

ECONOMIC OF PRODUCTION OF WEANING PIGS FED SOLID WASTE PRODUCT OF SUGAR INDUSTRY (SWAPSI) AS REPLACEMENT FOR MAIZE.

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ABSTRACT

Twenty four (24) land race piglets of equal sex and average live weight of (6.02-6.91kg/pigs) were utilized in a 63days experiment to evaluate the economic indices of weaning pigs fed solid waste product of sugar industry (SWAPSI) as a replacement for maize. Four (4) treatments diets namely T1, T2, T3, and T4 were compounded to be iso-caloric (2900kcal/kg ME) and iso-nitrogenous (20% crude protein), the SWAPSI was replacing maize at 0, 25, 50, and 75%. The experiment was arranged in a Completely Randomized Design. Each treatment was replicated 3 times having two pigs per replicate. Feed and water were provided to the animals daily and all standard routine management practices were strictly observed throughout the experiment. At the end of the feeding trial, total feed intake and cost per kg of feed was used to calculate the total feed cost. Feed cost per kg weight gain was calculated by multiplying feed conversion ratio (FCR) with cost per kg diet, cost of feed consumed, cost of production and revenue were calculated and recorded. The result indicated significant ($p>0.05$) reduction in the cost of feed consumed from T1 (10518.07₦/kg) to T4 (9084.14₦/kg) and total cost of production T1 (35918.07₦/ pig) to T4 (34484.14₦/ pig) but T2 (10248.85 and 35648.85₦/ kg) and T3 (9873.45 and 35273.45₦/ kg) were similar ($p>0.05$) with the control diet T1. Feed cost/kilogram weight (₦/ kg), revenue (₦) and gross margin were not ($p>0.05$) significant. 25%SWAPSI is therefore, recommended for optimum revenue generation.

Keywords: Economic, Maize, Weaned pigs, SWAPSI

INTRODUCTION

Feed represents the biggest single cost that livestock/pig farmers face. Even with sheep which are ruminants that typically consumed more forage than other domestic species. Feed may represent 55 percent or higher of the total production costs (Ologhobo, 2004). Longe (2006) reported that the cost of ingredients could be as high as 80% of the total cost of production of finished feed. Maize, as an energy ingredient is a major cereal crop for both livestock feed and human nutrition (Prasanna *et al.*, 2001). Maize grain alone accounts for about 15 – 56% of the cost of pigs feed (NRC, 2012). Increasing feed cost due to competition between man and animals for cereal grains has stimulated interest in ways of making use of agricultural by-products in livestock diets. The unconventional feedstuffs are feed items, which are not normally the first choice materials for the supply of respective nutrients when formulating livestock rations (Iyayi, 2008). Therefore, to reduce feed cost, which accounts for 60 - 70% of total cost (Nworgu *et al.*, 2000), such alternatives should have comparative nutritive value and cheaper than the conventional feeds ingredients. The use of non-conventional feedstuffs as substitutes for grains and other feedstuffs have been suggested thus, the search for non-conventional feedstuffs has been the most active area of animal nutrition research in the tropical world. It is on this background information that necessitate the use of SWAPSI as an alternative feeds to reduce the cost of weaning pig production.

MATERIALS AND METHODS

Location to the Study

This study was conducted at the Livestock Complex of the Department of Animal Science, College of Agricultural Science and Technology, Lafia. The farm is located in the Southern Guinea Savannah Zone of Nigeria on Latitude 8^o28'N and longitude 8^o31'E. The average minimum temperature is 23^oC and maximum temperature is 36.9^oC. Mean monthly relative humidity is 74%. The mean annual rainfall is 823mm; the mean monthly temperature is 35.06^oC (NIMET 2010).

Sources of experimental feed ingredients and processing

SWAPSI was sourced from sugar processing industry in Numan LGA of Adamawa State. The SWAPSI collected, was sun dried for 2 - 3 days to reduce the moisture content and also to avoid the growth of mould and rancidity after which it was grinded to produced swapsi meal. Other ingredients were purchased (from bio- ingredient Ltd Abuja) such as maize, rice offal, ground nut cake, fish meal, palm oil, lysine, methionine, salt and premix.

Proximate Analysis determination of SWAPSI

Proximate composition such crude protein, dry matter, ether extract, crude fiber and nitrogen free extract of swapsi were determined using the procedure outlined by (AOAC, 2010) as described by (Alu *et al.*, 2018). See Table 1.

