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THE RESPONSE OF WEANER PIGS TO DIETS CONTAINING FISHMEAL AND BLOODMEAL AS SEPARATE SOURCES OF ANIMAL PROTEIN

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Target Audience: Animal nutritionists, piggery farmers

ABSTRACT

Thirty-six hybrid (large white x landrace), weaner pigs were used to evaluate the response of weaner pigs to diets containing fishmeal and bloodmeal in various proportions as separate sources of animal protein and their effect on carcass characteristics. Diet I was the control with neither fishmeal nor blood meal inclusion, diets 2 and 3 had 5% and 7.5% fishmeal while diets 4, 5 and 6 contained 4%, 6% and 8% bloodmeal inclusion respectively. The parameters measured were liveweight, feedintake, feed efficiency as well as body anthropometric measurements like bodylength, heartgirth, height at withers as well as carcass quality characteristics , which included among others, backfat and abdominal fat thickness, warm dressed-out percentage and organ weights. Diet 4 with 4% bloodmeal was superior to other test diets in all growth parameters while diets with bloodmeal were better than diets with fishmeal and the control diet. All carcass quality characteristics were similar for the diets except the final slaughter weight, warm dressed-out percentage and the weight of the reproductive tracts, in which diet 4 excelled others. In terms of economy and cost benefit, diet 4 was the cheapest followed by diet 6, 5, 1, 3 and 2 in that order.

Results generally indicate that the best and cheapest level of inclusion of bloodmeal was 4% and that further increment in the level from 4 to 8 has no deleterious effects in growth and carcass characteristics of weaner pigs. It also suggests that it is more cost-effective to include bloodmeal than fishmeal in diets of weaner pigs and that, it is even cheaper not to include fishmeal at all in the diet.

Key words: Fishmeal, bloodmeal, weaner pigs, carcass quality.

DESCRIPTION OF PROBLEM

In Nigeria as in many other developing countries of the world, the food supply is inadequate and protein most especially, is in short supply (1). The quantity and quality of amino acid profile of protein and their availability determines the nutritional value of many feedstuffs. The basic measure of dietary amino acid availability can be interpreted from data on performance achieved by the animal being fed, and growth or production characteristics have been a popular way of predicting availability of dietary protein.

The need to effectively incorporate sufficient amounts of animal products

such as milk, eggs, and meat in human diets has invariably brought pressure on the livestock sector of agriculture, necessitating a redoubling of efforts to increase animal products. Before the current inflation in Nigeria, with its accompanying economic recession, there has been competition between man and livestock especially monogastrics for feed-stuffs used in the preparation of animal feed.

The solution is to drastically increase the production of these livestock feed ingredients to meet the need of both man and farm animals or the use of alternative /unconventional feed-stuffs. The scarcity of animal proteins at reasonable prices is a contributing factor to high feed prices. Of the animal protein sources, fishmeal remains the most expensive with a consequential increase in production cost and marginal profit for farmers. Fishmeal is a high quality source of protein, minerals, vitamins and some fatty acids. (1) reported that fishmeal contains approximately thirty percent more protein than soyabean and its amino acid balance is better than those of the vegetable sources. Fishmeal processed and used locally have been associated with problems such as inconsistency in quality, adulteration, degradation or decomposition due to rancidity, bulkiness and fish odour (2). Above all, it is nor readily available in Nigeria (3). There is therefore, need for alternative sources of animal protein in swine diets.

Nevertheless, bloodmeal, a by-product of the abattoirs is a good source of lysine, leucine, and contains over eighty five percent crude protein and is highly favoured by lack of competition by man (4). Any local effort towards harnessing and processing should be encouraged. This study is therefore aimed at investigating the response of weaner pigs to diets containing fishmeal and bloodmeal in various proportions as separate sources of animal protein with a view to finding out the effects of low and high levels of these protein sources on growth and carcass characteristics.

MATERIALS AND METHODS.

