

WASTE MANAGEMENT AND ITS ENVIRONMENTAL EFFECTS ON POULTRY ENTERPRISES IN OGBOMOSONORTH AND SOUTH LOCAL GOVERNMENT AREAS OF OYO STATE

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ABSTRACT

The study focused on what happens to the poultry house environment as an enterprise. Poultry is a very important agricultural subsector taking care of protein supply to the teeming population worldwide. Sixty poultry houses very close to the urban population were examined. The respondents were mostly educated (85.0%) mainly Christians (51.7%) but all other religions also featured. Most farms (76.7%) were managed by their true owners who undertook poultry layers enterprise (60%) or a combination with other aspects. Most farms (48.3%) were small thereby generating smaller bits of waste which might spell doom to the environment cumulatively if not controlled. Farmers (45.0%) believed that finished feeds added more to waste. Most respondents (91.7%) believed dead birds offered persistent and offensive odor but did not understand the issue of pathogens, (58.3%) were always weary of flies while (83.3%) agreed that predators feeding on them in the landfills could spread diseases. Most respondents detested the persistent and offensive odor (75.0%) by spoilt eggs and their attraction to flies and insect eggs (83.3%). In burning beddings, (66.7%) of the respondents agreed that smoke posed great environmental pollution. On hatchery wastes, (91.7%) complained of incidence of flies and insect eggs with the attending persistent and offensive odor (66.7%) and more respondents (45.0 %) believed in the buildup of pathogens. Most respondents (66.7) had at one time or the other had encounters with health officials. On the cost of removal which was the greatest concern of the respondents, Ordinary Least Square regression analysis was done to isolate factors affecting cost faced by the farms. Types of feed, beddings, number of dead birds and present population, housing system and droppings of birds were significant at various levels.

KEYWORDS: *Human Debilitation, Droppings, Encroachment, Aerial Emission, Absorbents*

INTRODUCTION

Poultry worldwide is an important subsector of the economy that provides employment generation, egg, and meat which are a veritable source of protein needed for human sustainability and health. Since poultry involves continuous maintenance of live birds, wastes are bound to be generated on a continuous basis hence removal and the need for keeping the business environment clean. If not, the damage can be so enormous in terms of pollution and diseases both to the birds and the human population nearby. Bird flu, for instance, can wipe out both animal and human population. On a smaller scale, poultry had been associated with some human illnesses a part from the diseases it generates to the chicks it contains. According to (HSUS) Report 1989, fecal decomposition generates several irritating chemicals, including hydrogen sulphide, methane, and ammonia, which in a poultry house are nauseating to the caretaker, irritate the eyes, and affect the

chickens. Apart from chemicals generated, millions of living organisms that have been blamed for irritation and human debilitation are also created through the wastes. For instance, mites may also be a major allergen in poultry farmers, the Northern fowl mite (*Ornithonyssus sylviarum*) residing in chicken feathers may be the predominant allergen causing occupational allergy in poultry farmers (Bar-Sela *et al.*, 1984, Lutsky *et al.*, 1982).

Poultry wastes come in the following forms: Hatchery wastes which are presented in form of damaged equipments like egg trays and disinfectant containers and other debris, dead chicks and the weaklings, infertile and spoilt eggs, egg shells and even offensive odors from an unkept hatchery and rotten chicks. Other forms include dead birds which are not well disposed of or properly incinerated, droppings of animals which are daily and continuous until the lifespan of the flock under consideration, wastes from the slaughterhouse especially the visceral organs. Most of these wastes are solids while some are liquids and some are in gaseous forms emanating from different parts of the farm. However, these wastes are necessary and contingent on the production of an essential protein supplier to the human population. Since we cannot do without them, adequate plans should be made to manage them to the benefits of the ecosystem in which both the flora and the fauna species subsist. Efforts had been made to utilize these unavoidable substances in various forms. Livestock and poultry wastes are good soil conditioners improving land productivity and can also be used as a feed supplement. (Moyo 1985; Khumalo 1988; Kunene 1992). In animal refeeding, scientific research has documented that nutrients and energy from poultry waste by-products, including manure and litter, can be safely recycled as a component of livestock and poultry diets when pathogens are neutralized (McCaskey, 1995). Since the farm is destined to undergo the processes of these wastes removal or conversion to other products, farm then faces a necessary cost function which can either make or mar the success of the farm. Cost of poultry waste disposal not normally captured in production budgets may contribute significantly to overall production expenses (Doye *et al.*, 2009). Most farms in Nigeria are set up either for profit or as a source of protein /money to supplement the family income; hence the burden of removal in the form of costs becomes imperative to a poultry producer.

