MON -38

Growth Performance of Weaner Pigs Fed Varying Dietary Levels of Pineapple Wine Sediment

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Abstract
This research was carried out to solve the problem of animal protein deficiency among the Nigerian populace due to high cost and scarcity of conventional feedstuffs used in Tropical livestock production and moreover, to reduce competition between human beings and monogastric animal for food. Pineapple wine sediment was used at varying dietary levels to investigate the growth performance of weaner pigs. A total of 32 weaner pigs of large white x landrace strain of average initial weight (10.50 ± 0.50 kg) were fed to T_1(0%), T_2(5%), T_3(10%) and T_4(15%) dietary inclusion levels of pineapple wine sediment meal (PWSM) for performance assessment in a completely randomized design. The trial was replicated four times and the experiment lasted for 35days. It was established from the result that PWSM could replace maize partially up to 10% dietary levels for optimum performance of weaner pigs and that at higher levels of 15% despite positive impacts on the economy of production; growth rate and feed conversion are negatively affected. Based on the above results, it is recommended that PWSM be included in the ration of weaner pigs at 10% level.

Keywords: Weaner pigs, pineapple wine sediment, monogastric animal, economy of production

Introduction

In many developing countries of the world however, there is acute shortage of animal protein due to competition between man and livestock for the available grains amidst spontaneous population and economic growth (Rosegrant and Thornton, 2008; Madubuike, 2012). The impact of this demand for food is expected to jack-up the annual meat demand from 6 to 23 kilogramme per caput worldwide by the year 2020 (Insights Development Research, 2008). The prices of eggs, meat and milk have continued to obey the law of demand and supply, by rising sharply out of the reach of the common man (Abeke *et al.,* 2013). The current scenario of low level of animal protein in Nigeria has earlier been expressed by Oyediji (2010) and Madubuike (2012); buttressing the fact that this issue has been recurrent in the Nigeria economic development. There is the need for rehabilitation of the swine industry in Nigeria so as to liberalize the consumption of pork more so as pork consumption has been stimulated in recent years because of high cost of beef, chicken, milk, and eggs.

Pineapple wine sediment meal (PWSM) is one of the industrial byproducts obtained from a major wine industry, Jacobs wines Ltd. Mgbidi, Imo State. It is obtained as a viscous residue deposited at the bottom of stock-fermenting vessels over a period of time after filtering out the pure wine. PWSM is a conglomeration of heterogeneous compatible elements which include pineapple pulp, brewer's yeast slurry, glycerin, residual sugar, caramel, bentonite, acetic acid, tannin, alcohol and stabilizers.

It is therefore ideal to assess its nutritive value so as to determine the optimal dietary inclusion level for optimum productivity.

Materials and Methods

The study was carried out at the Teaching and Research Farm of the Imo State University, Owerri which lies within the humid tropical rainforest zone of South Eastern Nigeria. The climatic data of Owerri obtained from NIMET, (2015), showed that Owerri lies within latitudes 5°45'N and 7°15'N, and longitude 6°50'E and 7°25'E with an annual rainfall range of 2400-2500mm and annual temperature range of 26°C- 29°C while relative humidity is between 70-78% annually (NIMET, 2015).

Thirty two cross-bred (Large White x Landrace) strains of weaner pigs, 8-10weeks old with average initial live weight of 10.50±0.50kg were used for the study. Pigs were acclimatized / adapted in the study area by feeding control diet and water supplied *ad libitum* for one week within which time routine management

practice notably deworming was carried out to keep endoparasites under check and oxytetracycline was also given to the pigs as prophylactics against bacterial infections. After adaptation, pigs were weighed using Salter weighing scale (0-50kg) before -the commencement of the experiment and weekly thereafter to determine the body weight changes. The pigs were divided into 4 groups of 8 weaner pigs each and fed one of the experimental diets for 35days. Each treatment was replicated four times in a Completely Randomized Design (2 weaner pigs per replicate)

Four experimental diets were formulated such that PWSM replaced maize at 0%, 5%, 10% and 15% dietary levels as T_1, T_2, T_3 and T_4 respectively. The percentage composition of the experimental diets and proximate analysis of PWSM are presented in Tables 1 and 2 respectively while the growth performance of weaner pigs is summarized in table 3. Data collected were subjected to analysis of variance and where significant differences were observed, treatment means were compared using Duncan's new multiple range test as outlined by Onu and Igwemma (2000).

