

RESPONSE OF ALBINO RATS FED GRADED LEVELS OF RAW SICKLE POD (*Senna obtusifolia*) SEED MEAL

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ABSTRACT

A feeding trial was conducted for twenty eight (28) days to investigate the effects of feeding raw *Senna obtusifolia* seed meal (RSOSM) on the productive performance, carcass characteristics and organ weights of albino rats. Five (5) experimental diets were compounded to contain RSOSM at graded levels of 0, 5, 10, 15 and 20% respectively, which constituted five (5) treatments designated T1, T2, T3, T4 and T5, respectively. Sixty (60) albino rats with an average weight of 70.52 to 81.05g were allotted to the five dietary treatments in a randomized complete block design with three replicates of 4 rats each. Data were collected on feed intake, weight gain, feed conversion ratio, live weight, dressed weight, dressing percentage, organ weights (heart, liver, kidney and lungs). Data obtained were subjected to analysis of variance (ANOVA) using a computer statistical package (Statistix 9.0). The productive performance, carcass characteristics and organ weights were observed to be significantly ($P < 0.05$) depressed as the level of RSOSM increases in the experimental diets. Albino rats fed 15 and 20% RSOSM significantly ($P < 0.05$) recorded the lowest weight gain and dressing percentage of 60.10 and 51.78g, 74.46 and 75.38%, respectively. The weight of organs revealed a declining trend as the level of RSOSM increases except for the liver and intestine which indicated progressive increase in the size as the level of RSOSM increases in the experimental diets. Albino rats fed 15 and 20% RSOSM recorded the highest liver weight of 4.21 and 4.29g. It can be concluded that inclusion of RSOSM beyond 5% in the diets of albino rats has adverse effects on their productive performance, carcass characteristics and organ weights. The study recommended the thorough processing of RSOSM before incorporation into the diets of albino rats and other monogastric animals.

Keywords: Response, *Senna obtusifolia*, albino rats, performance, graded levels.

INTRODUCTION

The scarcity and high cost of conventional feed ingredients is one of the major challenges confronting the Nigerian livestock industry. Durunna et al. (1999) reported the progressive increase in the cost and scarcity of conventional feedstuffs. Therefore, there is an urgent need for animal nutritionists to intensify research on the utilization of under-exploited wild legumes in Nigeria. This was further buttressed by Adegbenro et al. (2011) who similarly pointed out the need to exploit under-utilized seeds which could be possible replacers for the costly conventional feed ingredients. Oyebiye et al. (2007) encourages the utilization of unconventional feed ingredients which are readily available and have comparable cost advantage and are not utilized by humans. The seeds of *Senna obtusifolia* have been recently identified as a possible alternative feed resource

for poultry (Augustine, 2016). *Senna obtusifolia* is a pantropical weed that belongs to the family leguminosae caesapinoideae. It is an erect bushy annual shrub that grows up to 90 cm tall and propagates through seed. The leaves are obovate and the flowers are yellow in colour (Akobundun and Agyakwa, 1998). It has become important to generate baseline information on the effects of feeding raw *Senna obtusifolia* seed meal to albino rats and other domestic animals. At the moment, information on effect of RSOSM on the performance of albino rats seems to be very scanty hence, the need to bridge such information gap. The choice of albino rats was due to their tractable nature and sensitivity to diverse diets (Akande et al., 2012). Based on their digestive physiology, rats are good representative of other monogastric animals such as rabbits, guinea pigs and pig. This study was designed to evaluate the effects of feeding

RSOSM on the productive performance, carcass attributes and organ weights of albino rats.

MATERIALS AND METHODS

Location of the study area

The study was conducted at the Animal House in the Department of Biological Sciences, Adamawa State University, Mubi. The area lies between latitude 9° 30' and 11° North of the equator and longitude 13° 45' East of the Greenwich meridian. The area has minimum and maximum temperatures of 12.7° and 37° and a minimum and maximum of 37.3 mm and 238.7 mm of mean monthly rainfall (Adebayo, 2004).

Chemical analysis

The proximate composition and levels of anti-nutritional factors of the *Senna obtusifolia* seed and the experimental diets were conducted according to the procedure of AOAC (2004).

Experimental diets and treatments

Five experimental diets were compounded and RSOSM was incorporated at 0, 5, 10, 15 and 20% levels making five (5) experimental diets designated T1, T2, T3, T4 and T5, respectively (Table 1).

Experimental animals and their management

A total of 60 albino rats were used for the experiment. The rats were managed in constructed metal cages. Known quantity of feed and water were given to the rats *ad libitum*.

Experimental Design

The 60 albino rats were randomly allotted to the five (5) dietary treatments in a randomized complete block design with three replicates of four (4) rats each.

Parameters measured

Data were collected on feed intake, weight gain, feed conversion ratio, and mortality. Data were also collected on live weight, dressing percentage, weight of organs (heart, liver, kidney, lungs, and intestine). Data obtained were subjected to the analysis of variance (ANOVA) using a computer statistical package (Statistix 9.0) and where significant differences occurred, Least significant difference (LSD) was used to separate the treatment means between treatments. The experiment lasted for twenty eight (28) days.

