

# Scenario of Waste Management of Poultry in Bagmara Upazila, Rajshahi



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# Scenario of Waste Management of Poultry in Bagmara Upazila, Rajshahi



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## **List of Abbreviations**

**DLS-** Department of Livestock Services

**DVM-** Doctor of Veterinary Medicine

**SSC-** Secondary School Certificate

**HSC-** Higher Secondary School Certificate

**ND-** Newcastle Disease

**IBD-** Infectious bursal disease

**C-** Carbon

**N-** Nitrogen

**P-** Phosphorus

**K-** Potassium

**S-** Sulfur

**Ca-** Calcium

**Mg-** Magnesium

**B-** Boron

**Cu-** Copper

**Fe-** Iron

**Mn-** Manganese

**Mo-** Molybdenum

**Zn-** Zinc

**NH<sub>3</sub>** - Ammonia

## **Abstract**

The study attempts to determine the scenario of waste and biosecurity management of poultry farms located in Bagmara upazila, Rajshahi, Bangladesh. The study was conducted in 8<sup>th</sup> to 28<sup>th</sup> December 2018 at two village in Bagmara upazila. A total number of 31 commercial poultry farms was considered for the study. Each farm was visited individually, and a structural questionnaire was used to collect data related to poultry waste management system and biosecurity management in order to determine the public health concern surrounding farms. In this study, the percentage of broiler, layer and turkey was 9.68, 87.10, 3.23, respectively. In those farms 93.55% farm owner used poultry litter as fish feed whereas, 3.23 and 3.23% farm owner used litter as fertilizer and biogas. Majority of the farmer (87.10%) used cage rearing which is followed by shelf rearing (9.68 %) and floor rearing (3.23 %). About 97.77% farm had no foot bath. Most of the farms (77.24%) caused the water pollution while 54.84% farms produced noise and smell. About 83.7% farms used chemical sanitizer for disinfection purpose. Only 35.5% farms properly managed their dead birds and eggs. Most of the farms were surrounded by long tree and bush except 19.35% of farms. In conclusion, the litter and waste management system and biosecurity procedures in the study farms were not adequate. Poultry farm owners should undertake proper waste management systems to reduce the environment and public health risk from poultry waste.

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Keywords: Poultry, waste management, biosecurity and public health.

## Chapter 1: Introduction

Poultry represents an important sector in animal production, with backyard flocks representing a huge majority, especially in the developing countries. In these countries, villagers raise poultry to meet household food demands and as additional sources of incomes. Poultry meat alone contributes 37% of the total meat production in Bangladesh. Poultry contributes about 22-27% of the total animal protein supply in the country (Prabakaran, 2003). The present meat and egg production can meet only 68% and 64% of the national demand. The demand for meat and egg products have been expanding dramatically with income growth, population growth, urbanization and dietary changes. The total population of poultry in Bangladesh is 3379.98 lakh (DLS 17-18).

With the growing trends of intensive poultry farming, concerns regarding environmental pollution and public health issues posing significant challenge on the prospects of poultry industry. Improper litter and waste management exaggerate the overall farm biosecurity management and consequently increase the occurrence of different diseases like, Salmonellosis, colibacillosis, mycoplasmosis, fowl cholera, infectious bursal disease (IBD), Newcastle disease (ND), etc. Besides, improper management of poultry wastes has been shown to contribute eutrophication of surface waters and nitric oxide pollution of ground waters. Because, the manures, litters, sludges, composts, and wastewaters originating from poultry production operations are normally used in large-scale land application programs and are rarely concentrated enough to be considered a point source of nitrogen and phosphorus (Liebhardt *et al.*, 1979; Ritter and Chirnside, 1987; Magette *et al.*, 1989; Weil *et al.*, 1990; Edwards and Daniel, 1992). Some exceptions exist, such as manure storage areas, the direct discharge of wastewaters from poultry processing plants into streams or rivers, and the disposal of large quantities of dead poultry in landfills due to a major disease outbreak. Excessive richness of nutrients from poultry litter in water causes accelerated growth of algae or water plants, depletion of dissolved oxygen, increased turbidity, and a general degradation of water quality (Liebhardt *et al.*, 1979; Ritter and Chirnside, 1987; Magette *et al.*, 1989; Weil *et al.*, 1990; Edwards and Daniel, 1992).

