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The Effect of Feeding Pellets versus Mash on Performance and Carcass Characteristics of Broiler Chicks

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ABSTRACT

The effect of feeding pellets, mash and mix of pellets and mash on growth performance and carcass characteristics of Hubbard broiler chicks was studied. Ninety one day-old chicks were used in a completely randomized design with three forms of diets. Each dietary treatment consists of 3 replicates with 10 chicks in each replicate. Live body weight (LW), weight gain (WG), feed intake (FI) and feed conversion ratio (FCR) were measured weekly from the first week to sixth week. Carcass components were recorded at the end of trial (day 42). Dressing out percentage on hot and cold base, relative and absolute weight of liver, heart, gizzard and abdominal fat and length of small intestine were recorded. All performance parameters were not affected ($p \geq 0.05$) by the inclusion of different forms of diets. The results indicate that mash feed had significantly ($p \leq 0.05$) increased relative weight of gizzard compared to birds fed pellets and mix feed. The inclusion of different diets had no ($p \geq 0.05$) effect on other carcass characteristics.

It is concluded that similarities in growth response between mash, mixed and pellet-fed birds may be attributed to the pellet quality and greater lysine requirements of the pellet-fed birds.

Key words: Broiler chicks, growth performance, carcass characteristics, Mash, Pellets.

INTRODUCTION

Modern broilers have genetically selected for improved feed conversion ratio and rapid growth rate. Today's fast growing broiler chickens can reach 2 kg body weight within 35 days, consuming only 3 kg feed [8]. This rapid rate of growth is due to high feed intake rather than increased nutrient digestibility [15]. Thus, increased feed intake is perhaps the single most important factor determining feed efficiency for broilers [2]. Optimal feed intake is dependent on a number of factors such as environmental temperature, nutrient density, and physical feed quality. The later is considered to have a very significant impact on broiler growth [13]. It is well documented that feed represents the major cost of poultry production, constituting up to 70% of the total cost. However, the cost of feed processing represents a significant portion of feed costs and likely gives the greatest opportunity for influencing broiler performance beyond nutritional adequacy [6]. Using of different techniques of feed processing e. g. extrusion, milling and pelleting is depending on facility and purpose of production. The physical form of feed (mash, pellet and crumble) is a key factor in meat yield of broiler. Mash is a finely ground and mixed feed that gives greater unification of growth and is more economical. However, ground feed is not so palatable and does not retain its nutritive value so well as ungrounded feed [14]. Pellet system of feeding consists of mechanically pressing the mash into hard dry pellets. It is generally accepted that the feeding of pellets improves broiler growth rate compared to mash [9, 17]. Reasons for the enhanced performance may be due to decreased ingredient segregation, increased digestibility, reduction of energy during prehension, less time and energy expended for prehension, destruction of pathogenic organisms, thermal modification of starch and protein and increased palatability [4,5], However, feeding pelleted rations is not enough to ensure enhanced performance of poultry [13]. The quality of pellets must be taken into account also [7]. Crumble also is a type of feed prepared at the feed mill by pelleting of the mixed ingredients and then crushing the pellet to a consistency coarser than mash. Recently this form of feed has become popular in broiler production due to its convenience of feeding [9]. The objective of the present study was to investigate the effect of pellet and mash diets on the broiler chicks' performance and carcass characteristics.

MATERIALS AND METHODS

This study was conducted in an open- sided poultry house at the Poultry Farm, Faculty of Agricultural Technology and Fish Science at University of Alneelain. In this study, 90 one-day-old unsexed Hubbard broiler chickens were used in a completely randomized design with 3 treatments (mash, mixed pellet and mash and pellet). Each treatment replicated three times with 10 birds/replicate. Each replicate was provided with feeder and drinker. Feed and water were offered *ad–libitum*. The broiler chicks were weighed on arrival, and kept on a deep litter floor system. They were fed on pre-starter diets from 0-5 days and on mash starter ration for three weeks (Table 1). Then after, they were fed on the three experimental forms of diet with a similar composition of ingredients from fourth to sixth week (Table 2). Live body weight, feed intake, weight gain and feed conversion ratio were calculated weekly from week 1-6. At the end of experiment, three birds per treatments were slaughtered for carcass measurements.

Feed samples were analyzed for proximate composition according to the methods outlined in the [1]. Statistical analysis of the data was carried out using one-way analysis of variance [21] in [20] version 6.12. [11] was used to detect significant differences between treatment means.

Table 1. Composition of experimental broiler starter diet.

