Scholarly Journal of Agricultural Science Vol. 7(1), pp. 15-19 February, 2017
Available online at http:// www.scholarly-journals.com/SJAS
ISSN 2276-7118 © 2017 Scholarly-Journals

Full Length Research Paper

Effects of feeding varying levels of tigernut (*Cyperus esculentus*) seed meal on the performance and blood profile of weaner grass cutters

Alagbe, J.O.

Livestock Department at Dan-malafia Research Farms Ibadan, Nigeria. Email: demsonfarms@yahoo.com.

Accepted 18 February, 2017

A 60 day feeding trial involving forty-five, 6 weeks old weaner grass cutters of mixed sex with an initial weight of 745 -750g was conducted to examine the effect of feeding varying levels of tiger nut seed meal on the performance, heamatological parameters, some biochemical parameters and enzymes assay of weaner grass cutters. The grass cutters were divided into five (5) treatment groups of nine (9) grass cutters per group in a completely randomized design experiment. The five treatments groups had diets containing tiger nut seed meal at 0, 10, 20, 30 and 40% dietary inclusions levels. The performance criteria were initial live weight, final live weight, total feed intake and mortality while the blood profile includes the hematological and serum biochemical analysis. All the hematological parameters evaluated : Pack cell volume (PCV), Haemoglobin (Hb), White blood cell (WBC), Red blood cell (RBC), Mean corpuscular haemoglobin concentration (MCHC), Mean corpuscular volume (MCV), Mean corpuscular haemoglobin (MCH) were not significantly(P>0.05) affected by the inclusion of Tiger nut meal. Significant influences were not observed for albumin, globulin and total protein. Serum glutamic oxaloacetate transaminase (SGOT) and Serum glutamic pyruvic transaminase (SGPT) were significantly affected (P<0.05) as the level of tiger nut meal increased in the diets. The results of this experiment demonstrated that the inclusion of tiger nut meal up to 40% has no deleterious effect on the performance and health status of grass cutters.

Key words: Grass cutters, tiger nut meal, performance live weight, mortality.

INTRODUCTION

Modern livestock production is faced with the challenges of producing high quality animal protein at low prices; there has also been an increase in the prices of conventional protein feedstuffs due to competition among ingredients used in the manufacture of animal feed. There is consequently a great need for alternatives that can supply in high demand for such ingredients, in particular for soya bean meal (Chisoro, 2015).

Animal protein intake is low in developing countries (Barwa, 2009) and one of the ways of making protein available is by the use of some leafs, trees and seeds that are of high nutritional properties and beneficial when incorporated into livestock feed. The use of local, cheap and readily available materials particularly those that are not utilized by man has received attention as the only viable alternative to the use of conventional feedstuffs (Odunsi, 2003).

Tiger nut (Cyperus esculentus) is an underutilized crop of the family Cyperceae, which produces rhizomes from the base and tubers that is somewhat spherical. According to Bamishaiye *et al* (2011), tiger nuts are rich in minerals such as phosphorus and potassium, calcium, magnesium and iron necessary for bones, tissue repair, muscles, the blood stream and for body growth and development and rich in vitamins E and C, it is often cultivated for its nutritive edible nuts and high contents of soluble glucose of 21% (Bamishaiye *et al.* 2009).

Laboratory reports have detected the presence of anti-nutrients like polyphenols and tannin which can be eliminated by boiling in water. Grass cutter also known as

Table 1: Proximate Composition of Tiger nut meal (TNSM)

Parameter	Dry matter (%)
Moisture	3.77±0.03
Crude protein	7.54±0.15
Ether extracts	29.40±0.23
Total ash	4.96±0.01
Crude fibre	7.10±0.43
NFE	47.23±0.05

NFE: Nitrogen Free Extracts

Table 2: **Phytochemistry of Tiger nut seed meal.**

Parameter	Quantity
Saponin (%)	1.75
Tannin (%)	1.89
Phenols (%)	2.30
Phytate (mg/g)	17.22

cane rat belongs to the family of rodents. They have the ability to tolerate high fibre diet than poultry and can produce animal protein of high biological value (Omole *et al*, 2011)

Grass cutter is an herbivore in the wild where it is considered as pest to major crops like sugar cane, maize, cassava, potato and some plantation crops. Its gastro-intestinal tract combines the function of monogastric and ruminant digestive tracts. Yi *et al*. (1980) also reported that balanced feeds for grass cutter may be formulated from maize, rice bran, palm kernel cake or groundnut cake, oyster or periwinkle shells, bone meal, common salt and vitamin/ mineral premix.

