Growth Performance of Pigs Fed Baobab Seed Cake Based Diets

Magonka, J.M., Komwihangilo, D.M., Njau, B.G., Semuguruka, Y., Malingila, B.P. and Daniel, E.

Tanzania Livestock Research Institute (TALIRI), P.O. Box 202 Mpwapwa

Corresponding author e-mail: *magonkaj@yahoo.com*

Abstract

The effect of feeding Baobab seed cake (BSC) based diets on the growth performance of weaned pigs was evaluated. A total of 30 pigs (15 females and 15 males) crosses of landrace and large white were involved in the experiment. The inclusion levels of BSC were 0, 5 and 10% in diets 1, 2 and 3, respectively replacing sunflower seedcake (SSC). The experiment was spread in a complete randomized design with three treatments replicated twice. Initial weights were taken at the start of the study and subsequently on weekly basis for 90 days. Chemical composition of feed ingredients and experimental diets were determined. The results show that growth performance was significantly higher (P<0.05) in pigs fed on 0%BSC compared to those fed on 10%BSC. Sex had no significant (P>0.05) influence on the performance of pigs. However, males on the three diets had slightly higher weight gain than females. Feed costs per pig were higher in 0% BSC based diet and lower in 10%BSC based diet; however, weight gains were lower in 10% BSC and 5% BSC than 0%BSC diets. The inclusion levels of 5% and 10% BSC in growing pigs' diets reduced the feed cost by 2.03% and 30.58%, respectively. It can be concluded that BSC might be included in pig's diets up to 5% without compromising growth performance and minimizing feed cost. Research to validate, evaluate the effects of using high levels of BSC and when used alone in pig diets are needed. Assessing presence or absence of anti-nutritional factors, carcass and pork qualities are crucial before calling up the use of it.

Key words: Weight, treatment, diets, feed cost, inclusion level

Introduction

Feed accounts for 65- 75 % of the total cost in pig production (Morel *et al.,* 2012). Conventional feed ingredients such as protein concentrates including sunflower seed cake used in the formulation of pig diets are predicted to be in short supply in a few years to come. Major reason contributing to this shortage is price increase of conventional non ruminant feed resources which occurs during the dry season when supplies are low (Saina *et al.,* 2005). Pig producers are calling for higher pig prices to cover the increasing cost of production as feed prices rise rapidly. These economic pressures have forced animal nutritionists to search for available alternative feed ingredients to battle the rise in feed costs.

Therefore, research on low-cost and locally available indigenous feed resources is fundamental importance. In particularly, it is important to obtain information on nutritional qualities of feed resources especially those which do not attract competition with human beings and ever-expanding intensive livestock production. One such potential alternative is the use of local indigenous multipurpose tree products and byproducts, such as seed cakes and leaf meals (Alli *et al.,* 2010). The utilization of non-conventional feedstuffs especially when it encourages a shift to other ingredients that are not edible to man but readily available will reduce the cost of feed and maximize the returns from pig farming. *Adansonia digitata* (baobab) seed cake is one of the potential low-cost and locally available protein sources in livestock diets (Sola-Ojo *et al.,* 2013). This tree is native to semi arid areas of Tanzania. It produces seeds that are rich in protein (20-36%), provides some necessary fiber, vitamins C (57.31mg/100 dry

weight), minerals like calcium (677.23mg/100 dry weight), Iron (21.67mg/100dry weight) amino acids, particularly, lysine and methionine which are limited in most cereals but essential for livestock growth and development (Tairo *et al.,* 2011; Nkafamiya *et al.,* 2007; Murray *et al.,* 2001). Baobab seed cake shows high levels of nutritional composition and this is the reason for using it among other multipurpose trees.

