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Proximate Composition of Heat Treated Poultry Litter (Layers)

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Abstract: Proximate composition was conducted to investigate the nutrient quality of heat treated poultry litter. The litter was subjected to heat treatment by deep stacking at temperature range of 40.10-55°C (104.20-31°F) for 21 days. This was done to ensure pathogenic microbial safety when used as animal feed supplement. Results obtained on the chemical composition showed that poultry litter (layers) contained 621.41 ME kcal/kg, 87% DM, 20% CP, 10.40% CF, 2.20 EE and 18.50% Ash. The results on mineral composition indicates that poultry litter has 4.5% Phosphorus (P), 2.00% Calcium (Ca), 0.10% Sodium (Na), 2.05% Potassium (K) and 0.48% Magnesium (Mg). This study on proximate composition of poultry litter shows that it could be incorporated into animal feeds.

Key words: Chemical composition, heat treatment, mineral composition, poultry litter, proximate composition

INTRODUCTION

The compelling need to harness the potentials of the numerous agro-industrial by-products and the so-called "wastes" as part replacement for the more expensive conventional feed ingredients have been seriously expressed (Aletor, 1986; Aletor and Ogunyemi, 1990; Onifade and Babatunde, 1998). This need has arisen mainly from the increasing demand for and supply deficit of, conventional feed resources with a concomitant sharp rise in their cost prices. The net effect of increased unit cost of the conventional feed resources is increased cost of the compounded rations, which by extension gives rise to increased cost of meat and animal products. It then becomes highly imperative that other sources for rapid livestock output to meet the growing human demands for animal protein foods be sourced. Such other sources should be cheap and nutritionally adequate for feeding animals with the aim of lowering the cost of producing meat. One of such measures is the recycling of poultry litter as part replacement for conventional and expensive grains and oil seeds used in livestock nutrition.

MATERIALS AND METHODS

Poultry litter (52 weeks old) was collected from the layers' section of Rivers State University of Science and Technology, Teaching and Research Farm using shovel and feedbags.

The litter was then allowed to go through a heat cycle created by deep stacking. This was achieved by bagging the litter in feedbags. The bagged poultry litter was stock piled and covered with thick black plastic cellophane and placed under a roof (Shed) for 21 days at a temperature range of 40.10-55°C (104.20-131°F).

Proximate analysis (AOAC, 1975) was carried out at the Nigerian Stored Product Research Institute (NSPRI), Port Harcourt to study the chemical and mineral compositions of heat treated poultry litter.

RESULTS AND DISCUSSION

Results obtained (Table 1) shows the chemical and mineral compositions of heat treated layer poultry litter. The values obtained for Dry matter (DM), Crude Protein (CP), Energy (E), Crude Fibre (CF), Ether extract (EE) and Ash were 87%, 20%, 621.41 kcal/kg, 10.40%, 2.20% and 18.50%, respectively. The results also showed that Phosphorus (P), Calcium (Ca), Sodium (Na), Potassium (K) and Magnesium (Mg) has the values of 4.5%, 2.00%, 0.10%, 2.05% and 0.48%, respectively.

The crude protein (CP) contents of poultry litter (layers) as reported in this study was 20.00%. Various authors have reported various values of CP for poultry litter. Adegbola *et al.* (1990) reported 16.5% CP for the value of layer litter. Ensimnger (1977); Devendra and Rooghavan (1978); Lamidi (1995) all reported approximately 25% CP for poultry litter. The marginal differences in the CP content of poultry litter used in this study (20%) when compared to the findings of other authors as cited above could be attributed to the difference in the type of bedding material, degree of contamination of excreta with bedding, the type of rations used, method of handling and method of processing and storage of the poultry litter.

However, this result agrees with the findings of Saleh *et al.* (2003) who compared the nutritive contents of poultry litter from three locations in Egypt and obtained Crude Protein scores of 19.4, 20.2 and 23%, respectively.

Table 1: Percentage chemical and mineral compositions of treated poultry litter (DM basis)

Components	Compositions
Dry matter (% DM)	87.00
Crude protein (CP)	20.00
Energy (ME Kcal/kg)	621.41
Crude fibre	10.4
Ether Extract (EE)	2.20
Ash	18.50
P	4.50
Ca	2.00
Na	0.10
K	2.05
Mg	0.48

The energy content of the litter was lower than what obtains in most conventional feedstuffs. This is probably because of the high ash content of the manure (Lowman and Knight, 1971; Ruffin and McCaskey, 1991) resulting from the use of sawdust as bedding material.

The ash content provides important information about the quality of poultry litter. This is because it measures the mineral content of the litter. Ash is normally high in poultry litter because of the wood shavings or sawdust. In this study, the ash content of the litter was 18.50%. Ash samples between 15-25 percent are acceptable (Ruffin and McCaskey, 1991). This finding is in line with their recommendation and they further observed that a high ash content (above 28 percent) will result in poor consumption in cattle and subsequent poor animal performance.

With respect to the Dry Matter content, the study observed a DM content of 87.00%. This means that the recycled poultry litter had 13% moisture. From earlier reports Ruffin and McCaskey (1991); Burdine *et al.* (1993); Bagley *et al.* (1994), it was concluded that moisture in the litter should be between 12 and 25 percent. Results obtained in the present study are strongly in agreement with their findings. This range of moisture in the poultry litter will enhance easy processing and feeding. If the litter is too dry, it will not go through a proper heat cycle during deep stacking, and it will be dusty when fed. Dusty feeds are often poorly consumed by livestock.

The mineral composition provides an important information about the quality of poultry litter. This is because it measures the mineral content of the litter. Poultry litter is a good source of calcium and phosphorus. El-Sabban *et al.* (1969); Polin *et al.* (1971); Lamidi (1995); Fontenot (1996) reported calcium and phosphorus levels of 5.7 and 2.5%, respectively.

Uniquely, it was observed in this study that the phosphorus level was high when compared to other minerals. This is not surprising because phosphorous is poorly digested by monogastric animals. The primary constituents of diets for monogastric animals are plant-based ingredients. These ingredients come primarily from the seeds of plants. Most of the stored P in plants

is found in seeds and mainly as Phytin P (PP). Phytin P is poorly available to monogastric animals, including poultry and availability varies both within and between ingredients (Angel *et al.*, 2006). It is interesting to note that phosphorus has been implicated in eutrophication. Phosphorus has been reported to build-up in soil when used as organic fertilizer and it has the ability to stimulate algae growth once it reaches the ponds and streams-a process known as eutrophication.

Conclusion: Recent difficulties with animal production inputs in Nigeria and the high cost of feed ingredients in particular have brought about the need to look inwards for alternative to the conventional feed resources. It has thus become necessary to explore other locally available and relatively cheaper feed materials. The limited supply of raw materials for the feed industry has resulted in a continuous increase in the cost of production, causing a phenomenal rise in the unit cost of animal products. Thus these products have become too expensive for the majority of the population. Thus, this study which evaluated the proximate composition of poultry litter has explored the practical possibility of incorporating it into animal feeds hence reducing the cost of production of feed consequently reducing the unit cost of animal products.

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