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The Effect of Replacing Graded Levels of Fishmeal with Grasshopper Meal in Broiler Starter Diet.

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ABSTRACT

A study was conducted in Kaduna State, Nigeria in 2006 using 140 Day-old broiler birds in a feeding trial which lasted for 5 weeks. The chicks were divided into three (3) treatments and each treatment was replicated twice with 22 chicks per replicate. Three broiler-starter diets were formulated. Grasshopper meal was included at 0%, 50% and 100% in the diets as replacement for fishmeal. The 100% fishmeal (0% Grasshopper meal) served as control. The results of the analysis indicated that 100% Grasshopper meal diet resulted in higher weight gain (1.02Kg) and feed intake (1.48) but lower feed conversion efficiency (69%). Treatment 3 containing 100% fishmeal has the feed conversion efficiency (92%). The result of this study shows that whole Grasshopper meal diet (100% grasshopper meal) was more expensive N46.65 per Kg of feed than the 50% Grasshopper meal (N44.62/Kg) and 100% Fishmeal diet (N42.60/Kg of feed). The cost and return analysis shows that whole grasshopper meal ration gave the highest return (N5,905.08), followed by treatment 2 (N4,346.07) and N2,380.20 for treatment 3.

***Keywords**: Grasshopper Meal, Fishmeal, Broiler Birds, Broiler starter diets and feeding trial.*

INTRODUCTION

In commercial poultry production the main constraint is the feed cost which accounts for about 75 to 80% of the total cost of production (Hassan, 2002). The cost of feed ingredients has been steadily increasing due to growing number of poultry farms and

feed compounding mills. In order to cut the high cost of feed, farmers need to learn how to compound feeds locally using the available feed ingredients. Fishmeal is a high protein feed stuff usually marketed at 65% crude protein (CP), but the CP content varies from 57 and 77% depending on the species of the fish used (Aduku, 1985).

According to (Ahmed, 1987), the importance of fish meal as feed stuff has been on the decline in many countries including Nigeria, because of relatively high cost, non-availability, and at times, adulteration by feed suppliers which leads to heavy losses in poultry stocks. The commonest diseases which results from contaminated feed materials include Salmonellosis, fowl cholera etc. The replacement meal will help to eliminate these diseases. The grasshopper is available in the Northern part of the country at affordable price and will serve as a very good substitute for fishmeal both interms of cost, availability and quality. A strong economic incentive therefore exists for finding an alternative animal protein source for poultry feed in order to reduce the cost of feed and maximize the returns from poultry farming (Esonu et. al., 2003) and (Kekocha, 1985).

Grasshopper meal, according to (Nazneen et. al., 1995) has a high proportion of crude protein (537.60g per Kg Dry matter), ether extract (158.6g per Kg Dry matter) and is therefore a probable protein source for poultry feed, provided the price is reasonable.
According to (Patrick, 1953), plant proteins are usually low in lysine and methionine which are critical on poultry diets. To prepare a poultry diet certain amounts of animal protein sources like fishmeal, blood meal and meat meal must be added to the diet in order to balance the deficiencies of the essential amino acids (Scott et. al., 1976). These amino acid sources supply some unidentified growth factors (Balton et. al., 1977). Fish meal is the only source of animal protein being used to overcome these deficiencies (Ahmed, 1987).

This study was conducted to assess the replacement value of graded level of fish meal with Grasshopper meal in broiler starter diets and the effect of this on growth performance. Indicators such as weight gain and feed intake as well as mortality rate and feed cost were analyzed using descriptive statistics.

MATERIALS AND METHODS

Procedure:

Two weeks before the arrival of the chicks, the brooding house and all the materials for the experiment were cleaned thoroughly, washed and disinfected. The brooding

facilities were then set up. The experiment was conducted with 140 unsexed Day-old broiler chicks (ñKabirò breed). The chicks were distributed in a completely randomized design of six pens. The weights of the chicks were approximately equal (30g). The chicks were divided into 3 treatments; each treatment was replicated twice with 22 chicks per replicate. Three broiler starter diets were formulated. Grasshopper was included at 0%, 50% and 100% in the diets as replacement for fish meal. Grasshopper meal at 100% replaced all the fish meal in the diet. The 100% fish meal diet served as control. The diets were formulated to contain 24% crude protein (this is the recommended crude protein content of a broiler starter diet) (1). All the feeds were isocaloric and isonitrogenous. Table 2 shows the percentage composition of the compounded feed.

