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Research Paper

Assessment of Performance of Broiler Birds Fed With Different Forms of Feed (Pellet, Crumble and Mash) In Sokoto State, Nigeria

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ABSTRACT: *The study assessed performance of broiler birds fed with different forms of feed. 180 broiler birds from dayold were divided into 3 different feed treatment groups, namely: pellet, crumble and mash. Each group was divided into 6 replications consisting of 10 birds. The birds were raised for 6 weeks. Body weight and feed consumption of the birds were recorded weekly in each group. The results revealed a significant increase in weight gain in the pellet group and also a significant increase in feed consumption in the mash group in week 1-3. However, there is no significant increase in feed conversion ratio (FCR) in the pellet group.*
Keywords: *Broiler, pellet, crumble, mash, productivity*

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I. INTRODUCTION

Poultry industry is one of the fastest growing segments of the agricultural sub-sector in Nigeria (Udoh and Etim, 2009). It accounts for 9-10% of the agricultural GDP with net worth value of over three billion Naira (Sonaiya, 2000). Poultry population is 140 million sub-divided into commercial (25%), semi-commercial (15%) and rural/backyard (60%) (Udoh and Etim, 2009). Poultry farming is an integral component oflivelihood for both rural and urban middle income earners providing a source of income and nutrition. Estimated one billion table eggs and 500,000metric tonnes of poultry meat are produced annually (Agbamu, 2005).

In Nigeria, animal protein especially meat is expensive and out of reach of the majority of the population (Waziri and Agbugba, 2010). The effect of inadequate animal protein intake is felt more by a large proportion of the population especially in the rural areas where the inhabitants constitute over 70% of the Nigerian population and who constitute over 85% of the extreme poor in the country (Chukwuji, Inoni, Ogisi, and Oyaide, 2006).

According to Kalla *et al.* (2007), broilers are chickens raised specifically for meat production. Modern commercial broilers for example, Cornish crosses, Cornish rocks, are specifically bred for large scale, efficient meat production and grow much faster than egg laying hens or traditional dual purpose breeds. They are noted for having very fast growth rates, a high feed conversion ratio and low levels of activity (Sonaiya, 1990). Broilers often reach a harvest weight of 2kg in only 6-8 weeks, although more slow growing free range and organic strains reach slaughter weight at 12-16 weeks (Sani *et al.*, 2000). Typical broilers have white feathers and yellowish skin. This cross is also favourable for meat production because it lacks the typical "hair" which many breeds have that necessitates singeing after plucking. Both male and female broilers are slaughtered for their meat (Damerow, 2011).

According to Izunobi (2002), protein is one of the several natural substances that exist in food such as meat, eggs and beans, which the body needs in order to grow and remain strong and healthy. Animal protein helps in body building and growth of the reproductive system and enhancing community against diseases. The sources of animal protein such as fish, beef (from cow), goat meat, pork and chickens are readily available in our communities and country (Kitalyi, 1998).

However, broilers are the easiest means of getting animal protein in commercial quantity. (Kumar and

Pandey, 1999). These are special breeds of chickens, which are raised under intensive care for the sole purpose of being slaughtered within a period of eight weeks (Law and Payne, 1999). Broilers are rich in protein, highly palatable and very succulent. Broiler meat is an important source of high quality proteins, minerals and vitamins to balance the human diet (Henning *et al.*, 2007). Broilers have the ability for fast growth and high feed conversion efficiency. Investment justification shows that Nigeria is about the largest market in the black world for such food items (Ovwigho *et al.*, 2009). The market for broilers is almost assured because less that 50% of the food requirement in Nigeria is currently being met. As a result, whatever is produced has a ready-made market, even at good price. Land requirement for broiler production is very minimal and market also exists in other African countries such as Niger Republic, Chad Republic and Northern Cameroon (Ostrander, 2008).

Nowadays, various commercial feed mills are producing different forms of broiler feed for different age group of bird (Munt *et al.*, 1995). Pelleting is a processing method that is employed by the feed manufactures to improve farm animal performance (Nir *et al.*, 1995).

The physical form of feed (mash, pellet and crumble) is a crucial factor in meat yield of broiler (Preston *et al.*, 2000). Different types of feed forms have been evolved in broiler production at the present time (Reese *et al.*, 1985). Various feed forms including pellet, mash or crumble that are fed to broilers are the most important factors which directly influence the cost of mixed feed and production performance of broiler (Munt *et al.*, 1995). The major objective of poultry feeding is the conversion of feedstuff into meat (Moran, 1990). Mash is a form of a complete feed that is finely ground and mixed so that birds cannot easily separate out ingredients; each mouthful provides a well balanced diet (Asha *et al*., 1998). However, ground feed is not so palatable and does not retain their nutritive value so well as ungrounded feed (Nir *et al*., 1995). Mendes *et al*, (1995) showed that birds fed mash diets had a better feed conversion efficiency than those given the pellet. Moran (1990), observed that the incidence of sudden death syndrome (SDS) was significantly higher for broilers fed on crumble-pellet or ground crumble-pellet form diet than for birds fed on mash.