Poultry wastes contain all essential plant nutrients (C, N, P, K, S, Ca, Mg, B, Cu, Fe, Mn, Mo, and Zn) and have been well-documented to be excellent fertilizers (White, *et al.*, 1944; Hileman, 1967; Perkins, 1964; Wilkinson, 1979; Sommers and Sutton, 1980; Bouldin *et al.*, 1984; Sims, 1987; Stephenson *et al.*, 1990; Simpson, 1991; Edwards and Daniel, 1992). Therefore, poultry wastes could be a better option to fertilizer and biogas production. Broiler litter is a mixture of manure, bedding material, wasted feed, feathers and in some cases soil (Jacob *et al.*, 1997). While on the other hand, litter from cased layer includes all above-mentioned items except bedding and casing material. These wastes can be used successfully for crop production, but require soil testing, crop nutrient requirement, nutrient value of manures and proper storage and application. Moreover, poultry litter can also be used as feed ingredient for cattle and as fuel in powerhouse (DLS, 2000).

In Bangladesh, there is no existing regulation on poultry management. There is no well-informed report on the scenario of poultry farm waste management in Bangladesh and how it impacts the environment and public health. Therefore, the present study was undertaken to evaluate the waste management, biosecurity and public health concern were focused on the report.

The specific objectives of the study were:

1. To identify the different methods of waste management available in poultry farm
2. To determine the farm biosecurity r management of poultry farm
3. To understand the public and environment health impact for poultry from



## Chapter 2: Materials and Method

### 2.1 Study area:

The study was conducted in Ramrama and Bhabaniganj village, Bagmara upazila, Rajshahi. The selection of study site was based on the availability of poultry farms and willingness of the farm owners to participate in the study.