RESULTS AND DISCUSSION

The results of the proximate composition and level of anti-nutritional factors of *Senna*

obtusifolia seed meal is presented in Table 2. The result indicated that *Senna obtusifolia* seed meal has a good nutritional property but also contained anti-nutritional factors such as tannins and total phenolics. The diet also indicated adequacy in meeting the nutritional requirements of albino rats in the tropics.

The productive performance of albino rats fed the experimental diet were significantly ($P < 0.05$) affected by the dietary treatments. The feed intake weight gain and feed conversion ratio of the experimental rats were depressed as the level of RSOSM increased in the diets. The productive performance of albino rats fed 15 and 20% RSOSM were more depressed. This may be attributed to the high concentration of anti-nutritional factors such as tannins in treatments T4 and T5. Similar observation was made by Vadivel and Pugalanthi (2007) who fed rats with raw and processed *Mucuna pruriens* seed meal and reported significantly lower feed intake, weight gain and protein efficiency ratio in the rats fed raw mucuna seed. They similarly attributed this to the adverse effects of anti-nutritional factors and poor quality of proteins of the raw mucuna seed meal.

The results of carcass characteristics and organ weights of the albino rats fed RSOSM were significantly ($P < 0.05$) influenced by the dietary treatments except for the kidney and lungs. The dressed weight and dressing percentage linearly declined as the concentration of RSOSM increases in the diets. This was attributed to the increase in the concentration of the anti-nutritional factors as the level of RSOSM increased in the diets. This finding was in agreement with the report of Uchegbuet *et al.* (2004) who similarly observed same for broiler chickens fed raw *Napoleonaimperialis* seed meal.

The diets had significant ($P < 0.05$) impact on the heart and liver of the albino rats. Albino rats fed 10 to 20% RSOSM indicated hypertrophy of the liver which was attributed to the adverse effects of the toxic components present in RSOSM. This finding was in conformity with the report of Soetan and Oyewale (2009) who reported that anti-nutritional factors can cause hypertrophy of heart and liver.

CONCLUSION AND RECOMMENDATION

The outcome of this study revealed that albino rats fed RSOSM beyond 5% indicated a decline in productive performance, carcass attributes and organ weights. It is therefore recommended that RSOSM be processed before incorporation in the diets of albino rats and other monogastric animals such as rabbits, guinea pigs and pigs.

REFERENCES

- Adebayo, A.A. (2004). *Mubi Region a Geographical Synthesis* Paraclete Publishers, Yola, Nigeria 133 Pp.
- Adegbenro, M., Onibi, G.E., Agbede, J.O., Aletor, V.A. Aro, S.O and Adeyeye, S.A. (2011). Evaluation of the nutrients and anti-nutritional factors in some under-utilized seeds. *Proc. 16th Ann. Conf. of Anim. Sci. Ass. of Nig.* 12th -15th September 2012 Abuja, Nigeria Pp. 148-151.
- Akande, T.O., Odunsi, A.A., Ogunsola, J.B and Idowu, A. (2012). Histological response of albino rats to varying levels of detoxified castor bean cake based diets. *Proc. 17th Ann. Conf. of Anim. Sci. Ass. of Nig.* 9th -13th September 2012 Abuja, Nigeria Pp. 148-151.
- Akobundu, I.O and Agyakwa, C.W. (1998). *A Handbook of West African Weeds* 2nd ed. Published by INTEC printers Ibadan, Nigeria. Pp.306.
- AOAC (2004). Association of Official Analytical Chemists. *Official Methods of Analysis* 18th Edition, Washington D.C., USA. Pp. 275 – 293.
- Augustine, C. (2016). Evaluation of sickle pod (*Senna obtusifolia*) seed meal as source of protein for domestic chickens. Ph.D thesis Department of Animal Science, University of Maiduguri, Borno State, Nigeria.
- Duruna, C.S., Udedibie, A.B.I and Anyanwu, G.A. (1999). Combination of maize/sorghum based dried brewers grain, cocoyam corn and cassava tuber meals as substitutes for maize in the diets of laying hens. *Agric. Biotech. Envr*, 1:1-7.
- Oyebiye, O.O., Farina, G.O. Togun, V.A., Akinlade, J.A., Ajibola, H.O and Laniyonu, B.I. (2007). Studies on growth and haematological attributes of weaner rabbits fed graded levels of sundried cassava-blood meal mixture. *32nd Ann. Conf. Nig. Soc. for Anim. Prod.*, Calabar, March, 18th – 21, 2007.
- Soetan, K.O. and Oyewale O.E. (2009). The need for adequate processing to reduce the anti-nutritional factors in plants used as human foods and feeds: A review. *Afr. J. Food Sci*, 3:223-232.
- Uchegbu, M.C., Okoli, I.C., Anyanwu, C.E., Etuk, E.B., Esonu, B.O and Udedibie, A.B.I. (2004). Performance, carcass and organ characteristics of finisher broilers fed graded levels of raw *Napoleonaimperialis* seed meal. *Livestock Research for Rural Development* volume 16 www.org/Irrd/6/16/uche/6041htm#retrieved 2nd August, 2013.
- Vadivel, V. and Pugalentghi, M. (2007). Biological value and protein quality of raw and processed seeds of *Mucunapruriens* var. *utilis*. *Livestock Research for Rural Development* 19, Article # 97 retrieved July, 2007.

