



Performance of broiler chickens fed wheat offal and maize based diets

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ABSTRACT

Food crisis in the developing countries especially Nigeria is affecting both man and domesticated animals. The use of grain such as maize in feed production for poultry is creating more shortage of maize for man with the growing population and high demand in the country. There is a need for alternative products for producing poultry feeds from agricultural waste to reduce the competition. This study was conducted to determine the growth response of broiler chickens to feeds produced from wheat offal (agricultural waste product from wheat) and maize. A total of 50 broiler chickens (day-old) were used with 25 birds (5 birds in each replicate) fed with feed made from wheat offal and 25 birds fed with feed made from maize and monitored for 12 weeks. The body weight of the broilers was recorded weekly for 12 weeks, and the feed conversion ratio was also determined. The mean weights of the broilers fed with wheat offal for day-old, weeks 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12 were 76.6, 115.6, 144.0, 186.0, 305.6, 462.6, 562.0, 693.6, 758.8, 814.4, 866.4, 956.8 and 1,032.8 g/broiler while the corresponding weights for broilers fed with maize feed were 99.6, 129.6, 151.2, 188.8, 234.8, 300.0, 386.8, 466.8, 550.8, 646.8, 732.4, 804.0 and 882.8 g/broiler, respectively. Wheat offal feed increased the body weight of the broilers by 16.99% at 12-week compared to broilers fed with maize feed. Broiler feed should be produced from wheat offal to reduce the competition and make more availability of maize for human consumption.

Keywords: Broiler; feed conversion ratio; poultry feed; wheat offal

INTRODUCTION

Food crisis in some developing countries like Nigeria is a serious problem, making it difficult to meet the high demand of the growing population. Grain such as maize that is commonly consumed by man is also needed for production of poultry feed. Broiler chicken production is essentially needed in the country to provide animal protein for good health, growth, development of children and for better economy. Continuous use of maize for the

production of poultry feed creates a shortage of maize in the country for human consumption. The high demand of maize for poultry feed and for human consumption could lead to high cost of maize in the country. The cost of production of poultry feed is also high in the country because of low production of maize which could not meet the demand of the growing population. Availability of maize and the competitive demand for maize by man, livestock and industries are factors that determine the price of maize in the country (Alabia and Atteh, 2012). Faniyi (2002) reported that high cost of broiler feed is a serious problem in Nigeria that normally led to high cost of production of broiler chickens.

There is a need to look for alternative products such as agricultural wastes that contain essential nutrients from which poultry feed could be formulated. Some of agricultural wastes such as rice bran, wheat offal or wheat bran and other waste products that are normally discarded after the useful product and the discarded waste product that normally pollute the environment could be used to produce poultry feed and reduce the competition for maize. Aniebo *et al.* (2016) reported that wheat offal is the outer covering of the wheat berry and is a by-product of dry milling of common wheat into flour, it contains crude protein of 14-17%, crude fat of 3-4.5% and crude fibre of 10.5-12%. Ogunleye (2019) reported that wheat offal is a high fibrous feed material that contains non-starch polysaccharides which cannot be easily digested by endogenous digestive enzymes found in the gastrointestinal tract of poultry birds. Aderibigbe *et al.* (2017) concluded that enzyme supplementation of wheat offal helped to increase and improve protein and fibre digestibility. The replacement of maize with wheat offal and supplemented with 100ppm xylanase enzyme reduced feed intake and increased weight gain and better feed conversion ratio of broiler chickens (Aderibigbe *et al.*, 2017). Therefore, wheat offal could be used as a replacement for maize in the production of poultry feed for broiler chickens.

Christopher *et al.* (2007) pointed out that replacement of maize with about 25% wheat offal has no adverse effect on growth, feed intake and efficiency of feed utilization of broiler chickens. Ereke *et al.* (2017) concluded that wheat offal as a replacement for maize at graded levels with enzyme supplement enhanced nutrients digestibility and reduced feed intake. Yusuf (2020) reported that replacement of maize in broiler feed with 15% wheat offal increased the growth performance and organ yield of broiler chickens. The wheat offal increased the crude protein content of the broiler feed with enzyme supplement after fermentation by *Aspergillus niger* (Lawal *et al.*, 2012).