The objective of the study was to determine the effect of feeding varying levels of tiger nut (Cyperus esculentus) seed meal on the performance and blood profile of grass cutters.

MATERIALS AND METHOD

Location of experiment

The experiment was carried out at Dan-malafia Research Farms, Oyo state, Nigeria. The area is located within the derived savanna zone of Nigeria.

Animals and their management

Forty-five, 3 months old weaned male grass cutters with an average weight of 745 and 750 grams were randomly assigned to five dietary treatment of nine grass cutter per group in a completely randomized experimental design. The grass cutters were housed in a concrete cell measuring 220×80×60cm (length × breath height) which was disinfected one month before the arrival of the animals. The floor of the cell was made of solid concrete, temperature within the cells were within the range of 28-30℃ during the period of experiment. On introduction of the grass cutter the anti- stress was added into the drinking water and they were later dewormed. Feed intake and weights were recorded daily and weekly respectively throughout the experiment, which lasted for 60 days.

Preparation of experimental diets

Tiger nut seed was purchased from an open market in Kaduna state and later sun dried for seven (7) days and passed through a hammer mill to produce tiger nut seed meal (TNSM). The drying process was meant to reduce excess moisture so as to prevent rancidity of the material and growth of moulds. Proximate and phytochemical analysis of tiger nut meal was carried out as presented in Table 1 and 2 respectively.

Proximate analysis of tiger nut meal (TNSM) was carried out using the method of AOAC (1990).

The test ingredient (TNSM) was mixed with other ingredients to form five (5) experimental diets at levels of 0, 10, 20, 30 and 40%. The proximate composition is presented in Table 3

Blood Analysis

At the end of 60 days of the experiment, blood samples were collected from seven randomly selected grass cutters per treatment. The blood samples meant for haematology was collected into an Ethylene Diamine Tetra acetic Acid (EDTA) bottle while the sample for serum were collected into another bottle free from anticoagulant (EDTA) , blood samples were labeled according to treatment and replicates. The haematological indices determined included Haematocrit, Hemoglobin concentration (Hb), Red blood cell count (RBC), White blood cell count (WBC), Mean corpuscular volume (MCV), Mean corpuscular haemoglobin

Table 3: Percentage Composition of the Experimental Diets

Ingredients	Diets				
	1	2	3	4	5
Maize	51.50	41.50	41.50	31.50	21.50
Wheat offal	35.0	35.0	25.0	15.0	10.0
Soya meal	7.0	7.00	7.00	7.00	7.00
Groundnut cak	3.0	3.00	3.00	3.00	3.00
Bone meal	2.00	2.00	2.00	2.00	2.00
Limestone	1.0	1.00	1.00	1.00	1.00
Premix	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Tiger nut meal	0	10.0	20.0	30.0	40.0
Total	100	100	100	100	100
Determined analysis					
Crude protein	16.70	16.20	15.80	15.02	14.80
Crude fibre	6.80	6.93	7.00	7.54	7.89
Ether extract	4.03	4.87	5.03	6.01	6.45
Ash	3.11	3.34	3.52	3.64	3.97
ME (Kcal/kg)	2620	2676	2785	2805	2867

Premix supplied per kg diet :- Vit A, 15,000 I.U; Vit E, 5mg; Vit D3, 3000I.U, Vit K, 3mg; Vit B2, 5.5mg; Niacin, 25mg ; Vit B12, 16mg ; Choline chloride, 120mg ; Mn, 5.2mg ; Zn, 25mg ; Cu, 2.6g ; Folic acid, 2mg ; Fe, 5g ; Pantothenic acid, 10mg ; Biotin, 30.5g ; Antioxidant, 56mg.

Table 4: Performance traits of grass cutters fed varying levels of Tiger nut seed meal (TNSM)

	Diets					
Parameters	**1**	**2**	**3**	**4**	**5**	**S/L**
Initial body weight (g)	745±30.3	740±41.4	747±48.1	746±37.9	750±37.4	NS
Final body weight (g)	1468±33.1	1408±41.8	1400±30.9	1410±51.3	1470±35.2	NS
Total feed intake (g)	2411±20.1	2601±27.3	2601±32.1	2651±26.1	2547±29.3	NS
Mortality	0	0	0	0	0	-

NS: No significant difference (P>0.05)

concentration (MCHC), Mean corpuscular haemoglobin (MCH) and white blood differential counts which includes Lymphocyte, Monocytes and Neutrophils. The haemoglobin concentration was determined by colometry-cyanomethacmoglobin method, Red blood cell counts were determined by Neuberger haemocytometer method, Pack cell volume was determined by the micro-haematocrit method (Dacie and Lewis, 1991).