Management Practice:

The chicks were set on Newspapers spread on the floor of the poultry house. Broiler starter feed formulated was sprinkled on the floor and the medicated water with multivitamin was served adlibtum to the birds. Feed was also fed adlibtum throughout the period of the experiment. The room was well prepared and heat was supplied using 5 200 watts electric bulbs and also lantern and kerosene stoves so as to maintain a suitable brooding temperature for the chicks. The temperature requirement for broiler brooding is about 35 degree centigrade throughout the brooding period.
After the first seven days of brooding the feed was supplied in shallow feed troughs.
Water containers and feed troughs were washed thoroughly with soap every day. Labor was supplied by the researcher and a poultry attendant, the attendant was paid 4500 Naira as his wage for the duration of the study. The cost incurred during the experiment was recorded especially with regard to the feed ingredients used for the experiment. The cost of drugs and vaccines used were also recorded.

The following vaccination programme was adopted:

Name of vaccine	Dosage	Means of Application	Age
Newcastle intraocular	200 dose	one drop in each eye	1 day
Gumboro	200	in drinking water	2 weeks
Newcastle Lasota	200	in drinking water	from 3 wks

Feeding: The formulated diets were weighed and then fed to each group of the birds in the different treatments. The weight of the feed left over the following morning was cleaned and re-weighed before adding more feed. The birds were weighed every morning and the weight recorded by treatment. This practice was repeated every day throughout the 5 weeks experimental period.

Table 2: **Showing Percentage Composition of the Compounded Feed**

Ingredients	**100% GHM A**	**50%GHM & 50% B**	**100%FM C**
Maize	45.0	45.0	45.0
Maize Bran	14.3	14.3	14.3
G/nut Cake	22.0	22.0	22.0
Soyabean Cake	5.0	5.0	5.0
Fishmeal	-	2.5	5.0
Grasshopper meal	5.0	2.5	-
Blood meal	4.5	4.5	4.5
Bone meal	3.0	3.0	3.0
Lysine	0.30	0.30	0.30
Methionine	0.35	0.35	0.35
Premix	0.25	0.25	0.25
Salt	0.30	0.30	0.30
Calculated feed Analysis			
CrudeProtein (%)	24	24	24
Crude Fibre (%)	4.55	4.35	4.14
Ether extract (%)	5.07	4.61	3.97
Met. energy (K cal/Kg)	2885.3	2885.3	2885.3
Calcium (%)	1.40	1.45	1.49
Lysine (%)	2.32	1.74	1.16
Phosphorus (%)	0.30	0.45	0.60

Source: Laboratory Analysis (2006).

Results and Discussion

Average weight gain, feed intake, feed conversion efficiency, Feed Cost and Mortality.

The results shown in Table 3 indicate that the birds in treatment 1 recorded a higher weight gain (1.018kg) than the birds in treatments 2 (0.94Kg) and 3 (0.95kg). This could be as a result of higher feed intake of diet A compared to B and C (table 3) this may be as a result of higher crude protein content of this diet. This finding agrees with that of (osenfeld et. al., 1997) who reported that grasshopper meal constitute a high protein-rich concentrate that can be used as a protein supplement for broilers and that weight gain is as a result of feed digestibility and palatability, while (Oluyemi et. al., 1979) indicated that adequate nutrient intake like protein and energy level in the diets enhance proper growth and weight gain.