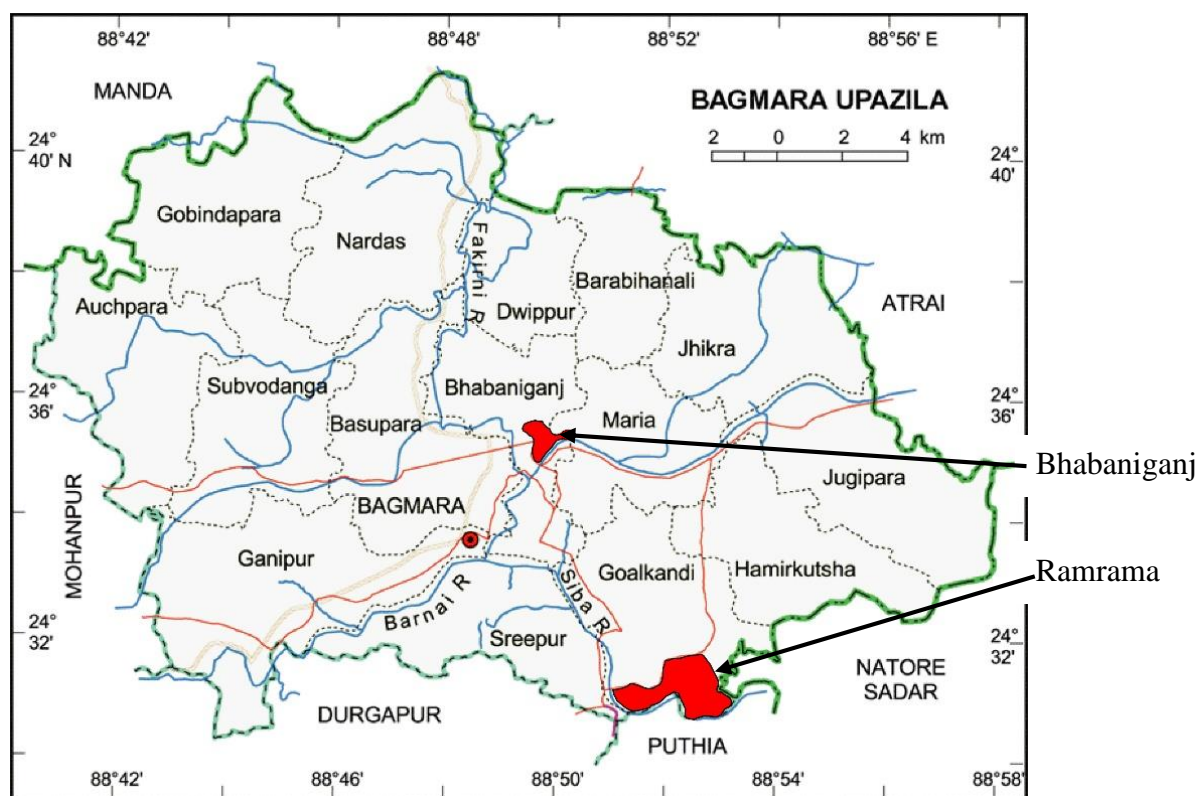


Fig: Study area

### 2.2 Study period:

This study was conducted within Upazila Veterinary Hospital (UVH) placement. Farms were chosen from 8<sup>th</sup> to 28<sup>th</sup> December 2018.

### 2.3 Study population

A total of 31 farms including layer, broiler and turkey farm were visited. The total number of poultry was 112950. The number of layer was 96200, broiler was 16500 and 250 were turkey.

## **2.4 Questionnaire and Data collection:**

A structured questionnaire was developed for the owners to obtain information of farmers and farm related information. Farmer's information includes name, age, educational status and mobile number. Farms information includes type and number of poultry, type of farm, number of shade, type of housing, duration of litter, use of litter after one batch, management of dead birds, litter and rotten eggs, type of sanitizers use. Biosecurity related information like, foot bath, presence of bush or long tree near shade were collected. Information about public health concern and water pollution surrounding farm was also recorded. Those data were collected individually from farm owner and the information of use of litter and their effectiveness were collected from litter buyers and pond owners.

## **2.5 Statistical evaluation:**

Data were entered to the MS Excel 2013 and then exported to STATA-14SE for performing statistical analysis. Descriptive analysis was done for different factors related to use of litter and public health concern. The results were expressed in frequency numbers and percentage.

## Figures



Fig 1: Data collection at layer farm



Fig 2: Shelf rearing of broiler



Fig 3: Case rearing of layer



Fig 4: Dirty case rearing of layer



Fig 5: Foot bath at the entrance of shade



Fig 6: Poultry shed near water source



Fig 7: Preparation of poultry wastes for fish feed



Fig 8: Preparation of poultry wastes for fish feed





Fig 9: Long tree and dirty area around turkey



Fig 10: Floor rearing of turkey



Fig 11: Preparation of poultry wastes for fertilizer



Fig 12: Preparation of poultry wastes for fertilizer



Fig 13: Dirty unclean area outside poultry shade



Fig 14: Dirty unclean area inside poultry shade



Fig 15: Poultry shade at the road side



Fig 16: Poultry shade at the road side

## Chapter 3: Results

A total number of 31 farms were visited and related data were analyzed to determine the actual waste management of poultry farm and public health concern surroundings area at Bagmara upazila, Rajshahi from 8<sup>th</sup> to 28<sup>th</sup> December 2018. All the details of the results are provided in Table 1-4.

### 3.1 Farmers demographic Characteristics

At Ramrama union, Bagmara upazila, most of the farm owners (30) were male and only one farm owner was female (Table 1). Among 31 farmers, 9.68% were non-educated and 90.32% were educated. The percentage of young farmers) were less (45.16%) than older (54.84%).

