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Growth Response and Cost Benefits of Growing Pigs to Different Herbal-Mix Feed Additives

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Abstract
This study was carried out with the aim of investigating growth performance and cost benefits 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 ± 0.2 kg was randomly assigned to three treatments (control diet, diets containing Moringa-Basil and Neem-Basil Leaf Meals mixtures) with each treatment consisting of three replicates of three pigs each. The Moringa-Basil and Neem-Basil leaf meals mixtures were in the ratio of 10 to 2; that is ten percent (10%) Moringa or Neem to two percent (2%) Basil. Data collected were subjected to one-way analysis of variance. Pigs on control diet had the highest final weight (49. 44, 43.22, 40.67 kg) and daily weight gain (515.87, 401.59, 388.89 g/pig) and the best feed conversion ratio (3.56, 4.59, 4.23) when compared to the values documented for pigs on ration containing different herbal-mix feed additives. The least total feed cost and revenue per pig were noted for pigs on Neem-Basil dietary treatment while the highest values were documented for pigs on control ration. It can be concluded from this study that performance indices of growing pigs were affected by the dietary inclusion of herbal-mix feed additives. Hence, it can be integrated into growers ration in order to lower production cost.

Key words: herbal, feed additives, growth indices, pig, cost

Introduction

The resistance of antibiotic organism associated with the misuse of antibiotics in farm animals and the risk of transfer of antibiotic-resistant genes to human pathogens calls for attention. Restriction on the use of in-feed antibiotics in many countries has fuelled the interest in alternative products (Windisch, *et al.,* 2008). Phytogenic feed additives are substances derived from plants. The consumption and demand for medicinal plants as phytogenic substances have been adopted in many countries because of low cost, easy availability, affordability for a common farmer, good antimicrobial ability, reduced diseases associated with risks, lowering blood cholesterol level and diversified functions in improving performance, growth rate, feed conversion rate and weight gain in domestic animals (Lewis *et al.,* 2003). Probiotics were developed as alternatives to the use of antibiotics as growth promoters, and incorporated in animal feed as a potential tool for reducing intestinal contamination with disease-causing and food-borne bacteria. Various plants parts and extracts have been studied for their antimicrobial abilities (Griggs and Jacob, 2005). Most studies on the utilization of phytogenic feed additives have been on poultry and rabbits. It is therefore of good reasoning to investigate the use of mixtures of Moringa leaf, Scent leaf and Neem leaf meals in the ration of growing pig.

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 a 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	Diet 1 (Control)	Diet 2 (Neem/ Basil)	Diet 3 (Moringa/ Basil)
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 (%)			
Metabolizable energy (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; Vit.A 12600 IU; vit D3 2800 IU; vit. E 49 IU; vit. k 32.8mg; vit.B1 1.4mg; vit. B2 5.6mg; vit. B6 1.4mg; vit. B12 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 1.4m g; Selenium 0.28 mg; Cobalt 0.7 mg; Antioxidant 168 mg

Data were collected on daily feed intake and weekly weight gain of the growing piglets while feed conversion ratio would be calculated. The initial weight of the animals was taken at the commencement of the experiment and subsequently on weekly basis to determine the change in their body weight. Weight gain (g) = Final weight – Initial weight. Feed intake was determined by taking the difference between the quantities of feed offered to the animals and feed leftover. Feed Intake (g/day) = Feed offered – Feed leftover. While Feed conversion ratio was determined by relating the feed intake to the weight gained of the animals. The prevailing market price of the ingredients at the time of study was used to calculate:

$$Cost\ per\ kg\ feed = \frac{\text{Summation of price per kg of feed ingredients x their proportion in the ration}}{100}$$

Data were processed by one-way analysis of variance using SAS (2002) 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 diets containing herbal-mix feed additives on growth performance of growing pigs is shown in Table 2. The final weight, total weight gain, daily weight gain, feed conversion ratio, feed cost per pig and revenue per pig were significantly ($p<0.05$) influenced by the dietary inclusion of herbal-mix. Diet without herbal-mix (control) had the highest ($p<0.05$) final weight, total weight gain and daily weight gain compared to those on other dietary treatment. Pigs fed diets containing Neem-basil additives had the least ($p<0.05$) final weight value of 40.67 kg. Pigs fed diets containing herbal-mix irrespective of type had a similar ($p>0.05$) total weight gain and daily weight gain. The feed conversion ratio of pigs fed control diet was better than those on diets containing moringa-Basil. While pigs on Neem-Basil mix had a similar ($p>0.05$) feed conversion ratio compared to those on control and Moringa-Basil diets. The feed cost and revenue per pig were higher in pigs fed diets without herbal-mix additives when compared to those fed diet containing Neem-Basil leaf meal.

