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Constraints Perceived by Poultry Farmers in Scientific Disposal of Poultry Waste in Bihar

Puspendra Kumar Singh[1*], Pankaj Kumar[2], Saroj Kumar Rajak[2] and N K Singh[3]

ABSTRACT

Poultry farming is one of the fastest growing segments of the livestock sector in India and plays a vital role in ensuring food and nutritional security, employment generation, and income diversification. The present study was conducted to identify and analyze the constraints perceived by poultry farmers in the scientific disposal of poultry waste in Bihar. The study was conducted across all four agro-climatic zones of Bihar. From each zone, two districts with the highest poultry population were purposively selected. A descriptive research design was adopted and the study was conducted across four agro-climatic zones of the state. A total of 200 poultry farmers having at least 5000 birds and three years of farming experience were selected using multistage sampling. Data were collected through personal interviews and analyzed using the Garrett ranking technique. The findings revealed that technical constraints ranked first, followed by economic and environmental constraints. Major constraints included lack of awareness about scientific waste management methods, high investment cost, shortage of land, and labour-related difficulties. Strengthening extension services and promoting waste management technologies are essential for sustainable poultry production. 1.15 WP (12.52) and Azadirachtin (11.47), while lowest (1.36) in the KSE 5% treated plots.

Keywords: Poultry waste management, Garrett ranking technique, Poultry farmers, Scientific waste disposal

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INTRODUCTION

Poultry farming has emerged as one of the most dynamic segments of the livestock sector in India, contributing significantly to food and nutritional security, employment generation, and income diversification. According to the 20th Livestock Census, India recorded a poultry population of 851.81 million birds, reflecting a growth of 16.8 percent over the previous census period (Department of Animal Husbandry and Dairying [DAHD], 2019). The sector has experienced consistent growth due to increasing demand for affordable animal protein, rapid urbanization, and commercialization of poultry production systems.

In Bihar, poultry farming has expanded steadily as both a commercial and subsidiary livelihood activity. The 20th Livestock Census reported a poultry population of 16.53 million birds in the state (DAHD, 2019). Backyard poultry plays a vital role in enhancing household nutrition and income among small and marginal farmers, while commercial broiler and layer farms are increasingly concentrated in peri-urban areas. This expansion has led to a corresponding rise in poultry waste generation, intensifying waste management challenges at the farm level.

Poultry farms generate various types of waste, including poultry litter, manure, feathers, broken eggs, feed residues, hatchery waste, and dead birds (Singh et al., 2022). A single broiler bird produces approximately 1.5–2.0 kg of litter during one production cycle, resulting in substantial cumulative waste in large and medium-scale farms (Singh et al., 2018). When disposed of improperly, poultry waste poses serious environmental and health risks. Raw poultry manure contains high concentrations of nitrogen and phosphorus and may harbor pathogenic microorganisms such as Salmonella and Escherichia coli. Unscientific practices such as open dumping, direct application of untreated waste, and indiscriminate disposal of carcasses can lead to soil and water contamination, foul odor, greenhouse gas emissions, and increased risk of disease transmission (Birthal and Jha, 2005).

Scientific disposal and value addition of poultry waste are essential for converting an environmental burden into a valuable resource. Technologies such as composting and vermicomposting stabilize poultry waste, reduce pathogen load, and produce nutrient-rich organic manure that improves soil fertility and crop productivity (Kumar et al., 2020; Kumar et al., 2018). Biogas production from poultry waste generates renewable energy and produces slurry suitable for agricultural use. The waste-to-wealth approach emphasizes recycling poultry waste into marketable products such as organic fertilizer and bioenergy, thereby enhancing

[1]Assistant Professor, Deptt. of Veterinary & A H Extension Education, Bihar Veterinary College, BASU, Patna
[2]Associate Professor, Deptt. of Veterinary & A H Extension Education, Bihar Veterinary College, BASU, Patna
[3]Director Research, Bihar Animal Sciences University, Patna
[*]Corresponding Author E-mail: puspendra2001@gmail.com

farm income while minimizing environmental pollution. Adoption of scientific waste management practices supports sustainable livestock farming by promoting nutrient recycling, reducing biosecurity risks, and improving environmental quality.

