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VALUE RE-ORIENTATION IN ANIMAL PRODUCTION:
A KEY TO NATIONAL FOOD SECURITY AND STABLE ECONOMY

HELD AT:

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PERFORMANCE OF GROWING RABBITS FED GRADED LEVELS OF SWEET POTATO (Ipomeq DRMANCE OF GROWING KABBITS FED GROWING WITH AND WITHOUT MOLASSES batatas) PEEL MEAL DIETS SUPPLEMENTED WITH AND WITHOUT MOLASSES A.A. Malik, Y.S. Kudu, M.J. Ibrahim, A.A. Agunbiade, and M.T. Oyedepo

A.A. IVIAIIK, 1.5. Rudu, IVI.5. Iblanding, Indiana, Pederal University of Technology, Minna, Niger State

Department of Animal Production, Federal University of Technology, Minna, Niger State Corresponding Author's e-mail: delemalik@yahoo.com

Abstract
24 growing rabbits of mixed breeds of average weight of 896±56g were fed graded levels of sweet potato peel meal 24 growing rabbits of mixed breeds of average weight of 050228. The animals were divided into 6 treatments (mith 2 (SPPM) in place of maize-based diets with and without molasses. The animals were divided into 6 treatments (with 2 (SPPM) in place of maize-based diets with and without molasses. 10% replacement of maize by SPPM replicates per treatment and 2 animals per replicate) and designated as follows: 0% replacement of maize by SPPM. replicates per treatment and 2 animals per replicate) and designation of the series of without molasses (T1); 0% replacement of maize by SPPM, with molasses (T4); 50% replacement of maize by SPPM, with molasses (T3); 25% replacement of maize by SPPM, with molasses (T6). The diets were by without molasses (T3); 25% replacement of maize by SPPM, with molasses (T6). The diets were offered SPPM, without molasses (T5); and 50% replacement of maize by SPPM, without molasses (T5); and 50% replacement of maize by SPPM, without molasses (T5); and 50% replacement of maize by SPPM, without molasses (T5); and 50% replacement of maize by SPPM, with molasses (T6). The diets were offered SPPM, without molasses (T5); and 50% replacement of many significant (p>0.05) difference in feed intake, weight ad-libitum to the animals for a period of 56 days. There was no significant (p>0.05) difference in feed intake, weight ad-libitum to the animals for a period of 30 days. There may be digestibility of dry matter, crude protein, weight gain and feed conversion ratio among the dietary treatments. Also, digestibility of dry matter, crude protein, ether extract, nitrogen free extract (NFE) as well as total digestible nutrient (TDN) showed no significant (p>0.05) difference among the different treatments; but the digestibility of crude fibre and ash were significantly (p<0.05) difference among the digitary treatments. Hence, sweet potato peel meal can replace 50% of maize in the diets of growing rabbits without any detrimental effect on growth performance and digestibility of nutrients.

Introduction

The world population is estimated to be about 7 billion and is growing at an exponential rate. This calls for an aggressive approach towards food production to feed the already high human population, and prevent malnutrition. The availability of animal protein on sustainable basis has been the major concern of the livestock industry in Nigeria. Hence, there is the intensive search for alternative feed sources to improve the level of animal production at reduced cost.

The rabbit (Oryctolagus cuniculus) is a monogastric herbivore that has the capacity to efficiently utilize forages and industrial by-products as feed sources (Aduku and Olukosi, 1990). As a source of meat, it is well disposed to early breed back; and is one of the farm animals that combine high efficiency and high rate of feed conversion with faster rate of maturity (Fielding 1991). Considering this quality in addition to its high reproductive capability and fast growth rate, the potential of rabbit in alleviating the shortage of animal protein is enormous and calls for development.

