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Growth, Carcass and Reproductive Characteristics of Male Rabbits (Bucks) Fed Raw and Boiled Pigeon Pea Seed (*Cajanus cajan*) Meal

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Abstract: Thirty-six (36) 24 weeks old rabbit bucks were randomly assigned to three treatment diets. The treatments T_1 T_2 and T_3 which contained T_1 0% control. T_2 20% raw pigeon pea seed meal and T_3 20% boiled pigeon seed meal and fed to the rabbits in a Completely Randomized Design (CRD). The mean body weight gain, feed intake and feed conversion ratio did not differ significantly ($p>0.05$) between rabbits on the control T_1 0% and T_3 20% boiled pigeon pea seed meal, but, however, they differed significantly ($p<0.05$) from rabbits on 20% raw seed meal. The dressed weight and dressed percentage did not differ significantly ($p>0.05$) between the control and 20% boiled seed meal, however, they differed significantly p<from rabbits on the T_2 treatment diets (raw seed meal). Carcass length were similar between the treatment groups. The cut part and organ weights did not differ significantly ($p>0.05$) between treatment groups, however, higher values were observed in rabbits fed 20% boiled pigeon pea seed meal. The testis characteristics (testis weight, tunica albuginea weight, testis length width and volume did not show any significant differences ($p>0.05$) between treatment groups, however, higher values were observed in rabbits fed 20% boiled pigeon pea seed meal. It is concluded that 20% boiled pigeon pea seed meal supported the carcass and testicular characteristics of rabbit bucks.

Key words: Rabbit bucks, growth carcass, reproductive characteristics, pigeon pea seed

Introduction

Rabbits have been recognized to have a very important role to play in the supply of animal protein to Nigerians, especially in the rural and peri-urban areas. They are efficient converters of feed to meat and can utilize up to 30% crude fibre as against 10% by most poultry species (Egbo *et al*., 2001). To make rabbit rearing more viable as a small-scale business, Alawa *et al.* (1990) advocated the development of alternative feeding materials that will be relatively cheap when compared with commercial feeds or conventional feedstuffs. Rabbits have the potential of utilizing such unconventional feedstuffs as pigeon pea seeds and other diverse plant materials (Igwebuike *et al*., 2001). Various studies have been conducted to determine the replacement value of pigeon pea seeds for groundnut cake in broiler finisher diets (Amaefule and Obioha, 1998); the processing methods of the seeds for broilers (Amaefule and Obioha, 2001) the performance of rabbits fed raw and boiled pigeon pea seeds (Iheukwumere, 2004).

Like most legume seeds, pigeon pea seeds contain anti-nutritional factors (ANF) which limit the use of the seeds in monogastric animal feeding (Ologbobo, 1992; D'Mello, 1995) D'Mello (1995) identified proteinase inhibitors and cynogens as the ANFs in the seed. Batterham *et al.* (1993) reported a proteinase inhibitor activity in pigeon pea seeds to be 4.8 mg g-1 and 2.7 mg g-1 seed for trypsin and chymotrypsin inhibitors, respectively.

Due to limited scientific information and data on the reproductive performance of rabbit bucks fed pigeon pea seed meal, this study was aimed at determining the growth, carcass and reproductive performance of rabbit bucks.

Materials and Methods

Animals and management: Thirty-six cross bred rabbit bucks aged between 35-45 weeks were used for this study. The initial weight of the animals ranged 930.3-1101.2 g. The rabbits were housed individually in wooden cages with wire mesh floors. Feed and water were provided to appetite. Routine management procedures in intensive rabbit production were maintained to ensure disease control and comfort of the experimental animals. The proximate composition of Raw and Boiled pigeon pea seed meal is shown in Table 1. The proximate composition of the pigeon pea seed meal was carried out by the methods of AOAC (1995).

