

**AN ASSESSMENT OF CHICKEN EXCRETA MANAGEMENT IN POULTRY
FARMS IN OYO STATE, NIGERIA**

Abstract

The rapid growth in the poultry industry in Nigeria especially in Oyo State, has led to increased generation of chicken excreta. Unfortunately, there has not been a commensurate increase in the quality of chicken excreta management. There is therefore the need to assess existing methods of chicken excreta management in Oyo State with a view to achieving environmentally- friendly and economically-viable waste management methods.

A three - stage sampling procedure was used. Oyo State was purposively selected due to its high concentration of chicken farms. For the same reason, two local government areas were also purposively selected: Afijio and Ido respectively. Lastly, based on the number of farms in each local government areas 50 and 70 chicken farms were randomly selected from Afijio and Ido respectively making a total of 120 farms. Of the 120 copies of the structured questionnaire administered, 101(84.2%) were retrieved. Data were collected on socio-economic characteristics, types of poultry waste generated and poultry waste disposal methods. Data were analysed using descriptive statistics, and inferential statistics. Most poultry farmers were male (85.1%) and married (86.4%) with a mean age of 41.0+ 10.8 years while household size was 5.0±1.58. Years of formal education and farming experience were 8±2 years and 8.09±5.87 years respectively .Based on the responses the following chicken waste disposal methods were evaluated: dumping on vacant lands (47%), using as manure (50.7%) and selling (29%). The management methods evaluated in the study area had adverse environmental effects.

Keywords: Waste, disposal methods, manure, re-use environmental effects

Introduction

Waste is broadly divided into four key categories-solid, liquid, agrochemical and others. Poor waste disposal has been associated with diseases and adverse environmental effects. Continuing population growth and urbanisation in developing countries increases waste generation, thus making waste management very difficult. The greatest challenge many cities in the developing world face in relation to environmental health is the proper management

37 of solid waste. .The poultry sector is a major source of income in Nigeria. It offers the
38 quickest returns on investment outlays in the livestock enterprise by virtue of the short
39 gestation period in chickens, their high feed conversion ratio as well as their being one of the
40 cheapest, the commonest and best sources of animal protein in the country [1]. In Nigeria,
41 the production of eggs and poultry birds occupies a prime position in improving animal
42 protein consumption by both rural and urban households. However; the activities involved
43 in their production also give rise to human health concerns. Chicken waste can be defined as
44 that is of no use in its current status. The poultry industry produces large amounts of solid and
45 liquid waste. The solid waste consists of bedding materials, manure, feed, feathers, intestines,
46 culled birds, hatchery waste (empty shells, infertile eggs, dead embryos and late hatchlings),
47 shells, sludge and abattoir waste (offal, blood, and carcasses). Dead birds and hatchery waste
48 are high in protein. They contain substantial amounts of calcium and phosphorus due to the
49 high level of material supplements in the diet. The approximate proportion of each of the
50 elements excreted by poultry is given as nitrogen (65%), phosphorus (68.5%) and potassium
51 (83.5%). These elements enhance soil fertility and increase crop production [2]. Poultry
52 feathers can serve as raw materials in the bed industry; broken eggs can be used in bakeries
53 while intestines can be used as fish feed. [3]. Chicken excreta is, therefore, potentially useful.

54 There are several ways of disposing of chicken excreta. These include burying, rendering,
55 incinerating, composting and using it as livestock feed, fertilizer or source of energy. The
56 predominant waste disposal method in Nigeria is burying in landfills. Waste disposal
57 methods also include conversion of chicken excreta to energy for treatment of heavy-metal
58 contaminated water [4] state that energy recovery is a promising form of waste disposal
59 which works by having some forms of waste recycled into a source of fuel for heating,
60 cooking and powering turbines. .. Another poor management method of disposing of poultry
61 waste that has gained prominence in Nigeria is open burning after waste has been subjected
62 to sun drying [5] to reduce the moisture content and, thereby, raising the calorific value. The
63 open drying itself releases excessive ammonia and other greenhouse gases capable of
64 worsening climate change [6]