The study was carried out at the piggery unit of Ebonyi State University teaching and research farm, Abakaliki. The experimental site was a standard block with open sides covered with nets, concrete floor and roofed with asbestos roofing sheets. Each pen, measuring 4m x 7.5m long, with a feeding, drinking and wallowing trough. A total of thirty six hybrid (large white x landrace) weaner pigs of initial weight of 6.03 ± 1.01 to 8.43 ± 2.35kg were used. They were randomly assigned on weight and sex basis into six groups of pigs. There were two replicates per group, each consisting of three weaner pigs housed in a pen. The animals were ear-tagged for identification and dewormed using ivomectin injectable prior to the start of the experimant.

Six experimental diets were formulated to consititute about twenty percent crude protein. Treatment one is the control containing 0% fishmeal and bloodmeal, treatments 2 and 3 had 5% and 7.5% fishmeal inclusion respectively while treatment 4, 5 and 6 contained 4%, 6% and 8% bloodmeal respectively. Other constituents of the diets are shown in Table 1.

Table 1. Composition Experimental diets (%)

Ingredients	0%(control)	5%Fm	7.5%Fm	4%Bm	6%Bm	8%Bm
Maize	25	30	30	30	30	30
Palm kernel cake	25	23	23	22	22	22
Wheatbran	18	20	23.5	24	27	30
Fullfat soyabean meal	27	17	11	15	10	5
Fishmeal	0	5	7.5	0	0	0
Bloodmeal	0	0	0	4	6	8
Bone meal	4.0	4.0	4.0	4.0	4.0	4.0
Salt	0.5	0.5	0.5	0.5	0.5	0.5
Premix*	0.5	0.5	0.5	0.5	0.5	0.5
Total	**100**	**100**	**100**	**100**	**100**	**100**
Calculated C.P(%)	21.40	21.28	21.16	20.54	20.55	20.56
Calcu. ME Kcal/kg	2579	2574	2531	2509	2455	2397

*Supplied the followings per kg: Vit. A 11785 I.U, Vit. D 1944.3 I.U., Riboflavin, 5.4mg; pantothenic acid, 982mg Nicotinic acid, 24.55mg; Folic acid 0.98mg; Choline Chloride 4.0 x 105mg; Vit k, 2.20mg; Vit B2 12-01mg; Methionine 245.53mg; Cobalt, 1.23mg; Iodine, 0.98mg; Copper, 9.82; Managanese 55.0mg; iron, 19.64mg, Zinc, 0.48mg; Cobalt, 0.28mg and Selenium 0.01mg.

FM = Fishmeal; BM = Bloodmeal

The bloodmeal used was collected fresh from local abattoirs, steam heated for 30-40 minutes and sun-dried for seven days (depending on quantity and temperature), (4). Fishmeal also was bought from the Abakpa main market at Abakaliki capital city while toasted full-fat soyabean served as the only source of plant protein in the diets. Proximate composition of the experimental diets were also determined on dry matter basis as shown in Table 2 (5).

Table 2. Proximate composition of Experimental diets (%)

	Diet					
Nutrients	0%(control)	5%Fm	7.5%Fm	4%Bm	6%Bm	8%Bm
Dry Matter %	93.50	93.50	93.00	94.00	95.00	93.70
Crude protein %	22.45	24.00	25.5	28.0	26.25	26.25
Crude fibre %	7.00	7.50	7.00	.50	7.50	65.00
Ether Extract %	6.75	5.50	7.00	8.50	8.50	8.50

Proximate analysis was by (5). Fm = Fishmeal; Bm = Bloodmeal

The experimental design used in this study was completely randomised design (CRD). The animals were fed twice daily, in the morning and in the evening. Feed consumed was obtained as the difference between quantity offered and quantity left over. Water was provided *ad-libitum*. The animals were weighed individually at the start of the study and subsequently on a weekly basis.

The parameters monitored were liveweight, weight gain, feed intake, heartgirth, bodylength, and height at withers. At the end of the experiment which lasted for 70 days, one pig were fasted for 18 hours but had access to drinking water. They were then stunned and bled completely. Removal of the hairs was by water treatment on the skin and use of razor and knives. The head, trotters, tail, intestinal or gut contents and organs were removed and the remaining carcass weighed to determine the warm dressing - out percentage. Fresh weights were determined using sensitive weighing balance (mettler).