Table 1. Percent proximate composition of swapsi

Parameters (%)	Values
Crude protein	7.16
Ether extract	5.62
Crude fibre	21.06
Ash	4.12
Moisture	4.13
Nitrogen free extract	57.91
Metabolizable energy kcal/ME	277.51

Experimental diets

The experimental diets was designed to be isonitrogenous (20% crude protein) and isocaloric (2900kcal/kg ME) for the weaner pigs with four (4) levels inclusion of the SWAPSI (0, 25, 50 and 75%) that replaced maize as source of energy. T1 will contain 0% SWAPSI serves as control, T2 contains 25% SWAPSI, T3 contain 50% SWAPSI, and T4 contains 75% SWAPSI for weaner pig's production. The feed was balanced to meet the nutrients requirement of pigs as thus presented in Table 2.

Table 1. Percent ingredients composition of the experimental diets for weaner pigs

Parameters	Percent inclusion of SWAPSI			
	T1 (0%)	T2 (25%)	T3 (50%)	T4 (75%)
Maize	28.00	21.00	14.00	7.00
SWAPSI	0.00	7.00	14.00	21.00
Maize bran	35.00	37.00	38.00	38.50
Rice bran	3.00	1.00	0.00	0.00
Groundnut cake	25.00	25.00	25.00	25.00
Palm oil	4.00	4.00	4.00	4.00
Bone meal	1.00	0.50	0.50	0.50
Blood meal	3.00	3.00	3.00	3.00
Lysine	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00
Probiotics	+	+	+	+
Toxin binders	+	+	+	+
Acidifiers	+	+	+	+
Calculated analysis				
Energy	2920.74	2911.25	2933.45	2931.84
Protein	20.41	20.46	20.40	20.28
Crude fibre	5.53	7.01	8.37	9.65
Ether Extract	8.14	8.19	8.26	8.38
Ash	2.73	2.57	2.58	2.78
Calcium	0.67	1.03	1.58	2.12
Phosphorus	0.42	0.58	0.82	1.08
Lysine	0.92	0.96	1.00	1.04
Methionine	0.45	0.46	0.47	0.48

SWAPSI= solid waste of sugar industry; The vitamin- mineral premix supplied the following per 100kg of diet: vitamin A15,000 I.U, vitamin D3 300,000 I.U.,vitamin E 3,000 I.U., vitamin K 2.50mg, vitamin B₁ (thiamin) 200mg, Riboflavin (B₂) 600mg, pyridoxine (B₆), Niacin 40.0mg, vitamin B₁₂ 2mg, Pantothenic acid 10.0mg, folic acid 100mg, Biotin 8mg, choline chloride 50mg, anti-oxidant 12.5mg, manganese 96mg, zinc 6mg, Iron 24mg, Copper 0.6mg, Iodine 0.14mg, Selenium 24mg, cobalt 214mg. Using Feedwin software version 1.01

Experimental animals and their management

Twenty four (24) land race male piglets of and average live weight of (6.02-6.91kg/pigs) were purchased from commercial pig's farm and reared in an open- sided pig pen. Before the arrival of pigs, pens were well fumigated, disinfected and equipped with feeders and drinkers throughout the period of the experiment. Piglets were fed with experimental diets and drinking water were provided to them *ad-libitum* and other routine management practices were adopted as outlined by Alu *et al.* (2009) throughout the experimental period.

Experimental design

Pigs were randomly assigned into a test diets (4) treatment in a Complete Randomized Design (CRD) with 3 replicates having 2 pigs per replicate. The following statistical model was used: $Y_{ij} = U + A_i + e_{ij}$ where Y_{ij} =individual observation, U = population mean, A_i = effect of factor A, and e_{ij} = experimental error.

Economic of production and data analysis

The cost per kg of the diet was calculated by multiplying the percentage composition of the feedstuffs with the prevailing price per kg of each feedstuff and summing all. Total feed intake and cost per kg of feed was used to calculate the total feed cost. Feed cost per kg weight gain was calculated by multiplying feed conversion ratio (FCR) with cost per kg diet. Data were subjected to analysis of variance (ANOVA) appropriate for completely randomized design using the General Linear Model procedures of SPSS (2007). Statistical significance was assessed at $P < 0.05$ (95% confidence) while means were separated using Duncan's Multiple Range Test.