65 There is a huge quantity of various forms of poultry waste generated from poultry operations.
66 Unfortunately, in some countries, these are dumped on vacant lands and into rivers and cause
67 severe environmental damage [7] Neglected waste creates environmental problems which, in
68 turn, spread various diseases, contaminate rivers or canal water and spread odour to homes
69 [8]. It is, therefore, important to approach poultry waste management in an innovative manner

70 since the selection of the best device and practice in each stage depends on a variety of
71 specific circumstances peculiar to the city under consideration .In Nigeria, there is a rapid
72 expansion of small and medium scale poultry farms. These farms generate large quantities of
73 chicken excreta which are not properly disposed of , resulting in soil, water and air pollution.
74 Modern management methods of chicken excreta management such as green disposal,
75 gasification and use in the production of organic fertilizer have not gained prominence in
76 Nigeria probably due to the level of awareness, lack of strict regulations from government in
77 respect of chicken excreta disposal and the care-free attitude of farm owners. Inadequacy of
78 waste management in Oyo State needs to assess existing waste management methods.

79 Waste management constitutes all the activities and actions required to manage waste from
80 its production to its final disposal[9] These includes among other things, the collection and
81 disposal of waste, together with monitoring and regulation. It also encompasses the legal and
82 regulatory framework in respect of waste management, including recycling. The term
83 normally relates to all kinds of waste, whether generated during the extraction of raw
84 materials, the processing of raw materials into intermediate and final products, or in the
85 course of other human activities. Effective waste management should reduce the adverse effects
86 of waste on health, the environment and aesthetics, and should encompass the 3Rs-- reduce,
87 re-use and recycle.

88 . Waste management methods include, anaerobic digestion, gasification, biodegradation and
89 recycling. Composting, dumping on vacant lands and in landfills and application to
90 agricultural land are some of the commonly used methods of chicken- waste management in
91 south western Nigeria. Recycling of chicken excreta is rare.

92 Composting is a form of waste disposal where organic substances decompose naturally under
93 oxygen-rich conditions. It is the rotting down of plant and animal remains in heaps before the
94 residue, the compost, is applied to the soil [10]; biodegradation is involved in composting.
95 Despite its several advantages, an unpleasant odour results from the disintegration of the
96 organic materials by bacteria during composting. The odour persists for quite some time,
97 given the fact that compost is not expected to be used immediately after it is made. It should
98 be left in a heap for, at least, one month, or better still, a year. Besides, since plant and animal
99 remains are involved in composting, it cannot be applied to chicken management because
100 plants and not animal remains constitute the bulk of what is used in composting. Composting
101 involves the breaking down of organic waste by micro-organisms in the presence of air. It can

102 also be done in the open air. In developed countries, in-vessel composting systems are used.
103 Since these are automated, it is much easier to control any emissions. Composting is
104 beneficial to flora/fauna and soils

105 Dumping waste on vacant lands, no matter where, constitutes a health hazard. Although such
106 waste will eventually enrich the land for agricultural use when it decomposes, it still has
107 adverse effects on the environment; it can also contaminate surface water.

