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Effects of Graded Levels of Boiled Rubber (*Hevea brasiliensis*) Seeds Meal on Growth and Carcass Characteristics of Rabbits

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ABSTRACT

The present study was conducted at the Teaching and Research Farm of the University of Dschang-Cameroon, in order to evaluate the effects of inclusion level of rubber seed meal (RSM) on growth performances and carcass characteristics in rabbits. Sixty rabbits (30 males and 30 females) aged 2 months and weighing 900± 80 g were randomly assigned to the 5 experimental rations, that is 12 rabbits (6@& and 6B&) for each ration, in a completely randomized design. The 1st group received ration free from RSM (T0); the 2nd group received ration containing 20% of raw RSM (R20); and the 3rd, 4th and 5th groups received rations containing respectively 20, 25 and 30% of boiled RSM (B20, B25 and B30). The feed intake (FI) and live weight (LW) were recorded weekly for 3 months. At the end of the trial, 8 rabbits (4 males and 4 females) per treatment were randomly selected and slaughtered for carcass characteristics evaluation.Results showed that the FI and the feed conversion ratio (FCR) decreased insignificantly (P>0.05) in rabbits fed with rations containing boiled RSM (B30 for the FI and B25 for the FCR) compared to those receiving T0 ration. Live weight and weight gain increased non-significantly (P>0.05) in rabbits fed with the B25 ration compared to those receiving T0 and R20 rations. The carcass yield, the weights of liver, kidneys, heart, abdominal fat, caecum, big intestine, ileum, and the lengths of ileum and large intestine were comparable (P>0.05) among the groups. Cost of a kg of feed was 184.17 and 180.25 CFAF, respectively for B25 and B30 rations, that is a reduction of 17.51 and 19.26% compared to T0 (223.25 CFAF). The production cost of a kg of live weight was 1676.61, 1084.76 and 1130.17 CFAF, respectively for T0, B25 and B30 rations. Therefore, the inclusion of boiled RSM in feed increased the growth performances and reduced the cost of production. Hence, boiled rubber seed meal can be used in rabbit ration upto 25% without any adverse impact on growth performance.

Key words: Boiling, Growth performances, Production cost, Rabbit, Rubber seed meal

INTRODUCTION

The prices of various feed ingredients in recent years have risen to the extent that the cost of feed is now very high, making animal production more expensive and its products inaccessible, leading to animal protein deficiency. According to Ekenyem and Oneagoro (2006), the deficiency of animal protein affects more than 70% of the total population of African countries. Feed accounts for 70 to 80% of production costs in intensive farming (Defang *et al.,* 2014). This high cost of feed coupled with non-availability of cheaper feed ingredients is among important factors that hinder commercial animal production. In this regard, use of non-conventional feed such as rubber seeds needs to be explored to be used in the ration of fast-growing animals like rabbit.

Hevea (*Hevea brasiliensis*) or rubber tree is known and used for its latex, but its seeds can be used in animal feeding. It is reported that raw rubber seed is rich in crude protein which range from 20-32.98%, fat (50.2%), crude fiber (6.5%) and a reasonable amounts of minerals including trace elements (Ahaotu*et al.,* 2018; Udo *et al.,* 2018). According to Aguihe *et al.* (2017) and Amanidja *et al.* (2019) rubber seeds showed potentials for animal feeding. Despite the nutritional potential of these seeds, its utilization as animal feed ingredient is limited, because the raw seed contains anti-nutritional factors such as tannins, oxalate, saponins,

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phytinand hydrocyanic acid (Syahruddin *et al.,* 2014; Ahaotu *et al.,* 2018). A variety of processing procedures such as boiling is commonly used to reduce the negative effect of anti-nutritional factors present in tropical legumes. It was hypothesized that boiling of rubber seed meal (RSM) would reduce the toxic principle and thus it would be possible to incorporate RSM in broiler ration. Specific objective was to study the effect of inclusion of different levels of RSM in rabbit diet on growth performances, carcass characteristics and the cost of production.

MATERIALS AND METHODS

The study was carried out at the rabbitry of the Teaching and Research Farm of the University of Dschang, under ethical regulation of Dschang University for animal welfare. Sixty (30 males and 30 females) local breed rabbits, aged 2 months and weighing 900±80 g were used. The rabbits were lodged in separate cages made from wire with dimensions of 100cm x 45cm x 25cm. Cages were raised above the ground level for ease of cleaning. Water and feed were provided *ad libitum* throughout the period of experiment.The rabbits were treated against parasitic infection with ivermectin® (0.2 ml/kg body weight) injected subcutaneously and multivitamins added to their water.

