Replacement Value of Poultry Waste for Wheat Offal and Palm Kernel Cake (P.K.C.) in Broiler Diet

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Abstract

The replacement value of poultry waste for wheat offal and palm kernel cake (P.K.C.) in broiler diet was studied for four (4) weeks. Forty (40) day-old broiler chicks were allotted into four treatment groups. Within each group, there was a further sub-grouping into two replicate lots of five birds each. The treatments were four diets comprising of 0% (T_1), 5% (T_2), 10% (T_3) and 15% (T_4) of poultry waste as a replacement for wheat offal and P.K.C., in a completely randomized design. Records were kept on feed intake, weight gain and feed conversion ratio (FCR). Results showed that birds fed 5% (902.75± 17.24) inclusion of poultry waste as a replacement for wheat offal and P.K.C. consumed significantly (P<O.O5) highest quantity of feed compared with the other groups. This was followed by T_1(858.50± 14.20) group, then T_3 (803.75± 16.26) before T_4 (778.172± 17.26) which had the lowest. There was also significant difference (P<O.O5) in weight gain among the treatment groups with highest and lowest weight gains being recorded in T_2 (776.75± 235.02) and T_4 (667.75± 200.79) respectively. The feed conversion ratio (F.C.R.) also differed significantly (P<O.O5) among treatment groups. This was higher in T_1(1.397±1.090) and T_2(1.345±0.945) than in T_3(1.264±0.945) and T_4(1.247± 0.875). The inclusion of 5% poultry waste as a replacement for wheat offal and P.K.C. should therefore be encouraged.

Keywords: Replacement value, poultry waste, feed intake, weight gain, broilers.

Introduction

The growth and development of the poultry industry in every region of the world depends to a large extent on the availability of feedstuff. Aletor (1986) stated that the most important factors affecting the availability of feed are high cost arising largely from fluctuations in feed supplies, rising prices of feed ingredients, poor quality feeds and inefficiency in production and distribution in the feed industry. The poultry industry has suffered more than any other livestock as a result of problem arising from inadequate supply of feed, with feed cost constituting about 60-80% of total cost of production (Ikoni *et al.,* 2001). The situation has forced many small and large scale poultry enterprises to fold up.

Poultry production in the tropics has been based on the use of wheat offal, brewer's dried grain and P.K.C. as a source of energy, fiber and protein. These products constitute up to 10%, 15% and 20% in starter, finisher and grower mash respectively (Martin, 2003) The increase in demand of P.K.C. and wheat offal have made their prices too high in ration formulation, caused increased cost of compounded feed and as well caused reduction of profit in the poultry industry (Taylor, 1993).

The high cost of feed ingredients especially protein sources and their availability have increasingly become a world-wide problem in poultry production. This has generated much interest in the search for alternative sources of protein, for instance, the poultry waste.

Poultry waste also referred to as poultry litter or poultry manure has been used as fertilizer mainly to supply nitrogen to the soil.

The nitrogen can be utilized up to ten times more efficiently when recycled through ruminants as a feed (Smith and Wheeler, 1979). According to Belewu (1993), the animal waste which contain large amount of protein, fiber and minerals has been deliberately mixed into animal feed for these nutrients.

The composition and nutritional value of poultry waste is clearly outlined in Tables 1 and 2 respectively. Its use as a protein supplement for livestock has been investigated in developed countries (El Sabean *et at;* 1970; Evans *et al.,* 1978; Kalu, 1980) as well as in Nigeria (Ibeawuchi *et al.,* 1993; Martin, 2006). They all concluded that the utilization of poultry waste might be available option for reduction of feed cost in livestock industries. It therefore becomes expedient to investigate the best level of replacement of poultry waste for the more expensive wheat offal and P.K.C. in broiler diet.

Materials and Methods

Experimental Site:

The study was conducted at Mekus farm, Enugu, Nigeria. Enugu is an area that lies between latitude 06° 26°N south and longitude 07° 31° East. It has a mean temperature of 30^0C and 21^0C during the hottest period of the year (February to April) and coldest period of the year (December to January) respectively. The mean annual rainfall of Enugu is between 1500 and 1800mm.

Experimental birds/ diets:

Forty (40) broiler chicks sourced from Farm associates Nigeria Ltd, Enugu were used for the study. They were weighed and randomly allotted into four experimental diets identified as T_1, T_2, T_3 and T_4 representing 0%, 5%, 10% and 15% inclusion of poultry waste respectively. Each treatment group of eight chicks in a completely randomized design, was replicated twice.

The inclusion was in feed only, and replication provided an estimate of experimental error and a more precise measure of treatment. The proximate composition of the diets is as shown in Table 3.

Preparation of Poultry Waste:

The poultry waste used for the trial was collected from the broiler unit of Ijoma farms, Enugu, Nigeria. Droppings of broilers housed in a deep litter system were collected onto a metallic sheet. Thereafter, they were dried in an oven. The dried poultry waste was subsequently milled and bagged for incorporation into feed.

