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Effect of the Incorporation of Pigeon Pea (*Cajanus cajan*) on Growth Performance of Cavies (*Cavia porcellus* L.)

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Abstract

The study of the effects of the incorporation of pigeon pea (*Cajanus cajan*) on growth performance of cavies (*Cavia porcellus* L.) was conducted at the caviaculture unit of the Research station of IRAD Ekona between June and September 2015. The animals, thirty (30) young male had an average weight of 250 ± 50g. They were divided into 6 groups of comparable average weight. Each group randomly received one of three treatments with 2 replicates. The treatments were the following: *Pennisetum purpureum* + Feed containing 0% of *Cajanus cajan* (T0) control group, *Pennisetum purpureum* + Feed containing 10% *Cajanus cajan* (T1) and *Pennisetum purpureum* + Feed containing 20% *Cajanus cajan* (T2). The animals were then observed for 8 weeks and data collected for each animal throughout this period. The results obtained at the end of this study were not significantly different (P> 0.05): The daily food consumption increases for treatments T1 and T2. Live body weight were 412.50 ± 6.36 g, and 457.94 ± 4.51g, 433.00 ± 35.35g for treatments T0, T1 and T2 respectively. ADG for T0, T1 and T2 were 3.21 ± 0.17 g, 3.77 ± 0.16 g and 3.50 ± 0.27 g, respectively. The feed conversion ratio were 8.82 ± 0.167, 8.44 ± 0.738, 8.87 ± 0.074 for the controls, T1 and T2. As regard to the evaluation of the carcass, the highest carcass weight was recorded with the treatment T1 330.500 ± 24.29 g. While with treatment T2 it was 271.625 ± 44.30 g. The carcass yields were 67.06 ± 7.88%; 66.93 ± 2.59% and 66.80 ± 1.75% respectively for the control group, T1 and T2.

Keywords: *Cajanus cajan, Life body weight, Carcass yield, cavy.*

Résumé

L'étude des effets de l'incorporation de pois d'Angole (*Cajanus cajan*) sur les performances de croissance du cobaye (*Cavia porcellus* L.) a été conduite à l'unité caviaculture de la station de recherche de l'IRAD d'Ekona entre Juin et septembre 2015. Les animaux, trente (30) jeunes cobayes mâles avaient un poids moyen de 250 ± 50g. Ils ont été répartis dans 6 lots de poids moyen comparable. Chaque lot recevait aléatoirement un des 3 traitements avec 2 répétitions. Les traitements étaient les suivant : *Pennisetum purpureum* + provende contenant 0 % de *Cajanus cajan* (T0) lot témoin, *Pennisetum purpureum* + provende contenant 10 % de *Cajanus cajan* (T1) et *Pennisetum purpureum* + provende contenant 20 % de *Cajanus cajan* (T2). Les animaux ont été observés pendant 8 semaines et les données collectées pour chaque animal pendant cette période. Les résultats obtenus au terme de cette étude ont été non significativement différents (P>0,05): La consommation alimentaire journalière augmente pour les traitements T1 et T2. Les poids vifs moyens étaient de 412,50 ± 6,36 g, 457,94 ± 4,51g et 433,00 ± 35,35g pour les traitements T0, T1 et T2 respectivement. Le GMQ pour le lot témoin, le lot recevant T1 et le lot recevant T2 étaient 3,21 ± 0,17 g, 3,77 ± 0,16 g et 3,50 ± 0,27 g respectivement. L'Indice de Consommation était de 8,82 ± 0,167, 8,44 ± 0,738, 8,87 ± 0,074 pour les lots témoins, T1 et T2. En ce qui concerne l'évaluation de la carcasse, le poids carcasse le plus élevé a été enregistré avec le traitement T1 soit 330,500 ± 24,29 g. Cependant avec le traitement T2 il était de 271,625 ± 44,30 g. Les rendements carcasses étaient de 67,06 ± 7,88 ; 66,93 ± 2,59 et 66,80 ± 1,75 respectivement T0, T1 et T2. T1 et T2.

Mots clés : *Cajanus cajan, poids vif, rendement carcasse, cobaye.*

Introduction

During recent years there has been growing interest for non-conventional livestock (NRC, 1991; Mensah, 1998). These non-conventional animals include guinea pig, it is exploited in latin America (Hardouin *et al.*, 1991) and in Africa south of the Sahara (Ngoupayou *et al.*, 1995). In Africa caviaculture faces many problem one of the most important being feeding both in term of availability and quality (Nuwanyakpa *et al.*, 1997; Niba *et al.*, 2012). Studies on cavies feeding have used leguminous plants like *Centrosema pubescens*, *Arachis glabrata* or *Desmodium intortum* (Tchoumboué *et al.*, 2001), or *Moringa oleifera* (Pamo *et al.*, 2005) and agro-industrial product like cotton seeds cake (Niba *et al.*, 2004). Pigeon pea (*Cajanus cajan*) is also a leguminous plant usable in animal feeding (Niyonkuru, 2003; Odeny, 2007; Orwa *et al.*, 2009; Sharma *et al.*, 2011). The present study aimed to benefit from the nutritive quality, particularly protein content of *Cajanus cajan* for cavy feeding. It has as general objective to contribute to the improvement of production performance of cavies through a diversification of feed ressources.