The rubber seeds were harvested in the rubber plantations of SOCAPALM® (Cameroon Company of Palm Groves) in the Moungo Division, Littoral Region. They were decorticated, separated into 2 batches and

Table 1. Ingredients and chemical composition of experimental rations

Ingredients (%)	Experimental rations				
	T0	**R20**	**B20**	**B25**	**B30**
Maize	32	15	21	16.5	14
RSM	0	20	20	25	30
Wheat brand	20	38	35	40	40
Soybean meal	7	2	3	1	0
Palm kernel cake	10	4	5	4.5	6
Cotton seed cake	5	3	2	2.5	2
Trypsacumlaxum	20	15	11	7.5	5
Sea shell	2	2	2	2	2
Palm oil	3	0	0	0	0
Salt	0.5	0.5	0.5	0.5	0.5
*Premix 0.5	0.5	0.5	0.5	0.5	0.5
Total	**100**	**100**	**100**	**100**	**100**
Chemical compositions of rations					
Dry matter (%)	94.92	95.21	96.33	95.57	96.50
		on % DM basis			
OM	85.99	89.11	90.39	90.30	90.28
Ash	8.64	8.11	6.41	5.85	6.59
CP	16.012	16.076	16.042	16.072	16.11
ME (kcal/kg DM)	2427.78	2463.77	2432.1	2435.85	2480.48
CF	13.14	13.29	13.24	13.21	13.32

*Composition of the 0.5 premix: vit A: 3.000.000 IU, vit D: 50.0000 IU, vit E: 6.000 mg, vit K: 600 mg, vit B_1: 600 mg, vit B_2: 800 mg, vit B_3: 1800 mg, vit B_6: 400 mg, Vit_{12}: 6 mg, folic acid: 250 mg, niacin: 600 mg, Cl: 86.500 mg, Fe: 12.000 mg, Cu: 1200 mg, manganese: 12.000 mg, Zn: 10.000 mg, I: 100 mg, Se: 40 mg, magnesium: 3397 mg, Na: 283 mg, CA: 215.166 mg, Methionine: 130.000 mg, lysine: 50.000 mg. RSM: rubber seed meal. DM= Dry Matter, OM= Organic Matter, CP,Crude Protein; CF, crude fiber; T0, ration containing no rubber seeds meal; R20, ration with 20% untreated rubber seed meal; B20, ration with 20% of boiled rubber seed meal ; B25, ration with 25% of boiled rubber seed meal and B30, ration with 30% of boiled rubber seed meal.

processed differently. First batch was sun dried and the second batch was cooked for 45 minutes in a cooking pot containing water sufficient to cover the seeds. After cooking, the seeds were decanted and sun-dried. This was to ensure complete reduction of moisture to ease milling. The processed rubber seeds were separately hammer-milled prior to experimental diet formulation, to produce the respective meals as raw rubber seeds meal (RRSM), and boiled RSM (BRSM).

Five experimental diets were formulated to meet the nutritional requirements of the rabbits. T0 (control) diet was free of rubber seed meal, R20 (control) contained 20% of raw RSM, while B20, B25 and B30 contained boiled rubber seeds meal at 20, 25 and 30%, respectively, (Table 1).Sixty (30 males and 30 females) rabbits were weighed and randomly assigned to one of the five (5) groups, each containing twelve (12) animals (6 males and 6 females), corresponding to five different dietary treatments. Group 1 rabbits (control group) received T0 ration, free from rubber seeds meal (RSM); group 2 rabbits received R20 ration, containing 20% of raw RSM; while animals of groups 3, 4 and 5 were fed with rations B20, B25 and B30, containing respectively 20, 25 and 30% of boiled RSM. Amount of feed offered left overs were collected and weighed every morning before serving new feed. Weekly feed intake (FI) was calculated by subtracting the left-over from the quantity of feed offered to each rabbit in each treatment, according to the following formula:

FI (g) = Quantity of feed served – Left over feed

Each rabbit was weighed at the start of the trial and thereafter at weekly interval, using an electronic scale of 5000 g capacity and 1g precision. Therefore, the weekly weight gain (WG) was calculated using the following formula:

$$WG\ (g) = Wn\text{-}Wn\text{-}1$$

Where WG: is the weight gain, Wn: weight at the end of the current week and Wn-1: weight at the end of the previous week.