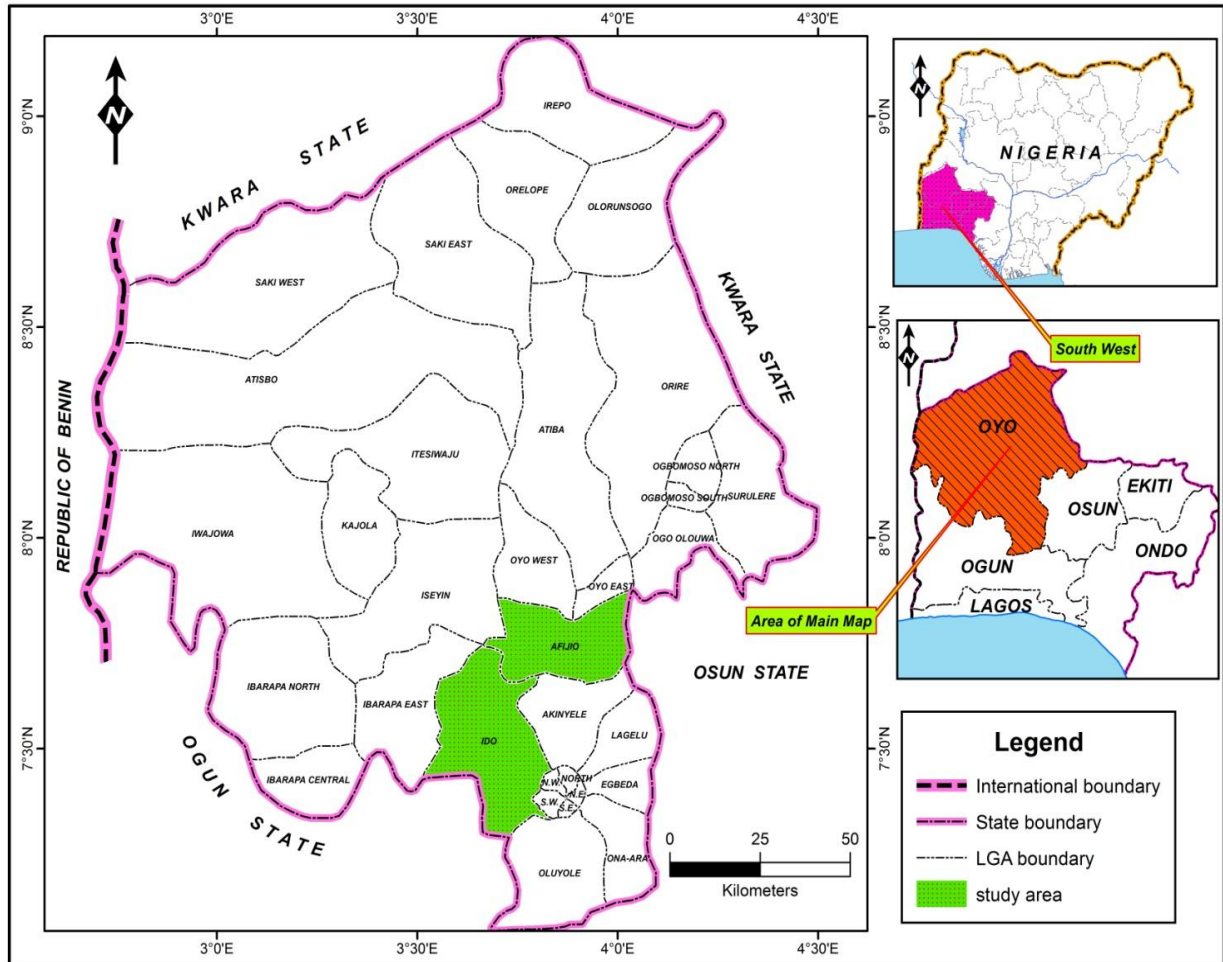
108 Landfills are special areas of land where waste is deposited. Dumping waste in landfills
109 appears to be one of the most commonly used methods of waste management in developing
110 countries. It is much better than dumping on vacant lands. Waste dumped in landfills does not
111 constitute as much of a nuisance as that dumped on vacant land. It fills up land and increases
112 the fertility of the soil around it. However, it still impacts negatively on the environment as
113 well as on underground water. Landfills are special areas of land where waste is deposited.
114 The volume of waste reduces when its biodegradable part decomposes. Dumping waste in
115 landfills appears to be one of the most commonly-used methods of waste management,
116 especially in developing countries. In developed countries, such as the United Kingdom, a
117 landfill is a specially engineered land area where waste is deposited. Each section of the
118 landfill is sealed with a permanent cap when it is full[11] About three quarters of the U.K's
119 municipal solid waste is disposed of directly to landfill. Socially, the cost incurred by illegal
120 dumping of waste is much higher than what is incurred by efficiently operating a landfill
121 [12]. It is the most economically viable waste management option in Australia.