Materials and Methods

Study site

This study was conducted at the caviaculture unit of the Research station of IRAD Ekona, situated in the South-west region of Cameroon. The center is 15 km from Buea, along Buea-kumba road, at 4°13‘59"N Latitude, 9 °20‘3"E Longitude and 381 m above sea level. Situated in the Monomodal rainfall Forest agroecological zone IV, with annual

rainfall of 2284 mm. temperature vary between 22 and 29°C with an average of 24.4 °C in dry season and 23.7 °C in rainy season, air humidity is between 85 and 90 %.

Trial Management

Thirty young male guinea pigs with an average weight of 250 ± 50g were randomly divided into three groups corresponding to three levels of pigeon pea inclusion in their diet (0, 10 and 20%). The animals were placed in completely randomised design with two replicates of 5 animals per treatment. Replicates were housed in identical wood/wire mesh cages of 74 cm x 58 cm corresponding to the allocation of 0.85 m^2 per animal. Animals received as basal diet forage being *Pennisetum purpureum*. Basal diet was supplemented with diets containing 0, 10 and 20% pigeon pea. The pigeon pea seeds were roasted, grinded and incorporated in the different diets. These diets were then pelleted. These diets corresponded to the three treatments denoted as R_0, R_1 and R_2.the percentage composition of the supplemental diets used in the study are shown in table 1.

Table 1: Percentage composition of supplemental diets

Ingredients	R_0 (0%)	R_1 (10%)	R_2 (20%)
maize	20	12	10
Pigeon pea	-	10	20
Wheat middling	34	28	40
Wheat bran	20	25	11
Palm kernel	16	15	15
Soybean cake	5	2	1
Palm oil	-	4	-
Fish meal	3	2	1
Sea shell	2	2	2
TOTAL	100	100	100

The proximate chemical composition of the basal and test diets shown in table 2

Table 2: Chemical composition of feeds (% dry matter)

	R_0	R_1	R_2	*Pennisetum purpureum*
Crude protein	17,032*	16,194*	16,868*	9.8
energy	2634,7*	2813*	2735,3*	1163.52
Crude fibre	7,45*	8,006*	8,392*	29,7
ash	1,8997*	1,7737*	1,6132*	17
Ether extracts	-	-	-	2,6

* Determined by calculation

Animal Management

Feeding was done *ad libitum*, and cleaning of cages daily. Live weight measurements were made weekly and feed consumed was measured by weighing the feed given and the left over the difference between the two values gave us the feed consumed. At the end of the study 4 animals per treatment were fasted for 12 hours and slaughter for carcass analysis.

Data Collection and Statistical Analysis

Mean values of weekly weight gain, feed consumption for the different treatments were also recorded, carcass evaluation was also carried out. Data collected were subjected to the one way analysis of variance and the Duncan test was used to separate means in case of significant difference at a range of 5%.

Results

Feed consumption

Table 3 shows the effect of the type of feed on feed intake for the period of study (0-8 weeks)

Table 3: Effect of the type of feed on feed intake

	Treatment T0 (Mean ± S.E.)	**Treatment T1** (Mean ± S.E.)	**Treatment T2** (Mean ± S.E.)
Average feed intake(g)	**28.35± 2.01[a]**	**31.85± 4.13[a]**	**31.07± 2.65[a]**

a: data affected with the same letter on the line are not significantly different (P>0.05).

Results show that the feed intake increases for treatment T1 and T2 with the highest recorded with treatment T1 (31.85± 4.13 g). However there was no significant difference (P>0.05), between the quantities of feed consumed between the three treatments.

The feed consumptions recorded in this study were higher than those reported by Ngoupayou *et al.*, (1995), Niba *et al*., (2004) with feed consumptions lower or equal to 22.53 g. This may be due to the feed presentation. In their studies they were using feeds in powder while in our study the feed were presented in pellets, which correspond to the results of Legagneur and Février (1955) who reported a feed consumption more than five times higher for animals receiving

pelleted feed compared to powdered feed on pigs. Higher consumption of T1 and T2 may be due to the flavor amelioration resulting from the incorporation of pigeon pea in these feeds.

Growth performances

Table 4 shows values for between treatments in mean weekly weight gain.