The weekly feed conversion ratio was calculated using the formula bellow:

$$FCR = \frac{\text{Total FI (g)}}{\text{Total WG (g)}}$$

At the end of the experiment, 8 (4 males and 4 female) rabbits per treatment were randomly selected, starved for 24 hours, stunned and slaughtered for carcass characteristics evaluation according to Jourdain (1980).

Carcass yield was calculated as the ratio of the dressed carcass weight to the live weight (after fasting) and multiplied by hundred.

$$\text{Carcass yield } (\%) = \frac{\text{Weight of carcass}}{\text{Live weight}} \times 100$$

The relative weight of organs and body parts (liver, kidneys, head, skin, legsand heart) were calculated as the ratio of the weight of organ or body part to the live body weight.

$$\text{Relative organs or body part weight } (\%) = \frac{\text{Weight of organs}}{\text{Live weight}} \times 100$$

The cost of per kilogram feed was evaluated from the price of ingredients in the local market. The cost of production per kilogram of live weight of the rabbit was calculated from the cost of the feed multiplied by the amount of feed consumed.

Data collected were submitted to two ways Analysis of Variance (ANOVA), to test the effects of rations and sex on the studied parameters. Means were separated for significant differences (Pp<0.05), using Duncan's multiple range test (Steel and Torrie 1980). The analyses were performed using SPSS 20.0 software.

RESULTSAND DISCUSSION

In general, feed intake increased from the start to the end of the trial regardless the incorporation rate of the rubber seeds meal. The increase in feed intake was more accentuated in rabbits fed T0 ration and less so in rabbits receiving the ration containing 30% of boiled rubber seeds (B30). At the end of the trial, the total feed intake (Table 2) was significantly (P<0.05) higher in rabbits receiving the T0 ration compared to those fed with rations containing rubber seeds meals, regardless

Table 2. Effects of feeding different levels of rubber seed mean on feed intake in rabbits

	Sex	Rations					P
		T0	R20	B20	B25	B30	
FI (g)	♂	8371.67±773.34[a]	6994.50±218.31[b]	7334.67±440.84[b]	7212.83±466.95[b]	6681.00±486.32[b]	0.000
	♀	8060.11±581.83[a]	7001.78±196.03[b]	7295.89±532.21[b]	7197.44±508.39[b]	6385.38±441.28[c]	0.000
	♂♀	8184.73±657.26[a]	6998.87±197.47[b]	7311.40±481.30[b]	7203.60±475.00[b]	6512.07±467.83[c]	0.000
P		0.423	0.949	0.881	0.953	0.268	

[a,b,c]values with the same letter, on the same row are not significantly different (P>0.05); T0, ration containing no rubber seeds meal; R20, ration with 20% untreated rubber seed meal; B20, ration with 20% of boiled rubber seed meal ; B25, ration with 25% of boiled rubber seed meal and B30, ration with 30% of boiled rubber seed meal.

of the sex. Feed consumption was comparable (P>0.05) between females and males. Irrespective of sex, feed intake was lower (P<0.05) in rabbits receiving the B30 ration as compared to those fed raw rubber seeds meals (R20). Overall feed intake decreased with the inclusion of rubber seeds meal in rations. This result is in agreement with that of Amanidja *et al.* (2019), who reported similar response in ducks fed RSM. Udo *etal*. (2018) reported that rubber seed is not quite palatable and appetizing to West African Dwarf Goats However, this result remains in contradiction with that of Loba (2017), which showed a high feed consumption in ducks having received feed containing the treated rubber seed powder.

Irrespective of the inclusion of rubber seed meal live weight increased from the start until the end of the trial. The increase in live weight was more rapid in rabbits fed with ration containing 25% of boiled rubber seed meal as compared to other rations. At the end of the experiment, the final body weight was significantly (P<0.05) higher in the rabbits fed with the ration containing 25% of boiled rubber seed meal compared to those receiving T0 or R20 ration (Table 3). However, no significant difference (P>0.05) was recorded between females and males. The gradual increase in body weight from the start to the end of the trial could be attributed to the fact that the animals used in this work were growing rabbits. According to Laffoley (1985), the live weight of rabbits increases considerably between 1 and 21 weeks of age. According to Smith (1997), this growth could be due to three phenomena: the increase in the number of cells (hyperplasia), the increase in the size of cells (hypertrophy) and/or the increase in intercellular substances (accretion). These phenomena are the consequence of the accumulation of nutrients from the food consumed. Kouakou *et al.*

