finished broilers at the rate Rs. 1.75 per lb. of live weight was Rs. 955.50. Thus, there is a saving

TABLE 5. *Assumed market prices of feed ingredients used in the formulation of the experimental rations*

Ingredients		Cost per maund
Yellow maize	..	Rs. 12.00
Jowar	..	Rs. 11.00
Berseem leaf-meal	..	Rs. 42.00
Blood meal	..	Rs. 42.00
Fish meal	..	Rs. 63.00
Undecorticated Cotton Seed Cake	..	Rs. 10.00
Wheat bran	..	Rs. 8.00
Molasses cane	..	Rs. 2.50
Bone meal	..	Rs. 18.00
Salt (Pulverized)	..	Rs. 10.00
Cod liver oil	..	Rs. 3.00 per lb.

of Rs. 132.81 per batch of 300 broiler chicks when raised for a period of seven weeks. Due to limited housing facilities, the chicks were under stress especially during the last 2 to 3 weeks of the study. That stress resulted in depressed growth. If the stress was not there, the chicks might have grown at a better rate and thus resulted in more profit.

IN CONCLUSION

The following conclusions can be drawn from the present study :

1. Maize and sorghum grain both singly as well as combined can be used in Broiler's ration as sources of energy at a level as high as 64 per cent of the total ration.
2. Undecorticated cotton seed cake can used as a source of protein in growing broiler chicks rations.
3. In growth promoting quality ration A, C and D were at par with Lever Brother's broiler ration. Their efficiency can be improved probably through proper supplementation with mineral and vitamin premixes.
4. Feed cost exceeds 50 per cent of the total cost of broiler production and this business can be more paying if feed cost could be minimized by formulating cheaper rations. More work needs to be done to find out the most economical and cheaper rations for growing chicks.

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