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Effect of Replacing Soybean Mean with Maggots on the Diet of Growing Pigs

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Abstract- A 92 days feeding trial was conducted with 36 growing Pigs to evaluate the effect of replacing soybean mean with maggots in their diet. The Pigs were randomly allocated to three treatments groups in a complete randomizes design. Each treatment was replicated four times having three Pigs per replicate. Three experimental diets were formulated in which soybean meal was progressively replaced with maggots at 0%, 50%, and 100% and identified as T_1, T_2, and T_3 respectively. T_1 served as the control diet. Each of the diets was offered ad libitum to the Pigs. Parameters measured included, weight gain, feed conversion ratio, The result showed a non significant ($P > 0.05$) difference in all the parameters measured among treatments. Thus the inclusion of maggots in diets up to 100% had no adverse effect on the performance, and carcass characteristics of the animal. Result also showed that replacement of soy bean with yam maggot meal caused a significant ($P < 0.05$) reduction in the cost of feed/kg weight gain of pigs.

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I. Introduction

Poor productivity and high mortality of stock which Characterized livestock industry in under-developed countries is largely explained by high cost of feeds due to stiff competition between human and livestock species for available feedstuffs. However, almost all animal by-products can be used in the formulation of cheaper livestock feeds especially for non ruminant animals (Sonaiya, 1987).

The housefly has been a very notorious insect, having been accused of disseminating all types of diseases and ailments. However, this very animal is been viewed from another angle. The maggots of housefly are now being produced to feed both man and his animals, Atteh and Oyedeji (1990). Maggots are easily obtained in piggery farms, sedimented wastes and sewage and they can also be cultivated using different media that can attract housefly infestation which will cause laying of eggs on wastes which have no direct human consumption value and this makes it a cheap high quality protein source that effectively substitute expensive protein concentrates such as fish meal, soybean meal, groundnut, meat meal, blood meal etc.

The use of unconventional feed source such as maggot meal (MGM) will reduce the competition between man and his animals. Maggots have traditionally been associated with decaying organic matter. Maggot is the larvae of the domestic fly (Musca domestica). They are deposited by the flies on the surface of dead animals, faeces and other suitable substrates that need decomposition {Jane-Petro and Sherman, 2003' Martins, 2004). The process is aerobic fermentation that requires a fly attractant (Jens et al, 2004), they consume a wide* variety of organic matter animal, manure, food waste etc) assimilating nutrients and thus reducing its volume and pollution potentials. The larvae are high in protein content for monogastric animals (Awoniyi et al., 2003). Furman (1999) and Papp, (1976) suggested that maggot should be produced in a maggottary away from human residence.

This research is aimed at determining the optimum performance of pigs fed with maggot meal as a replacement for soybean meal.

II. Materials and Methods

a) Experimental Site

The study was conducted at the Teaching and Research Piggery unit of the Department of Animal Science, Ebonyi State University, Abakaliki.

b) Experimental Design

The experiment was conducted using a Completely Randomised Design (CRD). There were three (3) treatments with four (4) replicates; each replicate contained three (3) pigs making a total of twelve (36) pigs in all. The treatment one (T_1) which was the control had 0% maggot meal, treatment two (T_2) had 50% maggot meal and 50% soybean rneai; while treatment (T_3) had 100% maggot meal with no soybean.

c) Experimental Animals

Twelve (36) growing pigs weighing 28.33 + 0.89kg were used for the study. The experimental animals were obtained from sows that farrowed about the same time and had the same level of management. The pens were washed, sanitized and allowed to dry for some days before the arrival of the pigs. The pigs were starved for 12 hours prior to the experimental feeding to clear the guts of the previous meals in line will the procedure of Amaefula et al., (2009).

d) Experimental Diets

Three experimental diets were formulated (table 2) Viuch that the maggot meal (MGM) progressively

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replaced soybean meal Is the major source of protein. The maggot meals were added at 0%, 50%\and 100% of soybean meal in the three experimental diets which were identified as T15 T2, and T3 respectively. T-, served as the control diet.

The experimental diets were analyzed for promixate compositon using the method of AOAC, (1990). Feeding was done once daily at 8:00am. Pigs were fed 5% of their average body weight as ration per replicate (Uchewa and Otuma, 2008). The diets were mixed with water before feeding to control dustiness. Water was provided to pigs and ad libitum throughout the experiment and the trial lasted for 92 days.

Table 2 : Percentage Composition of the Diet

INGREDIENTS	REPLACEMENT LEVELOF MGM FOR SOYBEAN MEAL T_1,	T_2	T_3
Maize	50.00	50.00	50.00
Soybean meal P.k.c	15.00 21.00	7.50 21.00	0 21.00
* Magmeal	0 5.00 6.75	7.50 5.00 6.75	15.00 5.00 6.75
Spentgrain			
Bone meal	1.00	1.00	1.00
Salt	0.50	0.50	0.50
Vit. Premix	0.50	0.50	0.50
Lysine	0.25	0.25	0.25
Total (%)	100	100	100

Table 3 : Proximate Composition of the Experimental Diet

Crude protein	18120	18.51	18.60
M.E(Kcal/kg)	2869.80	840.61	2811.43

e) Experimental Procedures

i. *Maggot Culturing*

The bags were placed in the East to West direction to reduce the, effect of direct sun light on the substrate. The mouths of the bags were allow for optimum free flow of air.