Although *A. digitata* seed cake contains some anti-nutritional factors (such as oxalate, phytate, saponins, and tannins) their levels are generally below the toxic levels for most livestock species (Nkafamiya *et al.,* 2007). The high crude protein and essential amino acid levels in this seed cake can still be taken as an advantage at low inclusion levels to cut down the cost of pig feeds. Previous studies has done a lot in poultry particularly broilers (Sola-Ojo *et al.,* 2013; Jerry *et al.,* 2013; Bale *et al.,* 2013; Saulawa *et al.,* 2014; Chisoro *et al.,* 2018). Other studies were done in rabbits, (Abdullahi *et al,*. 2017; Oladunjoye *et al* 2014b) in guinea fowl (Mwale *et al* 2008) and in layers (Sola-Ojo *et al,*. 2011). Pigs were chosen over chickens in this study simply because little has been documented on the inclusion of baobab seed cake (BSC) in pig's diet. There is inadequate information on their effects on growth performance. The aim of this study was therefore to examine the effect of BSC on pig performance.

Material and Methods

Study area

The study was conducted on-station at Vianze TALIRI main farm about four kilometers from Mpwapwa. The farm lies at an altitude of about 1,100m above sea level. The average rainfall of 660mm varies greatly in distribution and amount from year to year. The average minimum temperature is 15.5°C, the coolest months being August and warmest month being November (30.2°C).

Experimental pigs and diets

Pigs used in the study were born in the farm whereby thirty crosses of landrace × large white weaners were used in the experiment. There average ages were three (3) months. Initial average weights were 14.30 and 16.03kg for males and female respectively.

Three experimental diets were formulated with Baobab seed cake (BSC) as shown in Table 1. BSC was obtained from pressing machines after extraction of oil. The first group was fed with a ration containing sunflower seed cake as protein source (diet 1), the second group was fed with a ration where 5% of sunflower seed cake had been replaced by BSC (diet 2) and the third group was fed with a ration where 10% of sunflower seed cake had been replaced by BSC (diet 3). All rations were balanced to satisfy the nutrient requirements of weaner pigs.

Table 1: Inclusion levels (%) of ingredients on pigs' diets

Ingredients	**% of baobab seed cake**		
	1	**2**	**3**
Maize bran	70	70	70
Sunflower seed cake	21	16	11
Baobab seed cake	0	5	10
Fish meal	6	6	6
Bone meal	1	1	1
Limestone	1	1	1
Premix	0.5	0.5	0.5
Salt	0.5	0.5	0.5
Total	**100**	**100**	**100**

Management of pigs

Pigs were housed in a house roofed with iron sheets. One side of each pen allowed pigs to access sunlight everyday. Drinking water was provided ad-*libitum*. All the animals were fed twice daily for thirteen weeks, the first week was for acclimatization to the feed and the twelve weeks for data collection. All piglets were treated for external and internal parasite prior to the experiment.

Experimental Design and Data collection

The experiment was spread in a complete randomized design with three treatments replicated twice. Proximate analysis method was conducted to determine chemical composition of BSC and the experimental diets. The feeding trial lasted for ninety (90) days. Pigs were weighed at the start of the experiment and subsequently on weekly basis. Weight gains were calculated as final live weight minus initial live weight. Feed intakes were determined as the difference between the amount of feed offered and refusals. Feed conversion ratio was calculated as feed per gain. The cost per kg of the diet was calculated by multiplying the percentage composition of the feedstuffs with the price per kg of each feedstuff and summing all. Total feed intake × cost per kg of feed gave total feed cost. Gross margin was calculated as total income minus total feed cost. Data for growth were subjected to the General Linear Model (GLM) of Statistical analysis system SAS, 2006).

Results and Discussions

The chemical composition of three experimental diets and Baobab seed cake are presented in Table 2, high fat and energy contents was noted in diets 2 and 3 which contain BSC than in diet 1.This might be attributed by inclusion of BSC in the diet. High energy content in BSC was also noted in findings reported by Nkafamiya (2007). Crude protein was found higher in diet 2 and 3 than in diet 1, however, the difference was not significant. From the proximate analysis it shows that crude fibre was high in diet 1 than in diet 2.

