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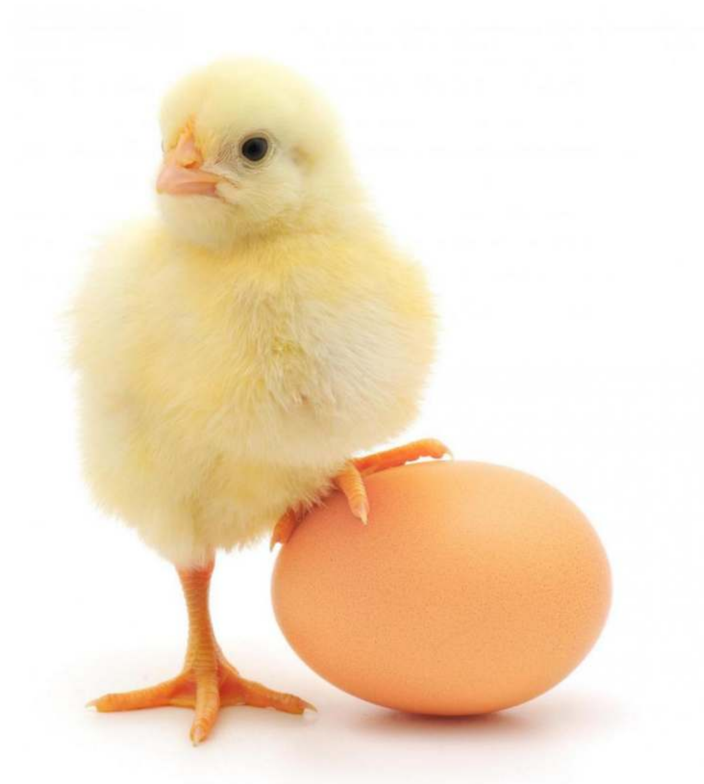

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Utilization of Heat-Treated Sheep Dropping in the Diets of Broiler Finisher Chicks

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Abstract: A 28 day feeding trial was conducted to evaluate the utilization of heat-treated sheep dropping in the diets of broiler chicks. Four experimental finisher diets were formulated such that diet 1 which served as the control contained 0% HSD (maize-based). Diets 2, 3 and 4 contained 7.5, 15 and 22.5% HSD respectively. 160, 5-week old broiler chicks were divided into four treatment groups of forty (40) birds each and each group randomly assigned to an experimental diet in a Completely Randomized Design (CRD). Each treatment was further subdivided into four (4) replicates of ten birds (10) per replicate. Results showed that there was a significant difference ($p<0.05$) in feed intake among the birds fed with the experimental diets. There was no significant ($p>0.05$) difference among birds fed diets T_1, T_2 and T_3 (15% inclusion of HSD) on average final body weight, average body weight gain and average daily weight gain. Birds fed 22.5% HSB-based diet recorded significantly ($p<0.05$) the lowest body weight gain. It was however observed that the 15% HSD diet gave the best result in terms of total cost of feed consumed, cost of daily feed intake, cost of feed per kilogram gain and cost saving in (%). It was found from this study that HSD can be included in broiler finisher diets at up to 15% dietary level without any deleterious effect.

Key words: Broiler finisher, heat-treated sheep dropping, utilization, carcass characteristics

Introduction

The might of the developed nations of the western world can be attributed to their ability to feed themselves, export to other countries and embark on food aids to needy countries facing food crisis. Contrastingly, in developing countries such as Nigeria, with over 108.5 million people is yet to achieve self-sufficiency in food production (Abubakar, 1996). More disturbingly is the acute shortage of animal protein in recent times especially among the rural dwellers that make up to 85% of the extreme poor in the country (F.O.S., 1995).

The most efficient and economic means of providing high quality animal protein in developing country is though the expansion and sustenance of the poultry industry. Poultry production, especially broiler production offers the greatest promise of increasing the quality and quantity of animal protein intake in Nigeria because of the high economic value, short generative interval and fast growth rate that can result in the production of meat within 8 weeks. Despite these attractive attributes of poultry. The future development of this agricultural sub-sector depends to a large extent on the availability of cheaply sourced feedstuffs.

