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Poultry Litter/Manure Management Practices in Intensively Managed Poultry Farms in Portharcourt

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Abstract: *The investigation to determine the different litter/manure management practices of poultry farmers was carried out in Port Harcourt urban area. A well structured questionnaire was administered to 30 randomly selected poultry farmers in the study area by one on one interview and observation of the environment. The results revealed that poultry farming is on the increase. Majority of these farmer's management practices showed that they have little knowledge about proper disposal of litter/manure resulting from their farm operations. 53.3% sell their waste immediately after clearing their farms while 43.3% store them for later use and 3.4% applied theirs directly to nearby farm lands. During the period of study, 96.7 % of the farmers had not heard of manure treatment before disposal while 3.3% have heard of it but did not practice it. It was also noted that improper handling of poultry production from start to finish could lead to environmental hazards.*
Keywords: *Intensively managed, Poultry farms, Litter/manure, Port Harcourt.*

I. Introduction

Poultry is one of the most developed animal industries in Nigeria. Historically, the growth of poultry industry began as a result of its high level of energy and protein, rapid turnover rate and short incubation period (i.e. 21 days) which are advantages of poultry over other livestock animals [1]. This rapid growth in the poultry industry has created a major problem. This includes the large scale accumulation of poultry waste including manure and litter which may pose disposal and environmental problems unless environmentally and economically sustainable management technologies are evolved [2, 3].

Poultry litter production occurs as a result of the normal everyday processes of the poultry industry. It is a valuable by-product of this industry and has valuable potential uses beyond the traditional one of fertilizer [4]. Bedding materials used in the poultry industry includes wood shavings; saw dust, sand, pine shavings, shredded papers or paper chips, dry straw, rice hulls, maize cobs, corn silage, peat as alternative litter materials [5, 6, 7, 8]. Basic requirements of good litter include moisture holding capacity, microbial tolerating ability, low cost, availability and nontoxic to poultry [9, 10].

Tao and Manci [11] estimated daily manure production by a broiler and laying hen to be 0.09 kg and 0.18 kg, respectively. Factors that influence manure production include type of chicken, age and breed, stocking density, feed conversion, kind and amount of feed type and amount of litter, moisture content of litter, type of floor, and even climatic conditions during accumulation [12]. On the other hand, factors affecting composition of litter/manure are type of birds, feed nutrient density, bedding material and amount, time in use and other management factors [13]. The properties of manure depend on several factors including animal species; feed ration digestibility; protein and fibre content; animal age and productivity; manure management and handling; and the environment [11].

There are several ways of disposing of poultry waste including burial, rendering, incineration, compositing, feed for livestock, fertilizer or source of energy. Other waste disposal methods include conversion of poultry waste to energy and use of poultry waste for treatment of heavy metal contaminated water [14]. Most of the poultry litter produced ends up as fertilizers on lands used for agriculture. Environmental contamination occurs when land application of poultry wastes is in excess of crop utilization potential, or is done under poor management conditions causing nutrient loss from environmental factors such as soil erosion or surface run-off during rainfall.

The aim of this study was to find out how poultry farmers in Port Harcourt manage or dispose their poultry waste, the problems they encounter during waste disposal.

II. Materials And Methods

2.1 Study area

This study was carried out Port Harcourt urban area i.e. Port Harcourt metropolis and surrounding LGA. The other local government areas visited includes Obio/Akpor, Ikwerre, Eleme, Obigbo, Etche and Khana.

2.2 Survey instrument and design

A structured questionnaire was designed to collect information from poultry farmers about their manure/litter management procedures. This questionnaire was designed to adequately capture relevant information. A total 30 questionnaires were` administered in poultry farms in Port Harcourt and environs visited within the August to October 2014.

2.3 Data collection

Data was collected through one on one oral interview with the farm owners using the questionnaire and also by observation of the poultry farm and surroundings.

2.4 Questionnaire Analysis

The data gotten form the questionnaires were imputed into the computer and analyzed with SPSS (version 20) using several descriptive statistics including frequencies and means. Results were presented in graphs (using Microsoft office excel 2007) and tables.

III. Results And Discussion

The frequency of the years of experience in the sampled poultry for 1 - 5 years, 5 - 10 years, 10 - 15 years, 15 - 20 years was 36.7%, 36.7%, 20%, 6.7% respectively as shown in figure 1. This shows that more people started poultry farming recently as there was a steady increase in the number of poultry farms over the years. This steady increase could be due to the fact poultry farming helps to create job opportunities and alleviate poverty [15], poultry efficiency in converting vegetable proteins into animal proteins; acceptability and accessibility of its meat to most people unlike pork that is unacceptable to some religions; its attractiveness and competitive costs; its healthfulness as perceived in human diets; the ease of its technology transfer between countries and the less initial capital needed for small scale rearing etc. (Lamidi, 2005).