Table 1: Percentage composition of the weaner pigs ration containing graded levels of PWSM

Ingredients	T_1	T_2	T_3	T_4
Pineapple wine sediment meal	0.00	2.50	5.00	7.50
Maize meal	50.00	47.50	45.00	42.50
Groundnut cake	20.00	20.00	20.00	20.00
Wheat offal	10.00	10.00	10.00	10.00
Rice milling waste	6.50	6.50	6.50	6.50
Fish meal	3.00	3.00	3.00	3.00
Palm kernel cake	7.00	7.00	7.00	7.00
Bone meal	3.00	3.00	3.00	3.00
Salt (Nacl)	0.25	0.25	0.25	0.25
Vit/min.premix	0.25	0.25	0.25	0.25
Total	100	100	100	100

Results and Discussion:

Treatment 3 and 2 recorded the highest weight gain of 400g and 350gm while the least value of 285.71g was recorded from weaner pigs on the control diet T_1.

Table 2: Proximate composition of sun-dried Pineapple Wine Sediment Meal.

Parameters	Concentration (%)
Crude Protein	22.88
Ether extract	4.43
Nitrogen free extract	53.76
Crude fibre	7.28
Ash	11.65
Metabolizable Energy (kcal/kg)	2778.24 kcal/kg.

Table 3 Performance of weaner pigs fed varying dietary Levels of PWSM as replacement for maize.

Parameters	T_1	T_2	T_3	T_4	SEM
Initial Weight (kg)	10.00^{a}	10.90^{a}	10.20^{a}	10.80^{a}	0.45
Avg. final weight (kg)	20.00^{a}	23.30^{a}	21.90^{a}	16.10^{b}	1.64
Avg. total weight gain (kg)	10.0^{a}	12.40^{a}	11.70^{a}	5.30^{b}	0.85
Daily feed intake (g)	1200^{a}	1196^{a}	1193^{ab}	1188^{b}	3.50
Daily weight gain (g)	285.71^{ab}	350.00^{a}	400.00^{a}	240.00^{b}	25.00
Feed conversion ratio (FCR)	4.20ab	3.42^{b}	2.98^{c}	4.95^{a}	0.61
Feed cost/KG weight gain (₦)	92.47^{a}	90.61^{a}	88.75^{b}	86.89^{b}	1.39
Apparent dry matter digestibility.	76.40^{b}	74.30^{a}	78.20^{b}	72.20^{a}	1.50
Feed cost/KG diet (N)	77.06^{b}	75.51^{b}	73.96^{a}	72.41^{a}	1.16

^{abc} Means along the row having different superscript differ significantly ($p<0.05$ level).

There were significant differences ($p< 0.05$) among weaner pigs fed PWSM-based diets and the control diet. The best performance of diet 3 and 2 may be due to the moderate inclusion of PWSM which contains proteolytic enzymes called bromelin which breakdown the metabolite amino acid hence stimulating healthy metabolism (Taira *et al.*, 2005). Average daily weight gain recorded in this study agrees with 0.35- 0.46kg/day recorded by Ogunsipe *et al.,* (2017) in a study where cocoa bean shell meal was substituted for maize up to 40% level in weaner pigs. Pigs on T_1 and T_2 recorded the highest daily feed intake of 1200 and 1196 gm which were however similar ($p>0.05$) to T_3 while T_4 was least consumed. The relatively high feed intake of T_1 is attributed to the nutrient dilution (Energy) accompanied by low fibre level of the diet. Animals have been reported to continue feeding until the energy requirement is met (Fang, 2007). Similar observation was recorded by Agbabiaka *et al.* (2012), when broilers were fed with tigernut meal. The results obtained from this work did not agree with the work of Taira *et al.* (2005) which stated that PWSM is an aromatic ingredient and a palatability enhancer. It appears that pigs on control diet marginally recorded the highest daily feed intake but did not efficiently convert the food into muscle. This is because T_1 did not contain bromelain, a proteolytic enzyme which catalyzes the hydrolysis of the peptide bonds of protein liberating amino acids the building blocks in the body (Heuze *et al.,* 2013). T_3 (PWSM) recorded the best feed conversion ratio of 2.98 while T_4 recorded the least conversion ratio of 4.95 which means low efficiency in conversion ($p<0.05$). The slightly higher level of fibre in diet T_4 appears to have conversely increased the level of non-starch polysaccharides in the diet and as such reduces the enzymatic action and efficiency (Luiz Lecznieski, 2008). A PWSM-based diet has vitamins, minerals and enzymes that are good for digestive system and helps to maintain ideal weight and balanced nutrition. There was a linear reduction ($p<0.05$) in feed cost as PWSM increased in the diets. Diet 4 and diet 3 appeared to be more cost effective than diet 1 and diet 2. Similar observation on cost reduction was reported by Agbabiaka *et al*. (2014), and Ogunsipe *et al.* (2017) in weaner and grower pig production experiments.

Conclusion

The results showed that in weaner pig production, that PWSM could replace maize partially up to 10% dietary levels for optimal performance and that at higher levels of 15% despite the positive impacts on the economy of production, growth rate and feed conversion ratio are negatively affected

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