Experimental diets and design: The raw pigeon pea seeds used for this experiment were bought at Ariaria market in Aba town of Abia State, Nigeria. The seeds were dried in the sun for three days. The seeds were submitted to the process of cooking i.e. boiling. After, 15 kg raw seeds were cooked with water in a large water bath at a temperature of 100°C for one hour. The boiled seeds were oven-dried at a temperature of 6°C for 18 hours. The boiled and raw samples were separately

Table 1: Proximate composition of Raw and Boiled pea seed meal

Nutrients	Raw pigeon pea seed	Boiled pigeon pea seed
Dry matter (%)	85.16	87.50
Crude protein (%)	24.01	23.15
Crude fibre (%0	6.67	6.23
Total ash (%)	5.52	5.56
Ether Extract (%)	2.60	2.44
NFE (%)	61.40	66.15

Table 2: Composition of the experimental diets

	Dietary level of Pigeon pea seed meal (%)		
Nutrients	T_1 0	T_2 20 Raw	T_3 20 Boiled
Maize	70.00	56.00	56.00
Local fish meal	1.00	1.00	1.00
Soybean	14.00	8.00	8.00
Palm kernel cake	12.00	12.0	12.00
Pigeon pea meal	0	20.00	20.00
Bone meal	2.50	2.50	2.50
Salt	0.25	0.25	0.25
Premix*	0.25	0.25	0.25
Total	100.00	100.00	100.00
Calculated composition			
Crude protein	15.96	16.86	16.46
Crude fibre	3.76	4.59	4.49
Avail calcium	98.60	98.60	98.60
Avail phosphorus	0.41	0.41	0.41
ME (MJ/kg)	14.85	14.47	14.47

*Premix supplied, Vit A-10,000 iu, Vit D-1500 iu; Vit K-2 mg; Riboflavin-3 mg; Panthotenic acid-5 mg; Nicotinic acid-20 mg; Choline-5 mg; Vit D3-0.88 mg; Folic acid-4 mg; Mn-8 mg; Zinc-0.5 mg; Iodine-1.0 mg; Iron-20 mg; Cu-10 mg; Cabalt-12.5 mg; Flavomycin-100 mg; Methionine-50 mg

milled in a hammer mill before incorporating them into the rations. Three experimental diets which consisted of control T_1 (no pigeon pea seed meal) T_2 20% raw and T_3 20% boiled pigeon pea seed meal were formulated as shown in Table 2.

The rabbits were divided into 3 treatment groups of 12 rabbits each group. Each treatment group was further replicated 3 times with 4 rabbits per replicate. The groups were then randomly allotted to thee treatment diets at 0, 20% raw and 20% boiled pigeon seed meal inclusion levels in a Completely Randomized Design (CRD). Feeding of experimental animals commenced after a 2-week adjustment period. The rabbits were fed equal quantities of (150 g/day) of fresh *Centroscema pubscens* as forage supplement to the diets during the period of the study.

The rabbits were weighed weekly through out the study which lasted for 8 weeks. At the end of the experiment, 3 rabbits per treatment were randomly selected and starved for 24 hours but not without water, then slaughtered. The testes and other internal organs were carefully removed and trimmed of adhering tissues. Testis characteristics such as testis weight, tunica albuginea weight, testis length, testis width and testis volume, were measured.

Internal organs such as the heart, kidney, liver, lung and spleen were also weighed and expressed as percentage of live weight. Cut-parts of the carcass were also weighed and expressed as percentage of live weight.

Data generated from this study were subjected to analysis of variance Steel and Torrie (1980). Where significant means were indicated, they were separated by Duncan's New Multiple Range Test as described by Obi (1990).

Results and Discussion

The results of this study are presented in Table 3, 4 and 5.

The results of the effects of dietary levels of Raw and Boiled Pigeon pea seed meal on the growth of rabbit bucks are shown in Table 3.

The average daily feed intake, live weight gain and feed conversion ratio of rabbits fed on the control diet (0%) and the diet with 20% boiled pigeon pea seed meal were not significantly different ($p>0.05$) from each other. However, they were significantly different ($p<0.05$) from rabbits fed diets containing raw 20% pigeon pea seed meal. The improved performance of rabbits fed diet with boiled pigeon pea seed meal could be that boiling improved the palatability of the diet by reducing the crude fibre and other extract contents (Udedibie and Mba, 1994; Amaefule and Obioha, 2001). Boiling eliminates some of the possible anti-nutritional substances, probably because of the eluting property of boiled water (Awosanya *et al*., 1999). Rabbits on raw pigeon pea seed meal performed generally poor in the parameters evaluated compared with the groups on the control (%) and 20% boiled pigeon pea seed meal diets. This could probably be attributed to high level of inhibitors in raw pigeon pea seed, resulting in poor utilization of available nutrients. This is in agreement with the findings of Amaefule and Obioha (2001), Esonu *et al.* (2001).