**Table 1:** Farmers demographic characteristics of Bagmara, Rajshahi (N=31)

| <b>Factor</b>             | <b>Category</b> | <b>N</b> | <b>%</b> |
|---------------------------|-----------------|----------|----------|
| <b>Gander</b>             | Male            | 30       | 96.77    |
|                           | Female          | 1        | 3.23     |
| <b>Educational status</b> | Non-educated    | 3        | 9.68     |
|                           | Educated        | 28       | 90.32    |
| <b>Age</b>                | 25-35 years     | 14       | 45.16    |
|                           | 40-60 years     | 17       | 54.84    |

### 3.2 Farm Characteristics

Table 2 shows that, majority of farmers (87.10 %) used cage system for layer rearing, while 9.68 and 3.23% of broiler and turkey was reared in shelf and floor, respectively. No litter material was used on the floor in 97.77% poultry farms. Only 3.23% of farmers used straw as litter material on floor.

**Table 2:** Farm characteristics of Bagmara, Rajshahi (N=31)

| <b>Factor</b>                   | <b>Category</b> | <b>N</b> | <b>%</b> |
|---------------------------------|-----------------|----------|----------|
| <b>Type of poultry</b>          | Broiler         | 3        | 9.68     |
|                                 | Layer           | 27       | 87.10    |
|                                 | Turkey          | 1        | 3.23     |
| <b>Rearing system</b>           | Case            | 27       | 87.10    |
|                                 | Shelf           | 3        | 9.68     |
|                                 | Floor           | 1        | 3.23     |
| <b>Type of litter materials</b> | No              | 30       | 97.77    |
|                                 | Straw           | 1        | 3.23     |

### 3.3 Biosecurity of farm

In the study farm, about 87.10 and 93.55% farm had long tree and bush surroundings the farm, respectively (Table 3). Only one of the farms used foot bath containing potassium permanganate at the entrance of shade. Among 31 farms, 16.3% farms used just water for cleaning at the interval of one batch and 38.71% used Potassium permanganate and water. Around 9.68% farmers used calcium hydroxide, potassium permanganate and water, 6.45% used Calcium hydroxide, Timsen, and water, 9.68% used Calcium hydroxide and water, 9.68% used Timsen and water, 3.23% used Potassium permanganate, Virucid and water, 3.23% used Potassium permanganate, cow dung and water as sanitizer. About 93.55% of farmers used litter materials as fish feed, while rest of the farmers used them as fertilizer (3.32%) and biogas (3.32%). All of the farmers changed or removed droplets at two days interval. 93.55% of user were satisfied after using of litter as fish feed or biogas, where 6.45% were not satisfied using of litter as fish feed and fertilizer

**Table 3:** Biosecurity of farms, Bagmara, Rajshahi (N=31)

| <b>Factor</b>             | <b>Category</b>                                  | <b>N</b> | <b>%</b> |
|---------------------------|--|----------|----------|
| <b>Long tree</b>          | Yes  | 27       | 87.10    |
|                           | No   | 4        | 12.90    |
| <b>Bush</b>               | Yes  | 29       | 93.55    |
|                           | No   | 2        | 6.45     |
| <b>Both</b>               | Yes  | 25       | -        |
|                           | No   | 6        | 19.35    |
| <b>Types of sanitizer</b> | Only water                                       | 5        | 16.3     |
|                           | Calcium hydroxide, Potassium permanganate, water | 3        | 9.68     |
|                           | Potassium permanganate, water                    | 12       | 38.71    |
|                           | Calcium hydroxide, Timsen, water                 | 2        | 6.45     |