Table 2: Chemical composition of BSC and the experimental diets

Component	Diets			BSC
	1	2	3	
Dry matter (%)	90.72	90.55	90.39	90.70
Crude protein	15.07	15.48	15.19	22.81
Crude fibre	9.42	8.97	9.50	21.61
Ether extract	9.83	10.79	10.22	5.41
Tryptophan	0.27	0.26	0.27	0.31
Lysine	1.08	1.07	0.98	0.22
Methionine and Cystine	0.74	0.73	0.66	0.12
Energy content (ME, kcal/kg DM)	1,880.13	2,024.81	2,015.33	1,649.18

Effect of diets on growth performance

Results of the performance of the pigs used in this study are presented in Figure 1. Results showed that there is significant difference ($P<0.05$) among the diets which was mostly seen in various weeks. This could be attributed to the differences in the chemical composition among the three diets as summarized in Table 2. From week 9 to 12 there were significant differences ($P<0.05$) between diet 1 and 3. Equally, there were significant differences in growth rate during week 7 and 8 among the three diets. However, from week 1 to 5 there were no significant differences ($P>0.05$) among all the diets. This could be attributed to introduction of the new feeds.

Pigs on diet 1 had a high final body weight gain of 24.78 kg which differed significantly from a value of 20.86 kg recorded for pigs on diet 3.

Body weight gain was higher in diet 1 (control) and significantly increased from week 6 to 12. This might be attributed to higher feed intake value reported for diet 1 (Table 3). This is in line with Nahashon *et al.* (2006) and Nkafamiya *et al.* (2007) who reported that; feed intake influences body weight gain. For diets with low energy content animal tend to eat more to fulfill body requirements. This agreed with Velkamp (2005), who reported that feed intake decrease as energy content increases.

Effect of Diets on Sex

Figure 2 shows the effect of diets on sex. Results indicated no significant ($P>0.05$) difference between sex from week 1 to 5 of the three diets on weight gain. However, the weights of males in those weeks were higher than females. The effect of diets on weight gain for males and females were significantly different ($P<0.05$) in week 6 to 12 in diet 1 and 3.

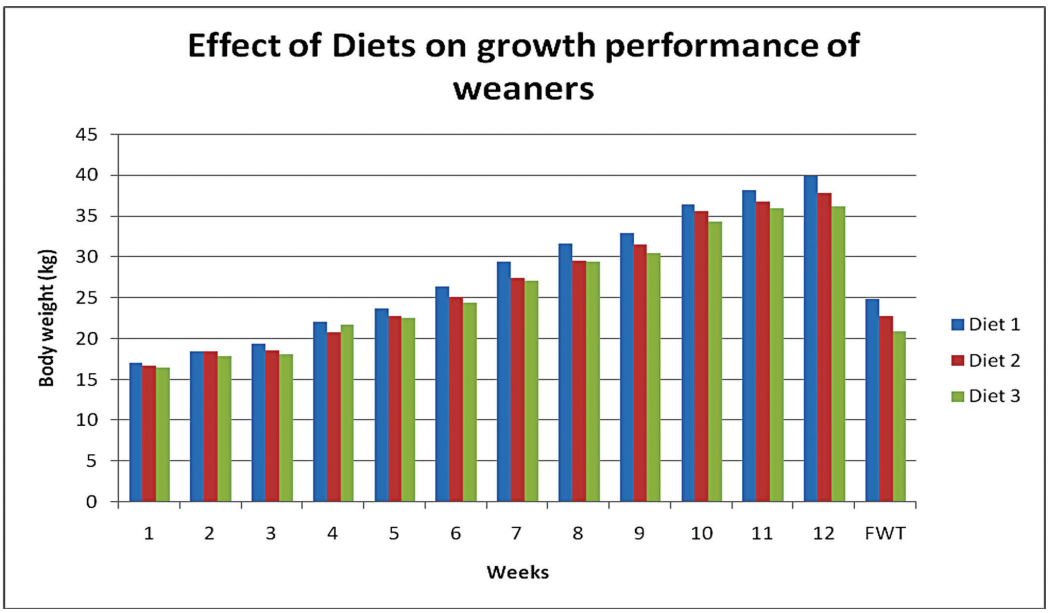

Figure 1: Effect of Diets on growth performance on weaner pigs

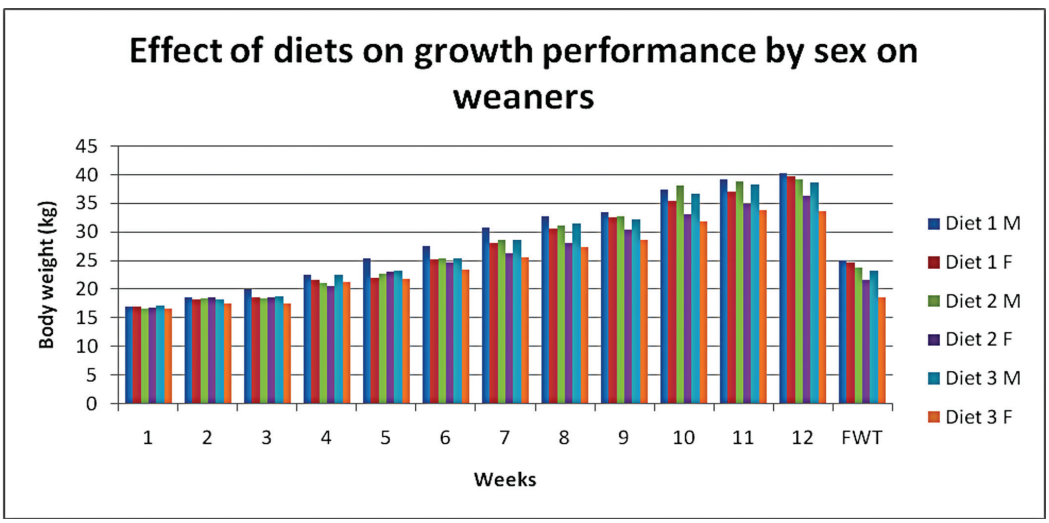

Figure 2: Effect of diets on growth performance by sex on weaner pigs

Growth performance of growing pig based of three diets

Body weight gain and average daily gain per pig were higher in diet 1 than diet 2 and 3 though the difference was not significant. Feed intakes were lower in diet 2 and 3 compared to diets (Table 3). This could be attributed to high fat and energy content of BSC reported earlier. This affect the weight gain of diet 2 and 3 which were found to be lower than diet 1.The results are in agreement with findings by Mwale *et al.* (2008,) who reported that lower feed intake are associated by high fat content in baobab seed cake. This also is in line with Nahashon *et al.* (2006) and Nkafamiya *et al.* (2007), who reported that feed intake influences body weight gain. The high feed intake, results to high body weight gain and low feed intake leads to low body weight gain.

Decrease in feed intake with high energy in diets was supported by Veldkamp *et al.* (2005) who showed that feed intake decrease linearly as dietary energy increases. Nahashon *et al.,* 2005 also reported that as dietary energy increases monogastric animals meet their energy needs by decreasing feed intake. Average income per pig were higher in diet 1 than diet 2 and 3, this might be due to high body weight gain. Feed conversion ratio was lower in diet 3 which indicates that pigs in diets 1 are efficiently turning feed into body weight. Feed cost were higher in diet 1 and lower in diet 2 and 3, this might be due to high feed intake observed in diet 1, which also lead to increase in weight gain than diet 2 and 3.

Table 3: Body weight, daily gain, feed intake, feed cost of pig based of three diets

Item	Diet 1 (0%)	Diet 2 (5%)	Diet 3(10%)
Number of pigs	10	10	10
Feed cost /kg	466.98	460.79	454.61
Initial body weight (kg/pig)	14.15a	15.20a	16.61a
Final body weight (kg/pig)	37.75a	38.00a	38.72a
Body weight gain (kg/ pig)	23.60a	22.80a	22.11a
Average daily gain (kg/pig/day)	0.26a	0.25a	0.24a
Average daily feed intake (kg/pig/day)	0.89a	0.88b	0.85c
Average feed cost (Tshs/pig/day)	414.95	406.54	384.37
Average income (per pig/day)	525.00	422.22	322.22
Feed conversion ratio	0.41	0.41	0.39

Conclusion

The present study has revealed that a BSC diet has high fat and energy content than SSC, Baobab Seed Cake might be included in pig's diets up to 5 % without compromising growth performance and minimizing feed cost. However, further research is needed to validate, evaluate the effects of using higher levels of Baobab seed cake where it may be reasonably cheap and abundant. Assessing carcass and pork qualities are crucial before calling up the use of it.

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