122 Applying waste, especially animal waste, on agricultural land is a common waste
123 management practice. This is because animal manure is a key ingredient in maintaining soil
124 fertility owing to its nitrogen, phosphorus and potassium contents. However, despite its
125 advantages, applying animal waste such as chicken waste on agricultural land produces
126 pollution and nuisance problems. Incineration of pre-sorted waste is another waste-
127 management technique. It involves the burning of waste after sorting. Incineration can also be
128 done without sorting. This is generally done to reduce the volume of solids in the waste.
129 More flora and fauna are destroyed and the soil is more adversely affected when incineration
130 is done without pre-sorting. The environmental and health effects of waste justify the need
131 for its management, especially considering the rapidly increasing human population

132 **Methodology**

133 **Study area**

134 The study was carried out in south western Nigeria, which comprises Oyo, Ogun, Osun,
135 Ekiti, Ondo and Lagos states. It is one of the six geo-political zones in Nigeria and falls on
136 latitude 6⁰ North and latitude 4⁰ South and is marked by longitude 4⁰ (to the) West and 6⁰ (to
137 the) East. It is bounded in the north by Kogi and Kwara states, in the east by Edo and Delta
138 states, in the south by the Atlantic Ocean and in the west by the Republic of Benin. The zone
139 is characterised by a tropical climate with a distinct dry season between November and
140 March and a wet season between April and October. The mean annual rainfall is 1480mm
141 while the mean monthly temperature ranges between 18⁰C and 24⁰C during the rainy season
142 and 30⁰C and 35⁰C during the dry season. The zone covers an area of about 114,271 km² and
143 has a population of 27,581,992, which is predominantly agrarian. Major food crops grown in
144 the area include cassava, cowpea and yam[13]. The people are predominantly farmers as well
145 as lovers of education and they are also given to hospitality. According to [14], most
146 commercial poultry farms with moderate to high bio-security systems are located in south
147 western Nigeria, especially in the states nearer to Lagos, the industrial capital of Nigeria. It is
148 estimated that over 65% of Nigeria's commercial poultry farms are located in Lagos, Ogun,
149 Oyo, Osun and Ondo states while another 25% are located in the south-south and south-east
150 geo-political zones. The balance of 10% or less of Nigeria's commercial poultry farms are in
151 the North-central, North-west and
152 North-east zones.



153

154 Fig 1: Map of Oyo State indicating sampled Local Government Areas (LGAs); Inset: Map of
 155 Nigeria indicating the southwest and map of the southwest indicating Oyo State.

156 Source: Dept. of Geography University of Ibadan (2016)

157 **Sampling Technique, Sample Size and Sources of Data**

158 A structured questionnaire was used for data collection. The questionnaire administered on
 159 the farmers sought for data on their socio-economic and demographic characteristics and
 160 chicken waste disposal methods. Descriptive statistics, involving frequency distribution
 161 tables the mean and standard deviation were used to analyse the responses on the socio-
 162 economic characteristics of the respondents, types of waste generated by poultry farmers and
 163 methods of poultry waste disposal. Primary and secondary data were used for this study.
 164 Available records [15] show that Oyo State has the highest numbers of chicken farms per
 165 household in Nigeria [14]. Oyo State was purposively selected because the poultry business is
 166 very popular among farmers of the state and there is a ready market for poultry products. .

167 The sample was obtained using a multistage sampling technique. In the first stage, Oyo State
 168 was purposively selected. In the second stage, two local government areas- Afijio and Ido
 169 were purposively selected. This was due to the high concentration of poultry farms in these
 170 local government areas. The third stage involved the random selection of poultry farmers in
 171 the selected LGAs, proportionate to the number of poultry farms in each local government
 172 area. Altogether 120 chicken farms comprising 50 and 70 farms were selected from Afijio
 173 and Ido respectively

174

175 **Results and Discussions**

176 **Table 1. Socio-economic characteristics of poultry farmers**

177 Table 1: Socioeconomic Characteristics of Chicken Farmers in Oyo State

Variable	Frequency	Percentage
Age		
24-30	26	20.83
31-40	42	35
41-50	29	24.17
Mean	40.858	
Standard dev.		
Gender of Chicken Farmer		
Male	103	85.83
Female	17	14.47
Marital Status		
Single	18	15
Married	102	85
Household Size		
<5	48	40.00