The blood samples that were meant for serum chemistry were collected into other bottles free from any anticoagulant. The parameters determined include: Albumin and Globulin which were calorimetrically determined using diagnostic reagent kits. Serum glutamic oxaloacetate transaminases (SGOT), Serum glutamic oxaloacetate transaminase (SGOT) were also determined.

Statistical Analysis

All data collected were subjected to one way analysis of variance (ANOVA) using SAS 1988 and significant means separated by Duncan multiple range tests. (Duncan, 1955).

RESULTS

Table 1 shows the proximate composition of test ingredients, the values obtained are 3.77%, 7.54%, 29.40%, 3.99%, 7.10% and 42.23% for moisture, crude protein, ether extracts, ash, crude fibre and Nitrogen free extracts (NFE) respectively. These proximate values agree with the findings of Oladele and Aina, (2007) on yellow variety dried tiger nut. Table 2 shows the phytochemistry analysis for anti-nutritional inhibitors tiger nut seed meal the results obtained are 1.75%, 1.89%, 2.30% and 17.22 mg/g for saponin, tannin, phenols and phytate respectively. The composition of experimental diets is presented on Table 3. Table 4 shows the performance traits of grass cutters fed varying levels of tiger nut meal (TNSM), the final live weight ranges between 1400g and 1470g. There was no significant difference (P>0.05) among the treatment in terms of final live weight.

Table 5: Hematological traits of Grass cutters fed varying level of Tiger nut seed meal (TSML)

	Diets					
Parameters	**1**	**2**	**3**	**4**	**5**	**S/L**
Pack cell volume(%)	29.02±2.34	28.40±3.45	27.11±2.78	28.56±4.13	27.64±1.23	NS
Haemoglobin (g/dl)	9.25±1.30	9.10±1.23	9.23±0.98	9.16±0.45	9.22±1.67	NS
RBC (×106µl)	2.78±0.09	2.80±0.21	2.88±0.51	2.90±0.44	2.98±0.67	NS
WBC (×106µl)	8.09±0.45	8.03±0.21	8.60±1.14	8.05±0.77	8.03±0.21	NS-
MCV (Fl)	50.4±1.23	50.9±0.34	51.7±0.08	52.5±0.67	51.3±0.34	NS
MCHC (g/dl)	33.30±0.23	33.10±0.46	32.20±0.15	30.10±0.90	32.90±0.27	NS
MCH (Pg)	35.10±0.45	37.40±0.23	35.10±0.04	34.30±0.98	36.34±1.20	NS
Neutrophils (%)	33.3±1.34	34.5±1.86	33.17±1.22	32.13±1.09	31.11±1.43	NS
Lymphocytes (%)	41.9±1.23	42.23±1.65	43.03±1.82	43.12±2.32	42.23±1.78	NS
Monocytes (%)	1.97±0.35	1.20±0.28	1.81±0.21	1.75±0.41	1.80±0.39	NS
Eosinophils (%)	1.10±0.96	1.21±1.35	1.10±1.20	1.25±0.32	1.27±1.24	NS
Basophils (%)	0.00	0.00	0.00	0.00	0.00	NS

* =significance difference (P<0.05) NS = No significant difference (P>0.05)
RBC: Red blood cell
WBC: White blood cell
MCV: Mean corpuscular volume
MCH: Mean cell haemoglobin
MCHC: Mean cell haemoglobin concentration

Table 6: Serum biochemical Parameters of Grass cutters fed varying level of tiger nut meal

	Diets					
Parameters	**1**	**2**	**3**	**4**	**5**	**S/L**
Albumin (g/dl)	2.23±0.03	2.13±0.05	2.02 ±014	1.98±0.17	1.91±0.08	NS
Globulin (g/dl)	2.35±0.06	2.12±0.03	2.04±0.07	1.50±0.08	1.42±0.04	NS
Total protein (g/dl)	4.58±0.13	4.25±0.16	4.06±0.19	3.48±0.17	3.33±0.10	NS
SGPT (U/L)	8.78±0.67	7.83±0.77	4.17±0.69	4.67±0.87	4.03±0.72	*
SGPT (U/L)	14.31±1.34	15.33±1.12	13.08±1.24	17.12±1.36	17.55±1.12	*
Cholesterol (mg/dl)	3.12±0.75	3.11±0.89	3.13±0.98	3.12±0.56	3.12±0.77	NS

NS: No significant difference (P>0.05)
*= Significantly different (P<0.05)
SGOT: Serum glutamic oxaloacetate transaminase
SGPT: Serum glutamic pyruvic transaminase

The haematological parameters are presented on Table 5, pack cell volume (PCV) values obtained are 29.2, 28.40, 27.11, 28.56 and 27.64 % foe diets 1,2,3,4 and 5 respectively while those of haemoglobin are 9.25, 9.10, 9.23, 9.16 and 9.22 g/dl for diets 1,2,3,4 and 5 respectively. The values obtained for Red blood cell count (RBC) are 2.78, 2.80, 2.88, 2.90 and 2.98 (×106mm3) for diets 1, 2, 3, 4 and 5 respectively. White blood cell count (WBC) values obtained are 8.09, 8.03, 8.60, 8.05 and 8.03 (×106µl) for diets 1,2,3,4 and 5 respectively while those of Mean cell volume (MCV) are 50.4, 50.9, 51.7, 52.5 and 51.3 fl for diets 1,2,3 4 and 5 respectively.

The mean corpuscular haemoglobin concentration (MCHC) values are 33.30, 33.10, 32.20, 30.10 and 32.90 g/dl for diets 1, 2, 3, 4 and 5 respectively while those of mean corpuscular haemoglobin (MCH) are 35.10, 37.40, 35.10, 34.30 and 36.30 pg for diet 1,2,3,4 and 5. The pack cell volume (PCV), haemoglobin (Hb), red blood cells (RBC), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) were not significantly affected (P>0.05)with the inclusion of tiger nut meal (TNSM) in the diet, however, values of RBC increased from diet 1 to 5.

White blood cells (WBC), lymphocytes, neutrophils, monocytes, eosinophils were not significantly affected (P>0.05) with the inclusion of tiger nut meal in the diet. Table 6 shows the serum biochemical parameters of grass cutters fed tiger nut meal, the albumin values obtained were 2.23, 2.13, 2.02, 1.98 and 1.91 g/dl for diets 1,2,3,4 and 5 respectively while globulin values were 2.35, 2.12, 2.04, 1.50 and 1.42g/dl for diets 1,2,3,4 and 5. The values obtained for cholesterol are 3.17, 3.14, 3.13, 3.12 and 3.15 for diet 1,2,3,4 and 5 respectively.

Albumin, globulin, total protein and cholesterol values were not significantly (P>0.05) influenced by the different inclusion of TNSML, the albumin values increased from

diet 1 to 2 after which the values declined. SGPT and SGOT were significantly (P>0.05) by the inclusion of tiger nut meal in the diets, their values showed a marginal increase from diet 1 to 5 respectively.

DISCUSSION

The crude protein values in diet 1 to 5 did not significantly (P>0.05) affect the final weight of the grass cutters, which implies that the protein level is enough to support the growth of the animals. According to Meduna (2002) feeds containing 12-20% crude protein have been reported to be suitable for grass cutters. The heamatological parameters were not significantly influenced (P>0.05) with the inclusion of tiger nut meal in the diets, this could be attributed to nutritional adequacy and safety level of tiger nut meal, this report agrees with the findings of Onunkwo *et al*. (2015) when cockerels were fed to cockerels.

Oludele and Aina (2007) also reported that tiger nut contains some essential amino acids (leucine, lysine, methionine, isoleucine, valine, threonine, alanine and so on) and minerals (iron, calcium, sodium, magnesium, phosphorus, zinc, copper and potassium) which all play vital role in the well-being of the animal. Isaac *et al.* (2013) also reported that red blood cell is involved in the transport of oxygen and carbon dioxide in the body. The values of white blood increased from diet 1 to 3, this is a clear indication that the white blood cells and its differentials are able to defend the animal's body against invasion by foreign organisms, this values agrees with the findings by Byanet *et al*. (2008) on the haematological parameters of young grass cutters reared in northern Nigeria.