Currently feed accounts to about 75-80% of the total cost of poultry production in Nigeria the high cost of the conventional feed stuffs stemming directly from their high demands as staple human. (Opara, 1996; Esonu *et al*., 2001). Naturally, the solution is to drastically increase the production of these ingredients commonly used in poultry feeds so as to cater for the needs of man and poultry. (Ndubuisi, 2004) But when this cannot work, one of the ways to ameliorate this problem is to utilize unused resources to feed poultry in face of scarcity and high price. The utilization of unconventional feedstuffs especially when it encourages a shift to other ingredients that is not edible to man will reduce the cost of feed and maximize the returns from poultry farming. However, the utilization of such feedstuffs necessitates having a good knowledge of the nutrient composition. Adejinmi *et al*. (2000) reported that it is essential that existing data on the chemical composition of such ingredients are utilized or proximate analysis be carried out before incorporation.

Fortunately, Nigeria is blessed with many livestock species and the manure has some potential in poultry nutrition. In recent years, the use of animal manure for the feeding of livestock has generated considerable interest due to the fact that the conventional feedstuffs can no longer adequately meet the need of the fast-growing poultry industries (Abeke *et al*., 2003). This knowledge has brought into focus the need to provide more information on the seemingly useless but protein rich animal egesta for broiler feeding. Heat-treated Sheep Dropping (SD) has been reported by Abeke *et al*. (2003) to contain 86.95% dry matter, 16.88% crude protein, 24.42 crude fibre, 2.95% ether extract, 26.31% ash, 1.3% calcium, 0.5% phosphorus and 1088 kcal/kg metabolizable energy.

Despite the high nutrient content of HSD, there is paucity of information on its use in broiler feeding. Hence in the present experiment, the utilization of heat-treated sheep

Table 1: Composition of experimental broiler finisher diets

Ingredients	1	2	3	4
Maize	50.0	48.0	46.0	44.0
Soyabean meal	20.0	14.5	9.0	3.5
GNC	8.0	8.0	8.0	8.0
HSD	0.0	7.5	15.0	22.5
Spent grain	8.0	8.0	8.0	8.0
Bone meal	2.0	2.0	2.0	2.0
Oyster shell	1.0	1.0	1.0	1.0
Fish meal	5.0	5.0	5.0	5.0
PKC	5.0	5.0	5.0	5.0
Salt	0.25	0.25	0.25	0.25
Premix*	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00

*supplied per kg ration; vitamin A 800.I.U; Vitamin D_3 180. I.U; Vitamin E 1200 I.U; Vitamin K 022 g, Thiamine-B_1 0.155 g, B_2 0.5 g Pantothenic acid 0.655 g, Folic acid 0.065 g, Mn 8.5g, Zn 5g, Fe 2.5 g, Cu 0.6g, I 0.11 g, Se 12 mg, C0 22 mg, B.H.T 9g, Ethozyquin 3.3 g and choline chloride 15 g

dropping in the diets of broiler finisher chicks was studied. The effects of HSD on carcass characteristics and economy of production was also evaluated.

Materials and Methods

The experiment was carried out at the Teaching and Research Farm (Poultry unit) of the Department of Animal Production and Fisheries Management, Ebonyi State University, Abakaliki-Ebonyi State, Nigeria.

Sources and processing of sheep dropping: The sheep dropping used in this experiment were sourced from sheep farmers in Iboko, Izzi Local Government Area of Ebonyi State. Heat-treated Sheep Dropping (HSD) was processed by heating four Kilograms (4kg) of fresh dropping each time in an open pan for five min with constant stirring to prevent charring until the temperature reached about 70°C as recorded by the thermometer. The heated-treated dropping were ground in a hammer mill.

Experimental diets: The HSD so prepared was used to formulate four (4) experimental diets such that diet 1 which served as the control contained 0% HSD (maize-based). Diets 2, 3 and 4 contained 7.5, 15 and 22.5% HSD respectively. The ingredients were measured out and mixed with a spade on a concrete floor. Turning was vigorously done to ensure good mixing of ingredients and homogeneity.

