ORGAN WEIGHT CHANGES OF WEANER PIGS FED DIET CONTAINING GRADED LEVELS OF COMBINED YAM PEEL AND SWEET POTATO PEEL MEAL COMBINATION

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ABSTRACT
Nutritionists focusing on animal health in Nigeria face ongoing challenges in finding alternative feeding solutions for monogastric animals, particularly pigs. To address this, a study was conducted using 24 weaner pigs to assess the effects of incorporating a combination of yam peel and sweet potato peel meal into a maize-based diet on organ weights. The total of twenty-four pigs were divided into four dietary groups, each replicated three times, with two pigs per replicate, following a Completely Randomized Design (CRD). The diets consisted of a maize-based diet (D1) and three experimental diets where the maize was partially replaced with a combination of yam peel and sweet potato peel meal at levels of 0, 5, 10, and 15%, respectively (D2, D3, and D4). The proximate composition and gross energy content of the combined sweet potato peel and yam peel meals were as follows: crude protein: 9.11 %, ether extract 1.20 %, crude fibre 3.47 %, ash 6.89 %, dry matter 89.10 % and gross energy 3.010 Kcal/kg. Anti-nutritional factors present in the meal included hydrogen cyanide (0.23 mg/kg), phytates (0.56 %), tannins (0.46 %), and Heamagglutinins (0.47 mg/hu). Significant differences ($p<0.05$) were observed in organ weights between the control and experimental groups, except for the heart and lungs. The spleen weights did not display a consistent pattern attributable to the test ingredient. However, the liver and kidney weights of pigs fed the experimental diets were higher than those on the control diet. Nonetheless, the observed enlargement of kidney and liver suggested that weaner pigs may have limited tolerance to the test ingredient beyond 10%.
Keywords: Weaner Pigs, Organ weight, Yam peel, Sweet Potato peel

INTRODUCTION

Over the past two decades, animal nutritionists in Nigeria, particularly those focusing on monogastric animals like pigs, have grappled with the challenge of finding alternative feeding options. This quest arises from the exorbitant costs associated with traditional feed sources, which are also in high demand among humans and various industries (Onyimonyi and Okeke, 2008). One promising solution to this issue, particularly concerning energy sources, involves utilizing kitchen waste such as sweet potato and yam peels (Anakebe, 2006). These waste materials are economically viable, readily available, and lack industrial utility (Akinmutimi and Anakebe, 2008). Sweet potato peel, for instance, boasts approximately 6.3% crude protein and a metabolizable energy content of 3411 kcal/kg (Osuagwu, 2006), while yam peel meal contains 11% crude protein and provides about 2604 kcal/kg of metabolizable energy (Akinmutimi and Osuagwu, 2008). However, there remains a dearth of information regarding the combined utilization of these peel meals in the diets of weaner pigs, specifically in lieu of maize within a maize-based diet, and its impact on organ weights.

MATERIALS AND METHODS:

The study was conducted at the Piggery unit of Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria, situated at latitude 5° 28 North and longitude 7° 31 East, with an altitude of 122m above sea level (NRCRI, 2023). Twenty-four weaner pigs were randomly assigned to four dietary treatments, with six pigs in each treatment, and two pigs per replicate, replicated thrice in a Completely Randomized Design (CRD). The pigs were provided with medication against diseases, and both feed and water were supplied *ad libitum* throughout the 56-day experiment. Four diets were formulated, with the first being maize-based and serving as the control, while the test ingredient—sweet potato and yam peel meal in a 3:2 ratio—replaced 5, 10, and 15% of maize in diets 2, 3, and 4 respectively, (Table 1). The test ingredient (sweet potato/yam peel meal) and respective diets were

analyzed for proximate and gross energy using the laid down procedure of AOAC (1990). Internal organs such as liver, spleen, heart and kidney were collected and weighed with a sensitive scale. This was carried out using the procedure reported by Amaefule e*t al*. (1999). The pigs selected from each treatment were fasted overnight and weighed to obtain the actual live weight and were slaughtered by severing the jugular vein, scalded in a hot water with a temperature of about 76^{o}C and eviscerated. The internal organs were then collected and weighed. Data on organ weights underwent Analysis of Variance according to Steel and Torrie (1980), with significant means separated using the Duncan Multiple Range Test (Duncan, 1955).

