

## WASTE MANAGEMENT OF COMMERCIAL POULTRY FARMS IN BANGLADESH

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### ABSTRACT

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Poultry farm provides meat, egg and employment for the people of Bangladesh and in the same time it also generates large quantities of waste materials. A survey was carried out in the 10 small, 6 medium and 4 large farms of Kishoregonj, Mymensingh and Gazipur districts during November 2003 to April 2004 to identify the poultry waste materials and to know their disposal procedure in Bangladesh. Pollutants in the poultry farm include litters, manures, odors, noise, feathers, dust and chemicals, wastewater, insects, dead birds, hatchery debris and dust from feed manufacturing plants. Litter is generally a mixture of manure, bedding materials, wasted feed, feathers and some portion of soil. Among the small farm owners 20% farmers could not use their poultry litter for any particular work, 40% of them sold their poultry litter in the market, 30% of them used their poultry litter for crop production and, 10% of them used their poultry litter for fish culture. About 50% of the medium farm owners used their litter for fish culture and all the large farm owners sold their litter after a particular time. It was observed that litter contained a high amount of nitrogenous substances (crude protein 24.9%) and ash 24.7% and total digestive nutrients 50%. Litter can be processed following deep stacking, composting and in lagoons, which were available in the study area.

**Key words:** Poultry, waste, dehydration, stacking and lagoon

### INTRODUCTION

In Bangladesh, small and large-scale poultry farm are expanding rapidly, which are providing meat, eggs and employment. In the same time it is also produces large quantities of waste materials. There are 123 million chickens (FAO, 2002) and about 50,000 poultry farms (FFYP, 2003) are available in Bangladesh presently. However, from another census it was found that 12.89% poultry birds came from non farm source, 51.95% from small farms, 27.43% from medium farms and 7.73% from large farms (BBS, 2003). The waste products of these farms are polluting the environment, although a small portion of poultry waste come to the use of fish and crop production by farmers.

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). So, it is estimated that about 1560000 metric tons poultry manure is produced in Bangladesh every year. Waste of a poultry farm includes litters from broiler and layers, hatchery debris, dead birds and much other debris. 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 caged layer includes all above-mentioned items except bedding and casing material. These waste 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). However, waste management mostly driven by environmental safety regulation of a country, concerns of people and profitability. The basic principle in environmental regulation and socially optimal production in a farm can be depicted. Therefore, the present study was undertaken with the following objectives:

- i. To identify the different poultry wastes available in Bangladesh and
- ii. To investigate the management and disposal procedure of poultry wastes in Bangladesh

### MATERIALS AND METHODS

The experiment was carried out with a several numbers of small, medium and large commercial poultry farms of Gazipur, Mymensingh and Kishoregonj districts to fulfill the objectives of the study. It was a survey type experiment and done during November 2003 to April 2004. Data were collected directly with a pre tested interview schedule from 20 different poultry farms. Types of farms determined on the basis of number of birds reared.

Small farm: Number of birds from 500 to 1500; Medium farm: Number of birds from 1501 to 4000 and Large farm: Number of birds are 4001 and above. The parameters studied were types of wastes, their management and disposal process.

## RESULT AND DISCUSSION

In many areas it is possible to dispose poultry manure by spreading it on cropland or grassland. However, in many instances the amount of available land is not enough for spreading poultry manure. About 3.6 metric tons of fresh manure may be spread on 0.4 ha of land devoted for crop production. Moreover, manure can be spread only in a particular time of the year, which necessitates storage of manure. Therefore, it is found that spreading is not suitable for managing bulk of manures. In the study area small farm owners try to use their broilers litters through spreading and composting (Table 2). Small farm owners stack their crop residue, cow dung, poultry litter and other bedding materials from cattle shed in a layer wise distribution in an anaerobic condition up to 6 months and then use it in the field as organic manure.