Despite the availability of proven technologies for scientific disposal and value addition of poultry waste, their adoption at the farm level remains limited. Most studies in the Indian context focus on the technical efficiency of waste processing methods, while empirical research examining the constraints faced by poultry farmers is limited, particularly in eastern India. Regional disparities in awareness, infrastructure, institutional support, and market access are insufficiently documented. Therefore, a systematic assessment of constraints hindering adoption of scientific poultry waste management practices in Bihar is essential for designing location-specific extension and policy interventions.

MATERIALS AND METHODS

The study followed a descriptive research design and was conducted in selected districts of Bihar. All the four agro-climatic zones in Bihar were considered for the study. From each agro-climatic zones two districts with highest poultry population were purposively selected. From each district 25 poultry farmers with at least 5000 flock size and 3 year poultry farming experience were randomly selected (Fig. 1). Therefore, 200 Poultry farmers were considered for the study.

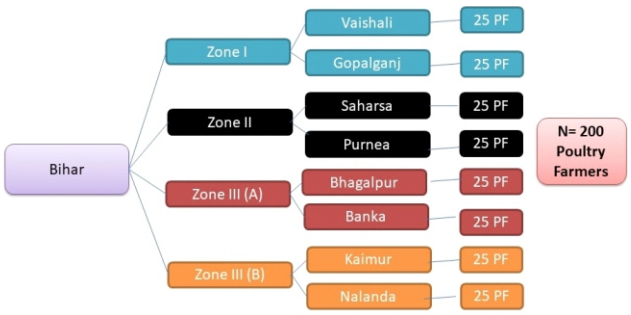

Fig. 1: Smapling plan for selection of respondents

Poultry farmers were selected using a multistage sampling technique. Primary data were collected through personal interviews using a pre-tested structured interview schedule. Constraints related to scientific disposal and value addition of poultry waste were categorized into technical, economic, infrastructural, and institutional constraints. Garrett ranking technique was employed to prioritize constraints based on farmers' perception. Ranks assigned by respondents were converted into scores using Garrett's formula:

$$\text{Percent position} = \frac{100\,(R_{ij} - 0.5)}{N_j}$$

Where:

Rij = Rank given for the i^{th} *item by the* j^{th} *respondent*

Nj = Total number of items ranked by the j^{th} respondent

100 = Constant used for converting into percentage

RESULTS AND DISCUSSION

The analysis of constraints in scientific poultry waste management was carried out using the Garrett ranking technique, which enabled prioritization of different categories of constraints experienced by poultry farmers. The constraints were broadly categorized into technical, economic, social, institutional, environmental and labour-related constraints.

Technical constraints perceived by poultry farmers in scientific management of poultry waste

Among the technical constraints as presented in Table 1, lack of awareness about scientific poultry waste management methods emerged as the most severe constraint with the highest Garrett mean score of 73.80. This was followed by difficulty in understanding composting, biogas and vermicomposting techniques (76.80). The lack of demonstration units or innovative farmers practicing scientific waste management ranked third with a score of 72.40.

Table 1: Technical constraints perceived by the poultry farmers in scientific management of poultry waste

Sr. no.	Constraints	Garrett Mean Score	Ranking
A	Technical Constraints		
1.	Lack of awareness about scientific poultry waste management methods.	73.80	I
2.	Difficulty in understanding composting, biogas, and vermicomposting techniques.	76.80	II
3.	Lack of demonstration units or innovative farmers practicing scientific waste management practices and earning wealth.	72.40	III

The results clearly indicate that technical knowledge gaps and limited exposure to improved waste utilization technologies are major barriers to the adoption of scientific waste management practices. Many farmers are unaware of the potential benefits of converting poultry waste into compost, organic fertilizer or biogas. In the absence of demonstration units and practical training, farmers continue to rely on conventional disposal practices such as dumping or direct application of raw manure.

