RESPONSES OF WEANED RABBITS TO DIETS CONTAINING SUN-DRIED SOYABEAN CHEESE RESIDUE MEAL

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ABSTRACT
This study was conducted to investigate the effect of feeding sun-dried soya bean cheese residue meal (SSCRM) to weaned rabbits. The SSCRM was used at 0, 10, 20, 30 and 40% level of inclusion which formed five dietary treatments designated I, II, III, IV and V in a complete randomized design. Forty mongrels weaned rabbits were used for the experiment. The results showed that daily feed intake was affected ($P<0.05$) by dietary treatments. Other performance parameters measured were not significantly different from the control (Diet 1). All the parameters measured for the organ weights and those of the guts were similar to the control. It is therefore inferred that inclusion of 40% sun-dried soya bean cheese residue meal is suitable for growing rabbits, especially in areas where soya bean is used for making cheese, milk and yoghurt.

INTRODUCTION
Rabbits have been recognized to have very important role in the supply of animal protein to Nigerians especially in the rural and peri-urban areas (Egbo *et al.*, 2001). The production of rabbits will be more widespread in Nigeria if cheaper feedstuffs that are readily available could be developed, since they have the potential of utilising unconventional feedstuff like soyamilk residue (Alawa and Amadi, 2001 and Igwebulke *et al.*, 2001). Over the years, there has been a great increase in the production of soya beans in Nigeria, which has resulted in a concomitant increase in the consumption of soyabean. Soyabeans is used in making various products such as soups, milk and cheese. Soyabeans cheese waste, a by-product of milk and cheese production is used for feeding animal such as cattle, sheep and goats. It is readily available and cheap in towns and villages where cheese is widely produced and eaten (Iyeghe-Erakpotobor, 2010). This study investigated the performance, organs and gut weights of growing rabbits (weaned rabbits) fed different levels of soyabeans cheese residue meal.

MATERIALS AND METHODS
The experiment was conducted at the teaching and research farm of Abubakar Tafawa Balewa University, Bauchi. The cages used were partitioned into pens. The rabbits used in this study were obtained from the rabbitary of the College of Agriculture, Bauchi. The soya bean residue was sourced from local cheese producers in Bauchi Metropolis. The remaining ingredient wre bought at Muda Lawal market in Bauchi. The processing of the soya milk cheese residue involved soaking the seeds in water for 1 – 2 hours to facilitate the removal of the seed coat. It is then ground and mix with reasonable volume of water to facilitate straining of the solid (residue) from the liquid which is the milk. The residue was then collected and sun dried for 2 - 3 days into smaller chunks. The residue was included in the diets at 0,10, 20, 30 and 40% levels as shown in Table 2. Forty (40) weaned Mongrel rabbits of mixed sexes were used, such that eight rabbits in two replicates each were allocated to five dietary treatments (Diets I, II, III, IV and V) in a complete randomised design arrangement. The rabbits were housed in cages, feeders and water troughs were properly fixed with copper wire to avoid feed wastage during feeding. The rabbits were gradually introduced to the experimental diets in a pre-experimental period of 7 days to enable them adjust. Routine management operations have been executed to the latter. Feed was supplied every morning and leftovers were usually weighed and subtracted from the amount offered daily, so as to know the daily feed intake. There was no mortality throughout the period of the feeding trials which lasted for forty two (42) days. Samples of fresh, oven dried and sun-dried soya bean cheese milk residue were determined in a proximate analysis according to the method of AOAC (1980) in the Animal Production Laboratory (Table 1). At the end of every week of feeding, individual rabbit was weighed and their average was recorded in grammes per treatment as daily weight gain while the ratio of feed fed to weight gain was recorded as the feed conversion ratio. Then at the end of the experiment, 10 rabbits (2 from each treatment) were randomly selected, starved overnight, weighed and slaughtered in the morning by slitting the throat. The slaughtered rabbits were skinned, eviscerated then the organs

and guts parts were separated; liver, lungs, kidney and spleen, small intestine, large intestine and caeca and were weighed individually. Data generated for all the parameters recorded were subjected to analysis of variance technique (ANOVA balanced design) as described by Steel and Torrie (1984). Where there was significant difference between treatment means, Duncan multiple range rest (DMRT) was used to separate the means.