The use of agricultural waste products like wheat offal would reduce the cost of broiler feed and reduce the demand of maize for production of poultry feed which could allow availability of more maize for human consumption. Kim and Kang (2016) reported that wheat contains high levels of starch, energy and soluble fibre fraction which is a main diet of broiler chicken. The objective of this study was to determine the growth response of broiler chickens to feeds produced from wheat offal and maize.

MATERIALS AND METHODS

Ingredients Used in Formulating the Feed

The ingredients used for the formulation of the broiler feed in this study for both wheat offal and maize feeds were presented in Table 1. A 70 kg feed was produced using the ingredients and the mass of each ingredient is shown in Table 1. The burr mill was used to grind the ingredients. The ground ingredients were mixed using a feed mixer. In this study,

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100% of 34 kg of maize was replaced with wheat offal while the feed with 34 kg of maize was called maize based diet. The same procedure was used to produce more of the feeds for this study.

Table 1: Ingredients composition of the wheat offal and maize based diets

Ingredients	Wheat offal feed composition		Maize feed composition	
	By mass (kg)	By percentage	By mass (kg)	By percentage
Maize	0.00	0.00	34.00	48.57
Wheat offal	44.00	62.86	10.00	14.29
Soybean	12.00	17.14	12.00	17.14
Omena	8.00	11.43	8.00	11.43
Bone meal	3.50	5.00	3.50	5.00
Premix	0.25	0.36	0.25	0.36
Palm oil	2.00	2.85	2.00	2.85
Salt	0.25	0.36	0.25	0.36
Total	70.00	100.00	70.00	100.00

Determination of Body Weight of the Broilers

The body weight of each broiler in each replicate was determined by weighing the birds on a sensitive weighing scale every week for 12 weeks. The birds were provided with 15 kg of wheat offal or maize based diet per week, but the quantity of feed consumed by the broilers in each replicate was determined weekly and recorded by subtracting the quantity of feed left from the quantity of feed that was provided for the birds.

Determination of Feed Conversion Ratio

The Feed Conversion Ratio was determined using equation (1) reported by Jeremiah *et al.* (2015).

$$FCR = \frac{F_i}{W_g} \quad (1)$$

Where FCR is the feed conversion ratio, F_i is the quantity of feed intake by the broiler chicken (g), W_g is the body weight gain by the broiler chicken (g).

Data Analysis

Independent sample t-test was used to check if the effect of wheat offal as a replacement for maize in the production of feed for broiler chicken is significant on the body weight or not. The mean difference between the results of wheat offal and maize, standard deviation, standard error and t-test values were determined as stated by Montgomery (1998).

RESULTS

The weekly mean weights of the broiler chickens fed wheat offal diets were 76.6, 115.6, 144.0, 186.0, 305.6, 462.6, 562.0, 693.6, 758.8, 814.4, 866.4, 956.8 and 1,032.8 g/broiler at day-old, weeks 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12, respectively. The

corresponding weights of the broiler chickens fed maize based diet were 99.6, 129.6, 151.2, 188.8, 234.8, 300.0, 386.8, 466.8, 550.8, 646.8, 732.4, 804.0 and 882.8 g/broiler. The trend of weights of the birds from week 1 to week 12 for the broiler chickens fed wheat offal and maize based diets was shown in Figure 1. The broiler chickens fed maize based diet had higher body weight from week 1 to week 3 than the broiler chickens fed wheat offal. From week 4 to week 12, the broiler chickens fed wheat offal had higher body weight than the broiler chickens fed maize based diet. Wheat offal increased the mean body weight of broiler chicken by 16.99%, 19.00%, 18.30%, 25.99%, 37.76%, 48.59%, 45.29%, 54.20%, and 30.15% at 12, 11, 10, 9, 8, 7, 6, 5 and 4 weeks, respectively.

