

## EFFECT OF FEED TEXTURE ON GROWTH PERFORMANCE, DRESSING PERCENTAGE AND ORGAN WEIGHT OF BROILERS

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Comparative efficacy of two important forms of feed, mash and crumbles, fed alone or in combination (mash-crumbs), was studied on growth performance, dressing percentage and organ weight of broilers. One hundred twenty broiler chicks were used in the present study and were fed mash, crumbles and mash-crumbs feed for 0-6 weeks of age. Four treatments, designated as A, B, C and D were used in this experiment. Chicks in group A were kept on mash feeding serving as control and those in group B were offered crumbles. Group C was fed mash from day old to two weeks and crumbles from three to six weeks of age while group D was offered mash from day old to four weeks and then crumbles were fed for next two weeks of age. The results of the experiment showed that different forms of feed exhibited significant ( $P<0.05$ ) effect on overall weight gain and feed conversion ratio (FCR) of the broilers. Whereas, feed consumption, dressing percentage and relative weights of liver, heart, gizzard, spleen, pancreas, intestine and abdominal fat pad of the birds remained unaffected due to different forms of feed. The broilers maintained upon crumbles throughout the experimental period, fetched maximum profit than other treatment groups.

**Keywords:** Feed forms, weight gain, FCR, dressing percentage, organ's weight

### INTRODUCTION

Feed plays a vital role in poultry production and represents 60–70% of total cost (Mahmood *et al.*, 2004; Cutlip *et al.*, 2008; Damiri *et al.*, 2012). Thus, any improvement in the performance of broilers and layers due to their feed may have a profound effect on profitability (Roy *et al.*, 2004; Ahmad *et al.*, 2011; Eila *et al.*, 2012) in poultry business. Nutritionists have focused long on the changes in dietary factors to minimize body fatness and to increase lean tissue whereas geneticists are selecting today's commercial broilers for rapid growth rate. Feed restriction, diet dilution and semi or free-choice feeding are the main dietary manipulations being recently tested with fast growing broiler chickens to optimize growth rate and FCR, and most importantly to reduce the feed cost (Yasar, 2003).

In recent past, efforts have been made in the direction of feeding practices to alter the conventional feeding practices for further economical production. Studies in this regard have shown that providing feed to poultry birds in the form of crumbles and pellets can enhance profit margin by improving feed efficiency and growth rates (Beyer *et al.*, 2000; Haug and Kenny, 2010). Particle size of the diet seems to have great influence in regulating the intake of broilers that shows preference for diets containing larger particles instead of those finely ground (Nir *et al.*, 1994).

Fine diets (finely ground mash) when fed to either broilers or laying hens, their gizzard acts as a transit rather than a

grinding organ. As a result of this, the feed is not retained in the gizzard for a significant period and is therefore, not exposed to the digestive enzymes of the proventriculus and low pH, which may play a vital role in aberrant bacterial populations such as *E. Coli* (Cumming, 1994).

Commercial feed producers have introduced and popularized crumbles and pellets in addition to mash already being conventionally used in the country. Comparative studies have been conducted to check what feed form (mash, crumble and pellets) is better for broilers. However, very little work has yet been done on this aspect of poultry feeding in Pakistan. It was, therefore, intended to initiate a study on broiler chicks by using same feed in the form of mash, crumbles and mash-crumbs with the objectives to compare growth performance, dressing percentage, relative organ weights and economic feasibility of broiler production.

### MATERIALS AND METHODS

One hundred twenty day old (Starbro) broiler chicks were reared from 0-42 days of age. The chicks were divided into twelve experimental units (replicates) kept in separate pens using Completely Randomized Design (CRD) comprising of four treatment groups (A, B, C and D), three replicates per treatment and ten birds per replicate. Chicks in group A were placed on mash feeding and served as control, whereas the chicks in group B were offered crumbles throughout the

experimental period of six weeks. Group C was fed mash from day old to two weeks and crumbles from three to six weeks of age. Group D was offered mash from day old to four weeks and then crumbles from five to six weeks of age. The birds in all groups were fed *ad libitum*, same feed (Table 1-2) in the form of mash or crumbles throughout the experimental period. Twenty four hours supply of fresh and clean water was also ensured. During the trial, initial body weight, weekly feed consumption, weekly body weight and mortality (if any) were recorded. The data recorded were utilized for the calculation of weight gain and feed conversion ratio of the birds.