Sweet potato (Ipomea batatas) is grown for its edible tuber. It ranks fourth in production and importance after cassava, yam and cocoyam (Ikwelle et al., 2003). It is also used as filler in canning and sauces for the manufacture of starch flour, glucose, syrup and alcohol; the young leaves are used as vegetable and the fresh vines as well as the tubers are often fed to (Williams and Rajaratnam, 1987). Sweet livestock potato plant is a creeping annual plant. The tuber is rich in starch and also contains some sugar, protein and fat. It contains about 6.3% crude protein and metabolizable energy of about 3411 kCal/kg (Jansen, 1989). The peel meal is readily available and cheap to procure. According to Kays (1985), the sweet potato peel is devoid of most of the anti-nutritional factors present in plant materials such as protease inhibitors, phytates, glucosinolates, saponins, tannins, lectins, cyanogens, mimosine, canaranine and oligosaccharides, etc. because it usually stores these chemicals in its tubers. Molasses is a by-product of the processing of sugarcane or sugar beet into sugar. The quality of the molasses depends on the maturity of sugarcane or sugar beets, the amount of sugar extracted and the method of extraction (McDonald et al., 1989). Molasses is a laxative food and normally given to animals in small quantities. It is added to animal feed as a sweeter and feed binder.

Hence, the main objective of this research study was to determine the growth performance and nutrient digestibility of growing rabbits fed graded levels of sweet potato peel meal diets, supplemented with and without molasses.

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Materials and Methods

The Experimental Diets

The sweet potato peels were obtained from the yam and potato fryers at Bida, Niger State. They were collected, sundried, and milled to obtain the sweet potato peel meal. This was then mixed together with other ingredients obtained from feed ingredients depots in Minna, to formulate the experimental diets as shown in Table 1 below. After proper mixing, the obtained mash diets were pelletized.

The Experimental Animals and their Management

A total of 24 growing rabbits were used for this research study carried out at the Teaching and Research Farm of the Federal University of Technology, Minna, Niger State. The animals were mainly hybrids of New Zealand and California White rabbits plus other crosses obtained from Minna Central Market. The animals were housed intensively in hutches; the back, right, and left sides of the hutches were fully covered with galvanized iron sheets while the bottom and front floors were made of 1/2" wire mesh. The hutches were thoroughly washed and disinfected and the disinfected before the commencement of the experiment. The rabbits were then randomly replicated into six (6) experimental treatments of two Some of the state Some of the routine management practices carried out during the experiment included weighing of the animals on arrival, before the commencement of the experiment experiment and subsequently at weekly intervals.

Feed and water Feed and water were supplied ad libitum, and records of mortality, weekly weight gain and feed intake were

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kept. Fresh Tridax procumbens leaves were collected daily, air-dried and fed to the rabbits in the evening of the following day. The hutches were thoroughly cleaned every morning, including feeders and waterers, before feed and fresh water were given.

Digestibility Studies

At the end of the 7th week, digestibility studies were carried out on the rabbits. The animals were kept off feed for 12 hours but with water supplied constantly; this was to evacuate their gut of the residual feed eaten. Fresh feed of known weights were then given to the rabbits. The left-over uneaten feeds were collected the following day and weighed. Faecal samples were collected daily, sun-dried and later oven-dried at 80°C for 24 hours before they were stored separately in plastic containers. This process of faecal collection lasted for 5 days at the end of which each replicate samples were bulked together. They were then separately analyzed for their proximate composition according to the procedures of AOAC (2000). From the data obtained, digestibility of nutrients and TDN were calculated as follows:

% Digestibility = amount of nutrient in feed - amount of nutrient in faeces x 100% (of a nutrient)

Total Digestible Nutrient (TDN) = Digestible Crude Protein + Digestible NFE + 2.25 X Digestible Ether Extract.

Chemical Analysis

The sweet potato peel meal, the experimental diets and the faecal samples collected were analyzed for moisture, crude protein, crude fibre, ether extract, ash and nitrogen free extracts using the procedures of AOAC (2000).

Statistical Analysis

The data obtained from this research study was subjected to a one-way analysis of variance (ANOVA) according to the Completely Randomized Design (CRD) model using the SPSS Package (Statistical Package for the Social Sciences). Where treatment means were significant, they were separated using the Duncan Multiple Range Test (Duncan, 1955).