Similarly the albumin, globulin and the total protein were not significantly influenced (P>0.05) by the inclusion of tiger nut meal, their values fall within the ranges reported by Byanet *et al*. (2008) for grass cutters. The values obtained for SGPT and SGOT increased from diet 1 to 5, they were significant difference (P<0.05) among the treatments. According to Iyayi (1994), SGPT and SGOT usually respond to the presence of toxic substance (anti-nutrient) in a diet. The significant effect of the diets on SGPT and SGOT agrees with the findings of Olabanji *et al.* (2007) in rabbits fed Wild sunflower blood mixture in their diets.

CONCLUSION

The results obtained from this study clearly demonstrated that Tiger nut meal could be efficiently utilized and tolerated by grass cutters up to 40% inclusion level without any deleterious effect on performance and health status of growing grass cutters.

REFERENCES

AOAC, (1990). Association of Official Analytical Chemists Official Methods Analysis 15th Edition

Bamishaiye . E O (2009). Haematological parameters of albino rats fed on tiger nuts (Cyperus esculentus) tuber oil meat based diet. The internet J. Nutr. and Wellness. 10(1).

Bamshaiye E. O (2011). Tiger nut: as a plant, its derivatives and benefits. Scholarly, peer reviewed. Afri. J. food Agric. Nutri. and Development. 11(5).

Barwa. E (2009). Increasing household protein consumption through mini livestock production in Nigeria. Information Manager Vol. 9 (2) 2009.

Byanet, O., Adamu, S., Salami, S.O. and Obadiah, H.I. (2008) .Haematological and plasma biochemical parameters of young grass cutters (Thyronomys swinderianus) reared in northern Nigeria. J. Cell and Animal Biol. 2(10): 177-181

Chisoro. P (2015). Potential use of baobab seeds in the diets of poultry diets. Department of Livestock and Pasture Science, Faculty of Science and Agriculture, University of Fort Hare (AFMA MATRIX). p 52.

Dacie, J.V and Lewis, S.M (1991). Practical Haematology 7th edition ELBS with Church hill, England.

Duncan, D.B. (1955). Multiple Range and Multiple F-Test Biometrics. 11:1-42

Isaac, O.S (2013). Haematological parameters and factors affecting their values, Published by Science and Education Centre of North America. Agric. Sci. 2(1): 37-47.

Iyayi, E.A. (1994). Supplemental effect of low and high cyanide cassava on the performance, nutrient digestibility and serum metabolites of growing pigs. J. Agric. Trop. Sub-trop 95:199-205.

Meduna, A.J (2002). Preliminary observations on cane rat (Thryonomys swinderianus, Termminck) feeding and breeding of the Federal College of Forestry, Ibadan. Proceedings of the 27th Annual Conference on Nigerian Society of Animal Production, March 17-21. Federal University of Technology, Akure. pp: 304-305.

Odunsi, A.A (2003). Assessment of Lablab purpureus leaf meal as a feed ingredient and yolk colouring agent in the diet of layers. Int. J. Poultry Sci. 2:71-74.

Olabanji, R.O (2007). Studies on haematological and serum characteristics of weaner rabbits fed different levels of sunflower (Tithonia diversifolia) leaf – blood meal mixture. International Journal of Applied Agricultural and Apicultural Research, IJAAAR4 (1&2): 80-89, 2007.

Oladele et al . (2007). Influence of processing techniques on the nutrients and anti- nutrients of tiger nut (Cyperus esculentus). World J. Dairy and Food Sci. 2: 88-93.

Olomu, J.M., Ezieshi, V.E and Orheruata, A.M. (2003). Grass cutter production principles and practice, A. Jachem Publication, Benin Nigeria.

Omole, S.H. (2011). Small and medium scale grass cutter farming, back to Agriculture series II. Green Choice publication. p 3.

Onunkwo, D.N., Ugwuene, M.C (2015). Hematological and Serological Characteristics of Cockerels Fed Different Levels of Tiger nut seed meal. Int. J. Multidisciplinary Res. and Rev. 1(1): 23-27.

Statistical Analysis Systems Institute Inc. (1988). SAS User guide statistic, version 6 edition. Gary, New York, USA.

Yi, S.S.A and O.O. Tewe (1980).Food preference and carcass composition of grass cutters (Thryonomys swinderianus) in captivity. Afri. J. Ecol., 133-140.