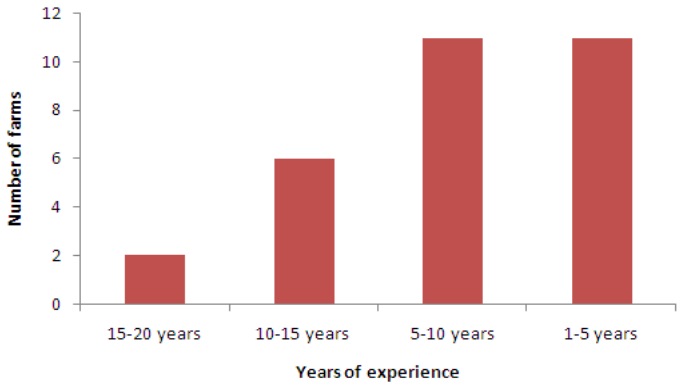

Fig 1: The frequency of poultry farms in the study area in relation to years of experience.

The combination of poultry birds in the 30 farms surveyed are as follows; twenty percent (20%) reared only layers; 6.7% reared only broilers; 16.7% reared layers, broilers and cockerels; 3.3% reared layers, broilers, cockerels and turkey; 23.3% reared layers and broilers; 26.7% reared layers and cockerels while 3.3% reared layers, broilers and quails.

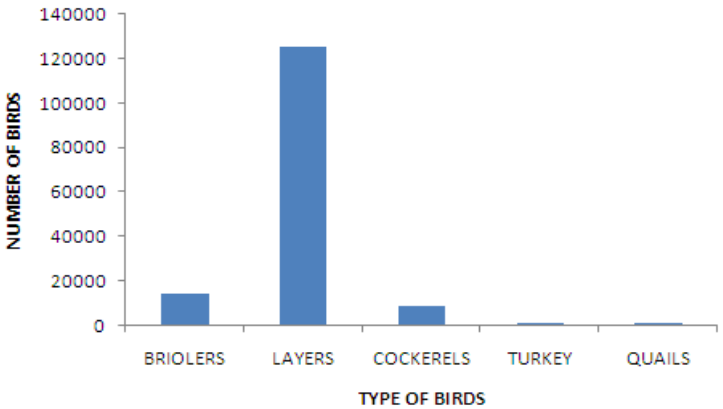

Fig 2: The frequency of the type of birds reared in the study area.

From this study it was noticed that most poultry farmers preferred to rear layers. Majority of them (93.3%) had layers in their farms at the time of sampling. The reason for keeping layers might be due to the fact that layer production is more profitable than broiler production [16, 17, and 18]. Two (6.7%) out of the 30 farms visited use battery cages, 83.3% use deep litter system while 10% of the farms use both deep litter and battery cages (Table 1). The use of the deep litter system by most poultry farmers in Port Harcourt may be attributed to its cost effectiveness in terms of construction. This could also be due to the fact that layers reared on deep litter system had higher laying rate than those reared in battery cages and that battery cages produces more broken eggs [19].

Majority (96.6 %) of the poultry houses had concrete floors and 3.3% had floors that were not cemented. Concrete floors are damp proof thereby making it easier to manage litter [20]. Few farmers raised their birds on sandy floor covered with bedding materials. Raising birds on uncemented floors does not affect the productivity of such birds because research have shown that birds raised on sand performed as well as or better than those that were raised on wood shaving.

Sixty percent (60%) of farmers use saw dust as the bedding material, 16.7% use wood chippings, 20% use both wood chipping and saw dust while 3.3% of farmers do not use bedding materials. The type of bedding material used by farmers depends on locality and availability. The fact that sawdust was mostly used by the poultry farmers than other bedding materials may be because it is relatively cheap and readily available.

Table 1: The frequencies of the different variable

Variables	Number of farms	Frequencies (%)
Management System		
Battery cages	2	6.7
Deep litter	25	83.3
Battery cage and deep litter	3	10.0
Total	30	100.0
Floor type		
Concrete	29	96.7
Un cemented floors	1	3.3
Total	30	100.0
Litter type		
Saw dust	18	60
Wood chippings	5	16.7
Saw dust and wood chippings	6	20
Unlined floors	1	3.3
Total	30	100.0
Type of feeds used		
Commercial	29	96.7
Local alone	0	0
Commercial and locally prepared	1	3.3
Total	30	100.0
Frequency at which litter is changed		
Monthly	4	13.3
Every 8 weeks	3	10.0
Every 4 months	1	3.3
Twice a year	1	3.3
As the need arises	21	70.0
Total	30	100.0
Procedure used during change of litter		
Clear all litter and sweep floor before replacing	27	90
Clear out all litter and replace without sweeping	2	6.7
Remove only topmost caked layer	1	3.3
Total	30	100.0
Number of bags per clearance		
1- 5	1	3.3
5- 10	2	6.7
10- 15	1	3.3
15-20	6	20
20 and above	20	66.7
Total	30	100.0

