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The Effect of Feeding Shea Butter Residual Meal on Pullet Chicks, Haematological and Serum Chemistry Response

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Abstract: Pullet chicks were fed shea butter residual meal of different categories. (A= Apparently brown nuts not sprouted, B= Dark Shea nuts and C= sprouted nuts) at 0g/kg, 50g/kg, 100g/kg, 150g/kg, and 200g/kg diet, administration of these residual meal as alternative protein and energy source to pullet chicks indicate that the pullet chicks growth rate at ($P<0.05$). Sprouted Shea butter residual supported the least growth. Result of hematological and serum chemistry did not show any significance difference in all the parameters tested. Thus indicating that the residual meal of Shea butter could be a useful adjuvant in compounding animal fed, most especially the brown nuts.

Keywords: *Butyrospermum Parkii,* Serum, Haematology, Pullet Chick, Residual Meal

1. Introduction

Butyrospermum parkii, which is normally known as *butyrospermum paradoxum*, is a medium sized deciduous perennial tree from which the Shea nuts was obtained [19], The Shea tree is an important oil bearing tree in Africa and major source of vegetable oil in rural areas of West Africa, the Shea fruits which resemble a small Avocado pear [18, 12]. It has a flavorful pulp which is edible. The kernel yields the butter, which represent half of its content. Shea butter is used for cooking porridges and as a flavour additive in confectioneries. It is also used in the soap, cosmetic, pharmaceutical industries and in traditional medicine, for fuel, waxing of fruits, in candle making and as butter substitute [4, 16]. Because of its enormous usefulness in the production of non-timber forest product, it is also fast gaining attention from agro forest researchers and breeders as a tree with very rich potentials that is worth scientific investigation for the purpose of its domestication and subsequent improvement as an Agricultural tree crop [10]. The high cost of food items is a major reason for the high incidence of hunger and malnutrition among the poor, especially in the under developed countries. Efforts to reduce the high cost of feeds and the cost of poultry products have concentrated on using alternatives feed stuffs.

The increasing world demand for shea fat as a cocoa butter substitute as when compared with the cotton seed oil, as well as for cosmetics [11] has increased the supply of shea nut meal in sub-Saharan of Africa because of its availability. Shea nut meal is the residue that remains after fat extraction from the harvested nuts, and fat extraction from shea nuts [5]

The residual meal as reported by Umaru, *et al.*, [17] is used for cattle fed and is also eaten raw by children. [7, 8]. The residual meal (SBRM), which remains under exploited, judging from the limited and conflicting information on its utilization in livestock species, Morgan and Frinder [13] indicated that a maximum of 25% to 30% could be tolerated by the pigs and ruminant. However the residual meal used for these studies was obtained from local method of the butter extraction by (boiling method). Okai and Bonsi [15] reported that 500,000 million of the residual meal is disposed annually in the savannah region of West Africa. The aim of these studies was to investigate the effect of the

residual meal of shea butter after extraction on body weight, Nutrient retention, Blood and Serum parameters on pullet chicks.

2. Material and Methods

2.1. Sample Collection

Fresh shea nuts (*B-parkii*) were collected by Kerenhappuch in the wild field of Michika local government in Adamawa state, the nuts were sun dried for seven days to reduce the moisture content to prevent fungal growth as well as to facilitate de-husking. The shea nuts were sorted into three groups A= Sprouted nuts, B = Brown whole some, not sprouted, C= Dark shea, sample of each group were selected for the subsequent feed formulation.

2.2. Sample Preparation

The grouped samples were subjected to heat and allowed to roast on fire for 5 to 10min and was pounded into powder for subsequent use. Each of the group was mixed with boiling water (5% w/w) and cooked for 3 to 4 hours until oil floated on the top of the mixture; extracted oil was gently skimmed from the top. The Residual meal was dried for four days and then fried for 3min with palm oil 10g/kg, before incorporation into the diet. The three iso-nitrogeneous and isocaloric rations were formulated as shown in table 1. The control ration of diet, as reported by [1] contain no residual meal while others were formulated by substituting; 50g/kg, 100g/kg; 150g/kg; and 200g/kg of guinea corn and groundnut cake with shea butter residual meal [6].

2.3. Experimental Animals

One hundred and twenty days pullet chicks were accommodated in flour pens with continues management and vaccination was followed. The diet, in mash form and water were provided for the chicks' ad-libitum. Records of feed consumption and weights were selected from each group, (8 chicks per treatment) for nutrient retention trial. The chicks were housed in metabolic cages, for a seven days trial period Feed were given ad-libitum. Total excreta were collected daily during the last 3 days of the metabolic trial.