Economic constraints perceived by poultry farmers in scientific management of poultry waste

Among economic constraints, low or uncertain income from selling poultry manure or compost ranked first with a Garrett mean score of 71.40. The lack of government subsidy or credit support for waste management ranked second (70.80), followed by high cost of chemical treatment of poultry waste (67.40). The high cost of constructing compost pits, biogas plants or incinerators ranked fourth with a Garrett mean score of 65.50.

Table 2: Economic constraints perceived by the poultry farmers in scientific management of poultry waste

Sr. no.	Constraints	Garrett Mean Score	Ranking
B	Economic constraints		
1.	Lack of government schemes on subsidy or credit support for waste management.	70.80	II
2.	High cost of chemical treatment of poultry waste	67.40	III
3.	Low or uncertain income from selling poultry manure/compost.	71.40	I
4.	High cost of constructing compost pits, biogas plants, or incinerators.	65.50	IV

These results suggest that poultry farmers perceive waste management technologies as economically risky due to uncertain returns and high initial investment costs. In the absence of organized manure markets and financial incentives, farmers are reluctant to invest in scientific waste management systems.

Social constraints perceived by poultry farmers in scientific management of poultry waste

Among social constraints, complaints from neighbours or villagers due to odour and flies ranked first with a Garrett mean score of 62.00, followed by fear of conflicts with the local community due to waste disposal (56.20). Reluctance of some farmers to use poultry manure in crop fields due to cultural beliefs ranked third with a score of 47.40 (Table 3).

Table 3: Social constraints perceived by the poultry farmers in scientific management of poultry waste

Sr. no.	Constraints	Garrett Mean Score	Ranking
C	Social constraints		
1.	Complaints from neighbours/villagers due to odour and flies.	62.00	I
2.	Fear of Conflicts with the local community due to waste disposal	56.20	II
3.	Reluctance of some farmers to use poultry manure in crop fields due to cultural beliefs.	47.40	III

Improper waste disposal often leads to foul odour and fly infestation, creating nuisance in nearby residential areas. As a result, poultry farmers often face social pressure and conflicts from neighbouring communities.

Institutional constraints perceived by poultry farmers in scientific management of poultry waste

Among institutional constraints as shown in Table 4, lack of regular training or extension services from government agencies such as State Agricultural Universities, Krishi Vigyan Kendras (KVKs), and state departments emerged as the most important constraint with a Garrett mean score of 70.40. Lack of awareness about State Pollution Control Board guidelines ranked second (55.60). Weak enforcement of waste management regulations (39.20) and limited role of Panchayats or local bodies in managing poultry waste (26.40) were relatively less severe constraints.

Table 4: Institutional constraints perceived by the poultry farmers in scientific management of poultry waste

Sr. no.	Constraints	Garrett Mean Score	Ranking
D	Institutional constraints		
1.	Lack of awareness about State Pollution Control Board guidelines for poultry waste management.	55.60	II
2.	Weak enforcement of waste management regulations at the farm level.	39.20	III
3.	Limited role of Panchayats or local bodies in managing poultry waste.	26.40	IV
4.	Lack of regular training or extension services from government agencies like KVKs, state department, state universities etc .	70.40	I

These findings highlight the critical role of extension agencies and institutional support in promoting scientific poultry waste management practices.

Environmental constraints perceived by poultry farmers in scientific management of poultry waste

Among environmental constraints, shortage of land near poultry farms emerged as the most serious constraint with a Garrett mean score of 73.60, followed by seasonal problems such as monsoon overflow and summer odour (67.20). The risk of groundwater contamination in high water table areas ranked third with a score of 53.00 (Table 5).

Table 5: Environmental constraints perceived by the poultry farmers in scientific management of poultry waste

Sr. no.	Constraints	Garrett Mean Score	Ranking
E	Environmental constraints		
1.	Shortage of land near poultry farms.	73.60	I
2.	Risk of groundwater contamination in high water table areas.	59.00	III
3.	Seasonal problems (monsoon overflow, summer odour).	67.20	II

Limited availability of land restricts the construction of compost pits or waste treatment units near poultry farms. Seasonal climatic variations also create difficulties in proper storage and processing of poultry manure.

