SURVEY OF PRODUCTION AND USE OF POULTRY LITTER IN KHARTOUM STATE, SUDAN

M.B. ELEMAM1*, A.M. FADELELSEED2, O.M.A. ABDELHADI3, A.O. IDRIS4, I. BUSHARA5, A.M. SALIH2

1Department of Animal Production, Faculty of Agriculture and Natural Resources, University of Kassala, POBox 12, New Halfa, Sudan.
2Department of Animal Nutrition, Faculty of Animal Production, University of Khartoum, Sudan
3Department of Animal Production, Faculty of Natural Resources, University of Kordofan, POBox 716, Khartoum, Sudan
4Department of Animal Production and Range, Faculty of Natural Resources and Environmental Studies, Peace University, Sudan
5Department of Animal Production, Faculty of Agricultural Sciences, Dalanj University, Sudan

*Email: murtadalelemam@yahoo.com

ABSTRACT: A survey of chicken litter production was undertaken by hand submitted questionnaire. The survey covered 219 farms out of 612 registered in Khartoum state to provide information on amount and use of litter. The survey revealed that most poultry farms followed similar management practices. About 58.94% of litter production was estimated to come from broiler houses and 41.06% from layer houses. It was estimated that 70% of the litter production is litter-based and about 30% are droppings collected without litter. The amount of litter produced was estimated to be 95097.58 ton/year and 87.1% of this amount was used as fertilizer. Samples of broiler litter were collected and proximate composition was conducted to investigate the nutrient quality of broiler litter. Results obtained on dry matter (DM) and ether extract (EE) showed that there are significant (P<0.05) differences among three locations (Khartoum, Khartoum-North and Omdurman). However, there are no significant differences on other chemical compositions.

Key words: Poultry litter, survey, chemical composition.

INTRODUCTION

Poultry litter contains a mixture of chicken manure, feathers, spilled food and bedding material. The rate of litter production and nutrient content can be affected by many factors, including the type and amount of bedding material used, number of flocks reared on the litter, feed formulation, litter management techniques, type of housing, ventilation rates and management, bird health, performance parameters, stocking density, and age of birds (Malone, 1992).

The last survey of poultry farms in Khartoum State revealed that there were about 612 farms with 8.2 million broiler chicken and 1.3 million layers. These large numbers of growing chicks implies large amount of poultry wastes. The quantity of manure excreted from chicken depends on feed intake and diet digestibility (Elemam, 2011). The treatment of broiler litter by deep stacking was effective in the destruction of pathogens as stated by (Elemam et al. 2010)

There is a powerful need to control the potentials of the numerous amounts of the litter as replacement for feed ingredients. This need has arisen mainly from the increasing demand and supply deficit of conventional feed resources. The net effect of increased unit cost of the conventional feed resources is increased accordingly the cost of the compounded rations, which increased the cost of animal products (Elemam et al. 2009a). It then becomes highly vital that other sources for rapid livestock output to meet the growing human demands for animal protein foods are secured. Such other sources should be cheap and nutritionally adequate for feeding animals with the aim of lowering the cost of animal products. One of such measures is the recycling of broiler litter as partial replacement for conventional cheap feed sources used in livestock nutrition. Broiler litter differs in composition from layer manure mainly because of the differences in diets fed and the bedding material that is mixed with broiler excreta.

The utilization of the waste through ruminant animals became a convenient option of disposing of the waste (Elemam et al. 2009b). The product is readily accepted by the cattle and sheep farmer, not because of any superior feeding qualities, but simply because it is cheaply available and is easily utilized by the digestive system of the...
ruminants. The purpose of this study was to provide some sectors with current basic information on the poultry litter produced in the State and to determine the chemical composition of the litter.

**MATERIALS AND METHODS**

**Farms survey**
A hand submitted questionnaire was designed to answer some questions by poultry farmers in Khartoum State to gather information about litter production, after that the received data was collected and analyzed.

**Chemical composition**
Broiler litter was collected from commercial broiler houses in Khartoum state. The litter was then spread under the sun from 8:00 am to 6:00 pm for heating and drying. Then representative samples of sun-dried broiler litter were taken and proximately analyzed was made on dried ground samples as outlined by (AOAC, 1990).

**Statistical procedure**
The data were subjected to the analysis of variance with the general linear model procedure of (SAS, 1994).

**RESULTS**

**Farms survey**
A total of 219 questionnaires were returned, representing a 35.78% response rate. The survey revealed that most poultry farms in Khartoum state practice the same management protocols in terms of Detergent, cleaners and pesticides were usually applied to poultry houses before administering a new batch. Litter type was sawdust shaving and application rate was not clearly known.

Poultry litter commonly collected after each production period in plastic sacks and sold as fertilizer (land application). No storage locations and handling practices. No medicinal or metabolic additives were used except for coccidiostat. The total litter produced from Khartoum state was 95097.58 ton/year based on information of poultry farm producer’s.

