PROXIMATE AND MINERAL ANALYSIS OF MUSARPORMS BASED DIET FED TO WEANER PIGS

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***Target Audience:** Animal Scientists, Poultry Farmers, Researchers*

Abstract

Plantain peels and palm oil mill slurry are often discarded as waste in the processing industry, posing a significant environmental threat. In light of the rising cost of grains used in livestock feed, this study investigated the proximate and mineral composition of MUSAPORMS (a blend of ripe plantain peels and palm oil mill slurry) fed to weaner pigs at varying levels of maize replacement. Five dietary treatments were evaluated: 0% (control), 30%, 40%, 50%, and 60% MUSAPORMS. The highest crude protein value (25.67%) was observed in the control, while the lowest (19.83%) occurred in Treatments 2 and 3. Treatment 5 (60% inclusion) did not differ significantly ($p>0.05$) from the control. Crude fiber decreased with increased MUSAPORMS, and iron content peaked at the highest inclusion level. Sodium ranged from 82.00 g/kg to 285.80 g/kg. These results support MUSAPORMS as a viable substitute for maize in weaner pig diets, with 60% inclusion level recommended as it maintained crude protein and energy values comparable to the control.

Keywords: Proximate and mineral composition, Animal feeds, MUSARPOMS, Weaner pigs, Alternative feed.

Description of the Problem

Plantain, scientifically named *Musa paradisiaca*, refers to a category of bananas that require cooking to be eaten because of their high starch content [1]. Despite differences between existing and currently marketed plantain cultivars, carbohydrates prevail as the main nutrient in their proximal composition [1]. Plantain (*Musa* spp., AAB) is a major staple in West and Central Africa, supporting over three million households [2]. Nigeria leads globally in plantain production [3]. The crop thrives in diverse environments and offers food year-round, enhancing food security. However, plantain peels and palm oil mill slurry (POMS), by-products of processing, are often discarded, causing environmental pollution [4]. With rising prices of conventional grains, their potential as livestock feed is being explored. A new feedstuff, MUSAPORMS, developed from ripe plantain peels and palm oil mill slurry, has shown promising nutritional value. Prior findings [4] revealed that MUSAPORMS (25% plantain peel + 75% POMS) recorded higher crude protein (22.17%) compared to raw plantain peels (10.69%). Fermentation further enhances its quality by reducing crude fiber and increasing protein content [5]. This study evaluates the suitability of MUSAPORMS-based diets as partial maize substitutes in weaner pig feeding.

Materials and Methods

Collection and Processing of Feed Materials: Ripe plantain peels were sun-dried (30–35°C), milled, and analyzed. Palm Oil Mill Slurry (POMS) was sourced from processors in Edo South and analyzed using [6] procedures for proximate and mineral contents.

MUSARPOMS Preparation: Following the method of [4], 250g of plantain peels (91.11% DM) and 750g of POMS (26.48% DM) were mixed thoroughly, aged for 3 days, dried, and milled.

Experimental Design and Analysis: Five diets

were formulated with 0%, 30%, 40%, 50%, and 60% MUSAPORMS replacing maize. Data were subjected to ANOVA using GENSTAT (12th Edition), and means were separated using Duncan's Multiple Range Test at 5% significance.

Results and Discussion

Proximate Composition: Table 1 shows that the control diet (0% MUSAPORMS) had the highest CP (25.67%), but Treatment 5 (60%) was not significantly different ($p>0.05$). The lowest CP (19.83%) was recorded in Treatments 2 and 3. Ether extract peaked in Treatment 1 (12.43%), with significant decreases across higher inclusion levels. Crude fiber was highest in the control (6.38%) and lowest in Treatment 4 (3.88%). NFE increased with MUSAPORMS inclusion, peaking in Treatment 3 (51.66%). The crude protein values were similar to those obtained by [4]. Ether extract values 10.29%, 10.11%,9.45%, and 8.55% were similar when compared to [7]. The crude fiber values were similar when compared to [4]. These NFE values (41.47% to 51.66%) were higher compared to those reported by [7].