Experimental animals and procedure: One hundred and sixty (160) 4, week old Anak broiler chicks were used. Prior to the commencement of the experiment, the birds were fed sheep droppings-free diet for one week (stabilizing period), after which the birds were divided into four treatment groups of forty (40) birds each and each group randomly assigned to an experimental diet in a Completely Randomized Design (CRD). Each treatment was further subdivided into four (4) replicates of ten birds (10) per replicate. Each replicate was housed in a compartment measuring 4m×4m^2. Fresh water and feed was provided *ad libitum* throughout the experimental period. The birds were provided with vitalytes (antistress) which was aimed at improving their appetite as well as enhancing their general performance. Other routine poultry management practices which included inspection of the birds for symptoms of diseases, mortality, cleaning of troughs and supply of feed and water were maintained. The experiment lasted for 28 days.

Carcass evaluation: At the end of the feeding trial, a set of three (3) birds were randomly selected from each replicate group, deprived of feed but not water for a day. They were then slaughtered by cutting the jugular vein to cause thorough bleeding. The birds were eviscerated after plucking their feathers in warm water. The eviscerated weights, dressing percentages, shanks, thighs and wings weights were measured as carcass parameters. Also, the weights of the various organs-heart, gizzard and liver were determined with a sensitive weighing scale and each value expressed as percentage of the body weight.

Data collection and analysis: The chicks were weighed before the commencement of the trial and thereafter, the weights were taken on weekly basis using a weighing scale. At the end of the experiment, the body weight changes were calculated by subtracting the initial body weight from the final body weight. The daily weight gain was determined by dividing the body weight change by the number of days the experiment lasted.

A weighed quantity of feed was served to the birds between 6.00 am and 7.00 am daily. The leftover feed per group was collected every morning, weighed and recorded. The daily feed intake of each replicate group was determined by the difference between the quantity of feed offered and the leftover the following day.

The Feed Efficiency (FE) was computed by dividing the average daily feed intake by the average daily weight day. Protein Efficiency Ratio (PER) was determine by first calculating the daily protein intake and then using the value obtained to divide the daily weight gain.

Data collected were subjected to analysis of variance according to the method of Steel and Torrie (1980). The differences in treatment means were separated using Duncan's New Multiple Range Test as outlined by Obi (2002).

Results and Discussion

The calculated chemical composition of the experimental diets is presented in Table 2. The increasing HSD inclusion in the diets resulted in a

Table 2: Calculated chemical composition of the experimental diets

Nutrients	0.0%	7.5%	15.0%	22.5%
ME. (Kcal/kg)	2883	2762	2642	2522
Protein %	20.93	20.21	19.97	19.68
Fibre	4.51	5.92	7.35	8.77
Ether extract	4.76	4.71	4.65	4.60
Ash	3.49	5.18	6.87	8.57
Available P	0.57	0.59	0.83	0.83
Lysine	1.38	1.23	1.07	0.92
Methionine	0.69	0.65	0.61	0.58

corresponding numerical increase in the crude fibre level of the diet, brought about by the high fibre content of the HSD. It was however observed that the increasing fibre content of the diet resulted in a gradual decease in the energy content of the diets.

The protein values of the diets also decreased as the level of HSD inclusion increased. However, the decrease in crude protein value is still within the value range of 18-20% recommended for broiler finishers by Ensminger *et al*. (1991) and Aduku (1993). The ash contents of the diets increased progressively as the level of HSD meal increased. However, HSD-based diets compared favourably with the control diet in terms of ether extracts (fats) content...

The data on the performance of broiler finisher birds fed the experimental diets are presented in Table 3.

There was a significant difference ($p<0.05$) in feed intake among the birds fed with the experimental diets. The daily feed intake of the birds fed on the control T_1 and T_2 (7.5%) HSD based diets did not differ significantly ($p>0.05$). However, there were significant ($p<0.05$) differences between these values and the values obtained for 15% and 22.5% (T_3 and T_4) HSD based diets. It was however observed that there was a significant improvement in the feed consumption at each incremental dietary level of HSD.