All data collected were subjected to analysis of variance, and differences among treatment means were separated using Duncan's New Multiple range test (DNMRT) (6)

RESULTS AND DISCUSSION

The performance response of the pigs are presented in Table 3. The feed intake of the Pigs on the diets showed significant ($P<0.05$) differences, pigs ion treatments 3 and 4 exhibited the best feed intake and those on treatment 6 had the poorest. The treatment significantly ($P<0.05$) influenced the average daily gain (ADG). The highest average daily gain of 497.86g was recorded by pigs on 4% bloodmeal inclusion while the control group had the lowest. Pigs on bloodmeal had better gains than those on fishmeal inclusion in their diets.

Table 3. Growth performance of weaner pigs fed Soya-based deits containing animal protein sources

	Treatments						
Parameter	0%	5%Fm	7.5%Fm	4%Fm	6%Bm	8%Bm	S.E.M
Av. Initial wt.(kg)	6.53	7.17	8.43	7.78	6.47	6.03	2.3
Feed intake (kg)	1.83c	1.98b	2.19a	2.19a	1.98b	1.62d	0.14
Av. Daily wt.gain(g)	302.86^{e}	340.14^{d}	342.43^{d}	497.86^{a}	375.71^{c}	421^{b}	0.02
Feed efficiency	1.26^{d}	1.40^{c}	1.29^{d}	1.91^{a}	1.60^{b}	1.66^{b}	0.08
Av. Final wt.(kg)	37.70	40.98	42.40	52.63	42.77	45.50	2.50

a,b,c,d,e:- Mean values in a row with different superscripts are significantly different ($P<0.05$)

S.E.M:- Standard error of means.

FM = Fishmeal, BM = Bloodmeal.

In the same vein, like the average daily gain, the best efficiency was observed from diet 4 with a value of 1.91 as against 1.26 from the control diet 1. Generally, animals fed 4 percet bloodmeal diet had the best overall performance. Table 4 summarises the carcass characteristics of the weaner pigs. There was significant ($P<0.05$) difference in the dressing percentage of the pigs on the six diets. Diet 4 had the highest percentage of 60.61 followed by diet 2 with fishmeal 59.10 percent and the lowest by the control group of 54.77%. Also, the backfat thickness and abdominal fat increased with animal protein content of the feed, but

Table 4: Carcass characteristics of weaner pigs fed Soya-based diets containing separate sources of animal protein

Characteristics	0%	5%Fm	7.5%Fm	4%Bm	6%Bm	8%Bm	S.E.M
Av.Slaughter wt(k)	37.70^{c}	40.98^{c}	42.40^{bc}	52.40^{a}	42.77^{c}	45.50^{b}	2.50
Dressing (%)	54.71^{c}	59.00^{b}	54.96^{c}	60.61^{a}	55.64^{c}	55.64^{c}	0.42
Head Wt. (kg)	6.51	6.65	6.95	7.30	6.30	6.30	0.20
Ham (kg)	29.0	29.30	29.60	29.60	29.10	29.30	0.16
Shoulder (kg)	12.0	14.10	14.10	15.80	13.20	12.60	0.45
Belly (kg)	14.90	15.20	15.40	16.80	14.80	15.20	0.19
Carcass length (cm)	66.10	66.30	65.40	67.90	67.00	65.30	0.21
Backfat thickness(cm)	2.95	3.10	3.65	3.90	3.40	3.70	0.08
Av. Lean cut (%)	71.60	74.60	77.00	80.70	74.90	76.10	2.01
Av. Fat Cut (%)	23.60	24.01	25.01	26.00	24.90	25.00	0.80
Thyroid gland (g)	4.80	4.71	5.22	6.00	4.53	4.53	0.20
Liver (g)	650	627.5	835	850	565	530	41.20
Heat (g)	113.5	116.5	149.75	156	104.8	98	9.10
Lungs (g)	250	253	335.7	315	197.2	204	27.0
Empty Stomach(g)	267.5	297	297.5	335	245	250	15.20
Weight of Intestine(g)	815	1100	1400	1600	1200	1102.5	81.50
Reproductive track(g)	126.5^{b}	141^{b}	218.5^{a}	216^{a}	161.15^{b}	135^{b}	14.0
Kidney (g)	99.75	107.5	137.1	139.9	73.0	99.05	9.10
Pancreas (g)	46.10	50.75	59.05	63.75	64.15	41.25	7.50
Spleen (g)	48.0	52.50	60.25	60.75	53.5	44.0	5.10

a,b,c, Mean values in a row not bearing same superscripts are different ($P<0.05$)