Results and Discussion

The proximate composition of sweet potato meal is shown in Table 2. It has a crude protein content of 7.70%; ash, 7.50% and NFE, 65.90%; which is comparable to 6.34%, 4.58% and 87.42% obtained for crude protein, ash and NFE respectively by Akinmutimi and Osuagwu (2008). The proximate Composition of the experimental diets is shown in Table 3, showing that the diets were formulated and Olive to the standard recommendations of Aduku and Olukosi (1990) for growing rabbits in the tropics. There was no significant (p>0.05) difference in feed fleed a initial weight, final weight, weight gain and feed conversion ratio among the rabbits fed graded levels of sweet potato peel meal (SPPM) in seemed sweet potato peer incar - seemed seemed seemed to maize; though the daily weight gain seemed to decrease as the inclusion level of SPPM (Table 4). This is in agreement with the

earlier report of Okereke et al. (2009) who reported that the overall performance of rabbits fed various levels of Hausa potato meals in substitution for maize at 10%, 20%, and 30% were not significant. This could be a further improvement on the research work carried out by Akinmutimi and Osuagwu (2008) who determined that sweet potato peel meal can be substituted for maize in the diets of weaner rabbits up to 33.33%.

Molasses inclusion in the diet did not exert any significant effect on the growth performance of the rabbits. This may be due to the low level of antinutritional factors present in SPPM as reported by Akinmutimi and Anakebe (2008), hence not making the sweetening effect of the molasses on the diets

significant.

The crude protein (CP), ether extract (EE) and nitrogen free extract (NFE) digestibilities as well as total digestible nutrient (TDN) showed no significant difference (p>0.05) among the different diets. Only crude fibre (CF) and ash were significant (p<0.05) among the diets (Table 5). This may be due to the fact that rabbits are less efficient than ruminants in the digestibility of fibre (Anugwa et al., 1998).

Conclusion

From the results of growth performance and digestibility studies above, sweet potato peel can be used to replace up to 50% of maize in the diets of growing rabbits, with or without the addition of molasses. It is an agro-industrial by-product that is cheaper when compared to maize.

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Table 1: % Composition of the experimental diets

able 1: % Composition	on of the exper	pipi oppio	Diets	MACA TACA	To Tancerie	T ₅
West meanings of	TO 12 ACT COL	ho Tember	T3 11111	T ₄	25.00	25.00
Feed ingredients	50.00	50.00	37.50	12.50	25.00	25.00
Maize	50.00	0.00	12.50	The second of the Person of the Party of the	22.05	22.05
SPPM	0.00	22.05	22.05	22.05 14.00	14.00	14.00
GNC	22.05 14.00	14.00	14.00	THE RESERVE AND A SECOND PORTION OF THE PERSON OF THE PERS	0.00	5.00
PKC	0.00	5.00	0.00	5.00 2.00	5.00	2.00
Molasses	5.00	2.00	5.00	THE WASHINGTON TO THE CO.	4.00	2.00
Wheat offal	4.00	2.00	4.00	2.00	0.10	0.10
Rice husk	0.10	0.10	0.10	0.10	0.10	0.10
Methionine	0.10	0.10	0.10	0.10	0.50	0.50
Lysine	0.50	0.50	0.50	0.50	2.00	2.00
Salt	2.00	2.00	2.00	2.00	2.00	2.00
Bone meal	2.00	2.00	2.00	2.00	0.25	0.25
Lime stone	0.25	0.25	025	0.25	100.00	100.00
Premix	100.00	100.00	100,00	100.00	A RESIDENCE OF THE PARTY OF THE	
Total GNC= Groundnut cake	PKC	= Palm kernel c	ake		eet potato pee	

GNC= Groundnut cake $T_1 = 0\%$ replacement of maize by SPPM, without molasses.

molasses. $T_2 = 0\%$ replacement of maize by SPPM, with molasses.

molasses.

