Utilization and Management of Litter and Other Waste Materials of Poultry Farms in Selected Areas of Mirsarai

Submitted By:

Md. Abu Bakar
Roll No: 11/43; Reg. No: 00697
Intern ID: D-39
Session: 2010-2011

A production report submitted in partial satisfaction
of the requirements for the degree of
Doctor of Veterinary Medicine

Faculty of Veterinary Medicine
Chittagong Veterinary and Animal Sciences University
Khulshi, Chittagong-4225, Bangladesh

October 2016

Utilization and Management of Litter and Other Waste Materials of Poultry Farms in Selected Areas of Mirsarai

Approved By:

Sohel Rana
Assistant Professor
Dept. of Agricultural Economics and Social Sciences

Faculty of Veterinary Medicine
Chittagong Veterinary and Animal Sciences University
Khulshi, Chittagong-4225, Bangladesh

October 2016

Contents

List of Tables

List of Abbreviations

Abbreviation	Elaboration
GDP	Gross Domestic Product
MoF	Ministry of Finance
FAO	Food and Agriculture Organization
FFYP	Fifth Five Year Plan
BBS	Bangladesh Bureau of Statistics
DLS	Department of Livestock Services

ABSTRACT

The study was carried out in the 10 small, 6 medium and 4 large poultry farms of Mirsarai, Chittagong during 25 May to 05 July 2016. The objectives of the study were to identify the poultry waste materials and to know their utilization and disposal procedure. Pollutants in the poultry farm include litters, manures, odor, 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. Litter can be processed following deep stacking, composting and in lagoons, which were available in the study area.

Keywords: Poultry, Waste management, Stacking and lagoon

INTRODUCTION

Bangladesh is a densely populated developing country and its economy is very much dependent on agriculture. Poultry is a part of agricultural farming system in Bangladesh. Broiler and layer are two main products of poultry farming. Even though raising poultry birds is mostly a subsistence practice in Bangladesh, broiler and layer are mainly commercially produced in Bangladesh (Rana et al., 2013). The contribution of poultry production is vital to the national economy in case of generating employment opportunity, additional income for households and improving the nutritional level of the people. About 2.58 percent of GDP came from animal farming during the 2010/11 financial year (MoF, 2012). The poultry sector has emerged as a flourishing and promising commercial sector in Bangladesh during the recent years. The poultry sector registered a per holding increase of 38.8 percent and per capita increase of 64.8 percent for the period between 1983/84 and 2005 (Planning Commission, 2011).

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 cased 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 designed and executed to fulfill the following objectives:

1) To identify the different poultry wastes available in poultry farm and
2) To investigate the management and disposal procedure of poultry wastes

MATERIALS AND METHODS

Study site

The study was conducted at 10 small, 6 medium and 4 large commercial poultry farms of Mirsarai Upazila, a major financial centre in Northern Chittagong. The selection of study site was based on the availability of poultry farms and willingness of the farm owners to participate in the study.

Experimental farms

Types of experimental 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.

Data collection

Data were collected from the selected poultry farm owners at farm level by a face to face interview during 25 May to 5 July 2016. The selected farmers were interviewed about litter and other waste materials that come from poultry farm, their management and disposal process.

Parameters studied

Collected data were analyzed in accordance with the objectives of the study. The parameters studied were types of wastes, their management and disposal process. Finally, relevant tables were prepared in accordance with the objectives of the study.

RESULTS

Types of waste materials in poultry farm tend to be increased in large sized poultry farm compared to small and medium sized poultry farms. Poultry manure/litter, feathers, dead birds etc. are common waste materials for all poultry farms regardless of size. Water runoff, dust and chemicals are also common waste materials for medium and large sized poultry farms whereas toxic chemical residues in tissues and eggs, processing plant waste and hatchery waste are additional waste materials for large sized poultry farms (Table 1).

Litter management procedure varies according to farm size. Spreading and composting, burial in the soil are the litter management procedure for small sized poultry farms whereas dehydration and lagoon are attributable to medium sized farms. On the other hand, large sized farm owners practicing deep stacking and lagoons for management of litter and waste materials of their poultry farm (Table 2).

Only in small sized poultry farms 20% litters cannot be used for any particular work. After a particular time 100% litter materials of large sized poultry farms were sold in the market whereas 40% and 17% litter materials were sold in the market from small and medium sized poultry farm respectively. 30% and 33% of litter materials from small sized and medium sized poultry farms respectively, were used as fertilizer in crop production. Litter materials were also used in fish culture as 10% and 50% of the litter materials from small and medium sized poultry farms respectively. Burial of other farm waste materials in the soil was practiced in small and medium sized poultry farms whereas disposal in a concrete pit was practiced in large sized poultry farms (Table 3).

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

Farm size	No. of farms	Types of wastes
Small	10	Poultry manure/litter, feathers, dead birds etc.
Medium	6	Poultry manure/litter, feathers, dead birds, water runoff, dust and chemicals
Large	4	Poultry manure/litter, feathers, dead birds, water runoff, 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

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

Table 3: Uses of poultry wastes in the study area

Farm size	No. of farms	Types of disposal		
		Litters		Others (e.g. dead birds)
Small	10	2*	(20%)	2 farmers burned their other wastes and 8 farmers buried in the soil their other wastes
		4**	(40%)	
		3***	(30%)	
		1****	(10%)	
Medium	6	1**	(17%)	Buried in the soil
		2***	(33%)	
		3****	(50%)	
Large	4	4**	(100%)	Disposal in a concrete 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.

