POULTRY OFFAL MEAL AS A PROTEIN SUPPLEMENT FOR GROWER PIGS

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ABSTRACT

A 16-week feeding trial, involving 18 weaner pigs in a randomized complete block design, was carried out to determine the value of poultry offal meal (POM) as a protein supplement for grower pigs at three dietary levels, 0%, 10% and 20%. Liveweight gain, dressing percentage and backfat thickness were significantly (<0.05) higher in pigs fed 20% POM dietary level. The cut parts, heart, liver and kdney, also increased with increasing level of POM), the diets.

The poultry offal meal (POM), the processed, edible and inedible parts of poultry (viscera feathers, beaks blood, discarded eggs and dead birds) used for this study, contained 56.4% crude protein 20.9% crude fat, 7.7% total ash 4.6% crude fibre and 3.18Kcal/gm metabolizable energy.

The results of this study suggest that POM could be incorporated in grower pig rations up to 20% with good results.

Key words: Poultry offal meal (POM), protein supplement.

INTRODUCTION

Poultry offal meal (POM), is the processed edible and inedible parts (heads, viscera, feathers, beaks, blood, discarged eggs and dead birds) from poultry processing plants. Until recently, very little is heard about this by-product, particularly in the tropics, since less than 5% of the total slaughtering of broilers or table birds is done through organized dressing systems (Daghier, 1975). In the United States, where it is common as a recycling product of poultry industry, it has been described as a valuable feed-supplement for household pets

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(Morris, 1946), hogs (Kahle and Gray, 1957) and poultry (Potter and Fuller, 1967; Jackson and Fulton, 1971; Narahari *et al*, 1981).

With the emergence of large scale poultry industries in Nigeria within the last few years, and the declining availability of protein concentrates, there is need to recycle the so called poultry wastes into valuable products for livestock industry. Imo Modern Poultry, Avutu, Imo State – Nigeria, has started doing that. Although the use of POM in poultry ration has been extensively studied, information on its value for swine is quite limited. This study was therefore conducted to determine the chemical composition of the POM from the plant at Avutu and evaluate its nutritive value as a protein supplement for grower pigs.

MATERIALS AND METHODS

Source and method of processing of POM

The POM used for the study was obtained from the Imo Modern Poultry, Nigeria (Ltd.), Avutu in Imo State of Nigeria. The method of production of POM at Avutu is the "wet rendering method'. This is by cooking the materials (viscera, feathers beaks, blood, discarded eggs and dead birds) at a temperature of about 148°C and 2.8Kgf/cm^2 pressure for 2½ to 3 hours. After that the materials are off loaded into a metal basket and allowed to cool before defatting by centrifuging.

The POM, groundnut cake (GNC) and diets were chemically analyzed by standard methods (AOAC, 1970).

Experimental Design.

Eighteen weaner pigs (9 males and 9 females) about 88 days old and weighing on the average 11.0±0.2kg, were used for the study. The pigs were arranged in trios according to wieght and sex and randomly assigned to three treatment rations, such that each treatment group contained 3 males and 3 females. Each group was further divided into three replicates with each replicate containing one male and one female. The three treatment diets were formulated (Table 1) such that POM was incorporated at three dietary levels of 0, 10.0% and 20.0% thereby replacing, on weight basis, 0%, 50% and 100%, respectively, of the GNC in those diets.

The pigs were given 4% of their average body weight as ration daily, in the morning and afternoon. Water was liberally provided. Individual liveweights were recorded weekly and feed offered adjusted accordingly. At the end of the 16–week trial, all the pigs were slaughtered and their carcasses cut into whole and retail parts and weighed. Internal organs were also weighed. Backfat thickness and loin eye muscle area were determined by the method of Drewry *et al* (1966).

Data were subjected to two-way analysis of variance as outlined (Snedecor and Cochran, 1967). Where significant effects were observed from the analysis of variance, means were compared using Least Significant Difference (LSD).

RESULT

The nutrient composition of the POM and GNC used in the study is presented in Table 2. The POM and GNC appear comparable in most of the nutrients, except for crude protein, fat, energy and some essential amino acids. These differences were reflected in the nutrient composition of the treatment rations (Table 1), since replacement was done

Table I.

INGREDIENT COMPOSITION OF TREATMENT RATIONS.

Ingredients (Kg)	*Dietary Levels of POM (%)* 0%	10%	20%
Maize	55.00	55.00	55.00
GNC	20.00	10.00	0.00
POM	00.00	10.00	20.00
Wheat bran	7.00	7.00	7.00
Dried brewers grain	15.00	15.00	15.00
Bone meal	2.50	2.50	2.50
Common salt	0.25	0.25	0.25
V it/Tm*	0.25	0.25	0.25
Chemical analysis			
Crude protein, (%)	17.00	18.06	19.16
Crude fat, (%)	5.12	6.05	8.02
Crude fibre, (%)	6.45	5.81	5.27
Calcium, (%)	0.78	0.76	0.74
Phosphorus, (%)	0.50	0.48	0.45
ME (Kcal/kg) (calculated)	2801.80	2821.80	2841.80

* To provide the following per kg of the ration:
V itamin A, 10,000 i.u.; vitamin D_3, 2000 i.u., vitamin E, 5 i.u;,vitamin K, 2.24 i.u.; vitamin B_{12}, 0.01mg; riboflavin, 5.5mg; panthothenic acid, 10mg; nicotinic acid, 25mg; choline, 350mg;folic acid, 4mg. manganese, 56mg; iodine, 1mg; iron, 20mg; Copper, 10mg; zinc, 50mg and cobalt, 1.25mg.

on weight for weight basis.