Result and Discussion

The result for the effect of SWAPSI on economics of production of weaned pigs is shown in Table 3. The result indicated significant ($p < 0.05$) reduction in the cost of feed consumed from T1 (10518.07₦/kg) to T4 (9084.14₦/kg) and total cost of production T1 (35918.07₦/ pig) to T4 (34484.14₦/ pig) but T2 (10248.85 and 35648.85₦/ kg) and T3 (9873.45 and 35273.45₦/ kg) were similar ($p > 0.05$) with the control diet T1 for CFC and TCP ₦/kg respectively. Feed cost/kilogram weight (₦/ kg), revenue (₦) and gross margin were not ($p > 0.05$) significant. However, higher ($p > 0.05$) values for revenue and gross margin were recorded at 25%SWAPSI included diets for weaning pigs. The reduction ($p < 0.05$) in the cost of feed consumed from T1 (10518.07₦/ kg) to T4 (9084.14₦/ kg) and total cost of production T1 (35918.07₦/ pig) to T4 (34484.14₦/ pig) were due to the lower cost of SWAPSI as an industrial by-product despite the cost of transportation. Solid waste product of sugar industry (SWAPSI) was gotten freely and always available. This agreed with the general statement that must of the agro-industrial by-products are cheap, available and can reduce cost feeding livestock diets. This is in consistent with the previous report of Alu *et al.*, (2012) who reported that, sugarcane scrappings as agro-industrial by-product reduced cost production of weaned rabbits, pigs and poultry feeds. The similarities observed from T2 (10248.85 and 35648.85₦/ kg) and T3 (9873.45 and 35273.45₦/ kg) were due to the SWAPSI inclusion. This makes the animals to be produced at similar cost and thereby making revenue and gross benefit to be higher for pigs on 25%SWAPSI diet. Despite low cost of production in 75% SWAPSI, there was low revenue and negative gross margin. This is due to the inclusion of SWAPSI at high level, therefore make the pigs to reduced weight and command low price.

Table 3. Effect of SWAPSI on economics of production of weaned pigs

Parameters	Percent inclusion of SWAPSI				SEM	LOS
	0%	25%	50%	75%		
FC/KG (₦/kg)	234.77	222.42	209.79	196.79	-	-
CFC (₦/kg)	10518.07 ^a	10248.85 ^a	9873.45 ^a	9084.14 ^b	186.54	*
FC/KG WG (₦/kg)	427.21	388.45	608.66	590.07	44.66	NS
TCP (₦/ pigs)	35918.07 ^a	35648.85 ^a	35273.45 ^a	34484.14 ^b	186.54	*
Revenue (₦)	50500.00	52000.00	34500.00	33500.00	3992.00	NS

Gross margin (₦)	14581.92	16351.14	-773.45	- 984.86	3874.44	NS
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FC/KG=feed cost/kilogram, CFC= cost feed consumed, feed cost/kilogram weight, TCP= total cost of production, %= percentage, SEM= Standard error means, NS= No significant (P>0.05), LOS= Level of significant, * = significant. a, b = Means on the same row bearing different superscript differ significantly (P<0.05).

Conclusion and recommendation

It is concluded that 25%SWAPSI can replace maize in growing pig's production with lower cost and high revenue and gross margin. Therefore 25%SWAPSI is recommended.

References

- Alu, S.E., Ari, M.M., Bitrus, S.V., Eqya, I.O. (2018). Effect of toasted castor seed meal on serum biochemistry of grower rabbit supplement with or without quantum blue® enzymes. *Proceedings. 43rd Annual conference of the Nigerian society for animal production, March 18th – 22nd 2018, FUT. Owerri.*
- Alu, S.E., Ruma, R.S., Umbugadu, A.A.U.andMakinde, O.J. (2009).The effects of different dietary fibre sources on the growth performance and carcass characteristics of growing rabbits. *Proceedings 14th Annual Conference of Animal Science Association of Nigeria. Ladoke Akintola University of Technology, Ogbomoso,Oyo State, Nigeria.Pp: 390-392.*
- Iyayi, E. A. (2008). Prospects and challenges of unconventional poultry feedstuffs. *Nig. Poult. Sci. J.* 5(4), 186- 194.
- Longe, O. G. (2006). Poultry: Treasure in a chest. Inaugural Lecture, University of Ibadan, Nigeria, pp: 1-42.
- NIMET (2021). Nigerian meteorological Agency, Lafia, Nasarawa state.
- NRC. (2012). Nutrient requirements of swine. 11th rev. ed. Natl. Acad. Press, Washington, DC.
- Nworgu, F. C., Egbunike, G. N. and Ogundola, F. P. (2000). Performance and nitrogen utilization of broiler chicks fed full fat extended soybean meal and full fat soybean. *Tropical Animal Production Investigation*, 3 (1): 47-54.
- Ologhobo, D. A. (2004). Anti-nutritional factors in feeds and feedstuffs and effect of processing. Report of study at the Institute of Animal Nutrition, University of Hohenheim Stuttgart, Germany.
- Prasanna, B., Vasal, S., Kasahun, B., Singh, N. N. (2001). Quality protein maize. *Curr. Sci.* 81: 1308-1319.
- SPSS (2007). Statistical package for social science 160 Brief guide: Spssinc 233south wacker drive, 11th floor Chicago IL 60606-6412 16.