RESULTS AND DISCUSSIONS

The result of performance is shown on Table 3. Daily feed intake showed a significant ($P<0.05$) dietary effect. However, rabbits fed diets II and III were similar to those fed the control diet. This is similar to studies by Iyeghe-Erakpotobor and Esievo (2010). In this study however, rabbits fed diet V with 40% SSBCRM had the highest value of 53g. The higher intake of feed by rabbits on diets V may be attributed to its better palatability. Daily weight gain showed that, rabbits fed diet II recorded the highest weight gain of 12.22g while those on diet IV had lowest weight gain 9.25g. Daily Weight Gain (DWG) showed no significant difference among the treatments. However, the highest weight gain was obtained in diet II. It may be attributed to high level of SSBCR in the diets and is consistent with the finding of Linga *et al.*, (2003) who fed lablab with SSBCR. On the Feed conversion ratio, rabbits fed diet IV recorded the highest feed conversion ratio 5.54 and while those on diet II recorded the lowest feed conversion ratio. There was no significant difference in feed conversion ratio among the treatment means. This collaborate the report (Iyeghe-Erakpotobor et al., 2006) which indicated that soyabeans contains certain intrinsic values which encourage growth in animals. The parameters recorded for the organs and gut weights were all not significantly different from the control. This might be as a result of complete metabolism of the diets which release to the rabbits their nutrient requirements. Rabbits fed diet IV recorded the highest liver weight of 4.82g while those on diet I recorded the lowest weight. For the lungs, rabbits fed diet V recorded the highest weight gain while rabbits fed diet III recorded the lowest weight gain of 0.48g. On the weights of the kidney and spleen, rabbits on diets III and IV recorded the highest weight of 1.29 and 0.19 respectively while rabbits fed diet II and V recorded the lowest of 0.70 and 0.09 respectively. There was no significant difference among the organs. Rabbits fed the tested diets (diets; II, III, IV and V) recorded higher values of 2.48, 6.64, 8.60 and 8.45g for stomach, small intestine, large intestine and caeca respectively. There was no significant difference among the weights of the gut measured.

CONCLUSION

It is concluded that sun-dried soya bean cheese residue meal showed good prospect as alternative feeding stuff for weaned rabbits, especially where soya bean is used for making cheese, milk and yoghurt. It is recommended that sun-dried soya bean cheese residue meal could be included at up to 40% in the diets of rabbits.

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Table 1: Proximate analysis of soya bean cheese residue

Parameter	Fresh (%)	Oven-dried (%)	Sun-dried (%)
Dry matter	88.63	87.89	89.61
Ash	4.83	4.82	5.23
Crude protein	27.43	26.88	16.63
Ether extract	8.23	7.49	6.22
Crude fibre	6.82	6.88	6.73

Table 2: Ingredients and nutrient compositions of diets containing sun-dried soya bean cheese residue meal

	DIETS				
Parameters	I (0%)	II (10%)	III (20%)	IV (30%)	V (40%)
Maize	37.92	30.21	22.44	14.68	5.93
Soya bean meal	19.56	17.29	50.85	12.80	8.95
Sun-dried soya bean cheese residue	-	10.00	20.00	30.00	40.00
Maize offal	40.00	40.00	40.00	40.00	40.00
Vitamin/premix*	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Bone meal	2.00	2.00	2.00	2.00	2.00
Total	100	100	100	100	100
Nutrient composition					
Crude protein (%)	17.00	17.61	17.78	17.38	17.61
Metabolisable energy (kcal/kg)	2550.21	2600.33	2700.35	2703.33	2750.32
Crude fibre (%)	6.83	7.20	7.57	7.95	8.19

Note: *each kilogram of premix contain vitamin A- 10,000.00iu, D_3 - 2000iu, B_3 - 0.75g, B_2 - 5g, Nicotinic acid - 25g, Calcium pentothenate – 12.5g, B_{12} - 0.015g, K_3 - 2.5g, E - 25g, Biotin - 0.050g, Folic acid - 1g, Manganese - 64g, Choline chloride - 250g, cobalt - 0.8g, Copper - 8g, Iron - 32g, Zinc - 40g, Iodine - 0.8g, Flavomycin - 100g, Spiramycin - 6g, D_1- methionine - 50g, Selenium - 0.6g, Lysine - 120g, BAT - 5g.

Table 3: Performance of rabbits fed Sun-dried Soya Bean Cheese Residue meal

	DIETS					
Parameters	I (0%)	II (10%)	III (20%)	IV (30%)	V (40%)	SEM
Daily Feed Intake (g)	51.13^b	51.78^b	51.10^b	49.46^c	52.69^a	0.85*
Daily Weight Gain (g)	11.31	12.22	11.01	9.25	11.31	NS
Feed Conversion Ratio	4.84	4.40	4.83	5.54	5.30	NS

[abc]Means bearing same letters in the superscript are the same, NS = not significant difference, SEM = Standard Error of Means

Table 4: Organs and gut weights (% body weight) of rabbits fed sun dried soya bean cheese residue meal

	DIETS					
	I (0%)	II (10%)	III (20%)	IV (30%)	V (40%)	SEM
Liver	2.10	2.78	3.57	4.82	2.62	NS
Lungs	0.75	0.57	0.48	0.77	0.86	NS
Kidney	0.90	0.70	1.29	0.92	1.01	NS
Spleen	0.10	0.10	0.10	0.19	0.09	NS
Stomach	6.10	7.15	6.92	8.60	4.14	NS
Small intestine	5.82	5.85	6.64	6.61	5.83	NS
Large intestine	1.45	2.48	2.29	3.87	2.02	NS
Caeca	6.69	7.70	7.32	7.34	8.45	NS
Fat	4.92	5.64	6.35	6.18	5.61	NS

Note: SEM = Standard Error Mean, NS = Not Significant