The birds in treatment 1 also showed a higher feed intake (1.48kg) than the birds in treatments 2 (1.18kg) and 3 (1.30Kg) (Table 3). The high feed intake in treatment 1 could be as a result of the slightly higher crude fiber content of the diet, as birds tend to consume more of a fibrous feed to satisfy their energy requirements. This agrees with the findings of (Ranjhan, 2001) that birds on high fiber diet tend to consume more of the feed to meet their requirements for growth and development. The higher intake of the feed in treatment 1 in addition could also be as a result of the greater aroma and palatability of the feed.

Feed conversion efficiency is an indictor of efficiency of feed utilization and form a basis for a quick check on profitability of a broiler farm (Kekoocha, 1985). Feed efficiency (Table 3) was found to be higher with birds in treatment 3 (92%) compared to birds in treatments 1 (69%) and 2 (80%).

Feed Cost (Table 3) in treatment 1 (100%) Grasshopper meal) was the highest (N46.65 per Kg) and was as a result of high cost of Grasshopper, as the Grasshopper had to be bought from Jigawa State. A kilogram weight of the Grasshopper cost about N500.

During the 5 weeks experimental period, mortalities were recorded only in the control pen (treatment 3), where four chicks died as a result of coccidiosis outbreak in this pen (Table 3).

Table 3: Showing Average Weight gain, feed intake, feed efficiency, feed cost and mortality among the 3 treatments.

Parameter (100%) (Average)	**Treatment 1 (100%) GHM)**	**Treatment 2 (50%GHM) 50% FM**	**Treatment 3 100% FM**
Initial Weight (g)	38	38	38
Finial Weight (Kg)	1.06	0.98	0.99
Weight gain (Kg)	1.02	0.94	0.95
Feed intake (Kg)	1.48	1.18	1.030
Feed efficiency (Kg)	0.69 (69%)	0.80 (80%)	0.92(92%)
Feed cost N/Kg	46.65	44.62	42.60
Mortality	-	-	4

Source: Experimental data 2006

Cost and Return for Broiler production

The total expenditure for broiler production in this study consist of Total Variable Cost (TVC), which comprises of feed, labour, DOC, medication, and utilities.
The Total Revenue (TR) is the proceeds from the sale of the broiler birds after the experiment.

Total Return = Total return ï Total Variable Cost

The total return for the broiler production per 22 birds was highest for treatment 1 N5, 905.08, N4, 346.07 for treatment 2 and N2, 380.20 for treatment 3. The average price of each bird was N600, N580 and N580 for treatments 1, 2 and 3 respectively, table 5.

Table 5: Showing the costs and return for broiler production per 22 birds in a treatment

Items	**Treatment 1**	**Treatment 2**	**Treatment 3**
Returns (R)			
Sales of broiler	13,464.00	11,994.40	9,910.00
Variable Costs			
Feed	1,518.92	1,158.33	789.80
Labour	1,500.00	1,500.00	1,500.00
DOC	2,640.00	2,640.00	2,640.00
Medications	1 250.00	1,400.00	1,650.00
Utilities	950.00	950.00	950.00
Total Variable Cost (TVC)	7,558.92	7,648.33	7,529.80
Total Return (R-TVC)	5,905.08	4,346.07	2,380.20

Source: Experimental data, 2006

The proximate composition of the Grasshopper used for the experiment is shown in Table 4.

Table 4: Showing **Proximate Composition of Grasshopper**

Nutrient	**Percentage**
Dry matter	94.23
Crude Protei	53.58
Crude Fibre	9.21
Fat / Oil	26.52
Ash	4.31
NFE	6.40

Conclusions and Recommendations

1) This research suggests that Grasshopper meal can replace significant quantity of fish meal in broiler ration.

2) Grasshoppers which are known to have a high capacity for destroying farm crops and causing great financial losses to the farmers especially in the northern parts of Nigeria could be turned into a money-spinning livestock feed ingredient.

3) This study recommends that poultry farmers should form cooperative societies to enable them procure the Grasshopper meal in large quantities so as to reduce the high cost involved in procuring the meal especially for the states that are far away from the Grasshopper sources.

4) The poultry farmers be taught how to compound their poultry feeds locally as this will go a long way in reducing the cost of feed which forms about 80% of the total cost of production in the poultry industry (Hassan, 2002).

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