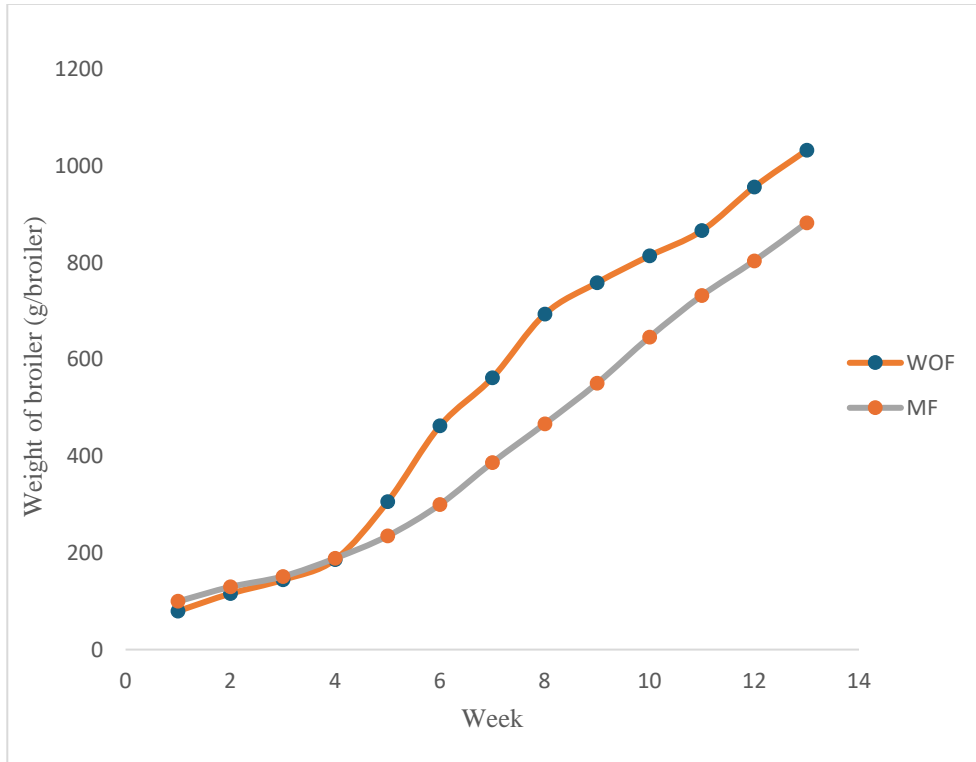


Figure 1: Mean weight of broiler chicken fed with wheat offal and maize feeds
 WOF = Wheat offal feed, MF = Maize feed

The broiler chickens fed a larger quantity of wheat offal from week 1 to week 9 and they grew faster than the broiler chickens fed with maize based diet shown in Appendix III. From week 10 to week 12, the broiler chickens that were given maize based diet fed more quantity of maize based diet than the broiler chickens given wheat offal, but the body weight was less than the body weight of broiler chickens fed the wheat offal. The broiler chickens that fed wheat offal had better feed conversion ratio with less feed producing higher body weight. The trend of the feed conversion ratio for the broiler chickens that were given wheat offal and the broiler chicken that were given maize based diet was shown in Figure 2.