Ingredients	%
Maize	65.20
Ground nut meal	27.40
Wheat bran	1.50
Super concentrates*	5.00
Dicalcium phosphate	0.50
Sodium cholride	0.10
Mycotoxin binder	0.10
Organic acids	0.20
Calculated analysis	
ME (kcal/kg)	2904.12
CP%	20.51
Crude fiber%	5.20
Ca%	0.49
Available phosphorous%	0.44
Lysine%	1.00
Methionine%	0.43
Methionine + Cystine%	0.76
Determined analysis	
DM%	97.75
CP%	22.20
Crude fiber%	3.55
EE%	3.75
Ash%	6.25

*Cp 40%, ME 2000 kcal/kg, C.fiber 3%, EE 3%, Ash 34%, Ca 8%, Av. P 1.38%, Lysine 12%, Methionine 3%, Methionine+Cystine 3.5%. Vitamin A 250000 IU/Kg, Vitamin D3 50000 IU/Kg, Vitamin E 500Mg/Kg, Vitamin K3 60 Mg/Kg, Vitamin B1/ Thiamin 20 Mg/Kg, Vitamin B2/ Riboflavin 100 Mg/Kg, Niacin Vitamin PP 600 Mg/Kg, Pantothenic acid/ Vitamin B3 160 Mg/Kg, Vitamin B6/ Pyridoxine 40 Mg/Kg, Vitamin B12 300 Mcg/Kg, Biotin/ Vitamin H 2000 Mcg/Kg, Choline 10000 Mg/Kg, Vitamin C 4000 Mg/Kg, Folic Acid 30 Mg/Kg, Iron 800 Mg/Kg, Manganese 1400 Mg/Kg, Copper 120 Mg/Kg, Zinc 1000 Mg/Kg, Iodine 6 Mg/Kg, Cobalt 12 Mg/Kg, Selenium 3 Mg/Kg.

RESULTS AND DISCUSSION

The results of broiler performance as affected by physical form of feed are shown in Table 4 and Figure 1. Feed Intake was not significantly ($P \geq 0.05$) affected by physical type of feed. However, Broilers fed mash diet had numerically increased feed intake compared with birds fed mash + pellet or pellet. This agreed with [18] who owed the increased feed intake to excessive feed wastage. These results were in disagreement with [16] and [10], who found that feed intake, weight gain, and final body weight increased, whereas feed conversion decreased among birds fed pellets compared with mash and 50:50 reground mash and pellets. This observation suggests that high pellet quality may be necessary to fully

obtain benefits of pelleting. For the current study, the poor performance of birds fed pellets feed may be due to low quality of pellets. For instance crumble-pellet form with 3200 Kcal/Kg and 23% protein had the highest weight gain and the best FCR [13]. In addition, vitamins are susceptible to damage during thermo-mechanical processing. Vitamin A loss has been suggested to increase with pelleting due to high pressure created in the die [12]. Furthermore, [3] found that growth performance decreased with a steam conditioning temperature of 90^0C, whereas conditioning at 70^0C was shown to increase performance.

Mean values of carcass characteristics as affected by physical form of the diet are shown in Table 5. All carcass parameters except for relative weight of gizzard were not significantly ($p \geq 0.05$) influenced by the form of the diet. This was in a disagreement with [19] who found that the weight of breast, thigh, abdominal fat, heart was significantly ($P \leq 0.05$) heavier in broiler fed pellet diets than in the broilers fed mash diets.

It is obvious that feeding poor pellets from 21 to 42 days of age does not result in any improvement in broiler performance. Accordingly, the quality of pellet feed plays an enormous role on the performance of broiler chicks.

Table 2. Composition of experimental broiler finisher diet.

Ingredients		**%**	
Maize		67.10	
Ground nut meal		22.50	
Wheat bran		4.50	
Super concentrates*		5.00	
Dicalcium phosphate		0.50	
Sodium cholride		0.10	
Mycotoxin binder		0.10	
Organic acids		0.20	
Calculated analysis			
ME (kcal/kg)		2896.45	
CP%		19.00	
Crude fiber%		5.00	
Ca%		0.39	
Available phosphorous%		0.41	
Lysine%		0.90	
Methionine%		0.37	
Methionine + Cystine%		0.68	
Determined analysis	Mash	pellets and mash	Pellets
DM%	96.50	96.25	96.00
CP%	18.95	19.45	18.40
Crude fiber%	3.45	3.55	3.75
EE%	3.40	3.35	3.25
Ash%	7.15	7.25	6.30

*As shown in Table 1.

Table 3. Overall performance of broiler chicks as affected by form of the diet

Parameters	**Form of diet**			
	Mash	Mash+Pellet	Pellet	**± SEM**
Feed intake (g/bird)	2663.28±143.32	2580.75±73.95	2547.37±84.29	60.65
Body weight gain (g/bird)	1178.15±128.78	1174.63±176.16	1203.33±57.95	75.26
FCR (g feed /g Bwt gain)	2.27±0.14	2.22±0.27	2.12±0.17	0.12

Values are means of 3 replicates per treatment.
SEM: Standard error of the means from ANOVA d.f 6.

Table 4. Carcass characteristics of broiler chicks as affected by form of the diet

Parameter	Form of diet			± SEM
Parameter	Mash	Mash+Pellet	Pellet	
Dressing out % on hot base	73.32±2.90	68.53±4.59	67.96±0.53	1.82
Dressing out % on cold base	64.48±2.09	60.92±3.08	67.03±5.70	2.27
Absolute weight of heart	8.00±0.50	8.67±1.42	9.80±1.41	0.69
Relative weight of heart	0.53±0.04	0.49±0.03	0.57±0.07	0.03
Absolute weight of liver	37.27±7.16	37.67±3.35	45.47±7.82	3.71
Relative weight of liver	2.49±0.47	2.16±0.11	2.65±0.43	0.22
Absolute weight of gizzard	30.40±2.18	24.97±6.65	26.23±2.46	2.47
Relative weight of gizzard	2.03 [a] ±0.19	1.41 [b]±0.23	1.53 [b] ±0.12	0.11
Absolute weight of abdominal fat	22.67±8.78	27.07±10.52	30.20±6.44	5.05
Relative weight of abdominal fat	1.51±0.59	1.54±0.59	1.76±0.37	0.30
Length of intestine	181.67±21.73	187.67±19.66	185.33±15.01	10.97

Values are means of 3 replicates per treatment.
[ab] Means with different superscripts in the same row were significantly different (P≤ 0.05).
SEM: Standard error of the means from ANOVA d.f 6.

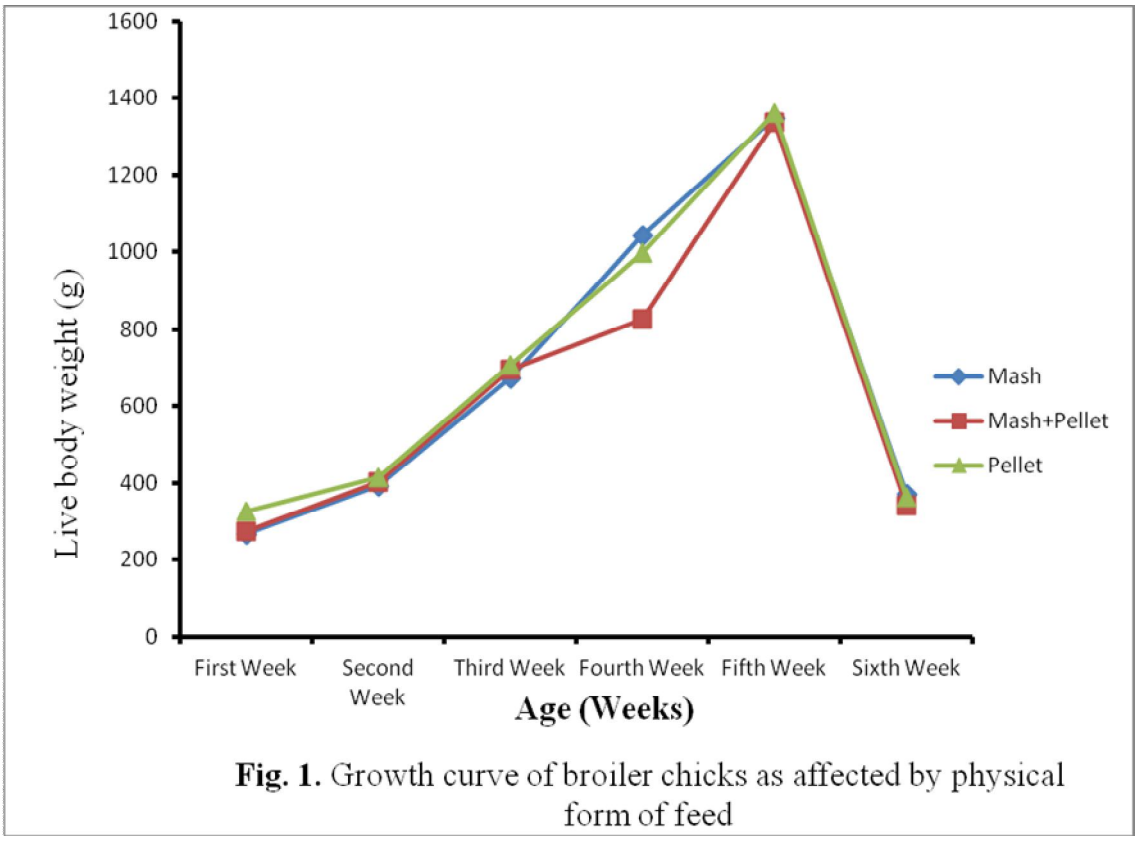

Fig. 1. Growth curve of broiler chicks as affected by physical form of feed

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