Pellet system of feeding is really a modification of the mash system. It consists of mechanically pressing the mash into hard dry pellets or "artificial grains". Pellet is a form of complete feed that is compacted and extruded to about 1/8 inch in diameter and 1/4 inch in long (Banerjee, 1998). The greatest advantage in using pellets is that there is little waste in feeding. The disadvantage is that pellets are expensive-about 10 percent more expensive than that of feeds not pelleted. (Asha Rajini *et al.*, 1998) reported that pellets had better-feed efficiency up to six-week age of birds. On the other hand, Moran (1990) observed that pelleting of feed improves the body weight of poultry. Bolton and Blair (1977) reported that feed intake of broilers could be up to 10 per cent greater with crumble or pellets compared with mash.

PROBLEM STATEMENT/JUSTIFICATION

The physical form of feed (mash, pellet and crumble) is a crucial factor in meat yield of broiler (Preston *et al*., 2000). Optimising feed conversion is of utmost importance (Banerjee, 1998). Thus, providing meat birds diets in the right form improves the rate and efficiency of growth. Also, the need to examine the performance of different forms of feed leading to cumulative feed conversion and higher breast meat yield cannot be overemphasized (Asha *et al.*, 1998). Poultry meat production offer considerable potential for bridging the nutritional gap of Nigerians, because animal protein consumption is currently less than the FAO recommended minimum intake of 65g/caput/day out of which 26g (i.e. 40%) should come from animal sources (Yakubu *et al.*, 2007). This study will assist both feed millers and broiler meat producers to know which form of feed to use in order to attain the highest level of productivity.

II. OBJECTIVES OF THE STUDY

The general objective of the study is to assess the productive performance of broiler birds fed with different forms of feed in the study area.

The specific objectives are:

(i) To determine which form of feed is more effective in body weight gain.
(ii) To find out which form of feed encourages more feed intake by the birds.
(iii) To ascertain which form of feed ensures overall productivity of the birds.

III. MATERIALS AND METHODS

The Study Area

The study was conducted in Sokoto State of Nigeria. The State,which consists of 23 Local Government Areas (LGAs), has its capital and seat of government located in Sokoto. The State is located in the North-west geographical zone of Nigeria lying between latitudes 4^0-$6^0 40'$ N and longitudes $11^0 30'$-$13^0 50'$ E. It covers a land area of 28,232.37 square kilometers (SOSGD, 2011). The site of the study is the poultry farm of Umaru Ali Shinkafi Polytechnic, Sokoto with the aim of comparing the effect of different feed forms on productivity in broiler birds. The experimental poultry farm is a large hall constructed for deep litter broiler production. The hall

was partitioned into 18 equal size pens (4.5 square meters) separated by plywood with a height of 1.5m. Before stocking, the entire hall was thoroughly washed and disinfected with liquid formalin and allowed to dry for one week. A total of 180 broiler birds at dayold was used for the experiment. The experiment was designed to contain 3 dietary treatments having 6 replications which was obtained from a reputable feed company but all the 3 forms of feed were of identical composition. Efforts was made to maintain the same standard management practice across all the treatments. The dayold birds were randomly selected and allocated to the 18 already established pens. Lightening was maintained at night by a bright 100 watts electric bulb on top of each pen. Each pen housed 10 birds. A feeder of 60cm x 8cm x 5cm and a 3 litres capacity drinker was provided in each pen. The position of the feeders was such that the birds can eat and drink freely and conveniently. Saw dust was used on the floor to maintain hygiene in the pens and to make the birds comfortable. Throughout the experimental period, feed and water were provided to the birds *ad libitum*. Feed and drinking water were given to the birds twice (in the morning and early evening) daily. Furthermore, the birds were exposed to a continuous lighting of 22 hours 30 minutes and a dark period of one hour 30 minutes in each 24 hours of photo period.During night, electric bulb of 100 watts was used to provide both light and additional heat. A standard vaccination schedule was adopted for the birds throughout the experimental period. To ensure sanitation and hygiene, drinkers were washed twice daily in the morning and evening while feeders were cleaned twice weekly. However, litter was changed twice weekly for the first two weeks and every other day from week 3 to the end of the experiment. Experimental house temperature was recorded 4 times daily (6am, 12pm, 6pm and 12am) using a thermometer. Dead and culled birds were sent to the pathology laboratory for investigation. During the experimental period, treatment and replication wise data on live weight, feed consumption, survivability and feed conversion ratio were recorded. Information on body weight gain and feed conversion ratio were calculated using the formula below:

$$FCR = \frac{\text{Feed intake (g)}}{\text{Live weght (g)}}$$

Table 1: The composition of experimental diets(starter and finisher phases)

