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### Impacts of Different Herbal-Mix Feed Additives on Nutrient Digestibility of Growing Pigs

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#### Abstract

This study was carried out with the aim of investigating the nutrient digestibility and bowel transit time of growing pigs on different herbal-mix feed additives. Twenty Seven, 8 weeks old Large White breed of pigs with an average body weight of  $15.33 \pm 0.2$  kg were randomly assigned to three treatments (Basal diet, Basal + Moringa-Basil and Basal + Neem-Basil Leaf Meals) with each treatment consisting of three replicates of three pigs each. On the 12<sup>th</sup> week of the experiment, three pigs were selected from each treatment and arranged in a clean disinfected metal metabolic cage. A 7 day adaptation period followed a 5 day of quantification of feed intake and excreted faeces. Faeces were quantitatively collected, homogenized and dried in a forced air cabinet. The faeces and diets were milled to 2 mm and analyzed for proximate composition following standard protocols.. Results obtained shows that all nutrient digestibility parameters considered in this present study were not significantly ( $p > 0.05$ ) influenced by herbal-mix feed additives except ash digestibility. Pigs on ration containing no herbal-mix and Moringa-Basil leaf meals had comparable ash digestibility values (80.69 and 80.52%) that differed significantly ( $p < 0.05$ ) from 60.04% noted for pigs on Neem-Basil leaf meal diet. Herbal-mix feed additives can be included in the ration of growing pigs in order to boost the mineral digestibility of the ration.

**Key words:** Herbal, feed additives, nutrient digestibility, pig, transit time

#### Introduction

In order to reduce the high cost of feeding, pigs can be maintained with alternative plant sources that are nutritional and medicinal in nature rather than conventional feed ingredients in the tropics and subtropics. *Azadirachta indica* (NLM), *Moringa oleifera* (MOLM) and *Ocimum gratissimum* (OGM) are among the leaf meals that could be used as feed ingredients in commercial livestock production in the tropics (Abou-Elezz *et al.*, 2011). The NLM and MOLM are distinguished by its high protein contents, which range from 13% to 34% crude protein (CP) in NLM and 15% to 30% in MOLM on dry matter basis; additionally *Moringa oleifera* have an acceptable profile of essential amino acids, vitamins and minerals (Odetola *et al.*, 2012). Basil leaf is available in Nigeria throughout the year because it is a perennial crop. Over the past few years' aromatic plants and their extracts have been used in animals' diets as feed additives in order to improve their performance, health and the quality of their products. The use of aromatic plant is based on the wide range of their antimicrobial, antioxidant, and anti-coccidiostatic properties (Ly, 2008).

This present study is aimed at exploring the potentials in the use of these herbal-mixes in the nutrient digestibility of growing pigs.

#### Materials and Methods

The experiment was carried out at the Piggery Unit of the Directorate of University Farms, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria. Twenty-seven Large White breed of growing pigs with the body weight of 14.44 - 16.22 kg were bought from a commercial farm within Abeokuta metropolis. The pigs were grouped based on their body weight into 3 treatment groups with 3 replicates of 3 pigs per replicate. Three pigs in a replicate were housed together in a naturally ventilated pen with floor dimension of 4 m by 3 m, equipped with concrete feeding and drinking troughs. Routine management practices were done on daily basis, with fresh water supplied *ad libitum* throughout the experimental period. Pigs on treatment one

were fed a basal diet that had no herbal-mix throughout the period, while those on treatments two and three were offered daily ration that contained herbal-mix feed additives (Moringa-Basil and Neem-Basil leaf meals, respectively). Three experimental diets were formulated and fed to the pigs based on their treatment group, the composition and analysed nutrients of the ration is shown in Table 1

**Table 1: Percentage composition of experimental diets of growing pigs**

| Ingredients             | No herbal-mix | Neem-Basil additives | Moringa-Basil additives |
|-------------------------|---------------|----------------------|-------------------------|
| Maize                   | 50            | 50                   | 50                      |
| PKC                     | 10            | 10                   | 10                      |
| Basil Leaf              | 0             | 2                    | 2                       |
| Moringa leaf            | 0             | 0                    | 10                      |
| Neem leaf               | 0             | 10                   | 0                       |
| Soybean meal            | 18            | 8                    | 8                       |
| GNC                     | 9             | 7                    | 7                       |
| Fish meal               | 2             | 2                    | 2                       |
| Wheat offal             | 6.9           | 6.9                  | 6.9                     |
| Bone meal               | 3             | 3                    | 3                       |
| Lysine                  | 0.3           | 0.3                  | 0.3                     |
| Methionine              | 0.25          | 0.25                 | 0.25                    |
| *Premix                 | 0.3           | 0.3                  | 0.3                     |
| Salt                    | 0.25          | 0.25                 | 0.25                    |
| Total                   | 100           | 100                  | 100                     |
| Calculated analysis (%) |               |                      |                         |
| ME (Kcal/Kg)            | 2834.59       | 2541.99              | 2805.9                  |
| Crude protein           | 20.90         | 18.87                | 17.60                   |
| Ether extract           | 4.56          | 4.84                 | 4.49                    |
| Crude fibre             | 4.68          | 6.4                  | 5.56                    |
| Ash                     | 3.05          | 3.54                 | 3.1                     |

\*To supply the following per kg diets; VitA 12600 IU; vit D3 2800 IU; vit E 49 IU; vit k 32.8mg; vitB1 1.4mg; vit B2 5.6mg; vit B6 1.4 mg; vitB12 0.014 mcg; Niacin 21 mg; Pantothenic acid 14 mg; Folic acid 1.4 mg; Biotin 0.028 mg; Choline chloride 70 mg; Manganese 70 mg; Zinc 140 mg; Iron 140 mg; Copper 140 mg; Iodine 1.4 mg; Selenium 0.28 mg; Cobalt 0.7mg; Antioxidant 168 mg