2.4. Blood Sample Collection

Blood sample was collected from eight overnight pullet chicks per treatment. Hematological specimen were collected in EDTA anticoagulant bottle and Packed cell volume (PVC), Red blood cell (RBC), White blood cell (WBC), and Hemoglobin were determined using winfrobes microhaematocrit, improved neubauer hemocytometer and cyanao methemoglobin method and urea were analyzed using sigma kits and cholesterol, according to Roschlan, et-al. [17] methods. Samples of the diets and excreta were dried in a forced draught oven at 60°C for 24hrs and grounded into powder in a laboratory hammer mill and proximate analysis determined [3]. Treatments means were separated using Duncan's multiple range tests [6].

Table 1. *Composition of the Standard and Shea Butter Residual Meal (A, B, C.) Prepared by Mixing Calculated Amounts of Maize, Guinea Corn, Blood Meal, Fish Meal, Bone Meal, Palm Oil, Salt, Crude Fiber, and Vitamin.*

Component	Group 1	Group 2	Group 3	Group 4	Group 5
Shea butter residual meal	—	50	100	150	200
Guinea corn	595.0	542.5	500.0	458.0	416.0
Wheat flour offal	119.5	114.5	109.5	104.5	100.5
Groundnut cake	190.0	180.0	170.0	150.0	140.0
Blood meal	30.0	30.0	30.0	30.0	30.0
Fish meal	30.0	30.0	30.0	30.0	30.0
Bone meal	20.0	20.0	20.0	20.0	20.0
Salt	3.0	3.0	3.0	3.0	3.0
Oyster shell	10.0	10.0	10.0	10.0	10.0
Premix	2.5	2.5	2.5	2.5	2.5
Vitamins	2.5mg/g	2.5mg/g	2.5mg/g	2.5mg/g	2.5mg/g
Palm oil	—	10	15	20	25
Calculated Analysis; Crude protein (g/kg)	200.0	200.0	200.0	200.0	200.0

Composition of the experimental diet (g/kg) for A, B, C.
A=Brown shea nut residual meal, B =Dark shea butter residual meal, C= Sprouted shea butter residual meal

Table 2. *Growth, and Apparent Nutrient Retention of Pullet Chicks Fed Graded Level of Shea Butter Residual Meal (SBRM) from Groups A, B and C.*

	0g/kg	50g/kg	100g/kg	150g/kg	200g/kg
BSBRM	7.15	7.18	7.19	6.98	6.05
DSBRM	7.15	7.15	7.10	6.40	6.01
SSBRM	7.15	7.12	6.55	5.89	5.03

Growth rate.

(BSBRM)	0g/kg	200g/kg	50g/kg	100g/kg	150g/kg
Dry Matter	75.35	75.40	75.42	75.00	74.83
Crude Protein	76.44	76.45	76.48	75.95	74.98
Either Extract	90.04	92.40	95.61	89.79.	87.58
Crude Fiber	25.15	28.89	37.97	23.00	18.47
Ash	34.02	38.96	43.27	33.76	35.89

Apparent retention (percentage);

DSBRM	0g/kg	50g/kg	100g/kg	150g/kg	200g/kg
Dry matter	75.35.	75.36	75.39	74.78	73.84
Crude Protein	76.44	76.41	76.42	74.98	74.59
either Extract	90.05	91.00	93.03	81.08	79.54
Crude Fiber	25.15	26.74	35.97	20.01	14.01
Ash	34.03	39.94	45.21	39.06	3

SSBRM	0g/kg	50g/kg	100g/kg	150g/kg	200g/kg
Dry Matter	75.35	75.03	74.35	69.45	64.24
Crude Protein	76.44	76.41	75.09	74.21	67.54
Either Extract	90.04	91.01	92.03	81.12	76.16
Crude Fiber	25.15	26.34	35.97	20.01	14.01
Ash	34.02	39.89	45.31	43.06	39.98

BSBRM=Brown shea butter residual meal, DSBRM= Dark shea butter residual meal, SSBRM= Sprouted shea butter residual meal

Table 3. *Haematological and Serum Chemistry.*

Brown Shea (Bsbrm). Darkshea (Dsbrm). Sprouted Shea (Ssbrm).

Blood and parameter	0 g/kg	50 g/kg	100 g/kg	150 g/kg	200 g/kg	0 g/kg	50 g/kg	100 g/kg	150 g/kg	200 g/kg	0 g/kg	50 g/kg	100 g/kg	150 g/kg	200 g/kg
PCV(%)	24.13	25.05	26.10	24.10	24.08	24.12	25.02	24.04	23.00	23.01	24.12	23.04	22.67	22.57	22.32
Hb(%)	7.50	8.00	8.10	8.20	8.18	7.45	7.75	6.89	6.86	6.01	7.50	7.01	6.98	6.78	6.34
RBC/06/L	3.60	3.65	4.01	4.05	4.10	3.60	3.19	3.20	3.20	3.22	3.60	3.12	3.06	3.01	2.90
WBC/03/L	21.40	22.01	22.03	22.05	22.07	21.41	21.56	20.67	20.34	20.62	21.40	21.34	21.15	21.02	21.02
Total protein g/dl	3.05	3.10	3.15	3.12	3.04	3.04	3.06	3.08	3.15	3.16	3.05	2.93	2.94	2.89	2.84
Albumin (g/dl)	0.91	1.02	1.12	0.92	0.98	0.89	0.73	0.69	0.65	0.74	0.91	0.83	0.85	0.89	0.90
Globulin g/dl	2.15	2.10	2.13	2.10	2.10	2.15	2.10	2.09	2.09	2.09	2.15	2.04	2.02	2.00	1.97
Creatinine mg/dl	0.4	0.42	0.43	0.35	0.35	0.4	0.33	0.32	0.33	0.33	0.40	0.25	0.26	0.24	0.23
Urea mg/dl	10.13	10.38	10.40	10.40	1042	10.13	10.18	10.09	10.10	10.07	10.13	9.23	9.15	9.25	9.19
Cholesterol mg/dl	97.13	97.15	80.00	78.02	78.03	97.12	96.18	78.45	78.78	78.97	97.12	88.12	70.04	70.00	69.87
Serum GPT IU/I	21.00	22.13	22.20	20.25	19.25	21.00	19.87	21.05	21.13	19.76	21.00	19.87	19.64	19.35	1915
Serum GOP IU/I	27.01	27.40	27.48	26.50	25.89	27.01	27.03	27.12	27.15	27.32	27.00	25.12	25.10	25.06	25.01

Mean in the same row with a significant different superscripts are different ($p < 0.05$) A=Brown shea nut, not sprouted, and wholesome (BSBRM);
B= Dark shea nut (DSBRM),
C= sprouted shea nuts residual meal (SSBRM).

3. Result and Discussion

The result of chicken feed formulation from shea nuts using residual meal and the changes in the Pullet chicks fed with 50g/kg and 100g/kg showed significant growth rate at $p<0.05$ when compared to pullet chicks fed 150g/kg and 200g/kg for all the shea butter residual meal. The apparent retention was highest in either extracts of the brown shea nuts when compared to the Dark shea and the sprouted nut, which agreed with Freeman report [9]. Value for 150g/kg and 200g/kg are lower when compared to values obtained for 50g/kg and 100g/kg in all the shea butter residual meal groups. The apparent retention of all the different shea butter residual meal decreased significantly with higher level of shea butter residual supplementation. This probably could be as a result of low feeding arising from odour or unpalatability of the residual meal at higher level in the pullet chicks. Feeding of the shea nut meal residual formulation to the pullet chicks was to examine the variability in dietary and growth performance of various residual obtained from the shea nuts extraction as a good choice for chicken feeds.

The results of hematological and erythrocyte studies showed no significant differences in the PCV of brown and other nuts at different concentration. However there was a significant decrease in the PCV with concentration of sprouted shea butter residual. Results of RBC showed significant increase in PCV ($p<0.05$) with concentration of Brown nut residual but decreased with concentration in dark and sprouted shea nuts residual. All the serum parameters tested showed a gradual decreased with increased in concentration of the residual meal in pullet chicks.