Table 1: Ingredient Composition and Calculated Analysis of the Experimental Diets

Ingredient (%)	Inclusion levels of raw <i>Senna obtusifolia</i> seed meal (%)				
	T1 (0)	T2 (5)	T3 (10)	T4 (15)	T5 (20)
Maize	49.00	48.00	48.00	48.00	48.00
Maize offal	13.85	13.85	12.90	11.90	7.65
Soya bean	17.80	13.80	9.75	5.75	5.00
Groundnut cake	16.00	16.00	16.00	16.00	16.00
RSOSM	0.00	5.00	10.00	15.00	20.00
Salt	0.30	0.30	0.30	0.30	0.30
Bone meal	2.50	2.50	2.50	2.50	2.50
Methionine	0.20	0.20	0.20	0.20	0.20
Lysine	0.15	0.15	0.15	0.15	0.15
Premix	0.20	0.20	0.20	0.20	0.20
Total	100.00	100.00	100.00	100.00	100.00
Calculated analysis					
Crude protein	19.67	19.39	19.45	18.57	18.95
Energy(kcal/kg)	2957.73	2936.63	2913.45	2906.67	2904.90
Crude fibre	4.08	4.35	4.65	4.88	4.95

Table 2: Proximate Composition of Raw *Senna obtusifolia* Seed Meal and Experimental Diets

Parameters	RSOSM	Inclusion levels of raw <i>Senna obtusifolia</i> seed meal (%)				
		T1 (0)	T2 (5)	T3 (10)	T4 (15)	T5 (20)
Dry matter	90.72	90.50	91.75	92.09	90.12	18.72
Crude protein	24.09	18.85	18.77	18.67	18.45	5.71
Crude fiber	13.17	4.88	4.98	5.08	5.18	5.93
Ether extract	7.21	6.21	5.33	6.01	5.72	5.71
Ash	4.50	5.32	4.95	4.95	5.76	5.31
NFE	40.39	38.11	38.95	37.20	36.07	37.10
Energy	2965.08	2553.37	2500.18	2524.83	2483.66	2483.04
Tannins	5.16	0.008	0.48	0.56	0.62	0.85
Total phenolics	8.43	0.019	1.05	1.45	1.63	1.87

Table 3: Productive Performance of Albino Rats Fed Graded Levels of RSOSM

Parameters	Inclusion levels of raw <i>Senna obtusifolia</i> seed meal (%)					SEM
	T1(0)	T2(5)	T3(10)	T4(15)	T5(20)	
Initial wt.	81.05	72.48	74.28	70.52	72.91	10.70 ^{NS}
Final wt.	184.49 ^a	148.94 ^b	138.29 ^b	130.62 ^c	96.69	15.41*
Overall wt. gain	103.44 ^a	76.46 ^b	64.01 ^c	60.10 ^c	51.78 ^d	17.64*
Feed intake	308.25 ^a	268.38 ^b	243.87 ^{bc}	241.60 ^c	212.82 ^d	8.28*
FCR	2.98 ^c	3.51 ^b	3.89 ^{ab}	4.02 ^a	4.11 ^a	1.03*
Mortality (no)	2.00	1.00	0.00	1.00	2.00	-

a,b,c,d = means in the same row with different superscripts are significantly different (P<0.05) * = Significant at 0.05 NS = Not significant (P>0.05); SEM = Standard error of the means; RSOM= Raw *Senna obtusifolia* meal.

Table 4: Carcass Characteristics and Organ Weights of Albino Rats Fed Graded Level of RSOSM

Parameters	Inclusion levels of raw <i>Senna obtusifolia</i> seed meal (%)					SEM
	T1(0)	T2(5)	T3(10)	T4(15)	T5(20)	
Live wt.	180.21 ^a	139.69 ^b	125.55 ^c	138.18 ^b	113.61 ^d	14.92*
Dressed wt.	152.71 ^a	115.69 ^b	100.04 ^c	103.17 ^c	85.64 ^d	12.15*
Dressing %	84.74 ^a	82.81 ^a	79.68 ^b	74.46 ^b	75.38 ^b	9.07*
Organ weights(% LBW)						
Heart	3.14 ^a	1.86 ^b	1.50 ^b	1.75 ^b	1.93 ^b	0.56*
Liver	2.95 ^c	3.38 ^b	4.53 ^a	4.29 ^a	4.21 ^a	0.39*
Kidney	1.11 ^b	2.83	1.83	1.07	1.51	0.09*
Lungs	1.52	3.20	2.47	1.30	1.98	0.17*
Intestine	8.68 ^d	16.86 ^b	14.60 ^c	17.81 ^a	18.07 ^a	3.23*

a,b,c,d = means in the same row with different superscripts are significantly different (P<0.05) * = Significant at 95% level of confidence; SEM = Standard error of the means; RSOM= Raw *Senna obtusifolia* meal %LBW = As percentage of live body weight