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SELF SUFFICIENCY OF ANIMAL PROTEIN IN NIGERIA: A REALITY OR A MIRAGE

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Chemical Composition And Dry Matter Digestibility Of Broiler Litter Based Diets In West African Dwarf Sheep

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Introduction

Throughout recorded history, the consumption of meat indicates a position of social and economic prestige. It is noteworthy that meat consumption is often an indication of the economic status of a country or individual (Hendrick, 1965).

As a nation industrializes and improves its economic position, its meat consumption which is the chief source of animal protein increases. Moreover, as people experience improvement(s) in their social or economic status, they tend to demand a greater and higher quality of meat products. It has long been demonstrated that low protein intake is the most important contribution to the incidence of retarded growth in children (Collions, 1966). F.A.O. (1982) recommended an intake of 68 gm per head per day as the dietary protein allowance for man, from both animal and plant origin. Africans consume just one-third of the value which is below 35 gm recommended as dietary protein allowance from animal origin (F.A.O. 1969).

Meat is one of the most nutritious foods used for human or animal consumption. Meat is an excellent source of high quality protein and it contains large amount of minerals and essential B-vitamins. Haan *et al.*, (2001) observed that by 2020, the global population is projected to consume about 120 million tons of meat and 220 million tons of milk above current consumption. In 2222, the global meat demand is expected to grow from 209 million tons in 1997 to 327 million tons, which is about 56% increase. Delgado *et al.*, (1999) and Delgado, Rosegrant and Meyer (2001) referred to the projected increase as livestock revolution. It is speculated that most of the growth in demand will be in developing world because, for the lower income classes, meat and milk have high income elasticity. In a bid to meet up with the speculated livestock revolution, the limited supply of raw materials for the livestock feed industry has resulted in a continuous increase in the cost of production of livestock products. Thus these products have become too expensive for the majority of the population. Carew *et al.*, (1998) reported that feed component constitutes between 55 and 80% of the cost of production. With increasing cost of feed, replacing feed by wastes of little or no economic value inevitably leads to a significant reduction in the cost of meat, milk and other animal products.

Animal excreta is considered as a nuisance, foul smelling pollutant and a source of human and animal health hazard on all farms and kraals. Its disposal is labour intensive, time consuming and usually expensive. Oftentimes, it contains drug residues, broken and dead epithelial linings, unabsorbed digestive juices and enzymes. The use of livestock wastes as feed ingredients have been considered. They have been found to have relatively high crude protein contents, when properly treated, dried and deodorized.

Sequel to Ososanya and Sekoni (2003), this study was designed to determine the chemical composition and dry matter degradability of broiler litter as a feed supplement in diets of West African Dwarf (WAD) sheep.

Materials And Methods

Broiler litter was collected from the Pullet House of Teaching and Research Farm, University of Ibadan. The house was partitioned into two pens. Each pen contained fifty birds and each pen had a surface area of 10 sq. metres. Wood shavings were used as the bedding material at an average depth of 5cm. The samples collected were bulked together; a representative sample of each pen was obtained. About 30 gm was taken out of the lot for proximate analysis according to AOAC, (1990) procedure. The parameters analysed were CP, EE, NDF, ADF, Ash and moisture.

The rumen degradability study was carried out at International Livestock Research Institute (ILRI), Ibadan. Three matured WAD sheep with stable ruminal cannulae were used. In order to evaluate DM disappearance, the samples were incubated in the rumen of fistulated sheep using the nylon bag technique (Orskov and McDonald, 1979). Three grammes of milled samples were weighed into nylon bags weighing 9 x 18 cm with pore size of 41 microns. The bags were incubated in the rumen of the sheep in duplicates for 12, 48, 60,

72 and 96 hours. The dry matter loss for each sample of the feed, for each incubated period was calculated as the mean of the three sheep. The dry matter from the incubated samples was then described by the equation:
$P = a + b (1 - e^{-ct})$ as reported by Orskov and McDonald (1979) where P is degradation time at time t, a is the water soluble fraction, b is the insoluble but degradable fraction, c is the rate of degradation of "b", t is the time of degradation and a + b is the potential extent of degradation. All data obtained were subjected to analysis of variance using the procedure of SAS (1999) and significant treatment means were separated using the Duncan (1955) Multiple Range test.

Results And Discussion

Table 1 shows the chemical composition of broiler litter. The values obtained from the chemical analysis showed that the broiler litter sample contained 84.06%DM, 23.46% of CP, 2.75% Fat, 21.47% Ash, 20.81% ADF and 39.33% NDF. Table 2 shows the effect of graded level of broiler litter on DM disappearance. The effect of degradation was not significantly different ($P > 0.05$) on the soluble fraction of the levels of inclusion (%). The highest potential release (a + b) of the levels of inclusion was recorded in the 75% inclusion (82.58%), followed by that of 50 and 25%. The effect of degradation of a + b was significantly different although the difference between 25% and 50% levels of inclusion was insignificant ($P > 0.05$). The only observable significance ($P > 0.05$) of the effect of degradability of broiler litter on DM disappearance was on the 75% level of inclusion and the effect was quite significant on lagtime as the value decreases 6.97 hour (0% level) to 1.30 hour (50% level).

Conclusion

From the results obtained, levels of inclusion, rate of degradability and potentially degradable feeds incubated were not significantly different ($P < 0.05$) at the different levels of inclusion in the sheep. Thus, it can be used to formulate feeds at these levels of inclusion. However, broiler litter has been found to be high in non-protein-nitrogen (NPN), therefore, it can be incorporated in ruminant diets up to 30% dry matter without any negative effect in performance and carcass quality. It must however be processed either by drying, ensiling or chemical treatment to reduce the microbial count, eliminate pathogens and increase the palatability and acceptability of the ration. In conclusion, it is more economical and productive to use broiler litter because it reduces the competition for food/feed between man and livestock.

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Table 1: Chemical composition of broiler litter

Nutrients	%
DM	84.06
CP	23.46
Fat	2.75
Ash	21.47
ADF	20.81
NDF	39.33

Table 2: Rumen degradation characteristics of broiler litter

Level of inclusion (%)	Rumen	Degradation	Characteristics		
	(%)	B (%)	A + B (%)	C ($\%h^{-1}$)	LT (h)
0	24.27 ± 0.00^{a}	49.46 ± 0.51^{b}	73.73 ± 0.57^{c}	0.03 ± 0.00^{c}	$6.97.0.47^{a}$
25	35.59 ± 0.00^{a}	43.48 ± 0.66^{c}	79.07 ± 0.66^{b}	0.11 ± 0.02^{a}	2.56 ± 0.50^{c}
50	34.73 ± 0.00^{b}	44.65 ± 0.05^{c}	79.38 ± 0.05^{a}	0.09 ± 0.00^{ab}	1.30 ± 0.12^{d}
75	31.05 ± 0.00^{c}	51.53 ± 0.13^{a}	82.58 ± 0.13^{a}	0.05 ± 0.00^{bc}	4.13 ± 0.03^{b}

a,b,c,d: means with the same superscripts are not significantly different.