

1 Evaluation of Two different Methods of processing Jackbean
2 (Canavalia ensiformis) meal as a Feed ingredient for pigs.

3

4 Abstract

5 The aim of this Research was to determine the response of young
6 growing pigs to diets containing Crack and Cooked jackbean (CACJ) and
7 jackbean Soaked in water for 72hours and Cooked (SACJ). Cracked and
8 cooked jackbean meal was prepared by breaking the seeds into pieces for
9 an hour. The soaked whole jackbean seeds were also cooked for an hour.
10 The cooked material were dried in the sun and milled. Seven diets
11 were formulated such that diet 1 (control) contained no jackbean. Diets 2,
12 3, and 4 contained CACJ at 15, 20, and 25% respectively, while diets 5,
13 6, and 7 contained 15, 20, and 25% SACJ respectively. Forty Seven
14 young growing pigs were divided into seven groups of seven pigs each,
15 and each group randomly assigned to one of the seven experimental diets
16 and fed for twelve weeks. The results of this studies showed that Cracked
17 and Cooked jackbean Significantly ($P<0.05$) depressed feed intake, growth
18 rate, of the pigs even at 15% dietary level. Soaked and Cooked jackbean
19 also Significantly ($P<0.05$) depressed feed intake and growth rate of the
20 pigs at three tested levels. CACJ and SACJ improved the feed gain ratio
21 of the pigs. The feed cost was also reduced. The results of this trials

22 tended to confirm the information in literature that pigs are very sensitive
23 to diets containing jackbean.

24 Based on this findings it is recommended that jackbean should not be
25 used as a feed ingredient up to 15% dietary level for pigs.

26 **Key words: pigs, crack , cooked, Soaked, Feed, jackbean .**

27 **1.0 Introduction**

28 The need to increase pig production for increased protein supply to the growing
29 population of the country, calls for the use of alternative source of livestock
30 feed which do not attract competition with man. Jackbean(*Canavalia*
31 *ensiformis*) has been identified as an indigenous legume which has shown
32 promise as energy and protein source for livestock production. However, the
33 potentials of the jackben is limited due to growth inhibiting proteins that must
34 be denatured before the beans are edible (D'Mello *et al* 1985,Udedibie and
35 Maduiké 1988, Udedibie and Nwaiwu 1988,Wyss and Biucel, 1988).

36 Many methods have been tried as means of improving nutritive value of
37 jackbean so as to render its valuable as a protein and energy supplement for
38 monogastric animals. It has been reported that heat treatment alone could not
39 significantly destroy the anti-nutritional factors in it (Monilla *et al*,
40 1981,Udedibie and Nkwocha 1990, Udedibie *et al*,1994). Recent studies by Uka
41 (1998),Emenalom *et al* 2002) have shown that cracked and cooked legumes

could be tolerated by broilers up to 25% in the diet. Information on pigs performance on diets containing jackbean is very sketchy. The aim of this research was to evaluate the response of young growing pigs to diets containing cracked and cooked jackbean (CACJ) and jackbean Soaked in water for 72hours and Cooked (SACJ).

2.0 **Materials and methods**

The jackbean seeds were processed using the two processing techniques developed by Udedibie and Carlini and (1997). Firstly, cracked and cook: the seeds were broken into smaller pieces using grinding machine, the broken seeds were then cooked for 1hour. The cooked material was sun dried to about 90% dry matter. It was then milled to produce cracked and cooked jackbean meal (CACJM). The second method, Soaked in water and cooked;. The whole beans were soaked in water for 72hours,the soaking water was changed after 48hours and replaced with fresh one to complete the remaining 24hours. After, the seeds was washed and raised with fresh water and cooked for 1hour. It is then sun dried and milled to produce Soaked and Cooked jackbean meal(SACJM). The meal was incorporated in the diets of growing pigs at 15, 20, and 25% levels respectively. (Table: 1).

61 Forth seven (47) weaned pigs of large white breed at week nine of age and
 62 weighing 5.5kg were procured from university farm. The pigs were divided into
 63 seven groups of seven (7) each according to weight and sex and randomly
 64 assigned to the seven experimental diets. They were individually weighed at the
 65 beginning of the experiment and weekly thereafter. Feed consumption was
 66 recorded daily and water offered ad libitum.