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. Moreover, manure can be spread only in a particular time of the year, which needs 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 dehydrators to produce a high quality product, to reduce the volume of manure and to prevent bacterial action that results in odor production. Two or three days are required to reduce moisture content from 75% to 20% if manure is spread thinly. Medium farm owners of the study area dehydrated their poultry wastes by spreading litter in a fellow land in the sunny day. It takes around 1 week to dry completely. Some farm owner piles 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. All the pathogenic microorganisms (yeasts, moulds and fungus) insects and other live organisms are destroyed due to high temperature in the stacks. 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 dispose their poultry wastes in the lagoons. But lagoons water is health hazardous if the concentration of litter is high.

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 (Table 3). 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 initial feed for fish. 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 sold their poultry waste after disposal of the laying birds from the farm. 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. India and china along with USA is generating biogas from poultry wastes. Australia is using biogas for different purposes. Large farm owners can use their litter and other wastes for commercial biogas production, which helps to minimize the fuel crisis of Bangladesh.

CONCLUSION

Now a day, the commercial poultry farms of Bangladesh are producing a large quantity of litter, which needs special attention for the environment safety. The supreme authority of Bangladesh 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. Biogas production technology is well developed around the globe. Poultry farm owners, both private and public can utilize their poultry litter and other wastes for biogas production, which will be helpful to remove the scarcity of gas supply in our country.

REFERENCES

BBS (Bangladesh Bureau of Statistics). 2003. Statistical Yearbook of Bangladesh. Bangladesh Bureau of Statistics, Ministry of Planning, Dhaka, Bangladesh.

DLS (Department of Livestock Services). 2000. General information related to livestock. Monthly livestock and fisheries bulletin, published by fisheries and livestock information office, Kharmarbhai, Farmgate, Dhaka, Bangladesh.

FAO (Food and Agricultural Organization). 2002. Production Yearbook of Food and Agricultural Organization, statistics series, Vol. 57, Rome, Italy.

FFYP. 2003. The Fifth Five Year Plan. Planning Commission, Ministry of Planning, Government of the People's Republic of Bangladesh.

Jacob, J, P., W. E. Kunkle, R.S. Tervola, R.D. Miles and Mather. 1997. Broiler litter, part-I: A feed ingredients for ruminants. Comperative Extn Service, Inst. Food Agril. Sci., Univ. Florida, USA.

Kunkle, W.E., J.P. Jacob, R.S. Tervola, R.D. Miles and F.B. Mather. 1997. Broiler litter, part-II: A feed ingredients for ruminants. Fact sheet PS-14, Dairy and Poultry Sci. Department of Comparative Extn. Service, Inst. Food Agril. Sci., Univ. Florida, USA.

MoF. 2012. Bangladesh Economic Review 2012. Economic Adviser's Wing, Finance Division, Ministry of Finance, Government of the People's Republic of Bangladesh, Dhaka.

Planning Commission. 2011. Sixth Five Year Plan FY 2011-FY 2015: Accelerating Growth and Reducing Poverty, Part-2: Sectoral Strategies, Programs and Polices. Planning Commission, Ministry of Planning, Government of the People's Republic of Bangladesh.

Rana, K. A.-M., M. Rahman and M. Sattar. 2013. Profitability of Small Scale Broiler Production in Some Selected Areas of Mymensingh. Progressive Agriculture, 23(1-2), 101-109.

Vest, L., B. Merka and W.L Segars. 1994. Poultry waste: Georgia¢s 50 million dollar forgotten crop. The University of Georgia and College of Agricultural and Environmental Science. Cop. Extn. Service Leatlet 206/july, 1994

ACKNOWLEDGEMENTS

The first and foremost reverence is to the Almighty “Allah” who enabled the author to complete the study and clinical report successfully.

The author gratefully expresses his heartiest appreciation, deepest sense of gratitude and best regards to his supervisor Mr. Sohel Rana, Assistant Professor, Department of Agricultural Economics and Social Sciences, Chittagong Veterinary and Animal Sciences University, for his continuous patronization, scholastic supervision and intellectual guidance throughout this work.

The Author also wishes to thank the poultry farms owners and employee of different poultry farms of Mirsarai Upazila for their assistance by giving important information during conducting this survey.

Finally, the author expresses his profound gratitude and appreciation to Professor Dr. Md. Ahasanul Hoque, Dean, Faculty of Veterinary Medicine, Chittagong Veterinary and Animal Sciences University, for his continuous suggestive advice and encouragement throughout this work.

The Author
October, 2016

BIOGRAPHY

I am Md. Abu Bakar, son of Md. Abu Nashar and Masuda Akter. I passed Secondary School Certificate examination in 2008 with GPA-4.50 followed by Higher Secondary Certificate examination in 2010 with GPA-4.40. Presently, I am an intern veterinarian under the Faculty of Veterinary Medicine in Chittagong Veterinary and Animal Sciences University. Recently, I authored two veterinary handbook entitled as “A Compendium of Veterinary Medicine” and “Veterinary Therapeutics and Vaccines (VTV)”. In future, I would like to provide competent veterinary medical care and uphold the standards of professionalism in Bangladesh with my best knowledge and practice.