Omdurman area secured the largest statistics of broiler, broiler growers, chicks and parents in comparison to the other two areas Table 1 and therefore there is a large quantity of litter produced about 68.42% from total litter produced in Khartoum state and this due to the existence of big companies there (Figure 1). Commonly most of poultry litter produced (87.1%) in Khartoum state was used as fertilizer and only 0.71% was used in animal feed (Figure 2).

<table>
<thead>
<tr>
<th>No. / Locations</th>
<th>Khartoum</th>
<th>Khartoum-North</th>
<th>Omdurman</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farms</td>
<td>89</td>
<td>103</td>
<td>27</td>
<td>219</td>
</tr>
<tr>
<td>Chicks</td>
<td>34000</td>
<td>18800</td>
<td>700000</td>
<td>752800</td>
</tr>
<tr>
<td>Layer growers</td>
<td>71241</td>
<td>27437</td>
<td>34765</td>
<td>133443</td>
</tr>
<tr>
<td>Broiler growers</td>
<td>31639</td>
<td>15463</td>
<td>32235</td>
<td>79337</td>
</tr>
<tr>
<td>Layers</td>
<td>277986</td>
<td>613233</td>
<td>21150</td>
<td>912369</td>
</tr>
<tr>
<td>Broilers</td>
<td>191950</td>
<td>210480</td>
<td>2400000</td>
<td>2802430</td>
</tr>
<tr>
<td>Parents</td>
<td>7500</td>
<td>2000</td>
<td>65000</td>
<td>74500</td>
</tr>
<tr>
<td>Poultry litter (ton/year)</td>
<td>12286.32</td>
<td>17748.26</td>
<td>65063.00</td>
<td>95097.58</td>
</tr>
</tbody>
</table>

**Chemical composition**
Results in Table 2 show the chemical compositions of broiler litter. The values obtained for dry matter (DM) and ether extract (EE) were significantly (P<0.05) different for the three locations. However, there were non-significant (P <0.05) difference between organic matter (OM), crude protein (CP), Crude Fibre (CF), Ash, nitrogen free extract (NFE) and metabolizable energy (ME) among the three location.

<table>
<thead>
<tr>
<th>Items</th>
<th>Khartoum-North</th>
<th>Khartoum</th>
<th>Omdurman</th>
<th>SEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry matter (DM)%</td>
<td>87.67 a</td>
<td>86.81 b</td>
<td>87.09 b</td>
<td>1.44</td>
</tr>
<tr>
<td>Organic matter % DM</td>
<td>76.05</td>
<td>70.89</td>
<td>68.30</td>
<td>2.83</td>
</tr>
<tr>
<td>Ether extract % DM</td>
<td>2.53 a</td>
<td>0.41 c</td>
<td>4.09 a</td>
<td>0.44</td>
</tr>
<tr>
<td>Crude protein % DM</td>
<td>26.38</td>
<td>27.45</td>
<td>26.35</td>
<td>2.76</td>
</tr>
<tr>
<td>Crude fiber % DM</td>
<td>16.80</td>
<td>17.31</td>
<td>15.39</td>
<td>1.91</td>
</tr>
<tr>
<td>Ash % DM</td>
<td>17.62</td>
<td>20.93</td>
<td>19.78</td>
<td>2.86</td>
</tr>
<tr>
<td>NFE % DM</td>
<td>30.35</td>
<td>25.74</td>
<td>22.48</td>
<td>4.15</td>
</tr>
<tr>
<td>ME (MJ/kg DM)</td>
<td>9.04</td>
<td>7.89</td>
<td>8.35</td>
<td>0.41</td>
</tr>
</tbody>
</table>

*SEM= Standard error of mean; ** means with different superscripts in the same row were significantly different (P <0.05). NFE: Nitrogen free extract. ME was calculated according to the equation: ME (MJ/kg DM) = 0.012CP + 0.031EE + 0.005CF + 0.014NFE (Maff, 1975).

**DISCUSSION**

The crude protein (CP) contents of broiler litter as reported in this study were 26.38, 27.45 and 26.35% for Khartoum-North, Khartoum and Omdurman respectively. 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. Ensmmger, (1977); Devendra and Rooghan, (1978); Lamidi, (1995) all reported approximately 25% CP for poultry litter. However, these results were lower than 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. The metabolizable energy of the litter was lower than that obtains in most conventional feedstuffs. This is probably because of the high ash content of the litter. 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 17.62, 20.93 and 19.78% for Khartoum-North, Khartoum and Omdurman respectively. 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 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 87.67, 86.81 and 87.09% for Khartoum-North, Khartoum and Omdurman respectively. From earlier reports Ruffin and McCaskey (1991); Burdine et al. (1993); Bagley et al. (1994), concluded that moisture in the litter should be between 12 and 25%.
REFERENCES