S.E.M:- Standard error of means. FM = Fishmeal, BM = Bloodmeal

were lowest in the control diet. Nevertheless, there was no significant difference ($P<0.05$) in carcass quality and organ weight of the pigs except for the weights of the reproductive tract that were significantly higher in diets 3 and 4 but similar for other diets. This diference could be attributed to the variation in the size and final liveweight of the pigs.

The addition of bloodmeal to an all- vegetable protein ration improved performance. Bloodmeal is high in crude protein content, and is a good source of lysine and leucine but is a poor source of isoleucine (7). This factor(s) as well as poor protein digestibility as reported (8), have been associated with the poor performance reported by several researchers when bloodmeal is used at high levels in pig diets. It was discovered from this study, even though synthentic amino acid were not added in the diets, that 4 percent bloodmeal performed satisfactorily better than the highest level of 7.5 percent fishmeal. It is worthy of note that even when inclusion of bloodmeal at higher levels of 8% did not show any detrimental effects on the carcass, the result agrees with the works of (9) and (10), who reported growth depressions when dietary bloodmeal levels exceeded 6 percent. In this study, 4 percent bloodmeal performed better than 7.5 percent fishmeal inclusion, supporting further the reports of (11), in the diets of pigs. The depressed performance of pigs on

higher levels of 6 to 8 percent bloodmeal inclusion could be attributed to poor digestibility and low palatability of the diets. The result of this work suggests that inclusion of bloodmeal beyond 4 percent in diets reduced feed efficiency and weight gain in pigs hence confirming the earlier reports (12, 13). Even, the results of the body anthropometric measurement like liveweight, body length, heartgirth, height at withers and carcass characteristics conforms with the reports of (11, 14, 3, 9, 10).

Table 5 shows the economics of feeding different proportions of bloodmeal and fishmeal to weaner pigs. Numerically, diet 4 had the lowest feed cost per kg weight gain followed by diet 6. Diets 5 and the control diet as well as diets 2 and 3 had close values. The diets with bloodmeal had lower cost than diets with fishmeal. It could be observed that diet 4 had the best feed efficiency, pointing to the fact that an efficient feed conversion is a guarantee of profitability.

Table 5: Economic evaluation of Soya-based diets containing separate sources of animal protein.

Parameter	0%	5%Fm	7.5%Fm	4%Bm	6%Bm	8%Bm
Total feed consumed (kg/ Animal)	768.6	831.6	919.8	919.8	831.6	680.4
Total Feed cost(#)	15292.14	20.873.16	24255.13	17798.13	16540.52	17180.00
Feed cost per Kg(#)	19.90	25.10	26.37	19.35	19.89	25.25
Total weight gain (kg/Animal)	41.02	38.36	44.66	62.30	46.69	59.99
Feed cost/kg weight gain	373.87	544.14	543.11	28 5.26	354.26	286.38

FM. = Fishmeal, BM = Bloodmeal

The poorest performance observed in the control diet goes to emphasise the need to include animal protein sources in the diet of weaner pigs. The difference between the results of this stufy and others, might be due to methods of processing. Seventy percent availability of lysine has been reported by (8) in the ring processed, dried and the conventional drum-dried bloodmeal used in pigs diet. Drying temperatures have also been indentified as a factor that affects lysine availability in bloodmeal as reported by (15).

CONCLUSIONS AND APPLICATIONS

This study shows that bloodmeal can be used to replace fishmeal in weaner rations at 4 percent for best performance and to achieve a greater percent profit margin.

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