Table 3. Effects of feeding different levels of rubber seed mean on live weight in rabbits

	Sex	Rations					P
		T0	R20	B20	B25	B30	
Initial live weight (g)	♂	1154.17±79.06	1197.00±85.60	1190.17±53.94	1203.67±60.82	1263.00±69.90	0.151
	♀	1212.22±74.77	1205.56±85.98	1242.67±54.21	1253.00±74.49	1247.13±58.00	0.514
	♂♀	1189.00±79.34	1202.13±82.83	1221.67±58.54	1233.27±71.54	1253.93±61.29	0.128
P		0.184	0.853	0.093	0.185	0.661	
Final live weight (g)	♂	2217.33±138.47[b]	2271.63±147.42[b]	2397.98±117.18[a]	2420.20±146.15[a]	2334.71±149.59[ab]	0.048
	♀	2245.43±99.82[b]	2292.59±131.63[b]	2316.59±147.98[ab]	2435.20±131.14[a]	2317.64±159.72[ab]	0.044
	♂♀	2234.19±112.90[c]	2284.21±133.33[bc]	2349.15±138.28[ab]	2429.20±132.34[a]	2324.96±149.73[bc]	0.004
P		0.679	0.784	0.258	0.843	0.841	

[a,b,c]values with the same letter, on the same row are not significantly different (P>0.05); T0, ration containing no rubber seeds meal; R20, ration with 20% untreated rubber seed meal; B20, ration with 20% of boiled rubber seed meal ; B25, ration with 25% of boiled rubber seed meal and B30, ration with 30% of boiled rubber seed meal.

Table 4. Effects of feeding different levels of rubber seed mean on weight gain in rabbits

	Sex	Rations					P
		T0	R20	B20	B25	B30	
Weight gain (g)	♂	1029.09±140.44^{c}	1074.64±125.17^{bc}	1340.73±133.72^{aA}	1320.36±275.11^{ab}	1158.64±262.48^{ab}	0.037
	♀	1186.36±136.70	1087.03±141.49	1166.36±154.04^{B}	1257.97±296.99	1102.64±243.95	0.436
	♂♀	1123.45±176.77^{ab}	1082.07±130.67^{b}	1218.11±175.17^{ab}	1282.93±280.06^{a}	1126.64±243.66^{ab}	0.036
p		0.079	0.862	0.018	0.685	0.692	

^{a,b,c}values with the same letter, on the same row are not significantly different (P>0.05); T0, ration containing no rubber seeds meal; R20, ration with 20% untreated rubber seed meal; B20, ration with 20% of boiled rubber seed meal ; B25, ration with 25% of boiled rubber seed meal and B30, ration with 30% of boiled rubber seed meal.

(2018) showed that the inclusion of rubber seed cake at a rate of 15% in the pig ration for fattening gave better results after weaning, with exponential growth. Suprayudi *et al.* (2015) reported an improved response in terms of the growth of juvenile carp fed with treated rubber seeds meal with an inclusion level of 50%.

The total weight gain (Table 4) was significantly (P<0.05) higher in rabbits receiving the ration containing 25% of boiled rubber seed meal as compared to those of R20 ration. In males, the increase in total weight gain was significant (P<0.05) higher in animals fed with B20 ration, males gained significantly (P<0.05) weight as compared to females. This result is in agreement with those of Amanidja *et al.* (2019), who reported increased weight gain in local ducks fed with rubber seeds flour. All the rabbits receiving boiled rubber seeds meal in the diets recorded betterlive weight and weight gain than R20. This indicates a possible elimination or reduction of anti-nutritional factors such as hydrocyanic acid, in boiled rubber seeds meal, due to the cooking process as reported by Udedibie (1991) and Umar *et al.* (2007). In addition, the nutrients present in the feed have been well utilized by these animals even though the feed intakes were lower in these treatments. In fact, the elimination or reduction of anti-nutritional factors in the feed through the boiling process could have favored a better feed digestibility, nutrients absorption, metabolism and accumulation (Matho *et al.,* 2021). The nutrients accumulation induces cells hypertrophy, hyperplasia and/or accretion, resulting in the increase of body weight and weight gain, as observed in the current work.

At the end of the trial, the feed conversion ratio (Table 5) was significantly (P<0.05) lower in the animals fed with rations containing rubber seeds meal as compared to those of the T0 ration. When B20 ration was fed, the feed conversion ratio was significantly (P<0.05) lower in males as compared to females.Overall feed conversion ratio decreased slightly in rabbits fed with feed containing boiled rubber seeds meal. This result is in agreement with those of Loba (2017), in ducks (*Cairinamoschata*) fed with rubber seed cake.