Management Procedures:

The birds were brooded in cage in a brooder house covered with water-proof to help retain heat. Kerosene lanterns and stoves were used for heating and lightening in the house. Feed and water were provided *ad libitum* throughout the experimental period. The birds were fed with commercial feed (Top) from 0-4 weeks of age, and treatment diets were given from the 5^{th} week to the end of the study.

Measured quantities of feed were given to the birds twice daily (morning and evening), while leftovers were collected and measured in other to determine the daily feed intake. The average weights of the birds were determined in the various treatments.

Feed conversion ratio was computed as feed consumed divided by weight gained.

Data Analysis:

Data collected were subjected to analysis of variance (ANOVA) in a completely randomized design using the statistical method of steel and Torrie (1980). Fisher's least significant difference (LSD) was used to separate significant means.

Results and Discussion

Result of the experiment is as summarized in Table 4. There was significant difference ($P<0.05$) in mean weekly feed intake among the treatment groups with T_2 and T_4 having the highest and lowest values respectively. The poor feed intake observed in T_3 and T_4 with high levels of inclusion of poultry waste could be attributed to the offensive odour, dustiness and high fiber contents of the waste. This finding supports that of Yaakugh *et al.* (1994) who indicated that the digestibility of a diet is inversely related to its fiber content.

Result also shows a significant difference ($P<0.05$) in the weekly weight gain among the treatment groups. Birds on T_2 has the highest weight gain followed by those of T_1. Lowest value of weight gain was from T_4 group.

This is a direct reflection of the varying degrees of feed intake in the different groups of birds. Ingested feed is expected to be digested and assimilated by the body cells and tissues to ultimately bring about increase in weight gain. The result is in agreement with that of Rohweder *et al.* (1978) and Ajala *et al.* (2003) that high indigestible component of diet reduces digestibility and utilization of feed component.

The FCR also varied significantly ($P<0.05$) among the treatments. This was highest in T_1followed by T_2then T_3before T_4. This might be difficult to explain but Chambers and Lin (1988) reported that variations in FCR among broilers are due to body weight and efficiency of nutrient utilization.

Conclusion and Recommendation

The trial has proved that the inclusion of dried poultry waste at 5% level inthe diet of broilers will not only increase productivity but also reduce overall cost. Moreover, use of dried poultry waste is a sustainable way of recycling waste thereby helping to solve the problem of waste disposal and environmental pollution within the farm settings.

In view of these therefore, the use of properly processed poultry waste at (5% level) as a replacement for the costly wheat offal and P.K.C. in broiler diet is recommended.

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Table l: Composition of Poultry Waste

	Moisture%	Nitrogen%	Phosphorus%	Potash%
Fresh waste	75.0	1.45	0.50	0.40
Stored waste	63.5	1.20	0.60	0.80
Broiler litter	19.0	3.60	1. 25	1. 50
Layer litter	22.2	2.50	1.15	1.80
Slurry	93.0	1.10	0.60	0.35

Source: Poultry management and business analysis manual 1974 -1975

Table 2: Nutritional Value of Dried Poultry Litter

Digestible protein	*22%*
Digestible energy	2.00 kcal/kg
Calcium	*8.8%*
Phosphorus	2. *9%*

Source: Bhattacharya and Taylor, 1975.

Table 3: Proximate composition of treatment diets in %DM

Ingredients	Treatments			
	T_1(0%)	T_2(5%)	T_3(10%)	T_4(15%)
Maize	50	50	50	50
Soy bean	26	26	26	26
PKC	8	5	3	-
Wheat offal	7	5	2	-
Poultry waste	-	5	10	15
Fat	5.3	5.3	5.3	5.3
Bone meal	2.55	2.55	2.55	2.55
Oyster shell	1.500	1.00	1.00	1.00
Salt	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25
Methionine	0.10	0.10	0.10	0.10
Lysine	0.15	0.15	0.15	0.15
Total	100kg	100kg	100kg	100kg

Table 4: Summary of Growth Parameters

Parameters	Treatments			
	T_1 (0%)	T_2 (5%)	T_3(10%)	T_4(15%)
Mean Weekly feed intake	$858.50^b \pm 149.00$	$902.75^a \pm 172.46$	$803.75^c \pm 162.68$	$778.70^d \pm 172.6$
Mean Weekly Weight gain	$649.75^b \pm 183.49$	$776.75^a \pm 235.02$	$688.75^c \pm 201.43$	$667.75^d \pm 200.79$
Feed Conversion ratio	$1.397^a \pm 1.09$	$1.345^b \pm 0.945$	$1.264^c \pm 0.945$	$1.247^d \pm 0.875$

Means with different superscripts on the same row are statistically significant($P<0.05$)