Table 2: Effect of herbal-mix feed additives on growth performance and cost benefits of pigs

Parameters	No herbal additives	Moringa-Basil additives	Neem-Basil additives
Initial weight (kg)	15.39 ± 0.62	16.22 ± 1.02	14.44 ± 1.56
Final weight (kg)	49.44 ± 2.68^{a}	43.22 ± 2.07^{ab}	40.67 ± 1.81^{b}
Total Weight gain (kg)	36.11 ± 3.25^{a}	28.11 ± 2.77^{b}	27.22 ± 2.11^{b}
Daily weight gain (g)	515.87 ± 46.46^{a}	401.59 ± 39.59^{b}	388.89 ± 80.19^{b}
Total feed intake (kg)	122.34 ± 6.84	120.12 ± 6.93	111.28 ± 5.29
Daily feed intake (kg)	1.75 ± 0.10	1.72 ± 0.10	1.60 ± 0.08
Feed conversion ratio	3.56 ± 0.31^{b}	4.59 ± 0.47^{a}	4.23 ± 0.27^{ab}
Feed cost per pig (₦)	19520 ± 1090.61^{a}	17463 ± 1007.40^{ab}	16206 ± 770.46^{b}
Feed cost/kg weight gain (₦)	568.74 ± 49.23	667.20 ± 67.93	616.06 ± 38.68
Revenue per pig (₦)	2472.22 ± 1338.82^{a}	2161.11 ± 1033.39^{ab}	2033.33 ± 905.23^{b}
Gross margin (₦)	5202.00 ± 1254.10	4144.40 ± 743.39	4127.00 ± 902.20

^{ab} Means on the same row with different superscript are significantly different ($p<0.05$)

Discussion

The decrease in final weight and total weight gain of pigs fed ration containing herbal-mix may be as a result of phytochemicals in the leaf meal used. Leaf meals are known to contain some chemical compounds such as phenols, tannins, oxalates, phytates, saponins, alkaloids, hydrocyanide etc (Isitua *et al.*, 2015). Even though these chemical substances may have some health benefits, but they are reported to contain anti-nutrients (Nkukwana *et al.,* 2014). These feed additives have been reported to reduce nutrient digestibility and efficiency of feed utilization. The anti-nutritive factor in the leaves used in this study may have resulted in the depressed growth recorded on pigs fed herbal-mix feed additives. Khachik *et al. (*1992) reported that the presence of phytates and other anti-nutrients can reduce the bioavailability of certain nutrients, thus depress growth. Ogbuewu *et al. (*2010) reported that different bioactive components of leaf meal may be irreplaceable for depression in nutrient utilization and growth of pigs at a higher level. The non-significant effect of total feed intake and daily feed intake in all the dietary treatment suggested that the feeds were palatable and the pigs showed total acceptability irrespective of the dietary treatments. It is also suggested that the pigs were not motivated to consume more feed with the addition of herbal-mix. Voluntary feed intake has been used by Mc Donald *et al*. (1998) as a function of acceptability, palatability and utilization. Gwiazda *et al*. (1983) reported that feed deterrent, depressant reduce palatability and acceptability index. The non-significant of feed cost per

kg weight gain in this study suggest that Herbal-mix diets can be used to produce a similar result as the control diet. The high values of feed conversion ratio of pigs on a ration containing Moringa-Basil and Neem-Basil leaf meal suggested that the diets were poorly utilized by the pigs. This is evident in poor final weight gain observed in pigs on these dietary treatments. It's more expensive to raise pigs on the control diet even though the high revenue per pigs on control diet compensated for high cost of feed incurred on pigs fed control diet

Conclusion

Herbal-mix feed additives impacted final weight, weight gain and feed conversion ratio, likewise, the cost analysis revealed that pigs on ration without herbal-mix feed additives had the highest feed cost and revenue per pig compared to the cost indices of pigs on different herbal-mix dietary treatments. Hence, the inclusion levels of the herbal-mix additives should be reduced in order to enhance growth indices in the pig.

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