4. Conclusion

The study successfully formulated a highly nutritious chicken feed from shea butter residual meal especial with BSBRM which shows a better feed meal at 50-100g/kg, Guinea corn, wheat flour offal, groundnut cake, blood meal, fish meal, bone meal, salt, oyster shell, vitamins, palm oil, and crude protein obtained in Michika local government Adamawa state Nigeria. The proximate composition of the brown wholesome shea butter residual formulated feed was found to be acceptable in comparable to the other two the DBSRM and SSBRM. The formulated feed mostly complied with recommendations for chicken feed. This study is suggesting that the shea butter residual meal will support growth best at 50g/kg and 100g/kg when used as animal feed compounder because of its availability as when compared with the cotton seed cake (*Gossypium* species) which is competitive, become one of the wide range of alternative feeding stuffs and the only agro industrial origin whose composition, method of processing and nutritive value are being used for livestock feeding for decade [2]. Thus the use of residual meal from shea nut extraction will drastically reduce the competition cotton seed and enhance chicken growth. So by this result we can draw conclusion that 50g/kg and 100g/kg is having a satisfactory growth rate for Animal compounders' benefits.

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References

[1] Adeogun WO (1989). Shea butter cake as an ingredient in Broiler chick rations. M. sc Thesis Department of Animal Science University of Ibadan Nigeria.

[2] Adeniji AA, and Ehinmidu OM (2007). Effect of Feeding Pullet Chicks Cotton Seed Cake with or Without Fish Meal Supplementation. International Journal of Poultry Science 6 (11): 818-821.

[3] AOAC, (1990). Association of official Analytical Chemistry. Official Method of Analysis. 15th Ed Washington D. C.

[4] Akingbala JO, Adebisi ET, Baccus-Taylor GSH, Falade K and Lambert IA (2007). Effect of Nut Roasting Temperature, Extraction, Process and Packaging Material on the Storage Properties of Shea Butter. West Indian Journal of Engineering 30 (1):32-36.

[5] Dei HK, Rose SP, Mackenzie P (2008). Metabolizeble energy in different shea nuts (*vitellaria paradoxa*) Meal Samples for Broiler Chickens. Poultry Science, 87 (4): 694–699.

[6] Duncan, D. B. (1955). Multiple range and Multiple t-test Bioa 11: 1- 42.

[7] Faegri K (1966). Some problem representatively in pollen Analysis. Palaeo Botanist 15:135-140.

[8] Farino, GO (1986). Technical Note-Chemical Composition of Plant Product of Savannah Forest zone of Nigeria, Food chemistry, 22: 325-320.

[9] Freeman CP (1983). Fat supplementation in Animal Production-Monogastric Animal. Proc. Nutr. Scie. 43:351-354.

[10] Garba ID, Sanni SA and Adebayo CO (2015). Analyzing the Structure and Performance of Shea Butter Market in Bosso and Borgu Local Government Areas of Niger State, Nigeria. International Journal of u- and e- Service, Science and Technology 8 (2): 321-336.

[11] Hall JB, Aebischer DP, Tomlinson HF, Osei-Amaning E, and Hindle JR (1996). *Vitellaria paradoxa*: A monograph. School of Agricultural and Forest Sciences Publication No. 8. University of Wales, Bangor.

[12] Konning GH and Mittal HG (1978). Shea butter revival of African wonder J. Pharm. Sci. 67 (3): 374-376.

[13] Morgan DE and Trinder H (1980). Composition and nutritional Value by production. In occasional Publication of British Society of Animal Production No 3.

[14] Oloredo BR, Onifade AA and Babantunde GM (1997). Comparative Utilization of Shea butter Cake and Palm Kernel Cake by Broiler Chicken. Nig. J. Animal. Prod, 24:124-131.

[15] Okai DB and Bonsai MLK (1989). Sheanut cake as a substitute for maize in the diet of growing gilts. Journal of the University of Science and Technology, 9:45-50.

[16] Pobeda M, Sousselier L (1996). Shea butter the revival of an African wonder in F, Renard (1990) PhD thesis Pharm France. 61-70.

[17] Roschen PEB and Gruber WW (1974). Enzymatische best immungdes gesamt cholesterius in serum. J Cli. Chem. Biochem., 12:403—407.

[18] Umaru IJ, Ogodo AC, Umaru HA, Ezeonu CS, Sindama A and Okirikata E (2015). Effect of sprouting on proximate composition, fatty acid profile and microbiological quality of shea nuts butter. Journal of Biochemistry International, 2 (3):119-124.

[19] Umaru IJ, Champbell PI, Umaru. HA, Wakawa, HY, and Naseer Inuwa Durumin-Iya (2016). Shea butter from B. Parkii on extraction methods. Journal of Biochemistry International, 3 (2):45-48.