Table 4: Effect of the type of feed on weekly weight gain

	Treatment T0 (Mean ± S.E.)	**Treatment T1** (Mean ± S.E.)	**Treatment T2** (Mean ± S.E.)
Daily weight gain (g)	**3.21± 0.17[a]**	**3.77± 0.16[a]**	**3.50± 0.27[a]**
Feed conversion ratio	**8,82± 0,167[a]**	**8,44± 0, 738[a]**	**8,87± 0, 074[a]**

a: data affected with the same letter on the line are not significantly different (P>0.05).

The results show that, the highest daily weight gain was registered with animals receiving the treatment T1 (3.77± 0.16 g) and the lowest with those receiving treatment T0 (3.21± 0.17 g). As regard the Feed conversion ratio the lowest was recorded with animal receiving the treatment T2 (8.44±0.738) and the highest with treatment T2 (8.87±0.074). However, these data were not significantly different (P>0.05).

Daily weight gains were higher than those reported by Niba *et al.,* (2004) when they were supplementing a *Pennissetun* purpureum based diet with concentrate feeds containing cotton seed cake with weekly weight gain between 8.437 ± 1.130 g and 12.654 ± 0.940 g. this is due to the difference in feed consumption which were higher in our study compared to the ones in their study. This difference may also be due to the feed presentation. The pellet limits the ingredients sort and thus permits a better use of these ingredients by animals. However our daily weight gain were less than those reported by Pamo *et al.,* (2005) when they were feeding young guinea pigs with a *Trypsacum laxum* based diet with 5 g of *Moringa oleifera* (5.00 ± 0.70 g). This difference may be due to the fact that in their study the animals considered were not weaned animals.

Feed conversion ratios obtained at the end of this study were less than those reported by Niba *et al.,* (2004) which were comprised between 9.19 and 23.65. This can be due to the better use of the different feeds in our study due to the presentation of the feeds. The presentation favors the consumption of all ingredients and in the good proportion and thus a better use of these by the animal. However our feed conversion ratios were higher than those proposed by NRC, (1991) which were between 3.2 and 5.7.

Carcass Evaluation

Table 5: Carcass and gut characteristics of the animals in the study

Carcass characteristics	**Treatment T0** (Mean ± S.E.)	**Treatment T1** (Mean ± S.E.)	**Treatment T2** (Mean ± S.E.)
carcass weight (g)	279.00± 72.49[a]	330.50± 24.29[a]	271.63± 44.30[a]
Carcass yield 2(%)	67.06± 7.88[a]	66.93± 2.59[a]	66.80± 1.75[a]
Carcass yield (%)	61.53± 9.06[a]	64.00± 2.69[a]	63.77± 1.51[a]
Head relative weight (%)	17.40± 2.45[a]	16.03± 2.17[a]	17.24± 0.82[a]
Liver relative weight (%)	5.44± 1.37[a]	4.38± 0.49[a]	4.52± 0.55[a]
Lungs relative weight (%)	1.7± 0.86[a]	1.57± 0.36[a]	1.53± 0.08[a]
Heart relative weight (%)	0.41± 0.19[a]	0.46± 0.03[a]	0.39± 0.21[a]

a: data affected with the same letter on the line are not significantly different (P>0.05).

None of the carcass characteristics was affected by treatments (P>0.05). However the highest carcass weight and carcass yield were recorded with treatment T1 330.50 ± 24.29 g and 64.00± 2.69 % while the lowest carcass weight was registered with treatment T0 279.00± 72.49 g and the lowest carcass yield with treatment T2 63.77± 1.51 %. The highest carcass yield 2 was recorded with treatment T0 67.06± 7.88%. Gut characteristics were not also significantly different (P>0.05). The highest Liver, Lungs and Heart relative weights were highest with treatment T0 17.40± 2.45 %, 1.7± 0.86 % and 0.41± 0.19 % respectively.

Carcass yields obtained were similar to those reported by Ngoupayou *et al.,* (1995) with carcass yields equal to 68 % at the age of 15 weeks.

Liver weights obtained in this study were higher than those reported by by Niba *et al.,* (2004) with weights varying between 9.64±0.74 g and 10.60 ± 0.67g. This may be due to the presence of tannin that encouraged the development of

liver in order to filtrate this substance from the animal's blood.

Conclusion

The results permit us to adduce that pigeon pea can be used as supplement in guinea pigs diet. An inclusion of 10 % gives better performance compared to an inclusion of 20 %. Pigeon pea has the advantage that it is not part of the human feeding habit in Cameroon, unlike soybean (soybean cake) and fish (fish meal). It is therefore important in the improvement of guinea pigs growth performance. Further studies on the effects of pigeon pea on reproductive performances, digestibility, and production cost are needed. And on other man non-used resources should be of paramount importance.

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