Seventy (70%) of the farms sampled change their litter as the need arises, 10% change their litter after every 8 weeks, 13.3% every month, 3.3% every 4 months and 3.3% twice a year. The differences in the frequency of changing the litters may be due to factors such as the quantity of litter produced in each farm. The quantity of litter produced closely relates to the type and amount of feed taken in, quantity of bedding material,

feed conversion rate, age of bird, breed, stocking density, moisture content of litter, type of floor and climatic conditions during that period [12]. The type of bird also affects the frequency with which the litter will be changed because daily production of layers litter has been estimated by [11] to be higher than that of broilers. According to [21], the frequency in the change of poultry litter may also be due to poor quality structures, poor management practices and frequent weather variation.

Ninety (90%) of respondents clear out all the litter and sweep the floor i.e. total clean out before replacing with new litter, 3.3% said they remove only the topmost caked parts of the litter and 6.7% clear out most of the litter and replace without sweeping the floors. These variations could be attributed to the type of litter management which could either be 'single use', 'partial re use' or 'multi use litter'. Single use litter involves the total clean out of the house and replacement of bedding material which was the major practice by poultry farmers in Port Harcourt. The partial re use involves the transfer of litter from the brooding section to the growers section while new bedding materials will be spread in the brooding section. The partially spent litter is often composted for a few days to elevate its temperature to kill pathogens. In the multi use of litter, only the caked portion is removed and the house disinfected [22].

Twenty percent of farmers get more than 20 bags of poultry waste each time they clear out their poultry farms, 3.3% of get 1- 5 bags, 6.7% get 5- 10 bags, 3.3% get 10-15 bags. The number of bags of litter gotten by individual farmers in this study depends on several factors such as type of feed, quantity of feeds consumed by birds, type of birds, feed conversion rate, stocking density [12] and other managerial factors. Also the frequency at which they poultry houses are cleaned can affect the numbers of bags gotten from each clearance. The longer the clearance interval, the higher the quantity of poultry wastes gotten. According to FAO [23], it is necessary a poultry farmer knows the quantity of waste produced by his birds because it helps in planning or designing an effective waste management programme. Poultry waste utilization should be done carefully because poultry wastes have been found to cause dermatitis among users [24].

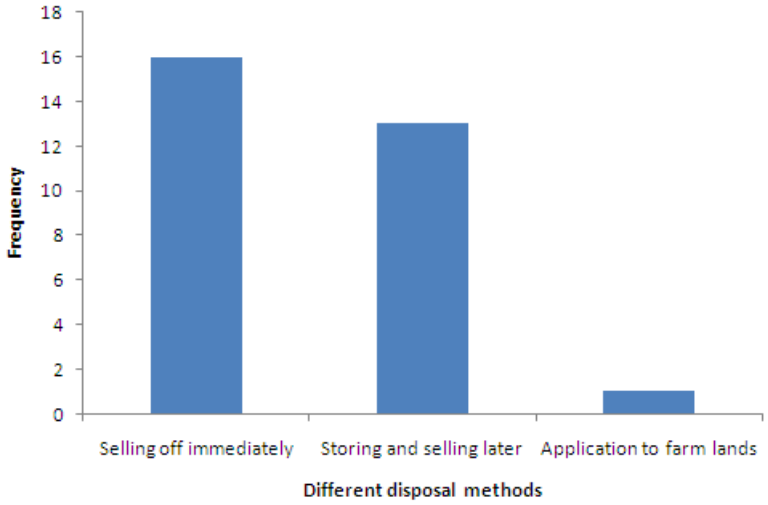

Fig 3: Poultry waste management strategies.

The method of litter disposal by poultry farmers in the study area includes selling it off immediately to farmers, storing and application to nearby farm lands (Figure 3). More than half of the respondents, 53.3% sell these bags off immediately, 43.3% store and sell later, 3.3% apply manure directly to their farm lands. The majority of the farmers from these results have good market for their poultry waste hence a good disposal system because a good number of them sell off their waste immediately. The fact that most farmers bag and store their poultry waste might be because the clearing of the poultry houses do not always coincide with crop production periods [25]. Manure storage prior to land application, may occur under roofed structures (dry-stack barns) or well secured impermeable tarpaulins. This allows flexibility in timing of land application [26]. Moreover, dry storage reduces the risk of environmental contamination as compared to the risk associated with leaving manure piles exposed. Stockpiling on a concrete floor and covering with a good quality tarp minimizes pollution [27]. This prevents run off and also makes for easy clear up. Few of the farmers apply this manure on their farms as soon as it is cleared from the poultry houses. This could be attributed to the number of poultry farmers that have agricultural lands. Whether poultry waste is sold off, stored or applied to farm land immediately, a greater portion of poultry waste end up in farm lands [28]. Excessive application of poultry manure on farm lands may lead to undesirable effects on forage crops and animals consuming the forage [29]. It also leads to contamination of surface waters and often ground water [3]. According to [30], excessive application of poultry waste results to leaching of nitrate into ground water.