The difference in consumption level among the treatment groups could be attributed to the energy and crude fibre levels of the different diets. Heat treated Sheep Dropping (HSD) is low in energy and high in fibre and as the inclusion increased, the fibre level of the diets also increased. Since the diets are bulky with low energy levels, the birds apparently increased their intake in an attempt to satisfy their energy intake diluted at HSD incremental levels. This is so because birds would normally adjust their feed intake to meet their dietary energy requirements. This is in agreement with the finding of Ishikwenu *et al*. (2000) and Onu (2006) who observed that feed intake of birds increased as the fibre content of feed increased. In addition, dietary fibre has a laxative effect as was reported by Abeke *et al*. (2003) which increased the rate of gastric evacuation in birds. This high rate of gastric evacuation is usually compensated for by increased feed intake as similarly reported by Aduku (1993).

There was no significant ($p>0.05$) difference among birds fed diets T_1, T_2 and T_3 on average final body weight, average total body weight gain and average daily weight gain. Birds fed 22.5% HSD-based diet recorded significantly ($p<0.05$) the lowest body weight gain. The improved body weight gain exhibited by the birds on T_1, T_2 and T_3 diets relative to the birds on T_4 diet strengthened the observation of Fisher and Wilson (1994) that an increase in energy density of feeds increases the weight gain of broiler and vise versa.

The depressive influence of high HSD diet on growth rate of broilers fed 22.5% HSD could be due to the drop in digestive efficiency impaired by high crude fibre content leading to low dry matter digestibility. Agbede *et al*. (2002) had similarly observed in monogastrics that high fibre content of diets decreases nutrient digestion and utilization which had also precipitated metabolic dysfunction with attendant weight reduction. This could also be attributed to the failure of the body of chickens to metabolize their body nutrients in the presence of high dietary fibre. Similarly, An (1994) had reported earlier that when birds are starved of or when energy level drops below body requirement, birds tend to mobilize energy reserves for maintenance. The implication of this was that HSD could be utilized efficiently by broiler chicks up to 15%.

No significant ($p>0.05$) different was observed in the feed efficiency of the birds fed 0% and 7.5% HSD-based diets as shown in Table 3. There was a significant ($p<0.05$) difference on the feed efficiency of birds fed diets T_3 and T_4. The superiority in the efficiency of feed utilization of birds fed diets T_1 and T_2 suggest that the nutrients were more available efficiently digested and utilized by the chicken. This agreed with the findings of Onifade (1993) and Onifade and Babatunde (1997) who reported that high fibre content of a diet interfered negatively with nutrients availability at the tissue level.

Data on carcass quality revealed that the dietary treatment did not significantly ($p>0.05$) influenced eviscerated weight, dressing percentage, thighs, wings and shanks. Significant ($p<0.05$) variations only existed in breast weights. The highest breast weight was recorded in birds fed 0% and 7.5% HSD-based diets, while birds on 22.5% HSD diets showed the least breast weight. The organ weights (liver, heart and gizzard) expressed as a percentage of the live weight was not significantly affected by the treatment.

Although the eviscerated weight and dressing weight of the broilers were not affected by the treatment, the trend showed that the highest was obtained in birds fed 0% and 7.5% HSD-based diets. The dressed weight of the broilers fed these two diets fell within the range of 84%-88%, suggested by Anonymous (1983) to be the relative value of dressed salable broiler carcass for maximum profit. This observation indicates that broilers can perform well on diets formulated with up to 7.5%

Table 3: Performance of broiler finisher birds fed experimental diets)

	Treatments				
Parameter	0.0%	7.5%	15.0%	22.5%	SEM
Initial body weight (g)	628.30	628.0	627.90	628.10	
Average Final body weights (g)	1856.29^{a}	1828.33^{a}	1786.75^{a}	1649.43^{bc}	15.83
Average Total weight gain (g)	1227.99^{a}	1200.33^{a}	1158.85^{a}	1021.33^{c}	15.83
Average Daily weight gain (g)	43.86^{a}	42.87^{a}	41.39^{a}	36.48^{b}	0.33
Total feed intake (g)	3408.33^{a}	3477.67^{ab}	3680.33^{b}	4168^{b}	75.40
Daily feed intake (g)	121.73^{a}	124.20^{ab}	131.44^{b}	148.86^{c}	2.69
Feed efficiency	0.36^{a}	0.35^{a}	0.32^{b}	0.25^{c}	0.007
Average daily protein intake	25.48^{a}	25.10^{a}	26.24^{a}	28.40^{b}	0.70
Protein efficiency ratio	1.72^{a}	1.71^{a}	1.58^{b}	1.29^{c}	0.25

^{a,b,c}Means value along the same row with different superscripts are significantly different ($p < 0.05$), SEM: Standard Error of Mean

Table 4: Carcass characteristics of finisher broiler birds fed HSD based- diets

	Treatments (inclusion levels of HSD)				
Parameter	0.0%	7.5%	15.0%	22.5%	SEM
Carcass yield					
eviscerated weight	1.590	1.567	1.405	1.322	12.45
Dressing (%)	85.65	85.64	81.99	80.17	1.946
Relative weight of cut-up parts					
Breast Muscle	14.64^{a}	14.40^{b}	13.71^{c}	11.42^{d}	0.053
Thighs	13.87	13.86	13.66	13.52	0.134
Shanks	4.07	4.04	4.01	4.00	0.216
Wings	5.13	5.11	5.10	5.05	0.316
Organ weight					
Gizzard	3.5	3.1	2.96	2.93	0.134
Heart	2.12	2.09	2.05	2.03	0.016
Liver	2.69	2.64	2.61	2.42	0.191

^{a,b,c,d}: Means within the same row with different superscripts differ significantly ($p< 0.05$) SEM: Standard error of mean

Table 5: Economics of Production

Parameters	0.0%	7.5%	15.0%	22.5%
Cost of feed per kg (N)	68.40	62.70	57.00	51.30
Total cost of feed consumed / bird (N)	233.13	218.03	209.78	213.82
Cost of daily feed intake / bird (N)	8.33	7.79	7.49	7.64
Cost of feed per kg gain (N)	125.59	119.25	117.41	129.63
Cost saving in (%)		5.05	6.50	-

HSD, since dressed weight represents the absolute value of salable meat (Tion and Ogra, 2004; Nwawe *et al*., 2005).

Economics of production: The economics of production data showed that cost of feed per kilogram (N) reduced steadily from 68.40 in T_1 to 51.30 in T_4 as presented in Table 5. This could be attributed to the partial replacement of the more expensive maize and soyabean with HSD that did not cost anything. The total cost of feed consumed per bird, cost of daily feed intake per bird (N) and cost of feed per kilogram gain (N) showed a reduction. However it appreciated in T_4. This could not be unconnected to the high feed consumption of birds fed T_4 diet. Cost saving in (%) recorded the highest cost saving value of 6.50% in T_3 followed by 5.05% in T_2 and a negative value in T_4 as showed in Table 5.

It be could be therefore affirmed that HSM can economically be substituted in broiler finisher at up to 15%.

Conclusion: Heat-treated Sheep Dropping (HSD) is very rich in essential nutrients which when utilized as a component of feed ingredient will be of great benefit. It could be concluded from the results of this study that the inclusion of HSM in the broiler finisher diets resulted in increased crude fibre content that resulted to a dilution in the energy values.

However, from the experiment it is deduced that HSD is an excellent alternative source of feed ingredient in broiler diets, since it did not affect birds performance adversely. The inclusion of HSD in broiler diets reduced the cost of feed that resulted in reduced cost of broiler production. The reduction in cost will lead to the provision of the much needed animal protein at a much affordable price to average Nigerian. This will consequently reduce the problem of shortage of animal protein in the diet of Nigerian citizenry. The maximum level of economic importance is at 15% dietary level of HSM inclusion.

References

Abubakar, M.M., 1996. Backyard rabbit for nutritional self-sufficiency and Economic Recovery" In: Sustainable development in rural Nigeria. Adedoyin, S.F. and J.U.Y. Achonsu (Eds.) Seget Company, pp: 321-325.

Abeke, F.O., S.O. Ogundipe, A.A. Sekoni, I.A. Adeyinkar, B.Y. Abubakar, O.O. Oni and B.I. Nwagu, 2003. Response of Laying Hens to Dietary Levels of Heat Treated Sheep Manure (HSM). Trop. J. Anim. Sci., 6: 111-116.