Table 5. Effects of feeding different levels of rubber seed mean on feed conversion ratio in rabbits

Growth performance	Sex	Rations					P
	T0	R20	B20	B25	B30		
FCR	♂	8.41±1.53^{a}	6.58±0.78^{b}	5.51±0.44^{bB}	5.64±1.06^{b}	6.50±1.34^{b}	0.001
	♀	6.91±0.87	6.55±0.95	6.52±0.91^{A}	6.06±1.14	6.10±1.41	0.440
	♂♀	7.51±1.36^{a}	6.56±0.86^{b}	6.11±0.90^{b}	5.89±1.09^{b}	6.27±1.34^{b}	0.000
p		0.064	0.939	0.015	0.483	0.601	

^{a,b,c}values with the same letter, on the same row are not significantly different (P>0.05); T0, ration containing no rubber seeds meal; R20, ration with 20% untreated rubber seed meal; B20, ration with 20% of boiled rubber seed meal ; B25, ration with 25% of boiled rubber seed meal and B30, ration with 30% of boiled rubber seed meal.

Data pertaining to the effect of the inclusion of boiled rubber seeds meal on the carcass yield and characteristics are summarised in Table 6. The carcass yield in male rabbits fed ration B30 was higher (P<0.05) than those in other groups. At B20 ration, the skin was significantly (P<0.05) heavier in males compared to females.The poor carcass yield in rabbits fed with ration containing raw rubber seeds meal could be attributed to impaired nutrients utilization due to the presence of anti-nutritional factors. Schrews (2000) and Mathew *et al.* (2010) reported that nutrition exerts several influences on the development of carcass characteristics, organs and muscle growth in an animal.

Data pertaining to the effects of the inclusion level of boiled RSM on the relative weights of the heart, liver, kidneys and abdominal fat in rabbits are presented in Table 7. All these attributes were comparable among the groups. It is a common practice in feeding trials to use weights of some internal organs like liver and kidneys as indicators of toxicity. Studies have shown that if there is any major effect of anti- nutritive factors in diet, organs such as kidney, liver would be affected by increasingtheir weight, since they are the major detoxifying organs (Carew *et al.,* 2003). The observations in this study suggest that the test diets did not contain any appreciable amount of toxin to cause organ damage during the period of experimentation.

Data pertaining to feed cost are presented in Table 8. Feed cost was higher for the T0 ration and lower at B30 ration, witha reduction of 19.26% compared to the T0 ration.The production cost per kg of live weight was higher with the T0 ration and lower with the B25 ration. A decrease of 35.50% compared to the T0 ration was registered.The highest feed cost and production cost

Table 6. Effects of feeding different levels of rubber seed mean on carcass yield and body parts weight in rabbits

Growth performance	Sex	Rations					P
	T0	R20	B20	B25	B30		
Carcassyield	♂	49.12±0.73^{ab}	48.12±0.91^{b}	49.29±0.95^{ab}	49.73±0.62^{ab}	50.17±1.83^{a}	0.048
(%)	♀	49.89±1.75	47.63±1.78	49.01±1.84	48.60±0.71	47.63±1.01	0.230
	♂♀	49.51±1.30	47.87±1.34	49.17±1.26	49.17±0.86	48.97±1.88	0.142
p		0.463	0.647	0.825	0.055	0.073	
Weight of the	♂	9.49±1.05	9.06±0.71	8.95±0.89	9.09±0.90	9.18±0.64	0.913
Head(%)	♀	8.72±0.58	8.81±0.47	8.78±0.90	8.82±0.60	8.74±0.48	0.999
	♂♀	9.11±0.89	8.93±0.57	8.87±0.82	8.95±0.72	8.96±0.57	0.977
P		0.259	0.582	0.815	0.633	0.326	
Weight of	♂	10.53±1.61	11.15±1.72	11.87±1.13^{A}	10.94±1.64	10.51±1.00	0.621
the Skin(%)	♀	10.50±0.76	11.20±1.05	9.99±0.35^{B}	10.35±1.18	10.05±1.22	0.492
	♂♀	10.52±1.17	11.18±1.32	11.07±1.03	10.64±1.36	10.27±1.06	0.613
P		0.973	0.963	0.007	0.583	0.577	
Weight of	♂	2.65±0.65	2.59±0.32	2.51±0.40	2.61±0.37	2.66±0.40	0.991
the legs(%)	♀	2.62±0.37	2.87±0.33	2.57±0.55	2.32±0.40	2.71±0.44	0.468
	♂♀	2.64±0.49	2.73±0.34	2.54±0.43	2.46±0.39	2.68±0.39	0.742
P		0.951	0.274	0.881	0.334	0.852	