67 Data collected were subjected to a one way analysis of variance (Snedecor and
 68 Cochran 1967) where the analysis of variance indicated significant treatment
 69 effects, means were compared using Fishers Least Significant Differences
 70 (LSD) test (Snedecor and Cochran, 1967).

71 **3.0 Results**

72 The data on the performance of the experimental Pigs are shown in Table 4.

73 Table 4: Performance of the experimental Pigs

74 Feed intake significantly ($P < 0.05$) dropped among the pigs fed on jackbean
 75 diets. The drop in feed intake was so drastic that the pigs were consuming only
 76 about 33% of the quantity of feed being consumed by the control group. There
 77 was no significant ($P > 0.05$) difference in feed intake among the groups on
 78 jackbean diets.

79 Weight gain: the control group recorded significantly ($p < 0.05$) higher growth,
 80 reflecting the significantly ($P < 0.05$) higher feed intake. Jackbeans significantly
 81 ($P < 0.05$) depressed growth of the pigs. The depression in growth rate was most

severe among the pigs on CACJ diets. Interestingly growth rate of the pigs on SACJ diets increased with increase in dietary level of SACJ. However the increase was not significant ($P>0.05$). All the jackbean based diets promoted similar growth rate ($P>0.05$). This observation could not immediately be explained. The feed conversion ratio of the pigs on the control diet was significantly ($p<0.05$) inferior when compared with those of the groups on Jackbean diets. The feed conversion ratios of groups on jackbean were statistically similar ($P>0.05$). The groups fed the SACJ diets gave the best feed conversion ratios, ranging from 1.37-1.4gm of feed per gram of the body weight.

3.1 Discussion

The results of this study tended to show that the two processing methods (CAC and SAC) could not completely eliminate the factors in the jackbean responsible for depressed feed intake of the experimental animals. The only anti-nutritional factor in the jackbean that could be blamed for sharp drop in feed intake of the pigs is conavanine. Enneking *et al* (1993), Michelangeli and Vargas (1994) have demonstrated that canavanine induces reduced feed intake in pigs. If the two processing methods used in this study were able to eliminate Con A, the factor that remains which could affect feed intake of the pigs is Canavanine. The sharp drop in feed intake of the pigs at 15% dietary level of both CACJ and SACJ showed that pigs are more sensitive to anti-nutritional factors in the jackbean

103 than broilers. This is in confirmation of the recent study by Ukah (1988)
 104 reported that CAC jackbean significantly depressed feed intake of broilers at
 105 30% dietary level , This research was also in line with the studies by Wyss and
 106 Bickel (1988) reported that pigs are very sensitive to diets containing jackbean.
 107 They also observed that more than 5% dietary inclusion of jackbean severely
 108 depressed feed intake and growth rate of growing pigs.

109 **4.0 Conclusion**

110 The results of this study have shown that CACJ and SACJ are too strong for
 111 young growing pigs at dietary level as low as 15%. There is need therefore for
 112 further studies to determine the exact factors in the seeds that are responsible for
 113 the sharp drop in feed intake of the pigs and then find ways of eliminating them.
 114 Until this is done, it is difficult to recommend jackbean as feed ingredients for
 115 pigs

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160 Table 1: Ingredient Composition of the experimental Diets.

161	Ingredients %	: Control	CACJ 15	CACJ 20	CACJ 25	SACJ 15	SACJ 20	SACJ 25
162	Maize	50.00	40.00	38.00	36.00	40.00	38.00	36.00
163	Jackbean meal	0.00	15.00	20.00	25.00	15.00	20.00	25.00
164	Soybean meal	15.00	10.00	7.00	4.00	10.00	7.00	4.00
165	Spent grain	7.00	7.00	7.00	7.00	7.00	7.00	7.00
166	Palm kernel cake	10.00	10.00	10.00	10.00	10.00	10.00	10.00
167	Blood meal	2.00	2.00	2.00	2.00	2.00	2.00	2.00
168	Wheat offal	10.00	10.00	10.00	10.00	10.00	10.00	10.00
169	Fish meal	2.00	2.00	2.00	2.00	2.00	2.00	2.00
170	Bone meal	3.50	3.50	3.50	3.50	3.50	3.50	3.50
171	Salt	0.25	0.25	0.25	0.25	0.25	0.25	0.25
172	Vit/min primax*	0.25	0.25	0.25	0.25	0.25	0.25	0.25
173	TOTAL	100.00	100.00	100.00	100.00	100.00	100.00	100.00