INGREDIENTS	STARTER PHASE %	FINISHER PHASE %
MAIZE	46.00	50.00
SOYBEAN MEAL	18.50	12.00
GROUNDNUT CAKE	15.00	11.00
FISHMEAL	2.00	2.00
WHEAT OFFAL	12.45	12.45
BINE MEAL	2.00	2.00
OYSTER SHELL	3.00	3.00
SALT	0.25	0.25
*PREMIX	0.25	0.25
METHIONINE	0.30	0.25
LYSINE	0.25	0.20
	100	**100**
CALCULATED:		
CRUDE PROTEIN %	23.05	19.91
ME(MJ/Kg)	11.75	11.71
EHER EXTRACT %	3.93	3.89
CRUDE FIBRE %	3.67	3.79
CALCIUM %	1.75	1.74
PHOSPHORUS %	0.43	0.41

1Kg of premix contains: Vitamin A: 10,000,000 IU; Vitamin D3: 2,000,000 IU; Vitamin E: 20,000 IU; Vitamin K: 2,250 mg

STATISTICAL ANALYSIS

All calculated and recorded data were statistically analysed using Analysis of Variance (ANOVA) technique using a SAS statistical computer package programmed in accordance with the principle of Completely Randomized Design (CRD). Less significant differences (LSD) were calculated to compare variation between treatments where ANOVA shows significant differences.

$Xij=\mu+Tj+\sum ij$

IV. RESULTS AND DISCUSSION

Table 2: Highest weight gain of broiler fed on pellet, crumble and mash (g/bird/day)

	TREATMENTS		
Week	**Pellet**	**Crumble**	**Mash**
1st Week	101.26±12.68a	98.06±9.24a	97.20±11.22a
2nd Week	226.72±11.69a	223.82±16.27a	220.91±14.83a
3rd Week	558.17±32.63a	551.28±28.11a	422.21±20.62b

4th Week	1211.26±31.10a	1196.82±36.01a	9622.81±40.79b
5th Week	1762,17±76.88a	1622.26±82.42a	1653.10±96.22b
6th Week	2263.81±26.52a	1974.88±43.74b	1968.22±74.96b

A,b,c showed there is a significant difference between groups ($p<0.05$)

Table 3: Average weight gain of broiler fed on pellet, crumble and mash (g/bird/day)

	TREATMENTS		
Week	**Pellet**	**Crumble**	**Mash**
1st Week	62.28±7.86a	61.31±12.16a	60.17±8.22a
2nd Week	156.59±35.20a	154.28±48.63a	153.66±26.78a
3rd Week	386.91±36.28a	369.25±50.56b	292.23±60.57c
4th Week	592.22±20.20a	401.99±60.18b	422.81±40.98b
5th Week	754.91±67.10a	716.22±38.63a	622.68±70.52b
6th Week	817.52±41.61a	792.76±26.71ab	658.28±30.64c

A,b,c showed there is a significant difference between groups ($p<0.05$)

The results in Table 2 and 3 revealed that in the first two weeks, there was no significant difference in weight gain of birds in the 3 groups of pellet, crumble and mash.in the 3-6 weeks, most weight gain was recorded in the pellet group and was significantly different in the crumble and mash groups. This is in line with the findings of patten *et al.* (1937), Lanson and Smyth (1955) and Lee *et al*. (1970), thatpelleting broiler diets improves growth rate. Also, Choi *et al*. (1985) asserted that pelleting the finisher diet significantly improved weight gain and feed intake.

Tanle 4: Weekly feed intake of broiler fed on pellet, crumble and mash (g/bird/day)

	TREATMENTS		
Week	**Pellet**	**Crumble**	**Mash**
1st Week	86.12±8.28a	87.65±3.59a	94.56±11.60b
2nd Week	296.83±41.38a	298.27±30.72a	312.16±60.91b
3rd Week	567.34±30.16a	591.68±20.31b	632.11±8.16c
4th Week	824.49±70.56a	776.23±30.81b	692.11±61.55c
5th Week	958.33±60.63a	929.65±20.49a	897.44±32.88c
6th Week	1287.38±16.39a	1128.76±80.45b	941.86±30.73c

A,b,c showed there is a significant difference between groups ($p<0.05$)

Table 4 showed that there was significant increase in feed intake in the mash group within the first 3 weeks of the birds. However, in the 4-6 weeks, more feed intake was recorded in the pellet and crumble groups and less in the mash group. This is in consonance with (Preston *et al.,* 2000) and (Munt et al., 1995) who showed significantly poorer performance of mash-fed birds. (Kim and Chung, 1996) showed that mash-fed birds had lower body weight at 41 days than birds fed on crumble and pellet.

Feed Conversion Ratio (FCR)

There were no significant differences in the FCR in the first two weeks among the three dietary groups. In 3-6 weeks the highest FCR was observed in mash and the lowest FCR was observed in crumble. There were significant differences among the entire groups ($p< 0.05$). this result is in line with the findings of Zakeri *et al.* (2013).

V. CONCLUSION

The results revealed that there is no significant difference in weight gain, feed intake and feed conversion among the 3 treatment groups in the first 2 weeks of the birds, but significant differences occur as the birds grow between 3-6 weeks.

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