Some poultry producers use artificial dehydration to produce a high quality product, to reduce the volume of manure and to prevent bacterial action that results in odor production. There are several types of dehydrators available in the market in which temperature can be varied from 37.1°C to 98.2°C. The length of drying period is dependent on drying temperature, moisture content of incoming manure, rate of flow and the moisture content of the finished product. The capacity of any dehydrator is rated by the number of kilograms of moisture it will remove in 1 hour. Two or three days are required to reduce moisture content from 75% to 20% if manure is spread thinly. In new cage system, manure belts between two decks are used in which air is channeled to the droppings area for facilitating drying on the belts. Some of the medium farm owners of the study area dehydrated their poultry wastes without any drier. They spread their litter in a fellow land in the sunny day. It takes around 1 week to dry completely. Some farm owners pile up their litter materials for further use. They stored their litter with 5 to 6 feet deep in a considerable area depending on the amount of litter for 3 to 4 weeks. The temperature in the stacks will reach about 70 to 75°C. All the pathogenic microorganisms (yeasts, moulds and fungus) insects and other live organisms are destroyed due to high temperature. For proper heating litter should contain 20 to 30% moisture and should be stacked at 6 to 8 feet deep. Water should be added to dry litter prior to stacking. The stack should be covered with plastic sheet to limit oxygen. Fresh poultry manure may be flush in to an open pond as a lagoon. As bacterial growth occurs only during the warm months, the use of lagoons is more common in warmer areas. When aerobic action takes place, the lagoon produces very little odor; but as sludge build up, anaerobic activity may take place and odor may be pronounced. Some large farm owners at the study area dispose their poultry wastes in the lagoons. But lagoons water is health hazardous if the concentration of litter is high.

Table 1. Types of poultry wastes available in the study area

Types of farms	No. of farms	Types of wastes
Small farms	10	Poultry manure/litter, feathers, dead birds etc.
Medium farms	6	Poultry manure/litter, feathers, dead birds, water run off, dust and chemicals.
Large farms	4	Poultry manure/litter, feathers, dead birds, water run off, dust and chemicals, toxic chemical residues in tissues and eggs, processing plant waste and hatchery waste.

Table 2. Management system of poultry litters in the study area

Types of farms	No. of farms	Management procedure of litters
Small farms	10	Spreading and composting, burned and buried in the soil.
Medium farms	6	Dehydration, lagoon.
Large farms	4	Deep stacking, Lagoons.

From Table 3, it was observed that about 20% of small farmers can't use their poultry litter for any particular work, 40% of them were sold their poultry litter, 30% of them were used their poultry litter for crop production and 10% of them were used their poultry litter for fish culture. Poultry waste contains a huge amount of nitrogenous substance (Jacob *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 (Table 4). About 50% of the medium farm owners used their litter for fish culture, 33% of them used their poultry litter for crop production and 17% of them sold their litter after a particular period. Medium farm owners were made a mix feed from waste by adding 50% of broiler waste with the similar amount of rice polish, wheat bran and cereal grains with molasses mixture. They supply it to their milking cows and working bullocks. Kunkle *et al.* (1997) was also suggested a wide variety of cattle ration from poultry waste which can be used for pregnant cows, lactating cows, growing calves, finished cattle, sheep and deer also. Dead birds, offal and feathers were buried in the soil by the medium farm owners in the study area.

All of large farm owners in the study area were sold their poultry waste after disposal of the laying birds from the parent-stock house. Debris and dead birds of the farm including hatchery waste were stored in the big disposal pit for the few years and had no further use. Large farm owners can use their litter and other wastes for commercial biogas production, which helps to minimize the fuel crisis of Bangladesh. Biogas is generated through anaerobic decomposition of organic wastes. Biogas production technology is well developed around the globe. India and china along with USA is generating biogas from poultry wastes. Australia is using biogas for different purposes. Poultry litter can be used as a fuel, management of dead or diseases birds and control of housefly.

Table 3. Uses of poultry wastes in the study area

Types of farms	No. of farms	Types of disposal	
		Litters	Others (dead birds, offal's feathers & hatchery debris)
Small farms	10	2* (20%)	Two farmers burned their other wastes and eight farmers buried in the soil their other wastes.
		4** (40%)	
		3*** (30%)	
		1**** (10%)	
Medium farms	6	1** (17%)	Buried in the soil
		2*** (33%)	
		3**** (50%)	
Large farms	4	4** (100%)	Disposed in a concrete disposal pit

Note: \* = Litters cannot be used for any particular work.

\*\* = Litters were sold in the market after a particular time.

\*\*\* = Litters were used for crop production.

\*\*\*\* = Litters were used for fish culture.

Table 4. Nutrient content of broilers litter

Component	Average	Range
Dry matter (%)	80.5	61-95
Total digestible nutrients (%)	50	36-64
Crude protein (%)	24.9	15-38
Crude fiber (%)	23.6	11-52
Ash (%)	24.7	9-54
Calcium (%)	2.3	0.81-6.13
Phosphorus (%)	1.6	0.56-3.92
Copper (ppm)	473	25-1003
Magnesium (ppm)	348	125-667
Iron (pp)	2377	529-12604

Source: (Jacob *et al.*, 1997)

## CONCLUSION

Now a day, the poultry of Bangladesh is producing a large quantity of litter, which needs special attention for the environment safety. The concern department 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 value. The power sector, both private and public, can utilize the poultry litters of large farms for generating power, which is very much helpful to remove the scarcity of electricity supply in our country.

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