**Table 1. Composition of experimental ration**

Ingredients	Parts (%)
Wheat	30.0
Rice	16.0
Rice polishing	10.6
Cotton seed meal	8.0
Rapeseed meal	3.0
Corn gluten meal (30%)	5.0
Corn gluten meal (60%)	6.0
SBM	5.0
Fish meal	7.5
Dicalcium phosphate	3.0
Limestone	1.7
Molasses	3.0
Vitamin Mineral premix	1.2
<b>Total</b>	<b>100.0</b>

**Table 2. Proximate analysis of experimental diet**

Contents	Values
Metabolizable energy (Kcal/kg)	2997.00
Crude protein (%)	22.30
Dry matter (%)	90.28
Ether extract (%)	4.31
Crude fiber (%)	5.70
Nitrogen free extract (%)	51.47
Ash (%)	6.50

At the end of experiment three birds from each replicate were picked up randomly and slaughtered to determine dressed, heart, liver, gizzard, spleen, pancreas, intestine and abdominal fat pad weights. The data recorded were utilized to calculate dressing percentage and relative organ weights (g organ weight/100g body weight). Economics of feeding mash, crumbles and mash-crumbs to the broilers was also calculated. Data thus collected were subjected to statistical analysis using CRD and the differences in the means were

compared by applying Duncan's Multiple Range (Steel *et al.*, 1997) test.

## RESULTS AND DISCUSSION

The results regarding weight gain, feed consumption and feed conversion ratio are presented in Table 3. Weight gain from 0-42 days of age was significantly ( $P<0.05$ ) affected by the texture of feed i.e. mash, crumbles and mash-crumbs. The results of the present study are in line to those observed by Jahan *et al.* (2006) and Jafarnejad *et al.* (2010). They found that broilers fed crumbles gained more live weight than those fed mash. In the present study it was also observed that the birds fed mash alone or mash and crumble in combination significantly showed less weight gain as compared to those fed on crumble diet throughout production period.

**Table 3. Weight gain (g), feed consumption (g) and feed conversion ratios (FCR) of broilers fed mash, crumbles and mash-crumbs (0-42 days)**

Parameters	Treatments				Pooled SE
	SJ	B	C	D	
Initial body weight	45	45	47	42	-
Final body weight	1510	1846	1774	1529	105.4
Weight gain	1465 <sup>b</sup>	1801 <sup>a</sup>	1727 <sup>a</sup>	1487 <sup>b</sup>	102.6
Feed consumption	3537	3561	3522	3245	223.2
FCR (g feed/g wt.gain)	2.41 <sup>c</sup>	1.97 <sup>a</sup>	2.03 <sup>a</sup>	2.18 <sup>b</sup>	0.138

Mean values with different superscripts, in a row are significantly ( $P<0.05$ ) different.

Feed consumption was apparently the highest in broilers of group B (fed crumbles throughout the experimental period) than those of mash or mash-crumbs fed groups. However, statistical analysis of the data depicted non-significant difference. The results of the present study are contradictory to those observed by Malik (1973) who recorded comparatively higher consumption of mash feed than crumble and pellets in broilers. The difference in the results of these studies may be due to the difference in genetic make up of the birds because fast growing broilers have a tendency to consume more feed as compared to slow growing broilers.

Feed conversion ratio was significantly ( $P<0.05$ ) influenced due the feed forms used in this study. Overall mean values for feed conversion ratios (FCR) of the broilers were significantly ( $P<0.05$ ) better in the birds fed crumbles than those consuming mash or mash-crumbs. The results are in line with those reported by Brickett *et al.* (2007), Agah and Norollahi (2008) who observed significantly better FCR values in broilers using crumbles than those fed mash.