 $T_4 = 25\%$ replacement of maize by SPPM, with $T_5 = 50\%$ replacement of maize by SPPM, without

LAVOMA POSTERISM TO SIEVIANO VAN-ST

 $T_3 = 25\%$ replacement of maize by SPPM, without molasses. $T_6 = 50\%$ replacement of maize by SPPM, with molasses. The state for red-avitation satisf ocial belieficesh Where it authorit Martin Manager St. Company to

Table 2: Proximate composition of sweet potato peel meal

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Parameter	% Composition
Moisture	8.90
Dry matter	of 10 complete protection of the
Crude protein	770
Ether extract	6.00
Crude fibre	4.00
Ash Ash Ash Sangaran Color and San Ash	7.50
Nitrogen free extract (NFE)	· · · · · · · · · · · · · · · · · · ·
the state of the s	65.90
Total	100.00

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Table 3: Proximate composition of the experimental diets

arameter	Time Time	To Man	Diets	M.A.	Andrew Agency Contraction	SECTION SECTION
oisture	4.20	3.80	T_3	T4 maria	T ₅	T ₆
y matter	95.80	96.20	4.00	5.60	6.00	5.80
ide protein	18.05	17.80	96.00	94.40	94.00	94.20
er extract	6.00	7.50	17.65	17.55	17.64	17.58
de fibre	5.33	4.66	8.50	8.50	7.00	7.00
그 그는 그 그리고 하는 이 시간이 하셨다면 주민들은 경기 시간을 받는데 그 것이다.	9.00	5.00	4.61	4.00	4.00	3.30
ogen free extract	57.42	61.24	8.50	9.00	9.00	10.00
uniblish se ennimoschole	100.00	100.00	56.74	55.35	56.36	55.32
Bolins Edirmini Of 19	House you will be	100.00	100.00	100.00	100.00	100.00

Table 4: Growth performance of growing rabbits fed graded levels of sweet potato peel meal diets, with and without

PARAMETERS T ₁	Particular of the last	13	14 1/11.	Talville v	T ₆	SEM	LS	יש זכלים בסווערים
Initial weight (g) Final live weight (g) Feed intake/rabbit/day (g) Weight gain/rabbit/day (g) Feed conversion ratio	903.00 1507.50 67.71 10.80 8.17	1020.00 1487.50 66.51 13.48 6.17	857.50 1335.00 63.20 10.67 7.42	995.00 1045.00 70.16 9.55 9.10	797.50 1420.00 67.76 9.55 8.88	805.00 1440.00 66.58 8.74 8.58	56.38 69.82 10.30 3.41 0.45	NS NS NS NS

Table 5: Digestibility of feed nutrients by growing rabbits fed graded levels of sweet potato peel meal diets, with of figure both or ordered, This Hall a survey of the marking of the and without molasses

PARAMETERS	oderane ioderane decament	T ₂	in ziżolitowa Paradija Paradija	T ₄	Diets T ₅	Telangil	SEM	LS	id vacajab nand (-pilt
Dry matter	84.29	81.05	88.73	87.27	84.94	07.04	CHUUUN	6-17-01-01-5) 1 	and Actually and
Crude protein	85.29	87.78	86.93	85.83	85.75	87.84	1.19	NS	T asyleans
Crude fibre	69.92ab	51.09 ^b	74.71 ^{ab}	71.12 ^{ab}	Supplemental and a	87.44	1.05	NS	in Parce VA
Ether extract	82.35	79.18	89.90	88.52	69.16 ^{ab} 82.85	77.92	3.18	oracianian	to policette
Ash	72.76ab	53.57 ^b	72.13ab	68.42ab	66.53ab	89.00	1.59	NS	rio Blank rish
Vitrogen free extract	87.32	85.59	92.73	91.77	88.98	78.07°	2.95	ding spaid	A History / Tue
Total digestible nutrient	76.66	80.34	82.78	82.78	78.33	90.17 81.27	1.05	NS NS	A altrophysic

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SEM = Standard error of mean

LS = Level of significance

person and low chalestern) compared to cartle, share T₁=0% replacement of maize by sweet potato peel meal (SPPM), without molasses.

T₂=0% replacement of maize by SPPM, with molasses.

T₃= 25% replacement of maize by SPPM, without molasses

T₄= 25% replacement of maize by SPPM, with molasses.

T₅=50% replacement of maize by SPPM, without molasses

T₆=50% replacement of maize by SPPM, with molasses. the Horizon town bear bear a teatraiquine The state of the first test of the state of