Most of the farmers (83.3%) did not know other methods of litter disposal while 16.7% know other methods of disposing poultry waste. The other methods mentioned by the poultry farmers include burning and burial.

All (100%) of the interviewed farmers agreed that improper poultry waste disposal could be hazardous to the environment. The major complaint by farmers was the odour that emanates from the poultry houses and application on nearby farm lands. They also said that their neighbors complained of the foul smell from their farms. Other complains by people were those of noise from the birds and a few complained about pollution of nearby water bodies and sometime blockages. These indicates that the primary complain most farmers received from people that reside close to them was that of bad odour. These odours are from gases that arise as a result of uncontrolled decomposition of manure. Odour may also arise from improper disposal of poultry waste. According to [31 and 32], activities in livestock production facilities cause environmental problems such as odour nuisance and land pollution resulting from improperly discharged manure. In addition, some odorous substances from these facilities may present health hazards. Poultry facilities are a source of odour and attract flies, rodents and other pests that create local nuisances and carry disease. Odour emissions from poultry farms adversely affect the life of people living in the vicinity. Odour associated with poultry operations comes from fresh and decomposing waste products such as manure, carcasses, feathers and bedding/ litter [33, 34].

Only 3.3% of the farmers said they have heard of manure treatment before disposal of litter while 96.7% have not heard of treatment of manure treatment prior to disposal. This indicates that poultry waste treatment is not a familiar practice in the study area.

Majority (96.7%) of farmers in Port Harcourt use commercial feeds for their poultry birds while 3.3% farmer use a mixture of commercial feed and locally formulated feeds. Commercial feeds are cheaper compared to the locally compounded feeds and it creates fewer problems for the farmers. It has been documented that these local feeds if not well produced, produces mold which could cause potential harm to the birds thus causing unnecessary loss to the farmers. Commercial rations often contain antibiotics and arsenicals to promote health and improve growth, coccidiostats for combating coccidiosis, and sometimes mold inhibitors [35].

Seventy percent of farmers had a litter depth of 5cm, 16.7% had litter depth of less than 4 cm while 13.2% had litter depths of between 6 – 10 cm. The mean dept of liter in the sampled poultry farms was 4.99cm. The variation in the depth of the litter may be attributed to the floor type, type of bedding material used, quantity of bedding material used and other managerial factors [36, 37].

For a litter to be well managed, considerations must be given to such factors as: type of litter used at the time of the year, depth of the litter, floor space per bird, feeding and watering devices, kind of floor, ventilation system, routine litter management practices, litter amendment procedure and incidences of disease that can have effects on litter value [7].

IV. Conclusion And Recommendation

From this study it was noted that wide spread of lack of knowledge affects poultry farmers and their management systems, therefore farmers are advised to consider issues associated with storing, managing and utilizing potential waste by-products when planning, construction and operation of poultry meat and egg operations of any size.

Poultry houses should be located far from residential buildings to avoid air pollution and disturbance due to noise from the poultry houses also the poultry waste should be cleared regularly to avoid accumulation of waste which could be hazardous to the environment.

Poultry waste should be stored in stockpiles (which should be covered with tarps or plastics), bunkers, litter sheds with concrete floors and adequate measures should also be taken to prevent run offs. Also these wastes should be properly treated before disposal.

Housing conditions that promotes good ventilation also helps in producing drier poultry litter which in turn reduces odour.

Poultry farmers should also be educated on the about the ill effects of improper disposal of their wastes.

The government and other authorities are advised to provide incentives to farmers for construction of liter sheds. This will help curtail improper disposal of poultry waste and hence help in the control of both air and water pollution.

Both State and Federal laws if in existence should be made available to poultry farmers. When not in existence, these laws should be established and enforced. Guidelines should also be developed and passed on to the farmers.

Monitoring of the application of manure on farm lands should be taken seriously by appropriate authorities.

Providing a cheap and timely option of disposing waste from poultry houses should be encouraged. This can be done through energy recovery which works by recycling some forms of waste into a fuel source for heating, cooking and powering turbines.

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