METHODOLOGY

The Study Area

The study was carried out in Ogbomoso North and South Local Government areas of Oyo state. Although most parts of these Local Government Areas are urban in nature, there existed poultry houses which were located in the extreme parts where elements of rural characteristics could still be noticed, much of which were being overtaken by urban expansion. Sixty farms were randomly chosen for the study with thirty poultry farms of various sizes from each Local Government Area. The sampling size was constrained by the number of poultry houses in the urban part of Ogbomoso North Local Government Area. The sample space was narrowing down by the day because the rural aspect of this Local Government Area was being eroded by various private enterprises and residential buildings mushrooming from various available spaces. The fallow land where poultry houses could be erected in Ogbomoso North Local Government Area lied between the area designated for the Ogbomoso-Ibadan Express Road and Kinnira axis, the strip of land along Express Road and the new Sawmill. Many poultry houses still existed along Iluju and Aaje –Ikose road up till Onigbinde Farms and the area near Omo Ojeun hotel/inner Aaje –Ikose/Pakiotan axis. However, hundreds of poultry houses existed in the Ogbomoso South Local Government Area especially along Agric-Odo Oba road, Sunsun- Otamokun road and along Ikirun road. The sampling was restricted to the poultry houses nearest to the urban centers. Structured questionnaires containing questions on the poultry operations were administered to the head or the farm managers and enumerators were on hand to explain the

questions if need be. Ogbomoson is the second largest city in Oyo State coming after Ibadan and as such the city is being encroached by awkward and unplanned urban expansion especially after the establishment of Ladoko Akintola University of Technology (LAUTECH) in the city. Ibadan had already been engulfed by this problem.

Analytical Techniques

- Descriptive statistics such as frequency, percentages, and tables were used to describe the socio-economic characteristics of farmers.
- Inferential statistics involved the use of Ordinary Least Square regression analysis to isolate factors affecting cost faced by the farms.
- The postulated relationship between the total cost of waste removed and the independent variables is as follows:
 $Y=(X_1, X_2, X_3, X_4, \dots, X_{14}, e)$

Where Y=Total cost

- X₁ = Aspect of poultry
- X₂ = Marital status
- X₃ = Type of feed
- X₄ = Religion
- X₅ = Beddings
- X₆ = Dead birds
- X₇ = Spoilt eggs
- X₈ = Years of experience
- X₉ = Educational status
- X₁₀ = Number of present birds
- X₁₁ = Housing system
- X₁₂ = Facilities
- X₁₃ = Droppings
- X₁₄ = Farm size
- e = error term

RESULT AND DISCUSSIONS

Socio –Economic Characteristics of the Respondents

Table 1 shows that most poultry houses heads interviewed were married (41.7%), this becomes important because most poultry enterprises made use of family labor. They were mostly educated (85.0%) in that they either had primary, secondary or tertiary education. Most of them were mainly Christians (51.7%) but all other religions also featured indicating that poultry enterprise was not hindered by any religious bias.

Table 1: Socio-Economic Characteristics of Farmers

Variables	Frequency	Percentage
Marital Status		
Single	19	31.7
Married	25	41.7
Divorced	12	20.0
Widowed	4	6.6
Religion		
Christianity	31	51.7
Islam	23	38.3
Traditional	6	10.0
Education		
None	9	15.0
Primary	12	20.0
Secondary	23	38.3
Tertiary	16	26.7

N = 60 Respondents

Management of the Farm

As shown in table 2, most managers (76.7%) were the true owners of the farms. The reasons may not be far-fetched since most farms were small or medium in the Nigerian context and they saw no reason for employing managers because of costs. Some also believed that most operations on the farm were so technical and should not be compromised hence their supervision to see that these operations were thoroughly carried out. Bigger farms (23.3%) employed managers especially skilled ones to oversee the technical aspects of modern-day poultry.

Table 2: Management of the Farm

Relationship to farm	Frequency	Percent
Owner	46	76.7
Worker	14	23.3
Total	60	100.0

Distribution According to Major Occupation

Table 3 shows that most operators in the poultry enterprises were either businessmen or civil servants (68.4%). Businessmen in that poultry enterprise are quite capital intensive and technical in nature so they believed capital should be well guided and supervised. Most operations are time-specific, for instance, when vaccines are required, they should be applied by the exact time otherwise the disease may wipe off the flock. Civil servants also ventured into poultry enterprise

to augment their salary which failed most often. Only (8.3%) of the practitioners had Agriculture background while others (14%) were into various occupations.

Table 3: Distribution According to Major Occupation

Major occupation	Frequency	Percent
Civil service	19	31.7
Business	22	36.7
Agric production	5	8.3
Others	14	23.3
Total	60	100.0

Aspects of Poultry Undertaken

Table 4 indicates that most poultry owners undertook poultry layers enterprise (60%) or a combination with other aspects mainly because eggs were the most lucrative aspect of poultry in the study area. Broilers and cockerels were raised to target markets in the festive periods of Christmas and Easter. Each aspect of poultry generates different quantities of waste due to their nature and age. In general, most farmers believed egg production generated a lot of offensive waste that needed attention.

Table 4: Aspects of Poultry Undertaken

Aspect of poultry	Frequency	Percentage
Chicks	6	10.0
Cockerel	2	3.3
Broilers	10	6.7
Layers	27	45.0
Two or more	15	25.0
Total	60	100.0

Table 5 shows the housing system in the study area. The Housing system dictates a lot of features needed, methods of waste collection, quantity and nature of wastes to be generated. For instance, beddings are needed in the deep litter while droppings from the battery cage system fall into the ditch underneath. In the study area, 38.3% of the respondents used the battery cages while 40.0% used the deep litter system. Only 21.7% of the respondents used an extensive system of housing. These were mainly smallholders using their backyards where most of the wastes generated were dumped in landfills designed for the purpose of these poultry houses or general landfills around.

Table 5: Housing System

Housing System	Frequency	Percent
Battery Cage	23	38.3
Deep litter	24	40.0
Extensive	13	21.7
Total	60	100.0

Size of the Flock

Table 6 discusses the size of flock kept in the study area. The quantity of waste is quite dependent on the size of the flock and other factors. In general, for each kg of feed consumed, a chicken approximately produces 1 kg of fresh manure with variable water content, while a commercial layer produces about 20 kg waste per year (Vest et al., 1994). In Nigeria, flocks below 500 birds are small scale holders while flocks above 500 but below 5000 are medium holders while

flocks above 5000 are large. In the study area, however, most farms (48.3%) were small thereby generating smaller bits of the waste but if not well managed could have big environmental consequences because of their proximities to urban populations. The bigger farms both the medium (36.7%) and large ones (15.0%) generated bigger and better managed wastes but were not yet encroached upon by urban development.

Table 6: Size of the Flock

No of Birds	Frequency	Percent
≤500	29	48.3
501-4999	22	36.7
5000 and more	9	15.0
Total	60	100.0

Types of Feeds

In the study area, farmers that compounded feeds (45.0%) believed that buying finished feeds added additives to the diet of the birds due to variation in the ingredients used. They also agreed that these ingredients might be sources of more odor and extra waste and this view is supported in the literature. It is believed that diet composition can alter water intake of poultry significantly. According to Patterson et al. (1989), hens fed a higher fiber wheat middlings diet consumed approximately 50% more water than those fed corn soya diets. While per cent fecal moisture levels were similar, the birds fed wheat middlings excreted over double the amount of fecal dry matter.

Table 7: Types of Feeds

Feeds	Frequency	Percent
Finished	33	55.0
Compounded	27	45.0
Total	60	100.0

Waste Management Practices and their Environmental Consequences

Dead Birds

In the study area, (8.3%) of the respondents said pond owners approached them for dead birds to feed their catfish while (25.0%) sold dead birds, to dog owners, especially those that were big and not badly mutilated.(33.3 %) dumped them in the landfills and others (33.3%) buried them. On the effects on the environment, most respondents (91.7%) believed dead birds offered persistent and offensive odor, few (18.3%) felt if not treated or disposed on time, dead birds could spread pathogens, (58.3%) were always weary of flies that laid eggs in them and others, (83.3%) agreed that birds, cats, and dogs that fed on them in the landfills could spread diseases.

Spoilt Eggs

Spoilt eggs were either sold (83.3%) especially the cracked ones to consumers or to fish owners who use them to compound feeds (91.7%) while rotten ones (16.7%) were added to manure. On the perceived effects on the environment, most respondents detested the persistent and offensive odor (75.0%) with the attraction of flies and insect eggs (83.3%). This and other unhealthy habits usually set them at loggerheads with health workers and the encroached populations.

Feathers

In the study area, feathers were either dumped in the landfills (71.7%) or burnt.(66.7%). These resulted in thick smoke (25.0%) with an offensive odor (90.0%) when burning or when it was moist and not well managed.

Beddings

Most respondents (66.7%) said beddings were converted to manure especially those from deep litters and parts of the extensive systems of rearing. They are an excellent source of nutrients to plants if well managed, dried and applied to the soil in the right quantities. Respondents (66.7%) that supplied manure to agricultural practitioners also burned parts of beddings not suitable for manure while others (16.7%) especially those respondents that operated family flocks dumped beddings in the landfills. Those burning beddings (66.7%) agreed that smoke posed great environmental dangers especially pollution while those dumping in the landfills (16.7%) agreed that aerial emission could also contain pathogens.

Hatchery Wastes

Hatchery waste was used for feeds (41.7%) manure (43.3%) while (33.3%) dumped the waste in the landfills. On perceived damage to the environment, most respondents (91.7%) complained of incidence of flies and insect eggs with attending persistent offensive odor (66.7%) and more respondents (45.0 %) felt the situation could build up pathogens than any other waste in the study area. Another set of wastes highlighted that were emanating from the hatchery was the pharmaceutical wastes including containers and carcasses of drugs used or damaged in the hatchery.