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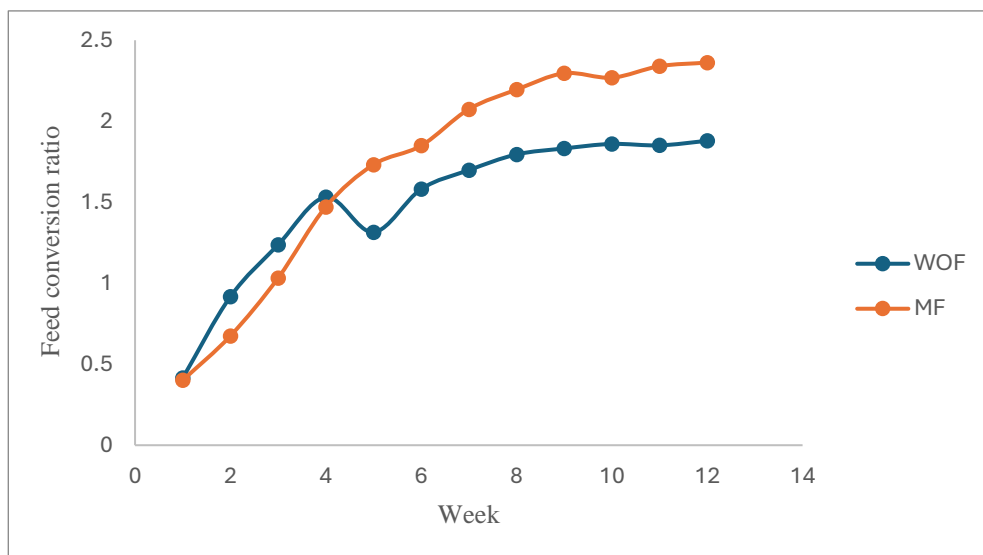


Figure 2: Feed conversion ratio of the birds fed wheat offal and maize based diets
WOF = Wheat offal based diet, MF = Maize based diet

DISCUSSION

The results revealed that broiler chickens that were given maize based diet grew faster during the starter phase with less feed intake than the birds that were given wheat offal. This could be attributed to the body's system inability to digest fibrous feed because wheat offal has higher fibre than maize feed. Ogunleye (2019) stated that wheat offal is a high fibrous feed that contains non-starch polysaccharides which cannot be easily digested by endogenous digestive enzymes of gastrointestinal tract of poultry. From week 4 to week 12, the birds that were given wheat offal grew faster and had higher body weight than the broiler chicken that were fed with maize based diet. This could be due to the high percentage of crude protein in wheat offal compared to maize which increased the total protein content of the feed which could enhance higher growth rate. The higher body weight of the birds that were given wheat offal feed was in agreement with the study of Ereke *et al.* (2017) that wheat offal as a replacement for maize at graded levels with enzyme supplement improved nutrients digestibility and reduced feed intake. The study was also in agreement with the study of Yusuf (2020) that replacement of maize in broiler chickens feed with 15% wheat offal increased the growth performance and organ yield of broiler chickens. The wheat offal increased the crude protein content of the broiler feed with enzyme supplement after fermentation by *Aspergillus niger* and this could increase the growth rate and body weight of the birds (Lawal *et al.*, 2012). The effect of given broiler chicken wheat offal was statistically significant on the body weight gain compared with the broiler chickens fed maize feed in which the calculated value of t-test was 4.818 and table value of t-test was 3.497 at $\alpha \leq 0.005$.

The birds fed less quantity of wheat offal-based diet compared to maize based diet and the birds grew faster and had higher body weight. This was also in agreement with the study of Aderibigbe *et al.* (2017) that replacement of maize with wheat offal and

supplemented with 100 ppm xylanase enzyme reduced feed intake and increased body weight gain with better feed conversion ratio of broiler chickens. The broiler chickens that were given wheat offal had lower feed conversion ratio than the broiler chickens given maize based diet. The trend of the feed conversion ratio as shown in Figure 2 indicates that broilers that were given wheat offal performed better than the broilers that were given maize based diet because they had better feed conversion ratio (Aderibigbe *et al.*, 2017).

CONCLUSION

Wheat offal is a good ingredient for production of broiler chicken as a replacement for maize. Wheat offal increased the body weight of the broiler chicken by 16.99%, 19.00, 18.30, 25.99, 37.76, 48.59% at 12, 11, 10, 9, 8 and 7 weeks, respectively. The broiler chicken fed with wheat offal had better feed conversion ratio than the broiler chicken fed with maize feed. This study recommended that wheat offal should be used as a replacement for maize in poultry feed production to reduce competition for maize with human consumption and for poultry feed that could cause more food crisis in the country.

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