GROWTH PERFORMANCE AND SERUM METABOLITES OF GROWING PIGS FED MICROBIAL DEGRADED CASSAVA PEEL-LEAF MEAL DIET

Akinola, O.S.[a*], Ayansola, E. I[a]., Williams[a], G.A.[b], Oso, A.O.[b], Egbeyale, L T.[a]

[a] *Department of Animal Production and Health, College of Animal Science and Livestock Production, Federal University of Agriculture, Abeokuta PMB 2240, Nigeria*

[b]*Department of Animal Nutrition, College of Animal Science and Livestock Production, Federal University of Agriculture, Abeokuta PMB 2240, Nigeria*

[a*] *Email address:bayomiola@gmail.com*

Abstract

This study was aimed to evaluate the effect of microbial degraded cassava peel-leaf blend on the growth performance and blood serum biochemistry of growing pigs. Eighteen intact male growing pigs (Landrace), weighing 44.6kg, were housed in a concrete cubicle with six pigs per treatment for six weeks. Pigs were fed ad libitum feed and water. Experimental diets were: control, microbial treated cassava peel and leaf blend and untreated cassava peel and leaf blend diets. The Cassava peel-leaf blend replaced maize at 100%. Cassava peel and leaf were mixed at ratio 5:1, allowed to ferment using Aspergilus tamari at 10.5 x 10^8 spurs/gram for five days, after which the mass was sundried to form microbial degraded cassava peel-leaf (MCPL). While the untreated cassava peel and leaf blend was tagged UCPL. Daily feed intake recorded and body weight was recorded for each treatment weekly. At the end of the experiment, blood samples were collected for serum biochemical indices. The results showed that pigs fed MCPL marginally gained more weight compared to pigs on the UCPL and control diets; and that the FCR of pig on MCPL was marginally better than those on other diets. The inclusion of cassava peel-leaf blend with or without microbial degradation had no significant (P>0.05) effect on the serum biochemical indices. It may be concluded that, feeding of microbial degraded cassava peel-leaf blend caused marginal improvement in the growth of pigs with no effect on blood serum biochemical indices.

Key Words: Pigs, microbial degraded, Growth performance, Serum metabolites, cassava peel-leaf blend

Introduction

The pig industry depends to a large extent on the availability of good quality pig feeds in sufficient quantity and at affordable price. In non-ruminant animals, such as pigs and poultry, greater proportion of cost is expended on feeding, feed representing 65-70% of total cost in intensive production system, in Nigeria and many developing countries (Apata and Babalola, 2012). As a result, alternate and cheap ingredients have been advocate, especially in the feeding of pigs. In general, the factors limiting the optimal use of alternate ingredients for monogastric animals include low palatability, often due to high levels of anti-nutritional factors (e.g. in cassava), low dry matter content (e.g. in duckweed) or high fibre content (e.g. in banana leaves and stem) and the low biological value of the protein (Khieu, 2014).

Cassava root is a rich source of energy but with low protein. Its by-products include: cassava peel, cassava leaf, cassava flour, cassava chaff and sievate. Major limitations in using cassava root is it low crude protein and presence of hydrocyanic acid (HCN). Several reports have shown that cassava leaf is high in protein, rich in lysine but low in some sulphur amino acids (Gomez and Valdivieso 1985).

Here in Nigeria, cassava peels and leaves are agricultural by product mostly discarded or fed to the local goat and sheep after the main content of the cassava product has been collected for further processing. However, their importance has not been discovered by both the local and commercial farmers in the Nigeria agro-industry (Aro *et al*., 2010; Adebayo, 2008). As such the combine use of

cassava peel and leaf in feeding of non-ruminant will assist in improving the utilization of these by-products and assist the farmer's economy.

Recent studies show that the biodegradation of by-products increase it nutritive content and reduces anti-nutritional content (Hawashi et al. 2019; Chebaibi et al. 2019). Augmenting cassava peel with other plant materials high in protein have been recommended to improve it use (Oni, 2010). Sun-drying and fermentation have been reported to reduce HCN or other anti-nutrients to tolerable level in diets (Ajagbonna et al., 1999). Therefore, this study is focused on evaluating the response of growing pig fed microbial degraded cassava peel and leaf blend diet.

Materials and Methods

The experiment was carried out at the piggery unit of the Directorate of University Farms, (DUFARMS) and at the College of Animal Science and Livestock Production Farm, Federal University of Agriculture, Abeokuta, Alabata, Ogun State, Nigeria. The site is situated in the derived savanna zone of the Southwestern Nigeria on Latitude $7^0$9' 39N and $3^0$20' 54E and 76m above sea level. The Mean Annual Rainfall is 1040mm and occurs from March to October, temperature average is 34.0C throughout the year.

Cassava root peels was collected from a reliable local cassava processing factory in Abeokuta and cassava leaves without petioles were sourced, sun dried. The two by-products were mixed at ratio 5:1 of cassava peel to leaves; degraded using microbial action *(Aspergilus tamari*) under anaerobic condition in a closed PVC nylon and container for 5 days; and then sun-dried. Table 1 show the gross composition of the experimental diet. Eighteen Male Land race pigs, weighing 44.6kgwere used Each treatment was allotted six pigs and given *ad libitum* feed and water six weeks. Daily feed intake and weekly weight of each pig, in each treatment, were recorded. Blood for serum biochemistry was collected at the end of the study and put in plane tube and analysed for Total protein, Albumin, Globulin, Cholesterol, Urea, Aspartate Aminotransferase (AST), Alanine Aminotransferase (ALT), Alkaline Phosphatase (ALP) and Creatinine. Data were subjected to one-way analysis of variance in a completely randomized design using MINITAB 17. The difference among means was separated using Tukey krammer mean comparism procedure.