Table l: Experimental diets with percentage composition and level of inclusion of sweet potato/yam peel meal

Ingredients (%)	T1	T2	T3	T4
Maize	45.00	40.00	35.00	30.00
Sweet potato peel meal	-	3.00	6.00	9.00
Yam peel meal	-	2.00	4.00	6.00
Maize offal	20.05	20.05	20.05	20.05
Soyabean meal	13.00	13.00	13.00	13.00
Palm kernel cake	13.00	13.00	13.00	13.00
Bloodmeal	3.00	3.00	3.00	3.00
Fishmeal	2.00	2.00	2.00	2.00
Bone meal	3.00	3.00	3.00	3.00
Common salt	0.50	0.50	0.50	0.50
Vit premix	0.25	0.25	0.25	0.25
Methionine	0.10	0.10	0.10	0.10
Lysine	0.10	0.10	0.10	0.10
Total	**100.00**	**100.00**	**100.00**	**100.00**
Crude protein (%)	17.9055	17.7235	17.7235	17.6325
ME (kcal/g)	2782.13	2764.92	2764.92	2747.63

Premix composition. Vit. A, 8,000, 0001.U, Vit D3, 2,000,0001U, Vit. E, 5000mg, Vit. K, 2000mg, Folic Acid, 500mg Niacin l5,000mg, Calpan 500mg, Vit. B_2, 8000mg, Vit. B_{12} 10mg, Vit. Bl 1500mg, Vit. B6 1500mg, Biotin 20mg Antioxidant, 125,000mg

RESULTS AND DISCUSSION

The proximate composition and gross energy of the experimental diets are presented in Table 2. The crude protein contents of the diets 17.30-17.60%, fall in line with the crude protein requirements for weaner pigs (Ornole *et al.,* 2008*).* The proximate composition and gross energy of combined sweet potato and yam peel meal is shown in Table 3. The result of the gross energy of 3.010kcal/g obtained clearly indicated that combined sweet potato and yam peel meal is a potential energy source. The anti-nutritional factor contents of combined sweet potato and yam peel meal determined is presented in Table 4. The anti-nutrients of the test ingredients showed that phytate 0.56% has the highest value while hydrogen cyanide 0.23mg/kg had the least.

Table: 2: Proximate composition percent and gross energy of the experimental diets.

	T1	T2	T3	T4
Crude protein	17	17.54	17.85	17.51
Ether extract	3.53	2.58	3.64	3.70
Crude fibre	3.69	3.93	4.23	4.36
Ash	5.71	5.77	5.83	6.03
Dry matter	90.16	90.27	90.33	90.24
Gross energy (kcal/g)	3.01	3.03	3.03	3.04

Table 3: Proximate composition percent of the test ingredient

Crude protein	Ether extract	Crude fibre	Ash	Dry matter	Gross energy (Kcal/g)
9.11	1.20	3.47	6.89	89.10	3.010

Table 4: Anti-nutritional factors of the test ingredients

HCN (Mg/Kg)	PHYTIC ACID (%)	TANNIN (%)	HAEMAGGLUTININ (MG/HU)
0.23	0.56	0.46	0.47

There were significant differences (P<0.05) for all the parameters measured except for heart and lungs (Table 5). The value of spleen did not follow any specific pattern that could be attributed to the effect of the test ingredient. The values for diets containing the test ingredient for liver and kidney were generally higher. This probably could be because of anti-nutritional factors resulting in extra work for these organs leading to enlargement and increase in weights, liver being a major detoxification organ and kidney the major excretory organ (Ukachukwu, 2000; Akinmutimi, 2004; Akinmutimi, 2008).

Table 5:Organ weights of weaner pigs (expressed as percentage dress weight) fed graded levels of yam peel and sweet potato peel meal combination in place of maize

Organ	T1	T2	T3	T4	SEM
Liver	4.75^{c}	6.19^{a}	5.19^{bc}	5.58^{b}	0.16
Heart	0.77	0.86	0.80	0.86	0.04
Spleen	0.26^{b}	0.32^{a}	0.32^{a}	0.27^{ab}	0.02
Kidney	0.69^{b}	0.99^{a}	0.72^{b}	0.77^{b}	0.02
Lungs	1.61	2.15	1.74	1.96	0.19

a-c treatment means in the same row with different superscripts are significantly different (P<0.05)

CONCLUSION

The findings from this study showed that there were deleterious effects on the organ weights of the weaner pigs which is the enlargement of kidney and liver of pigs placed on the test diets, thus making the control diet a superior diet.

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