*Preliminary Evaluation of Jackbean (*Canavalia ensiformis *L. DC) Seed Meal as a Substitute for Fishmeal in diets for* Clarias gariepinus *(Burchell, 1822)*

BY

D. I Osuigwe, A. I. Obiekezie , and

Johnny O. Ogunji

ABSTRACT

Jackbean (*Canavalia ensiformis*) is an under-utilised novel legume with crude protein content and amino acid profile that make it a potential candidate in the tropics as substitute for fish meal in fish diets. This study assesses the potentials of Jackbean seed meal (JBSM) for partial replacement of fish meal in diets of *Clarias gariepinus*. The study shows that 20% of fishmeal in the diet can be replaced with JBSM boiled for 60 minutes without any adverse effect on the growth performance.

INTRODUCTION

- Catfish cultivation is a major farming industry in Nigeria with feed accounting for more than 50% of the production cost.
- The high cost of feed stems from the use of expensive fish meal to meet high dietary protein requirement of farmed fish.
- This situation calls for the need to develop alternatives to fish meal that are high in nutritive quality for cost effective fish feed production.
- Jack bean is one of the neglected novel legumes. The mature seed has a high crude protein content (20-32%) that recommends it for use as a substitute for fish meal in fish feed. It is cheap, readily available and hardly consumed by man.
  - It however has some anti-nutritional factors some of which can be reduced by processing. The effectiveness of jackbean is yet to be evaluated in diets for catfish.
- This preliminary study examines, the potential of using jackbean seed meal as partial replacement for fish meal in the diet of catfish

MATERIALS METHODS

Table 1: Composition of the experimental diets

	Diet No. / Fish Meal Substitution By JBSM											
		Raw JBSM				JBSM BOILED 30 MIN.				JBSM BOILED 60 MIN.			
	1 Contr.	2 10%	3 20%	4 40%	5 60%	6 10%	7 20%	8 40%	9 60%	10 10%	11 20%	12 40%	13 60%
Fish meal	22.0	19.80	17.6	13.20	8.80	19.80	17.60	13.20	8.80	19.80	17.60	13.20	8.80
JBSM[1]	0.00	4.36	8.72	17.44	26.17	4.93	9.86	19.71	29.57	4.93	9.86	19.71	29.57
G.Nut Meal	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
SoyBean M.	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Maize	35.0	32.84	30.68	26.36	22.03	32.27	29.54	24.09	17.63	32.27	29.54	24.09	17.63
Wheat bran	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Palm oil	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Bone	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Salt	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Vit[3]	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
% CP	30.27	30.15	29.50	29.50	29.07	30.10	29.83	29.28	28.63	30.10	29.83	29.28	28.63
ME(Kcal/kg)[4]	2986.0	2975.1	2964.23	2942.62	2920.05	2973.66	2961.30	2936.5	2967.47	2973.66	2961.30	2936.5	2967.47

EXPERIMENTAL CONDITIONS

Water temperature (°C)	28.5±1
Dissolved Oxygen(mg/l)	6.4±0.5
PH	6.8±0.2
Tank size (Litre)	20
Water volume (Litre)	20
Initial size range of fish (g/fish)	1.87
Number of experimental diets	13
Number of fish per tank	10
Number of replicates	2
Experimental time (Weeks)	8
Feeding rate (% body weight)	3
Weighing intervals (weeks)	2

RESULT AND DISCUSSION

Table 2: The influence of the different diets on growth and nutrient utilisation of *Clarias gariepinus*

		Diet No / Fish Meal Substitution By JBSM											
		RAW JBSM				JBSM BOILED 30 MIN.				JBSM BIOLED 60 MIN.			
Parameter	1 Cntrl.	2 10%	3 20%	4 40%	5 60%	6 10%	7 20%	8 40%	9 60%	10 10%	11 20%	12 40%	13 60%
Initial wt.(g)	1.83	1.92	1.84	2.00	1.83	1.87	1.83	1.89	1.86	1.86	1.86	1.98	1.80
Final wt. (g)	4.50	4.00	3.73	3.35	2.86	4.00	3.70	3.64	3.15	4.83	4.50	3.90	3.42
Weight gain	2.67 b	2.08 c	1.89 d	1.35 g	1.03 h	2.13 c	1.87 d	1.75 e	1.29 g	2.97 a	2.67b b	1.93 d	1.63 f
SGR[1]	1.61 a	1.31 b	1.26 b	0.92 d	0.79 de	1.36 b	1.28 b	1.17 bc	0.94 d	1.71 a	1.58 a	1.22 b	1.15 bc
FCR[2]	1.88 a	2.28 a	2.39 a	3.27 ab	3.85 ab	2.23 a	2.41 a	2.55 a	3.21 ab	1.71 a	1.92 a	2.49 a	2.63 cd
PER[3]	1.74 ab	1.48 ab	1.38 bc	1.04 ef	0.89 fg	1.49 bc	1.40 bc d	1.35 cd e	1.09 de f	1.92 a	1.73 ab	1.51 bc	1.37 cd
Protein %	64.45 a	62.21 bc	61.74 cd	60.03 e	59.68 e	62.66 bc	61.87 c	60.29 de	59.72 e	63.60 ab	62.80 bc	52.50 bc	61.93 c

[1]SGR = Standard growth rate; [2]FCR= Food conversion ratio; [3]PER= Protein efficiency ratio

CONCLUSION

- The relatively better performance of the control diet over diets containing JBSM indicates that the level of boiling employed did not eliminate totally the presence of ANF which exert negative effects on growth and nutrient utilisation on most of the test diets.

- The result from this work showed that boiling and particularly for 60 minutes significantly improved the performance of *Clarias gariepinus* fed such diets at low inclusion level. Fish fed diet containing 10% JBSM boiled for 60% (diet 10) had better PER (1.92), weight gain (2.97), FCR (1.71) and SGR (1.71), than the control diet (1.74, 2.67, 1.88 and 1.61). This may be due to the enhancement of the protein digestibility. Bressani et al., (1987) reported the digestibility of 47.9% for raw JBSM but the values appreciated to 76.4% and 78.7% respectively when cooked or roasted.

- Fish fed diets with up to 20% fishmeal substituted by JBSM boiled for 60 minutes, had protein content similar to those fed the control diets ($P<0.05$). This study therefore shows that 20% of fishmeal in the diet can be replaced with JBSM boiled for 60 minutes without any adverse effect on the growth performance.