Results and Discussion

The effect of microbial degraded blend cassava peel-leaf meal on growth performance of growing pigs is shown (Table 2). The final weight gained of pigs fed MCPL was not significantly ($P>0.05$) improved compared to those on UCPL and the control diets. The feed conversion ratio of pigs on MCPL diet was not significantly ($P>0.05$) improved above those on other diets. Adeyemi et al. (2014) obtained similarity in values for all indices of performance for maize based diet and diet containing 50% replacement of maize with naturally fermented cassava peel and leaf meal for rabbit.

Table 1: Gross composition of experimental diet

Ingredients (g/kg)	Control	MCPLF	UCPLF
Maize	40.00	0.00	0.00
Microbial degraded Cassava Peel and leaf blend	00.00	40.00	0.00
Untreated Cassava Peel and leaf blend	00.00	0.00	40.00
Palm kernel Oil	1.00	4.50	3.50
Soyabean meal	17.00	18.00	19.00
Groundnut Cake	8.00	10.00	11.00
Palm Kernel Cake	11.00	10.00	10.00
Wheat offal	18.00	12.50	11.50
Bonemeal	3.00	3.00	3.00
Limestone	1.00	1.00	1.00
Salt (NaCl)	0.25	0.25	0.25
Lysine	0.25	0.25	0.25
Methionine	0.25	0.25	0.25
Premix	0.25	0.25	0.25
Total	**100**	**100**	**100**
Nutrients Composition			
Metabolisable energy (Kcal/kg)	2588.00	2516.00	2588.25
Crude protein (%)	19.16	19.68	19.29
Ether extract (%)	3.88	2.97	3.83
Fibre (%)	4.90	9.26	7.68

Microbial diet has 10.5 X 10^8 spurs/gram of *Aspergilus tamari* and untreated diet contains no inoculum culture.

Table 2: Growth performance of pigs fed microbial degraded cassava peel leaf meal diet.

Parameters	Control	MCPL	UCPL	SEM	P VALUE
Initial weight (kg)	44.00	43.50	45.00	3.970^{NS}	0.983
Final weight (kg)	65.83	67.17	66.83	1.890^{NS}	0.944
Weight gain per day(kg)	0.45	0.48	0.45	0.011^{NS}	0.274
Feed intake per day (kg)	2.18	2.14	2.20	0.118^{NS}	0.923
Feed Conversion Ratio	4.25	3.79	4.28	0.289^{NS}	0.408

SEM = Standard Error of mean; NS = Not Significant

Slight increase in final weight and weight gain observed with pigs fed diet containing MCPL. Solid state fermentation has been reported to enhance the nutrient content of foods through the biosynthesis of vitamins, essential amino acids and proteins by improving protein quality and fibre digestibility (Achinewhu et al., 1998). The slightly reduced feed intake can be explained by the higher water holding capacity of cassava peel-leaf by-product (Ngoc et al., 2013), which invariably increases the bulk density of the feed (Kyriazakis and Emmans, 1995). Fermented by-products may add some probiotic effects, which contributed to the improved FCR (Hong et al. 2016). Giang et al. (2010) reported that dietary supplementation of a lactic acid bacteria complex together with *Bacillus* and *Saccharomyces* to growing-finishing pigs improved FCR.

The effect of microbial degraded cassava peel, leaf meal on the serum biochemical parameters of growing pigs is shown on Table 3. The result revealed that there was no significant (P>0.05) effect of diets on the on serum biochemical parameters of pigs. Blood total protein ranged from 7.4 – 7.8 g/dl, Aspartate amino transferase (AST) value ranges from 36-38 U/L and Alanine amino transferase (ALT) 33-38 U/L.

Table 3: Effect of microbial degraded cassava peel leaf on the blood serum

Parameters	Control	MCPLF	UCPLF	SEM	P VALUE
Total protein (g/dl)	7.42	7.89	7.54	0.724^{NS}	0.897
Albumin (g/dl)	3.86	4.48	4.88	1.090^{NS}	0.809
Globulin (g/dl)	3.56	3.41	2.66	0.698^{NS}	0.642
Cholesterol (g/dl)	76.10	110.20	84.50	12.40^{NS}	0.207
Urea (mg/dl)	3.24	5.10	3.48	1.110^{NS}	0.483
AST (U/L)	38.00	36.33	38.00	5.620^{NS}	0.971
ALT (U/L)	38.67	39.00	33.00	3.910^{NS}	0.514
ALP (U/L)	51.33	39.67	40.00	5.600^{NS}	0.316
Creatinine	0.65	0.75	0.57	0.495^{NS}	0.119

Aspartate Aminotransferase (AST), Alanine Aminotransferase (ALT), Alkaline Phosphatase (ALP)

SEM= Standard Error of Mean; NS = Not Significant

The serum total protein and albumin of the growing pigs in this study were not affected by the diets in the three treatments. Gouache *et al.* (1991) reported albumin to be specifically influenced by protein shortage.

No significant (P>0.05) effect was observed in serum creatinine value with the imposed treatment. Ehebha and Eguaoje (2018) reported no significant difference in creatinine values of broiler fed varying dietary levels of sundried cassava peel meal supplemented with enzyme (Maxigrain). This indicate that no muscular wastage result from the use of cassava peel-leaf blend.

Conclusion and Recommendation

Microbial degradation caused marginal improvement of all growth performance parameter measured, except slight decrease in feed intake. All Serum indices measured indicated no adverse effect of microbial degraded cassava peel-leaf on the availability of nutrient for normal function of the growing pigs.

It is recommended that the utilization of cassava peel-leaf meal can be improve the adoption of microbial degradation.

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