### Data Collection

On the Twelve weeks of the experiment, three pigs were selected from each treatment and arranged in a clean disinfected metal metabolic cage. A 7 day adaptation period followed a 5 day of quantification of feed intake, excreted faeces. Faeces were collected quantitatively and stored in a freezer until analysed. After the collection periods, faeces were thawed and homogenized and dried in a forced air cabinet. The oven dried faeces and feed materials were milled to 2mm and analysed for proximate composition as described by AOAC (2000) protocols. Digestibility of nutrients in the experimental diets was determined using the formula:

$$\text{Nutrient Digestibility} = \frac{\text{Nutrient in feed (g)} - \text{Nutrient in faeces (g)}}{\text{Nutrient in feed}} \times 100$$

### Statistical Analysis

Data were processed by one-way analysis of variance using SAS (2000) package. Significantly ( $p < 0.05$ ) different means among variables were separated using New Duncan's Multiple Range Test as contained in the same package.

## Results

The effect of herbal-mix feed additives on nutrient digestibility of growing pigs is shown in Table 2. All nutrient digestibility parameters considered in this present study were not significantly ( $p>0.05$ ) influenced by herbal-mix additives except ash digestibility. Pigs on ration containing no herbal-mix and Moringa-Basil leaf meals had comparable ash digestibility values (80.69 and 80.52%) that differed significantly ( $p<0.05$ ) from 60.04% noted for pigs on Neem-Basil leaf meal diet. Slightly increase ( $p>0.05$ ) in crude protein digestibility of pigs on ration containing Moringa-Basil leaf meal over others on diets containing no herbal-mix and Neem-Basil leaf meal was noted. Pigs on Moring-Basil ration had the highest numerical ( $P>0.05$ ) crude fibre digestibility (59.32 %) followed by pigs on control ration while the least crude fibre digestibility was documented for pigs on ration containing Neem-Basil leaf meal. Dry matter digestibility followed the same trend with crude fibre digestibility. The ether extract digestibility of pigs on ration containing Neem-Basil leaf meal was highest ( $p>0.05$ ) compared to the value obtained for pigs on ration containing Moringa-Basil leaf meal and zero herbal-mix feed additives.

Table 2: The effect of herbal-mix feed additives and weight asymmetry on nutrient digestibility of pigs

| Parameters    | N.H                     | M.B                     | N.B                     | HHW         | HLW         | HW          |
|---------------|-------------------------|-------------------------|-------------------------|-------------|-------------|-------------|
| Crude protein | 58.19±6.01              | 68.10±5.57              | 48.44±11.43             | 66.14±4.69  | 55.35±7.78  | 53.24±11.61 |
| Crude fibre   | 47.60±5.88              | 59.32±7.91              | 38.90±8.36              | 40.46±7.22  | 48.27±7.27  | 57.10±8.73  |
| Ash           | 80.69±2.48 <sup>a</sup> | 80.52±3.41 <sup>a</sup> | 20.04±8.18 <sup>b</sup> | 63.67±12.77 | 62.87±11.86 | 54.72±16.13 |
| Dry matter    | 54.48±5.90              | 57.75±10.26             | 50.50±9.57              | 49.88±7.95  | 56.93±7.65  | 55.93±10.46 |
| Ether extract | 10.71±5.68              | 25.57±8.17              | 29.80±8.83              | 19.58±6.05  | 20.69±8.54  | 25.82±8.48  |

<sup>a, b</sup>Means with different superscripts on the sample row are significant ( $p<0.05$ ) different.

## Discussion

This present study revealed that herbal-mix feed additive had no positive impact on nutrient digestibility parameters except ash digestibility. The slight increase in crude protein and crude fibre digestibility of pigs on ration containing mixture of Moringa-Basil leaf meal over other treatment groups, although not significant could suggest a positive influence of active substances present in the mixture of Moringa and Basil leaf meals on the metabolism of growing pigs leading to improved digestive processes and nutrient metabolism (Lin *et al.* 2000, Cullen *et al.* 2005). This result is in tandem with the report of Chen *et al.* (2005) that noticed statistical similar values in crude protein and dry matter digestibility of pigs fed ration containing complex probiotics. Moringa leaves have been reported to provide a suitable protein source for ruminant and monogastric livestock (Soliva *et al.*, 2005). However, it is in variance with the study of Maxwell *et al.* (1983) that reported statistically improvements of crude protein and organic matter digestibility in pigs fed diets containing probiotic. The similarity in digestibility coefficient of CF observed in this study could therefore be attributed to ingredient matrix of the diets, levels of fibre and individual variations among the pigs fed the treatment diets. The significant differences noted in ash content can be associated with the rate of passage of digesta in the gastrointestinal tract. Jimenez-Moreno *et al.* (2010) reported that the presence of dietary fibre increases the rate of digesta passage which in turn impairs the rate of nutrient digestibility resulting to low ash digestibility. The high fibre content and presence of anti-nutritional factors in a diet containing a mixture of Neem and Basil leaf meals could have contributed to low ash digestibility in this present study. Caperna *et al.* (1991) asserted that growth hormone treatment enhanced ash accretion in muscle. Fibre utilization by pigs has been reported to be influenced by the physical and chemical composition of the diet, level of feeding, age and weight of animal, adaptation to the fibre diet and individual variation among the pigs (Morel *et al.*, 2006).

**Conclusion:** Herbal-mix feed additives positively influenced ash digestibility of growing pigs. Hence, the integration of herbal leaf meal in the ration of growing pigs can be adopted to enhance mineral utilization.

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