Contrary to the findings of the present study, Akram *et al.* (1988) reported non-significant effect of various forms of

feed on FCR values in broilers. The results of the present study are also contradictory to the findings of the Oliver and Jonker (1997) who found that different feed forms had no effect on FCR values in broilers. The difference in these results may be due to the difference in feeding plans of these studies.

A probable explanation of better growth and feed utilization may be improved digestibility, decreased ingredient segregation and increased palatability of the feed (Abdollah *et al.*, 2013). These beneficial effects may also be coupled with increase in the bulk density of feed and improvement in feed flow ability (Fairfield, 2003) which ultimately resulted in better growth of the birds. Therefore, better performance of broilers fed crumbles than mash fed birds, may be ascribed to higher growth rate and better efficiency of feed utilization of the birds.

Mean values of dressing percentage, relative weights of liver, heart, gizzard, spleen, pancreas, intestine and abdominal fat pad of broilers fed different forms of feed are presented in Table 4. Statistical analysis of the data revealed non-significant ( $P < 0.05$ ) effect of various feed forms on the mean values of dressing percentage and relative weights of liver, heart, gizzard, spleen, pancreas, intestine and abdominal fat pad.

**Table 4. Dressing percentage and relative organ weight (g organ wt./100g body wt.) broilers fed mash, crumbles and mash-crumbs**

Parameters	Treatments				Pooled SE
	A	B	C	D	
Dressing percentage	68.13	65.23	64.21	66.11	4.910
Liver weight	2.79	2.54	2.74	3.37	0.204
Heart weight	0.47	0.45	0.49	0.45	0.033
Gizzard weight	1.52	1.38	1.47	1.56	0.099
Spleen weight	0.14	0.13	0.16	0.14	0.010
Pancreas weight	0.31	0.28	0.26	0.25	0.021
Intestinal weight	5.90	5.70	5.50	5.20	0.363
Abdominal fat pad	1.69	1.91	1.44	1.84	0.130

These results are in line with those of Akram *et al.* (1988) who found non-significant difference in dressing percentage, relative weights of the liver, gizzard, heart, pancreas, and intestinal weight of broilers fed different forms of feed. Similarly, Ali (1998) reported non-significant difference in the pancreas weight due to crumble, mash or pellet feeding. Whereas, Engberg *et al.* (2002) reported that pellet fed birds had significantly lower relative pancreas weight. This contradiction indicated that composition of ration may be associated with form of feed and thus resulted into significantly lowered weight of pancreas.

Contradictory to the results of present study, Munt *et al.* (1995) observed that various feed forms exerted a significant effect on relative gizzard weight of broilers. Similarly, Deatson (1992) found that intestinal weight was significantly

affected by physical forms of feed. The difference in the results may either be due to difference in the composition of experimental diets used in these studies or the duration of application of feeding treatments or both.

Profit obtained from the birds of treatment groups A, B, C and D was found to be Rs. 11.50, 21.02, 19.61 and 14.73/Kg live weight, respectively. Use of crumbles exhibited an increase in the profit margin of the broilers as compared to mash feed. Feeding of crumbles throughout the experimental period fetched maximum profit as compared to other treatment groups.

The results of the present study are in line with the findings of Ali (1998) and Akram *et al.* (1988) who reported that feeding of crumbles throughout the study period was more profitable than those of mash or pellet fed groups. Increase in the profit margin of the birds fed crumbles may be attributed to the better efficiency of feed utilization, which resulted in higher growth and better feed to gain ratio, ultimately leading to higher profit margin than those fed ration in the form of mash.

**Conclusion:** In making final assessment of the study, feeding crumbles to the broilers proved to be the most beneficial because the results showed improvement in weight gain and better feed conversion ratio, both of these factors being specifically related to the economical production of birds. Better feed conversion ratio indicated efficient utilization of feed in the form of crumbles than mash. Therefore, it may be concluded that the use of crumbles may be more effective to achieve maximum profit from broiler production.

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