Data on feed intake, body weight changes and feed efficiency are presented in Table 3. There were no significant ($P<0.05$) differences in feed intake, since feed was not liberally offered. POM at 20% dietary level singificantly ($P<0.05$) improved the growth of the pigs, an indication of higher efficiency of feed conversion. Pigs on 10% POM

Table 2:

CHEMICAL COMPOSITION OF POM AND GNC USED IN THE STUDY (DRY MATTER BASIS)

Parameters		*POM*	*GNC*
Dry matter,	(%)	90.00	95.42
Crude protein,	(%)	56.40	44.31
Crude fat,	(%)	20.90	7.22
Crude fibre,	(%)	4.60	2.52
Total ash	(%)	7.70	6.70
Lysine,	(%)	2.01	1.34
Methionine	(%)	0.70	0.62
Methionine + cystine,	(%)	2.65	1.60
Threonine,	(%)	2.51	1.62
Arginine,	(%)	3.52	5.36
ME, Kcal/g*		3.18	2.82

* Metabolizable energy (ME) was calculated from GE (NAS , 1971).

Table 3:

EFFECT OF POM ON THE PERFORMANCE OF GROWER PIGS

Parameters	*0%*	*10%*	*20%*	*Sem*
Initial wt. (kg)	10.80	11.00	10.90	0.16
Final wt. (kg)	42.75^{a}	44.08^{ab}	46.00^{b}	0.34
Live wt. gain (kg/day)	0.29^{a}	0.30^{a}	0.35^{b}	0.04
Daily feed intake (kg)	1.16	1.16	1.17	–
Feed efficiency (kg feed /kg gain)	4.00^{a}	3.87^{a}	3.34^{b}	0.20

ab Means within rows with different letter superscripts are Statistically different ($P<0.05$)

Table 4:

EFFECT OF POM ON CARCASS CHARACTERISTICS OF GROWER PIGS

Parameters +	*Dietary Levels of POM (%)* 0% POM	10% POM	20% POM	*Sem*
Live wt. at slaughter (kg)	42.75[a]	44.08[ab]	46.00[a]	0.34
Dressing percentage	62.76	62.86	64.08[a]	0.46
Loin eye muscle area (cm^2)	14.12	14.54	15.10	0.28
Buston butt, %	5.93	6.29	6.38	0.03
Ham, %	13.41	13.67	13.87	0.16
Picnic %	9.23	9.24	9.31	0.08
Spare-rib, %	5.30	5.34	5.42	0.02
Loin, %	10.19	10.88	11.92	0.13
Belly, %	4.33	4.37	4.96	0.05
Heart, %	0.79	0.80	0.86	0.01
Liver, %	2.72	2.95	2.96	0.02
Kidney, %	0.79	0.79	0.71	0.01
Lung, %	1.60	1.79	1.46	0.03
Spleen, %	0.40	0.53	0.54	0.008
Backfat thickness (cm)	1.82	1.88	2.65[a]	0.07

ab Means within rows with different letter superscripts are different ($P<0.05$)
*+ Cuts are expressed as % of live weight at slaughter.
SEM= Standard error of estimates.

dietary level generally performed better than those on control ration but the differences were not significant ($P>0.05$).

Data on carcass yield are presented in Table 4. The group on 20% POM diet also recorded significantly ($P<0.05$) higher dressing percentage. Wholesale cuts and visceral organs followed a pattern of slight decreases in weights as POM levels in the diets decreased. These decreases were, however, not significant ($P>0.05$) except for the backfat thickness, which was significantly ($P<0.05$) thicker in pigs on 20% POM diet. Generally, at 20% POM dietary level, pigs deposited more fat in their bodies, but not enough to attract comments from consumers. Their deep body fat also appeared firmer than that of those on the control ration.

DISCUSSION

Based on the results of the chemical analysis (Table 2), the POM contains the necessary nutrients at comparatively high levels, despite the fact that it was processed at a temperature that is considered too high for certain essential amino acids (Carpenter *et al*, 1962; McNaughton *et al*, 1977). McNaughton *et al* (1977) reported optimal pressures and temperatures of 6.8kgf/cm² and 121–126°C, respectively for processing. Perhaps the low pressure used compromised for the high temperature. The values for the POM in the table compare very favourably with those reported (Narahari *et al*, 1981) for similar product in India. It is low in methionine. However, the performance of the pigs on POM diet did not indicate the need for methionine supplementation of the diets.

The results of the trial show that diets containing up to 20% dietary level of POM can be given to grower pigs with improved performance. However, at 20% POM dietary level, pigs developed higher body fat and thicker backfat. The high body fat and thicker backfat of the pigs on 20% POM diet could probably be credited to their high dietary fat intake (Table 1). A similar observation was made on broilers given high dietary POM (Narahari *et al*, 1981). Although the fatty acid compositions of the body fat of the pigs were not analyzed, it was believed that the softer body fat of the pigs on the control diet was due to the source of the fat in their diet. Vegetable fats are believed to contain more unsaturated fatty acids than animal fats. Monogastric animals, particularly pigs, tend to store them in the body as they are in the diet (Krider *et al*, 1982).

The POM used in this study was given by the producer and no cost could be placed on it. It is therefore difficult to determine the cost effectiveness of its use in relation to groundnut cake.

In view of the fact that pigs can tolerate POM up to 20% dietary level with good results, it is recommended that the production of POM in the country be stepped up to help reduce the high demand for groundnut cake and also stop the present wastage of the so-called poultry by-product.

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