Visceral Organs

Most respondents (66.7%) buried visceral organs, (50.0%) gave them to fish farmers while only 3 respondents (5%) dumped them in the landfills because they said visceral organs were one of the most vulnerable wastes in terms of spreading of diseases by vectors like cats and vultures,(58.3% complained of persistent and offensive odor (75.0%), pathogenic infestations (33.3%) and an army of flies laying eggs in them (83.3%).

Encounter with Health Officials

Most respondents (66.7) had at one or the other had encounters with health officials. These encounters were peculiar to farmers in the Ogbomoson North Local Government Area, where many of the farms were being consumed by rapid urbanization on a daily basis. Many farms around the Nigerian Television Authority (NTA) and the Manna Bread Bakery had been abandoned due to incessant clashes with neighbors who alerted the health officials on the hazards posed by these poultry houses.

Table 8: Waste Management Practices and their Environmental Consequences

Waste Management Practices	Frequency	Percentage
Dead Birds		
Fish Feeds Conversion	5	8.3
Sales	15	25
Manure	-	-
Dumping (Landfills)	20	33.3
Burying	20	33.3
Perceived damage (environment)		
Persistent/ offensive odor	55	91.7
Pathogenic infestations	11	18.3
Flies and insect eggs	35	58.3
Spread of diseases by vectors	50	83.3
Spoilt Eggs		
Manure	10	16.7
Fish Feeds	55	91.7

Sales	50	83.3
Perceived damage (environment)		
Persistent /offensive odor	45	75.0
Pathogenic infestations	10	16.7
Flies and insect eggs	50	83.3
Feathers		
Dumping {Landfills}	43	71.7
Burnt	40	66.7
Perceived damage (environment)		
Smoke/Pollution	15	25.0
Persistent /offensive odor	54	90.0
Beddings		
Manure	40	66.7
Dumping {Landfills}	10	16.7
Burnt	40	66.7
Perceived damage (environment)		
Smoke/Pollution	40	66.7
Aerial emissions (Damp)	10	16.7
Pathogenic infestations	10	16.7
Hatchery Wastes		
Fish Feeds Conversion	25	41.7
Manure	26	43.3
Dumping {Landfills}	20	33.3
Perceived damage (environment)		
Persistent/ offensive odor	40	66.7
Pathogenic infestations	27	45.0
Flies and insect eggs	55	91.7
Pharmaceutical waste	22	36.7
Visceral Organs		
Fish Feeds	30	50.0
Dumping {Landfills}	3	5.0
Burying	40	66.7
Perceived damage (environment)		
Spread of diseases by vectors	35	58.3
Persistent/ offensive odor	45	75.0
Pathogenic infestations	20	33.3
Flies and insect eggs	50	83.3
Encounter with Health Officials	40	66.7

Factors Affecting Cost Incurred in Waste Management

In order to do a worthwhile regression analysis, there are certain criteria that should be fulfilled. These among others are that the R^2 must be high, the F-statistic must be significant and a number of variables should also be significant. In this analysis, however, R^2 was 0.778 indicating that 77.8% of the variation in cost was captured by the system. Also, F-statistic was significant at 5% level and five variables were significant at various levels. Types of feed was significant at 1% and the coefficient was negative indicating that types of feed fed to the animals impacted negatively on the cost incurred in the removal of wastes. Beddings as a variable were significant at 5% level and the coefficient of the t-statistic was positive as expected, indicating that when bedding materials increased, cost of removal also increased. Dead birds and the present population of birds were significant at 5% level and their coefficients were positive meaning that as these variables increased, cost also tended to increase. Housing system and Droppings of birds were significant at 10% level and their coefficients were also negative indicating that their magnitudes move in opposite direction with the cost of collection.

When the housing system is large and adequate with absorbents, waste management becomes less intense and easy and this may be in line with the theory while the negative coefficients in the case poultry droppings ran counter to the a-priori expectation. It is expected that the higher the poultry droppings, the higher the cost of removal but the opposite is the case here.

Table 9: Factors Affecting Cost Incurred in Waste Management

Variables	T	Sig
Aspect of poultry	.831	.410
Marital status	.277	.783
Type of feeds	-.2.683	.010*
Religion	-.749	.458
Bedding s	2.438	.019**
Dead birds	2.631	.012**
Spoilt eggs	-1.257	.215
Years of experience	-1.665	.103
Educational status	1.239	.222
Number of present birds	2.449	.018**
Housing system	-1.949	.058***
Facilities	.756	.454
Droppings	-1.739	.089***
Farm size	-.969	.338

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