Mineral Composition: Table 2 indicates significant differences ($p<0.05$) across treatments. Calcium and phosphorus levels decreased with increasing MUSAPORMS, while iron levels peaked in Treatment 5 (25.15 g/kg), indicating its mineral-enhancing effect. Sodium dropped from 285.80 g/kg in the control to 82.00 g/kg in Treatment 5. Calcium, phosphrous, and Magnesium values, when compared to [8], showed similar values. Sodium values were lower compared to [4].

Table 1: Proximate Composition of 25% *MUSARPOMS*-based diet fed to weaner pigs

Parameters	Treatment(MSP)					P-Value	±SEM
	1(%control)	2(30%)	3(40%)	4(50%)	5(60%)		
DM (%)	90.66^{a}	89.22^{b}	90.82^{a}	89.51^{b}	89.05^{b}	0.016	0.36
MC (%)	9.34^{b}	10.78^{a}	9.18^{b}	10.49^{a}	10.95^{a}	0.02	0.36
CP (%)	25.67^{a}	19.83^{d}	19.83^{c}	22.17^{b}c	23.92^{ab}	<0.001	0.74
EE (%)	12.43^{a}	10.39^{b}	10.11^{b}	9.45^{c}	8.55^{d}	<0.001	0.19
CF (%)	6.38^{a}	5.34^{b}	4.64^{c}	3.88^{d}	4.13^{d}	<0.001	0.13
Ash (%)	4.70^{a}	3.99^{c}	4.57^{ab}	4.18^{bc}	4.51^{ab}	0.02	0.13
NFE (%)	41.47^{c}	49.67^{ab}	51.66^{a}	49.71^{ab}	47.94^{b}	<0.001	0.98

^{ab} means on the same row with different superscripts are significantly ($p<0.05$) different, SEM—Standard errors of the mean, *MSP25% - 25 % MUSARPOMS*

Table 2: Mineral Composition of 25% *MUSARPOMS*-based diet fed to weaner pigs as a replacement for maize

Parameters	Treatment (MSP)					P-Value	±SEM
	1(0%)	2(30%)	3(40%)	4(50%)	5(60%)		
Ca (g/kg)	618.40^{a}	454.70^{b}	334.80^{c}	291.90^{d}	288.80^{d}	<0.001	2.12
Cd (g/kg)	0.118^{a}	0.073^{b}	0.051^{b}	0.068^{b}	0.051^{b}	<0.001	0.01
Cr (g/kg)	0.173^{a}	0.144^{b}	0.09^{c}	0.078^{cd}	0.054^{d}	<0.001	0.01
Fe (g/kg)	16.45^{d}	16.18^{d}	18.68^{c}	22.34^{b}	25.15^{a}	<0.001	0.47
K (g/kg)	974.80^{a}	886.70^{b}	714.70^{c}	707.50^{d}	623.10^{e}	<0.001	1.23
Mg (g/kg)	419.20^{a}	282.30^{b}	216.40^{c}	182.30^{d}	177.00^{e}	<0.001	1.43
Mn (g/kg)	8.12^{a}	5.36^{b}	5.12^{b}	3.24^{c}	2.84^{d}	<0.001	0.11
Na (g/kg)	285.80^{a}	192.40^{b}	116.30^{c}	88.90^{d}	82.00^{e}	<0.001	0.91
P (g/kg)	588.50^{a}	333.50^{b}	308.60^{c}	242.10^{d}	215.80^{e}	<0.001	0.91

Zn (g/kg)	12.91[a]	11.71[b]	8.59[c]	8.81[c]	7.57[d]	<0.001	0.32

[ab] means on the same row with different superscript are significantly ($p<0.05$) different
SEM—Standard errors of the mean, *MSP25% - 25 % MUSARPOMS*

Conclusion and Application

This study examined MUSARPOMS, a fermented product from ripe plantain peels, as a partial maize substitute in weaner pig diets. Inclusion levels of 30–60% gave equal or better growth than maize, with stable protein and energy, higher nitrogen-free extract, lower fiber, and improved iron. These results show that MUSARPOMS is both cost-effective and eco-friendly, turning agro-waste into a valuable feed ingredient that supports sustainable and affordable pig farming. Further trials on other pig groups are recommended to confirm its wider benefits.

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