|   |  |    |       |
|---|--|----|-------|
|   | Calcium hydroxide, water                   | 3  | 9.68  |
|   | Timsen, water                              | 3  | 9.68  |
|   | Virucid, Timsen, water                     | 1  | 3.23  |
|   | Potassium permanganate, Virucid, water     | 1  | 3.23  |
|   | Potassium permanganate, cow dung,<br>water | 1  | 3.23  |
| <b>Use of litter after<br/>one batch</b>  | Fish Feed                                  | 29 | 93.55 |
|   | Fertilizer                                 | 1  | 3.23  |
|   | Biogas                                     | 1  | 3.23  |
| <b>Feedback after<br/>using of litter</b> | Satisfied                                  | 29 | 93.55 |
|   | Not Satisfied                              | 2  | 6.45  |

### 3.4 Public health concern

In the study area, 61.29% farm owner threw dead birds near the farm, 32.26% of them burry dead birds, 3.23% of them used dead birds as feed of catfish and 3.23% of them used in biogas plant (Table 4). Similarly, 29.03% of farmers buried spoiled eggs, 58.06% of them throw with garbage, 3.23% of them used in biogas plant and 9.68% of them used spoiled eggs with litter as fish feed. There were observed 77.24% farms polluted the nearby water bodies, 29.03% of them produce noise, 16.13% of them produce smell and 54.84% of them produce noise and smell.



**Table 4:** Public health concern of farms, Bagmara, Rajshahi (N=31)

| <b>Factor</b>                         | <b>Category</b> | <b>N</b> | <b>%</b> |
|---------------------------------------|-----------------|----------|----------|
| <b>Management of<br/>dead birds</b>   | Burry           | 10       | 32.26    |
|                                       | Throw up        | 19       | 61.29    |
|                                       | Bio gas         | 1        | 3.23     |
|                                       | Cat fish        | 1        | 3.23     |
| <b>Management of<br/>Spoiled eggs</b> | Burry           | 9        | 29.03    |
|                                       | Throw up        | 18       | 58.06    |
|                                       | Bio gas         | 1        | 3.23     |
|                                       | With litter     | 3        | 9.68     |
| <b>Water pollution</b>                | Yes             | 24       | 77.24    |
|                                       | No              | 7        | 22.58    |
| <b>Public health<br/>concern</b>      | Noise           | 9        | 29.03    |
|                                       | Smell           | 5        | 16.13    |
|                                       | Noise & smell   | 17       | 54.84    |

## Chapter 4: Discussion

In study, it was observed that most of the farm is operated by males and female helps them with their household works. Most of the farm owners were educated. Older people are more interested in poultry farming than young people. 87.10% farmers reared layers and most of them were in small scale ranges 250-2000. This might be due to profit in layer business with low risk in small scale rearing. Those who reared in cage and shelf, none of them use litter material as these system does not require bedding materials. Therefore, this system is economic and efficient to rear broiler and layer.

Though most of the farmers were educated but they had no training or prior knowledge on poultry rearing. The farmers acquired idea of poultry business by observing others business. They had zero knowledge about farm biosecurity and public health concern. Most of them throw dead birds or spoiled eggs at the side of farm or gather them with garbage materials and throw them without taking proper disposal manner.

About poultry litter management system, most of the farmers gathered waste materials at a distance of farm and kept them ready to reach a certain amount, so they could sell or use the waste materials to buyers. Poultry waste contains a huge amount of nitrogenous substance (Jackob *et al.*, 1997), which enhances the plant growth and the growth of phytoplankton and zooplankton in the pond, which are the basic feed for fish. Most of the farm owners were satisfied about using litter as fish feed or biogas but some of them were not satisfied as using poultry litter as fish feed or fertilizer.

Applying litter materials and other poultry wastes on water that pollutes water badly. Contamination of groundwater and surface water with pathogenic microorganisms is also an important environmental concern. Fecal coliform and *Escherichia coli* are generally used as indicators of pathogens in water sources (Edberg *et al.*, 2000). Concentration of the poultry industry in an area without adequate cropland can also result in the accumulation of soil phosphorus to excessive levels. Most land management programs for poultry wastes are based on nitrogen management to reduce the likelihood of groundwater contamination by nitric oxide (Sims and Wolf, 1994).