Adejinmi, O.O., J.O. Adejinmi and I.O.A. Adeleye, 2000. Performance Characteristics and Nutrient Digestibility of Broilers Fed Varying Levels of Soldier Fly Larvae Meal (SFLM). Trop. J. Anim. Sci., 3: 99-106.

Aduku, A.O., 1993. Tropical Feedstuffs Analysis Table Department of animal Science Faculty of Agriculture Ahmadu Bello University, Zaria.

Agbede, J.O., K. Ajaja and V.A. Aletor, 2002. Influence of roxazyme G. supplementation on the utilization of sorghum dust-based diets for broiler chicks. Proceedings of the 27th Annual Conference. Nig. Soc. Anim. Product., Akure, pp: 105-108.

An, W., 1994. Effects of Different Sources of Fibre on Performance of tibia Mineral Content in Broilers Poultry Abstract, 20: 377.

Anonymous, 1983. Appraising poultry enterprises for profitability, A manual for potential investors, world Bank Technical Paper No, 10 Washington D.C.

Ensminger, M.E., J.E. Oldfield and W.W. Heinemann, 1991. Feeds and Nutrition. The Ensminger Publishing Company, USA.

Esonu, B.O., O.O. Emenalon, A.B.I. Udedibie, U. Herbert, C.F. Ekpor, I.C. Okoli and F.C. Iheukwumere, 2001. performance and blood chemistry of weaner pigs feed raw mucuna bean (Velvet bean) meal. Trop. Anim. Product. Investigations, 4: 49-54.

Fisher, C. and B.J. Wilson, 1994. Response to Dietary Energy concentration by Growing Chickens. In: T.R. Morris and B.M. Freeman (Editors), Energy Requirement of Poultry. Br. Poult. Sci. Edinburgh, pp: 151-184.

F.O.S., 1995. Poverty alleviation in Nigeria. Federal office of statistics, Lagos Nigeria.

Ishikwenu, J.O., J.O. Akpodiete, I.O. Emegha and L. Bratte, 2000. Effect of Dietary Fibre (Maize Cob) Level on Growth Performance of Broiler Birds, Proceedings of the 25th Annual Conference of Nigeria Society of Animal Production Umudike, pp: 19-23.

Ndubuisi, E.C., 2004. The setbacks to non ruminant animal production in Nigeria and the way out. In: Issues in sustainable agriculture in Nigeria. Anene A and Nwaigbo L.C. (Eds.) Osprey publication centre, Owerri., pp: 20-25.

Nwawe, A.K., S.O. Omoikhoje and C.N. Nwawe, 2005. Replacement value of groundnut cake with cooked bambara groundnut meal on the carcass quality and relative organ weights of broiler chickens. J. Agri. Forestry, Soc. Sci., 3: 121-128.

Obi, I.U., 2002. Statistical methods of Detecting Difference Between Treatment Means and Research Methodology issues in laboratory and field experiments. Ap Express publishing company Ltd, Nsukka.

Onifade, A.A., 1993. Comparative Utilization of Three Dietary Fibre Sources by Broiler chickens. Ph. D. Thesis, University of Ibadan, Ibadan, Nig.

Onifade, A.A. and G.M. Babatunde, 1997. Comparative Utilization of three Tropical by product feed Resources Supplemented with or without molasses by broiler Chicks. *Archive Zootec*, 46: 137-144.

Onu, P.N., 2006. Performance Response of Starter Broilers fed Ronozyme in Soyabean Hulls. Based Diets. J. Sci. Eng. Tech., 13: 6664-6674.

Opera, C.C., 1996. Studies on the use of *Alchornia cordifolia* leaf meal as feed ingredient in poultry diets. M. Sc thesis: Federal University of Technology, Owerri, Nigeria.

Steel, R.G.D. and J.H. Torrie, 1980. Principles and procedures of statistics. A biometrical approach 2nd Ed. McGraw Hill Inc. USA.

Tion, M.A. and M.T. Orga, 2004. The effect of calorie to proteins rations of practical diets on performance and carcass quality of boiler chickens. Proc. of the 29th Annual conference of the Nigerian Society for Animal Production, pp: 29-30.