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176 Calculated Analysis (DM%)

177	Crude protein	18.17	19.22	19.19	19.17	19.02	19.12	19.14
178	Crude fibre	4.14	4.61	4.72	4.84	4.59	4.70	4.82
179	Ether Extract	6.15	5.31	4.84	4.37	5.28	4.78	4.29
180	<u>ME (Kcal/kg)</u>	<u>2792.7</u>	<u>2751.24</u>	<u>2734.3</u>	<u>2717.84</u>	<u>2751.24</u>	<u>2734.54</u>	<u>2717.84</u>

181 *To provide the following per kg of feed

182 VitD3,4000,000TU, VitE, 8.00g, Vitk3,0.40g,VitB1, 0.32g: VitB2, 0.096g: VitB6, 0.56g,
 183 VitB12,4.00mg, Cal-Pathothionate,1.60g .Folic acid, 0.16g: Biotin, 8.0mg, Chlorine,48.0g, Zinc,
 184 7.20g, Copper,0.32g: BHT,32.00g: Iodine,0.25g ,Cobalt,36.00mg: Selenium,16.00mg, Oxytetracycline
 185 100.00g VitC ,25.00gkg-1

186 Table 2: Nutrient Composition of the ingredients

187	Nutrient %:	Maize	Blood meal	PKC	Wheat offal	Fish meal	SBM	Spent grain	Bone meal
188	Crude protein	8.8	85.0	19.0	15.7	54.2	37.0	25.3	0

189	Crude fat	3.8	1.0	5.0	4.0	10.0	18.0	6.2	0
190	Crude fibre	2.2	0.6	0	11.0	1.0	5.5	15.3	0
191	Ash	1.8	4.3	4.0	2.8	1.93	4.6	0.43	9.45
192	Calcium	0.02	0.30	0.21	0.05	3.73	0.25	0.29	3.34
193	Phosphorus	0.28	0.25	0.5	0.37	2.43	0.58	0.52	1.62
194	ME(Kcal/kg)	3325	1927	1600	2320	2450	3540	1710	0
195	Methionine	0.2	1.5	0.33	0.20	1.90	0.50	0.6	0
196	Lysine	0.24	8.10	0.54	0.59	5.10	2.40	0.9	0

197 Adapted from NRC (1979): Mc Donald et al (1979)

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199 Table 3: Proximate Composition of the processed and Raw Jackbean

200	<u>Components (%): Raw Jackbean</u>		<u>CACJ</u>	<u>SACJ</u>
201	Dry matter	86.53	87.35	88.22
202	Crude protein	28.54	26.44	25.94
203	Crude fibre	7.82	13.05	12.36
204	Ether Extract	3.84	3.16	3.02
205	Ash	4.92	4.01	3.89
206	NFE	57.69	53.34	54.79

207 Adapted: Udedibie (1990)

208 Table 4: Performance of the experimental Pigs

Parameters	Control	Treatments						SEM
		CACJ 15%	CACJ 20%	CACJ 25%	SACJ 15%	SACJ 20%	SACJ 25%	
Initial body weight(kg)	5.63	5.53	5.25	5.75	5.49	5.5	5.49	0.05
Final body weight(kg)	15.75 ^a	11.10 ^b	11.57 ^b	11.50 ^b	12.63 ^b	12.75 ^b	13.50 ^b	0.08
Feed Intake(g/day)	593.30 ^a	206.70 ^b	207.11 ^b	186.16 ^b	184.15 ^b	193.30 ^b	190.18 ^b	56.96
Growth rate(g/day)	180.71 ^a	97.68 ^b	116.07 ^b	102.68 ^b	127.50 ^b	129.50 ^b	143.03 ^b	10.58
Feed conversion ratio	3.28 ^a	2.11 ^b	1.78 ^b	1.81 ^b	1.44 ^b	1.49 ^b	1.37 ^b	0.025
Feed cost/Kg gain(#)	84.03 ^a	44.22 ^b	37.30 ^b	32.31 ^b	30.26 ^b	29.25 ^b	23.68 ^b	

209 ab means within a row with different superscripts are significantly
210 (P<0.05) different.

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