The substrate bags, were arranged in rows with one side raisJng up at an angle of 30° - 45° such that one side that was on the plat form (raisje up) which was introduced with fresh substrate to enable the larvae of the fly trtet were being cultured to migrate to the fresh substrate for easy harvesting.

In each clean substrate bag, a quantity of substrate was being introduced using packer/hand spade and it was mixed with a given quantity of water. The flies were attracted immediately to lay eggs. The maggots were seen/observed six hour after first contact of the flies with substrate.

The substrates are watered periodically. The drier the weather, the more frequent the watering of the substrate was done to ensure better yield. The maggot attained optimal size between 5-8 days within this period, they were being harvested. 3.6.1

Harvesting and Processing of Maggots.

The harvest of maggots was done between the 5th to 8th days after first contact of fly with the substrate. The substrate was watered, while fresh substrate was introduced at the next substrate bag that was empty. Few minutes later maggots are seen migrating from the old substrate that was used to culture them to the new substrate that was used to attract them.

Therefore, a brush and a packer/hand spade was used! to scoop them into the collecting bowl for processing, wood ash was sprayed in collecting bowl to prevent the maggots from escaping from tee bowl.

Hot water was poured on the harvested maggots inside the bowl and killed. They were then poured into plastic baskets to enable the water drain off. The dead maggots are sun-dried and then packed into kn air tigh container for preservation.

f) Data Collection and Analysis

Data were obtained on the following growth performance parameters:

Body Weight

Total weight gain = Final weight - initial weight

$$\text{Average daily weight gain} = \frac{\text{Total days of experiment}}{\text{Total weight gain}}$$

i. *Feed Intake*

This was calculated by weighing the feed offered every day and subtracting from it the leftover of the previous day. That is; Feed intake = feed offered - left over.

ii. *Feed Conversion Ratio (FCR)*

This was calculated as:

$$\text{Feed Conversion Ratio} = \frac{\text{weekly feed intake (kg)}}{\text{Weekly weight gain (kg)}}$$

Data collected on growth performance parameters vitas subjected to analysis of variance (ANOVA) using a linear additive mode for complete! randomized design (CRD)

III. Result

The result of the growth performance of pigs fed graded levels of magmeal is shown in table 4. The result showed no significant difference ($p>0.05$) in all the parameters measured. The fines body Weight of the Pigs were increasing numerically as the level of magmeal inclusion was increased. Pigs on T3 had the highest weight (44.94 kg) followed by T2 (44.65kg) while the control T1 had the lowest (44.15kg).

Table 4 : Performance of Pigs Fed Graded Level of Meal (MGM)

Parameters	$T_,$	T_2	T_3	*SEM*		
Initial body weight (kg)	28.50	28.25	28.23	1	.6	NS
Final body weight (kg)	44.15	44.65	44.94	2	.2	NS
Average daily weight gain (kg)	5.55	5.80	5.99	0	.4	NS
Weekly feed intake (kg)	9.71	10.50	11.03	0	.6	NS
Feed conversion ratio	4.66	4.64	4.40	0	.4	NS

NS = Not Significant

The average daily weight gain of feed intake followed the same trend with those on T_3 having the highest figures numerically, followed by those on T_2 and those on T_1 but were not statistically different ($p<0.05$) from each other. Those on T_3 showed in superior conversion ratio which had no statistical difference from those on T_2 and T_3.

a) Discussion

The overall growth performances and no mortality obtained in each experimental group of this study confirm the suitability of chosen Maggots diet for growing pigs. The daily weight Gain, and final body weight increased with higher dietary inclusion of magmeal in thik study. This is in line with the study of Ogunji and Wirth (2002) who reporter an increased in growth and body protein retention of Oreochromis noliticus fingerlings fed diets containing maggot meal. The decreased with increase in MGM while feed intake increase with higher inclusion of MGM in this study. This may be due to dietary energy to protein ratio (P/E ratio).protein is an essential nutrient that must be included in diet at appropriate levels to ensure adequate growth and health of animals. Adequate energy must be pplied so that dietary protein is used for growth rather than metabolized for energy (Ikpi, 1987) it is therefore important to maintain a proper ratio of protein to energy in diet. Excessive energy can cause reduced feed intake and will result in decreased growth rates (Scoot et al., 1976). Inadequate protein as well results in decreased growth rates. The protein to energy ratio for the diet used in this study therefore seems optimal.

IV. Conclusion and Recommendation

The overall growth performances and good status of pigs obtained in each experimental group of this study confirm the suitability of maggot meal in the diet of growing pigs. There was increase hp the final body weight, feed intake and feed conversion ratio as the maggbt meai in the diet increased; also there is increase in the daily weight gain. The second reason for the numerically good performance of pigs fed diet containing maggots may be that there were no anti nutritional factors in the diet. However, the increase in the final weight gain, weekly feed intake and other parameter like feed conversion ratio were not significant ($P>0.05$).

From the result obtained in this study, the use of maggot meai as a replacement for soybean meal to boost the growth of growing pigs rather than soybean meal which is conventional feed that is costlier while magotmeal attract low monetary value and it is easily obtainaind safe for animal and human consumption.

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