5-7	64	53.33
.>7	08	6.67
Educational Level		
No Formal Education	03	2.50
Primary	09	7.50
Secondary	11	9.17
Tertiary	97	80.83
Years of Chicken Farming/ Experience		
<5	38	31.67
5-10	56	46.67
10-15	18	15
>15	08	6.66
Type of Chicken System		
Intensive	68	56.67
Extensive	12	10.00
Semi- Intensive	40	33.33

178 Source Field Survey, 2017

179 Table 1 show that 84.16% of poultry farmers were males. This is consistent with the findings
180 of [16] where 92.3% of the poultry farmers in Saki West were males. The average age of the
181 farmers was 41 ± 11 ; 84.16% of the chicken farmers were married while only 15% were
182 single. This likely implies that chicken farming is a lucrative venture with a lot of returns,
183 which enabled them take care of their families

184 The average household size of the farmers was 5 ± 1 . While 81.19% had higher education,
185 6.9% had no formal education. This suggests that chicken farming in the study area was

186 dominated by educated farmers .This may be due to the technicality of the operation
 187 involved. The average years of exposure to formal education of the farmers was 8 ± 2 years
 188 while average years of farming experience was 8 ± 1 year. The majority (55.66%) of farmers
 189 practised the intensive system of chicken farming. [17] Had also observed that the dominant
 190 poultry management system in Nigeria is the intensive system.

191 **Table 2: Types of Chicken waste generated in Oyo State**

Types of waste	Yes		No	
	Freq.	%	Freq.	%
Poultry droppings	97	80.83	23	19.17
Feathers	24	20.06	96	79.94
Hatchery waste	13	10.83	107	89.17
Carcasses	41	34.16	79	65.84
Offal	6	5.00	114	95.00
Poultry litter	68	56.66	52	43.34

192 Source: Field survey, 2017

193
 194
 195 Table 2 revealed that Poultry droppings accounted for 80.83% of the waste generated,
 196 followed by poultry litter (56.66%) and condemned carcasses (34.16%). The least quantities
 197 of poultry waste generated were feathers, hatchery waste and offal at 20.06%, 10.83% and
 198 5.00% respectively.

199 **Table 3: Methods of poultry waste disposal in Oyo State**

Methods	Yes		No	
	Freq.	%	Freq.	%
Burying	27	22.50	93	77.50
Dumping on empty land	62	51.67	58	48.33
Landfill	7	5.83	113	94.17

Use as manure on farm	65	54.17	55	45.83
Composting	9	7.50	111	92.50
Collected by other users	48	40.00	72	60.00
Fish feed	34	28.33	86	71.67
Sale to others	34	28.33	86	71.67

200 Source: Field Survey, 2017

201 Table 3 reveals that the most common methods of poultry waste disposal by poultry farmers
 202 in Oyo State were using it as manure (54.17%) dumping it on empty land (51.67%) Farmers
 203 who dumping waste on open land do so in an anticipation of reselling it during the dry
 204 season to vegetable farmers from the north. Other users (40%) also collected chicken excreta
 205 generated by farmers as part of the methods used to dispose chicken excreta. The least used
 206 disposal methods by farmers is dumping in landfills (5.83%) and composting (7.50%)
 207 methods respectively. Others do sell their chicken excreta (28.33%) to intending farmers
 208 while some farmers do use it to feed their fish or compound it as feed meal.