The effect of feeding raw and boiled pigeon pea seed meal on the carcass and internal organ characteristics of the rabbit (bucks) are shown in Table 4.

There were no significant differences ($p>0.05$) in dressed carcass percentage and organ weights between rabbits fed the control 0%, 20% raw and 20% boiled pigeon pea seed meal as presented in Table 4. Rabbits fed the control % and 20% boiled pigeon pea seed meal diets had numerically higher dressed carcass percentage than the rabbits on 20% raw diets indicating that the rabbits deposited more protein as muscle tissue than the rabbits on 20% raw pigeon pea seed meal. These findings are in agreement with the reports of Amaefule *et al*. (2004), Iheukwumere (2004). Gross examination of the liver did not show any enlargement or pathological lesions suggesting that the anti-nutritional substances in the raw seeds were well tolerated by the rabbits or detoxified by microbes in the

Table 3: Mean values for growth traits of rabbit bucks fed raw and boiled pigeon pea seed meal

	Treatments (Pigeon pea seed meal) %			
Parameters	T_1 0	T_2 20% RAW	T_3 20% Boiled	SEM
Av. Initial body wt (g)	58.50	56.20	56.20	3.52
Av. Final Body wt (g)	84.24[a]	55.80[b]	82.20[a]	6.20
Av. Body wt gain (g)	45.10[a]	20.75[b]	42.50[a]	5.60
Av. Daily feed intake (g)	50.56[a]	30.05[B]	56.35[a]	3.36
Feed conversion ratio (g/feed/g gain)	1.15[a]	1.71[b]	1.14[b]	0.35

a b: Means within row having different superscript are significantly different ($p<0.05$)

Table 4: Effect of feeding raw and boiled pigeon pea seed meal on carcass characteristics and organ weights of rabbit bucks

	Treatments (Pigeon pea seed meal) %			
Parameters	T_1 0	T_2 20% RAW	T_3 20% Boiled	SEM
Dressed wt (g)	840.50[a]	780.24[b]	860.10[a]	8.32
Dressing (%)	56.10[a]	40.01[b]	58.24[a]	4.03
Carcass length (cm)	24.13	22.50	25.85	1.54[NS]
Cut-parts (%) LW				
Shoulder wt	8.20	7.40	9.69	5.61[NS]
Loin wt	7.50	6.32	7.70	4.15[NS]
Leg wt	14.20	13.40	14.30	2.73[NS]
Rib wt	4.62	3.69	4.50	3.72[NS]
Internal organs (% of LW)				
Liver	2.50	2.35	2.50	0.08[NS]
Heart	0.25	0.24	0.27	0.003[NS]
Kidney	0.53	0.50	0.56	0.03[NS]
Lung	0.43	0.42	0.48	0.005[NS]
Spleen	0.05	0.05	0.05	0.008[NS]

SEM = Standard of mean

Table 5: Effect of feeding raw and boiled pigeon pea seed meal testis characteristics

	Treatments (Pigeon pea seed meal) %			
Parameters	T_1 0 Control	T_2 20% RAW	T_3 20% Boiled	SEM
Testis characteristics (Means of right and left testis)				
Testis weight (g)	1.45	1.25	1.50	0.50
Tunica albuginea weight (g)	0.16	0.14	0.18	0.04
Testis length (mm)	1.90	1.70	2.20	0.7s6
Testis width (mm)	1.07	1.98	1.07	0.16
Testis volume (ml)	1.14	0.76	1.16	0.26

SEM = Standard Error Means

caecum. This observation is in agreement with the findings of (Amaefule *et al.*, 2004). Effect of feeding raw and boiled pigeon pea seed meal on the testis characteristics of rabbit bucks are presented in Table 5. All testicular parameters measured were not significantly different ($p>0.05$) between the treatment groups. However, higher testicular values were observed in 20% boiled pigeon pea seed meal. This suggests that boiled pigeon pea seed meal can support testicular development. This agrees with the reports of Amoa *et al.* (2007)

Conclusion: It could be concluded that boiled pigeon pea seed meal supported growth and optimum carcass, organ weights and testicular characteristics at 20% inclusion level in the diets of rabbit bucks.

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