Most of the farmers did not maintained proper biosecurity around farm. There is a trend within the poultry industry for tighter house design and less frequent litter removal from poultry houses. This can lead to increases in house moisture and relative humidity levels and elevated nitrogen content in the litter. These conditions have the potential to increase the NH<sub>3</sub> concentrations in poultry houses. Ammonia can have detrimental effects on poultry production performance, animal health and welfare, and on the environment. Bird performance and health can be affected by both respiratory disease challenge and physical damage due to high NH<sub>3</sub> concentration (Ritz *et al.*, 2004).

Most of the farms situated at the side of house or road. Excess ammonia gas produces undesirable smell and noise of chickens which affects families and peoples passing by those roads. Acute noise events which do not cause permanent health impairments are considered as non-substantial. However, effects of long-term noise exposure, which do not habituate but increase the long-term risk of physical damage, are assessed as health hazards (Ising and Kruppa, 2004).

## **Chapter 6: Conclusion**

Now a days, the poultry of Bangladesh is producing a large quantity of litter, which needs special attention for the environment safety. Government can take initiative to motivate the producers, especially the small farm holders for disposing the litters in proper way or to aware them about its feed and fertilizer value. Biogas production technology is well developed around the globe. The poultry farm owners, both private and public, can utilize the poultry litters of large farms for biogas production, which is very much helpful to remove the scarcity of gas and electricity supply in our country.

## **Chapter 6: Limitations**

1. Few farms were enrolled in this study.
2. Most of the farmers / owners hide the actual process of waste disposal system.
3. Proper diagnostic protocol to get actual water pollution could not be maintained.
4. Wholesalers or pound owner's mask the actual management of poultry litter before applying them on pond and their proper output on growth of fish.

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**The Author**

**Jun, 2019**



## **Biography**

I am Debashish Sarker, Son of Professor Sudhir Kumer Sarker and Beauty Rani. I passed my Secondary School Certificate (SSC) examination from Taherpur High School, Bagmara, Rajshahi in 2011 and Higher Secondary Certificate (HSC) examination from Taherpur Degree College, Bagmara, Rajshahi in 2013. I enrolled for Doctor of Veterinary Medicine (DVM) degree in Chattogram Veterinary and Animal Sciences University, (CVASU), Chattogram, Bangladesh in 2013-14 session. At present I am doing my internship program which is compulsory for awarding my degree of DVM from CVASU. In the near future, I would like to work and have massive interest in pet animal medicine and surgery.

# Appendix

## Scenario of Waste Management of Poultry in Bagmara upazila, Rajshahi.

### Questionnaire for Farm Data Collection

**Date:**

**Place:**

**Type of poultry:** Broiler/Layer/Breeder/Cross/Local

**Type of Farm:** Backyard/ Commercial      **Number of shade:**

**Number of poultry:**

**Type of housing:**

**Rearing system:** Floor/Case/Other....

**Types of Litter materials:**

**Duration of litter:**

**Use of litter after one batch:** Fertilizer/ Fish Feed/ Recycling / Bio-Gas/ Others...

**Feedback after using of litter as.....**

.....  
.....  
.....  
.....

**Management of other wastes** (dead birds, eggs): .....

**Use of Drugs on litter:** Y/N. If Yes, Specify.....

Biosecurity/ Sanitation: Foot bath/ Bush/ Long tree/ Types of sanitizer

Sewage Disposal/ Liquid Waste Management:.....

**Public Health concern: Noise/ Smell**

**Water Pollution: Y/N**

**Owner Details:**

1. Name:
2. Age:
3. Sex:
4. Educational Status: Primary/ Secondary/ SSC/ HSC/ Graduate
5. Mobile No:
6. Address: