



Research Paper

Investigation on the Roles of Vegetable Fibres on Lard Quality in Piggery

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ABSTRACT

The present study was intended to proffer solution to the complaint of farm managers who reported that each time a pig from the University's farm is slaughtered for the table, there will be excess fat (lard) in the pork. The study therefore was aimed at modifying the ration of the animals by feed component substitution so as to be producing pork of high quality. This was successfully achieved by partial substitution of palm kernel cake (PKC) in piggery feedstuffs with varying percentages of fibres from vegetable matter and proteins from de-fatted soy bean meal (DSBM). A formulated feed-treatment formula was prepared and given to acclimatized 25 male grower pigs for four weeks and by obeying the 100% feed formulation formula of vegetable fibres (VF), rice chaff (RC), pawpaw stem/fruit (PSF), de-fatted soy bean meal (DSBM), and percentage-varied palm kernel cake (PVPKC). The animals were sacrificed after the four-week treatment and it was observed that the post-acclimatization weights of the animals were significantly ($p < 0.05$) reduced and the lard component of the pork were also balanced by the treatment. Hence, the substitution of palm kernel cake and/or any other seed oil components of the animal feed with vegetable fibres, significantly ($p < 0.05$) reduced the fat accumulation by farm animals in the long run. The rationale here is that the presence of enough vegetable fibres in animal feed formulation mops-up the major components of the lipid profile which on accumulation increases lard.

KEY WORDS: carcass, feedpalatability, piggery, pork (lard), ration, livestock,

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I. INTRODUCTION

Animal proteins have been of immense importance in both the young and old for their overwhelming anatomical, biochemical and physiological roles in man {1}. Pork is cherished by different tribes, although some people due to religious observances do not like it. Nigeria is the highest producer of pigs in Africa {12}, followed by Southern Africa and third, Uganda who are also the largest consumer of pork in Sub-saharan Africa {4}. However, the Tiv tribe of North Central Nigeria where they locally call it (Igijo), love pork, hence, the University of Agriculture, Makurdi where this work was carried out is domicile in their soil. Pig is one of the livestock with the highest feed conversion efficiency (HFCE), {9}, and so the quality of its product- pork is very much dependent on what it was fed on. Also, Farmers have important motivation to raising pigs because they require minimal inputs in terms of family labour and feeding {15}. Pig Production in Nigeria has hitherto remained at the subsistence level due to many reasons which religious belief, worm infestation due to poor rearing systems by some farmers and acclaimed dirty habit of the animal are inclusive. Nevertheless, the advent of establishment of large farms and introduction of mechanization has been of immense assistance and has greatly presented Nigeria as the foremost producer of pigs in African continent {3}.

The Problem of low animal protein intake by some Nigerians can be solved by accelerated pig production using species that have fast growth rate, resistance to helminth infestation and excellent meat quality {25}.

Vegetable matters inform of fibres have been the essential component of both man and livestock diet/ration. The use of fibres by the digestive tract of man and livestock was dated back to the years of early man {9}. Fibres constitute about 30% of the total constituents used in making diet/ration to meeting its palatability and nutritional demands. It is a known fact that plant fibres are used in many ways by farm animals. However,

in addition to their functions; facilitation of peristalsis, absorption of excess sugars from the body and mopping-up of excess cholesterol as well as increasing feed palatability amongst farm animals help to balance our diet/ration {24}.

The potentials of agro-industrial by-products such as palm kernel cake (PKC) in animal Nutrition have not been fully exploited even when (PKC) is relatively cheap and readily available.

Also, the import of vegetable matters (fibres) having not been represented very well in feed stuff production has resulted in excess lard production in the carcass of pigs meant for the table. Hence, it has been the complaint of farm managers that each time a pig from the University's piggery is slaughtered for the table, excess fat (lard) will be present in the meat (pork). This study therefore is aimed at modifying the ration of the animals by feed component substitution so as to be producing high quality pork for the University community.

II. MATERIALS AND METHODS

2.1 Experimental Ration/Design

Five treatment ration were formulated (table 1) in which palm kernel cake (PKC) concentration was varied and substituted with vegetable fibres, (VF), Rice chaff,(RC), Pawpaw stem/fruit (PSF), De-fatted soybean meal, (DSBM) and Cassava peelings, (CP).

Group 1 Normal control VF 10% + PKC 30%

Group 2 VF 15% + PKC 30%

Group 3 VF 20% + PKC 20%

Group 4 VF 25% + PKC 15%

Group 5 VF 30% + PKC 5 %

2.2 Animal Protocol

Twenty five (25) male grower pigs were procured from the University's piggery at the College of Animal Production, North Core of the Federal University of Agriculture Makurdi, Benue State Nigeria. The pigs were allotted to the five treatment ration having five (5) pigs per group.

2.3 Experimental

Five groups of five (5) male grower pigs each of 6 weeks were weighed and fed with standard feed and water *ad libitum* for four (4) weeks and were re-weighed, after which their masses-initial and final were recorded. At the end of this period, they were started on the five (5) treatments plan of Vegetable fibres (VF), Pawpaw stem/fruit (PSF), Soy bean chaff (SBC) and Palm kernel cake (PKC), for another four (4) weeks. However, the animals were sacrificed at the end of this last four weeks after which their lard growth rate (LGR) were measured with LCD Venier Callipers for all groups, and the group mean was also calculated and recorded.

2.4 Statistical analysis: The data obtained in this study were expressed as mean \pm S.D. Test for significance between mean parameter in respect of group differences were performed using student t-test {22}.

III. RESULTS

Table 1: Modified feed component for lard reduction in piggery (in percentages)

VF	RC	PSF	DSBM	PKC
10	35	10	15	30
15	5	20	30	30
20	20	20	20	20
25	20	25	15	15
30	20	25	20	5

Key: DSBM = defatted soy bean meal
 PKC = palm kernel cake
 PSF = pawpaw stem/fruit
 RC = rice chaff
 VF = vegetable fibres

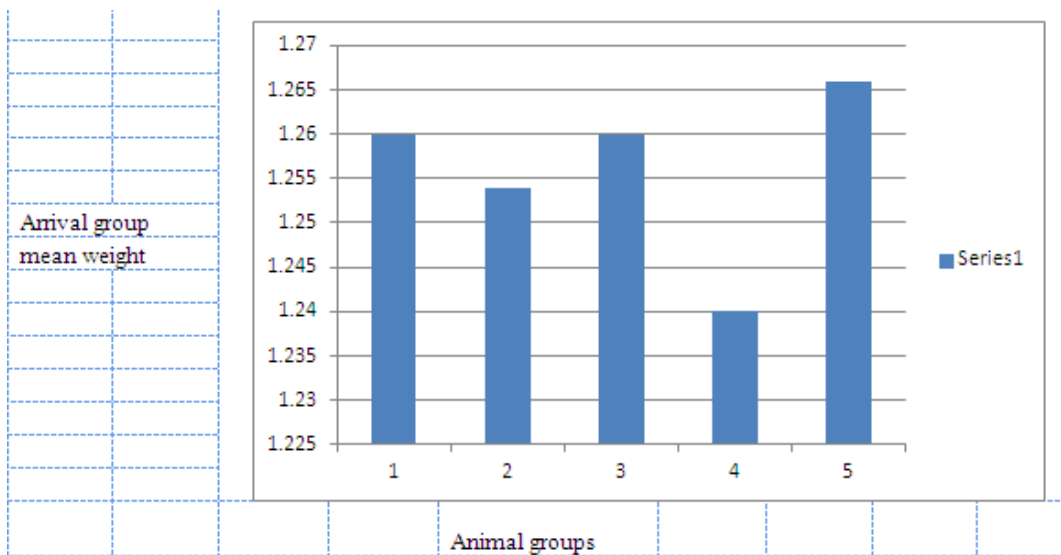


Figure 1: A chart showing the arrival group mean weight of the test animals.

Results expressed as mean \pm S. D.(n = 5)

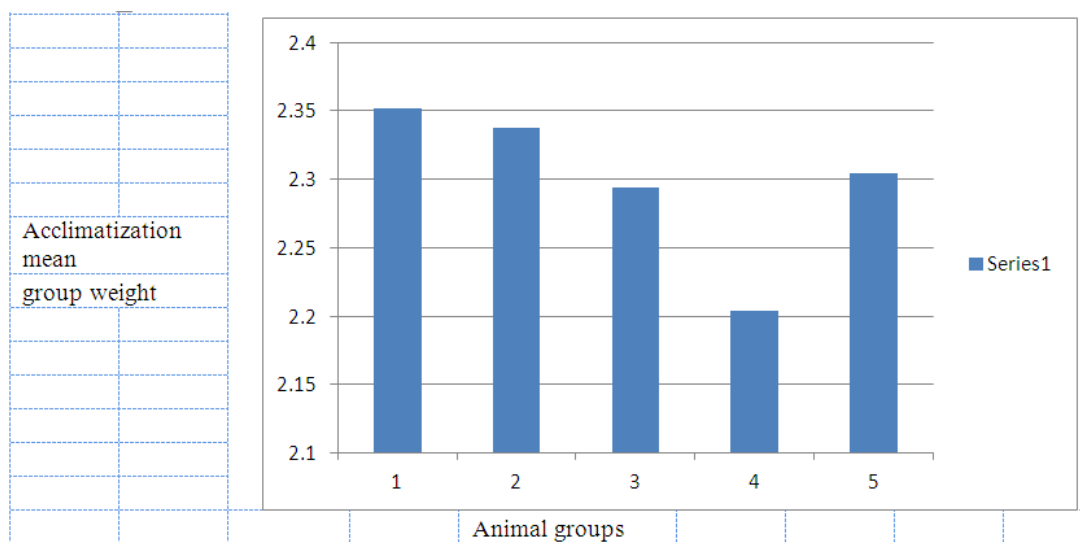
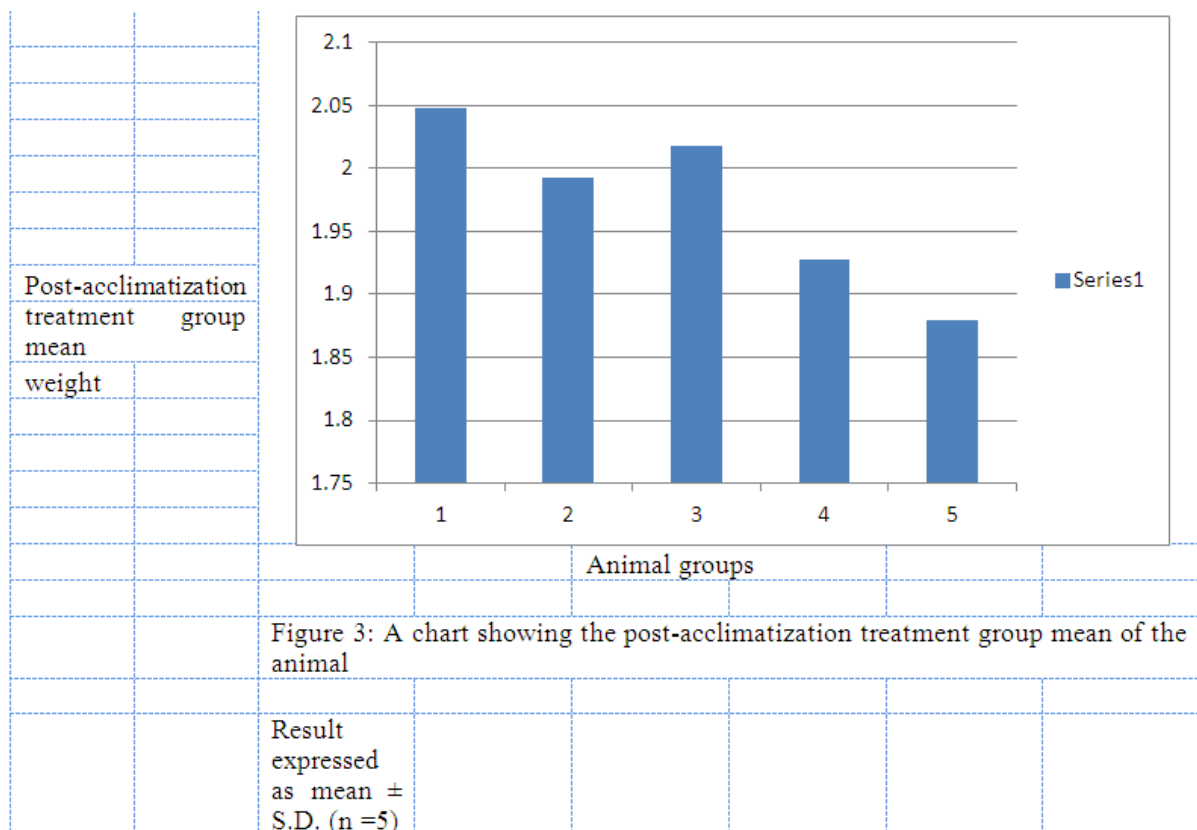


Figure 2: A chart showing the acclimatization mean weight of the test animals

Results expressed as mean \pm S.D. (n=5)



IV. DISCUSSION

Pig is the foremost livestock in animal husbandry that has the highest feed conversion efficiency {5; 9}. This in no doubt agrees with the results of {23}. In a piece of pork, the lard component is up to 80%. Thus the results show that the quantity of fats (lard) produced by a pig depends on how the feed given to it was formulated {6; 14}. Also, since the quantity of lard produced by the female animal is very much greater than that of the male, the possibility of female hormones helping in the conversion of feedstuffs to fats is suspected {10; 2}. Pork is a very good source of animal proteins, cholesterol and saturated fats, and it has a wide consumption rate. In animal nutrition, proteins serve several purposes such as tissue formation, growth and development, repair of worn-out tissues as well as helping in the processes of blood clotting where they are called essential blood proteins {16}. Lard contains saturated fat which serves essential functions of sperm cell capacitation in farm animals and also assists in the ripening of human sperm cells as well as assembling and transporting them in to the epididymis {19}. The arrival weight (AW) of these pigs showed the range of 1.22 through 1.264kg indicating that the four weeks acclimatization period produced rapid growth and appreciable weight gain in the animals. The post-acclimatization mean weight (PAMW) ranged from 2.204 kg through 2.352 kg, and thus showed that these animals were well-attended to during their acclimatization period. In groups 1 and 11, there was a sort of plateau of weight which may be attributable to equal concentrations of palm kernel cake (PKC). However, there was an appreciable decrease in the mean lard quantity (MLQ) in groups 11I,1V and V which were the groups with increasing concentrations of palm kernel cake (PKC) and vegetable fibres (VF) respectively. The results therefore showed that even in the presence of increased concentration of palm kernel cake (PKC), increasing also the concentration of vegetable fibres will in no small way reduce the mean lard quantity (MLQ) in piggery. It was also evident from the result that the weight of the pigs is directly proportional to the mean lard quantity (MLQ), hence, this agrees with the work of {16} which stated the relationship between body weight, adiposity(lard formation) and blood pressure increase. In the experimental, group1 animals have the highest value of PKC and the lowest value of VF, and so group 1 recorded the highest value of 2.048 kg. The group 2 animals have the mean lard quantity (MLQ) of 2.338 kg since there was a significant ($p < 0.05$) increase in the percentage increase of the vegetable fibre compared with the value in the control. However, group 3 animals have equal percentage of vegetable fibre and palm kernel cake, and these recorded significant ($p < 0.05$) decrease in the group mean mass (GMM) 2.018 kg of the group 3 animals when compared with the control. The group 4 animals had 25% of vegetable fibre (VF) and a reduced value of 10% palm kernel cake (PKC), and these recorded a group mean mass (GMM) of 1.928 kgs. The lowest value of PKC 10% in combination with the highest percentage of 30% vegetable fibre (VF) gave the lowest value of post-

acclimatization treatment group mean mass (GMM) of 1.88 kg. Hence, the above suggests that the higher the percentage/concentration of palm kernel cake (PKC) in the feed formulation, the higher the lard deposition in the pork. There are diverse roles of fibres in animals nutrition. They help to form bulk to the gut lumen {18; 24}. Fibres provide substrate for bacterial fermentation {23}. They also slow down the hydrolytic products of digestion {21; 7}. Outside the above roles, this study showed that vegetable fibres and animal proteins contained abundant nutrients, phytochemicals and bioactive substances that balance the formation of (lean meat/lard)-pork in piggery {11}. Using the results of the tested parameters, it was observed that careful addition of measured quantity of vegetable fibres as dominant component of animal feedstuff reduces the excess accumulation of fats in farm animals- adiposity.

V. CONCLUSION AND RECOMMENDATION

In Nigeria today, partial or total substitution of palm kernel cake or any other fats and oil source (s) in piggery feedstuff can serve as a means of diversifying and upgrading local pork production and standardize the lard quality for national animal protein demand. Also, the results of the arrival and acclimatization growth rate showed that organized feeding of animals using substituted feedstuff, produced good effects in animals meant for the table. Finally, the substituted feed formulation produced good quality pork when compared to the excess lard pork produced by unregulated feeding of pigs with oil-containing feedstuffs.

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Authors contribution

The authors confirm contribution to the paper as follows: the corresponding author conceptualized and, designed and wrote the paper, author number 2 performed the analysis and author number 3 contributed data or analysis tool.

Conflict of Interest The authors of this work has no conflict of interest whatsoever before, during and after this work.

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