^{a,b}values with the same letter, on the same row are not significantly different (P>0.05); T0, ration containing no rubber seeds meal; R20, ration with 20% untreated rubber seed meal; B20, ration with 20% of boiled rubber seed meal ; B25, ration with 25% of boiled rubber seed meal and B30, ration with 30% of boiled rubber seed meal.

Table 7. Effects of feeding different levels of rubber seed mean on the relative weights of internal organs and abdominal fatin rabbits

Organs	Sex	Rations					P
weight	T0	R20	B20	B25	B30		
Heard (%)	♂	0.23±0.03	0.25±0.15	0.23±0.04	0.26±0.04	0.24±0.24	0.645
	♀	0.24±0.04	0.24±0.04	0.23±0.08	0.22±0.05	0.30±0.05	0.201
	♂♀	0.23±0.03	0.25±0.41	0.23±0.05	0.24±0.05	0.27±0.05	0.367
p		0.778	0.724	0.998	0.222	0.084	
Liver (%)	♂	2.24±0.17	2.36±0.24	2.47±0.48	2.31±0.27	2.36±0.54	0.932
	♀	2.36±0.17	2.36±0.23	2.28±0.08	2.35±0.32	2.24±0.15	0.899
	♂♀	2.30±0.17	2.36±0.22	2.37±0.36	2.33±0.28	2.30±0.38	0.985
P		0.356	0.993	0.490	0.858	0.689	
Kidneys (%)	♂	0.51±0.09	0.54±0.14	0.60±0.12	0.58±0.02	0.51±0.04	0.537
	♀	0.64±0.09	0.57±0.05	0.56±0.9	0.52±0.05	0.55±0.11	0.396
	♂♀	0.57±0.11	0.56±0.10	0.59±0.90	0.55±0.05	0.53±0.08	0.806
P		0.092	0.742	0.623	0.088	0.571	
Abdominals	♂	1.07±0.42	1.75±0.56	2.17±0.49	1.94±0.84	1.81±0.84	0.228
fat (%)	♀	1.74±0.59	1.33±0.33	1.90±0.73	1.30±0.57	1.96±0.49	0.331
	♂♀	1.41±0.59	1.54±0.48	2.06±0.57	1.62±0.74	1.88±0.64	0.272
P		0.116	0.250	0.613	0.261	0.773	

T0, ration containing no rubber seeds meal; R20, ration with 20% untreated rubber seed meal; B20, ration with 20% of boiled rubber seed meal ; B25, ration with 25% of boiled rubber seed meal and B30, ration with 30% of boiled rubber seed meal.

were recorded in T0 (control) and the least was registered in B30 having 30% level of boiled rubber seed meal. The result obtained in this study was desirable in rabbit diet because the inclusion of rubber seed meal decreased the feed and production costs, giving better returns. This observation agreed with the report of Apata and Ojo (2000), that the high cost of feed was largely due to the exorbitant price and scarcity of conventional feed ingredients. Similarly, Smith *et al.* (1981) reported that feeding of non-conventional plant protein sources drastically reduced feed cost and these gave better feed cost per kg of weight gain.

CONCLUSION

It was concluded that boiled rubber seed meal can be incorporated into the ration of rabbit to enhance productivity and to reduce production cost.

Table 8. Effects of feeding different levels of rubber seed mean on feed cost

Parameters	Rations				
	T0	R20	B20	B25	B30
Price of the kg of feed (CFAF)	223.25	185.25	190.83	184.17	180.25
Percentage of variation/T0		-17.21	-14.52	-17.51	-19.26
FCR	7.51	6.56	6.11	5.89	6.27
Price of the kg of LW (CFAF)	1676.61	1215.24	1165.97	1084.76	1130.17
Percentage of variation/T0		-27.52	-30.46	-35.30	-32.59

LW: live weight; FCR: feed conversion ration; T0, ration containing no rubber seeds meal; R20, ration with 20% untreated rubber seed meal; B20, ration with 20% of boiled rubber seed meal ; B25, ration with 25% of boiled rubber seed meal and B30, ration with 30% of boiled rubber seed meal.

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