209 **Conclusions and Recommendations**

210 An evaluation of most of the methods of the chicken excreta management in the study area
 211 showed that they were not environment-friendly, since they had adverse environmental
 212 effects. Dumping chicken excreta on vacant lands was the most detrimental to environmental
 213 health. It is, therefore recommended that Poultry Association of Nigeria [15] should make
 214 a policies to ensure that chicken excreta farmers comply with environment-friendly chicken
 215 excreta methods. Poultry farmers should be encouraged or be involved in recycling chicken
 216 excreta for organic fertilizer production

217 Result from the empirical analysis showed that there is no effective methods of chicken
218 excreta methods in the study area. In terms of usefulness and methods of disposal leading to
219 environmental pollution at an increasing rate,
220 Poultry farmers should be trained through conferences and workshops by extension agents/
221 officers about the usefulness of chicken excreta for agricultural production.
222 There is need for effective monitoring services of farmers on the need for environmental-
223 friendly chicken excreta that would reduce environmental pollution and incidence of outbreak
224 of diseases.

225

226

227

REFERENCES

- 228 1 Ojo, S.O. Analysis of the Three Risk Factors in commercial poultry
229 production in Osun State, Nigeria ,Proceedings of 27th Annual Conference of
230 Nigeria Society for animal production(NSAP) Federal University of
231 Technology Akure, Nigeria. 2002.
- 232 2 Olumayowa, O. and Abiodun, O. O. Profit efficiency and waste management
233 in poultry farming. The case of Egba Division, Ogun State, Nigeria.
234 International Journal Poultry Science. 2011; 10(2): 137-142.
- 235 3 Shamsuddoha, M. Reverse supply Chain Process as Environmental
236 Sustainability in the Poultry Industry of Bangladesh. In Doctoral colloquim ,
237 edited by Jenny Goodison, Perth: Curtin business School, Curtin University.
238 2011b.
- 239 4 Moreki, J. C., and Charipasi, S. C.: Poultry waste management in Botswana:
240 A review online Journal Animal Feed Resource 1(6): 285-292.2011.
- 241 5 Adeoye G. O., Sridhor, K.K.C. and Mohammed, O. E. Poultry waste
242 management for crop production. The Nigerian Experience. Waste
243 Management and Research. 2014; 12: 2165-2175.
- 244 6 Akinbile, C.O. Environment impact of landfill on groundwater quality and
245 agricultural soil in Nigeria. *Soil and water Res.*7 (1): 18-26. 2012.
- 246 7 Shamsuddoha Q, M Applying reverse supply chain in the poultry industry. In
247 Emerging Research Initiatives and Development in Business. CGSB Research
248 Forum. , edited by Therese Jefferson, Shamsuddoha, M and Young, E(EDS),
249 Perth, Australia: Curtin University. 2011a.

250 8 Gupta, G and S. Charles,.Trace Element in soils fertilized with poultry litter.
251 *Poultry Science* 78: 1695-1698: 1999.

252 9 Glossary of Environment Statistics Series F, No 67 Department for
253 Economics and Social Information and Policy Analysis, United Nations. New
254 York. UN.1997

255 10. Akinsanmi, O.. Certificate Agricultural Science. Singapore: Longman. 1988

256 11 Review of Environmental and Health Effects of Waste Management:
257 Municipal Solid Waste and Similar Waste. DEFRA,2004

258 12 Choe Chongwoo and Fraser Ianln An economic Analysis of Households
259 Waste Management. *Journal of Environmental Economics and Management*
260 38, 234-246. 1999.

261 13 NPC National population Commission. Bulletins on Population Census
262 figures.2006

263

264 14 Adere D.F. and Oguntade, A. E.. The structure and importance of the
265 commercial and village based poultry industry in Nigeria. FAO consultancy
266 report. Retrieved on Nov. 15, 2015 from <https://www.scirp.org> 2006.

267 15 Poultry Association of Nigeria (PAN) www.poultry.associatin 2003

268 16 Amao Extent of Commercial Poultry Production in South West Local
269 Government Area of Oyo State , Nigeria *Transnational Journalof Scienc and*
270 *Technology*, Vol. 3 2013.

271 17 Sonaiya E. B. The Context and Prospects for Developmentof Smallholder
272 Rural Poultry Production in Africa,In,,CTA Seminar Proceeding Vol.1
273 Smallholder Rural Poultry Production Seminar Thessaloniki Greccce
274 PP pp35-52 2005.

275

276

277

278

279

280

281

282

283