Labour constraints perceived by poultry farmers in scientific management of poultry waste

A glimpse on Table 6 revealed that among labour related constraints, family members unwilling to handle poultry waste due to smell and health concerns ranked first with a Garrett mean score of 77.20, followed by non-availability of labour for waste handling (63.00). High cost of labour ranked third with a Garrett mean score of 53.60.

Table 6: Labour constraints perceived by the poultry farmers in scientific management of poultry waste

Sr. no.	Constraints	Garrett Mean Score	Ranking
F	Labour constraints		
1.	Non-availability of labour for waste handling.	63.00	II
2.	Family members unwilling to handle poultry waste due to smell/health concerns.	77.20	I
3.	High cost of labour	53.60	III

Handling poultry waste is often considered unpleasant due to foul odour and potential health risks. Consequently, farmers face difficulties in hiring labour for waste management activities.

Overall Garrett Ranking of Constraint Categories perceived by Poultry Farmers

The overall Garrett ranking of different categories of constraints perceived by poultry farmers in the scientific management of poultry waste is presented in Table 7. The analysis indicates that poultry farmers face multiple categories of constraints, which vary in their severity and impact on the adoption of scientific waste management practices. The results reveal that technical constraints emerged as the most severe category with the highest average Garrett mean score of 74.33, and hence ranked first. This indicates that poultry farmers face considerable difficulties related to lack of awareness about scientific poultry waste management methods, inadequate technical knowledge regarding composting, vermicomposting, and biogas technologies, and absence of demonstration units or model farms practicing scientific waste management. These findings highlight the need for strengthening extension services, training programmes, and practical demonstrations to enhance farmers' technical knowledge and skills.

The economic or financial constraints ranked second with an average Garrett mean score of 70.77. These constraints mainly include low or uncertain income from poultry manure, high cost of waste treatment technologies, and lack of government subsidies or credit support for waste management infrastructure. The results suggest that farmers perceive scientific waste management technologies as financially risky due to high initial investment and uncertain economic returns. The environmental or infrastructural constraints ranked third with an average Garrett mean score of 66.60. Major issues reported by farmers include shortage of land near poultry farms for waste disposal or composting, seasonal problems such as monsoon overflow and summer odour, and the risk of groundwater contamination in high water table areas. These factors make the management and storage of poultry waste difficult at the farm level.

Table 7: Overall garrett ranking of constraint categories perceived by poultry farmers

Sr. No.	Constraint Category	Average Garrett Mean Score	Overall Rank
1	Technical Constraints	74.33	I
2	Economic / Financial Constraints	70.77	II
3	Environmental / Infrastructural Constraints	66.60	III
4	Labour Constraints	64.60	IV
5	Social / Cultural Constraints	55.20	V
6	Institutional / Policy Constraints	45.33	VI

The labour-related constraints ranked fourth with an average Garrett mean score of 64.60. Farmers reported non-availability of labour for waste handling, unwillingness of family members to handle poultry waste due to unpleasant odour and health concerns, and high labour costs as significant problems affecting waste management practices.

The social or cultural constraints ranked fifth with an average Garrett mean score of 55.20. These constraints mainly arise from complaints by neighbours due to odour and flies, fear of conflicts with the local community regarding waste disposal, and reluctance among some farmers to use poultry manure in crop fields due to cultural beliefs.

The institutional or policy constraints were found to be the least severe category, ranking sixth with an average Garrett mean score of 45.33. Although relatively less severe compared to other constraints, farmers still reported lack of awareness about pollution control board guidelines, weak enforcement of waste management regulations, and limited involvement of Panchayats or local bodies in poultry waste management.

Overall, the findings indicate that technical and economic constraints are the most critical barriers affecting the adoption of scientific poultry waste management practices in Bihar.

Therefore, targeted interventions such as capacity building, financial incentives, improved extension support, and development of waste management infrastructure are essential to promote sustainable poultry waste utilization.

The results reveal that poultry farmers face multiple and interrelated constraints in adopting scientific poultry waste management practices. Environmental constraints such as shortage of land and labour-related problems emerged as the most severe barriers, followed by technical knowledge gaps and economic limitations.

The high ranking of lack of awareness about scientific poultry waste management methods indicates that farmers have limited access to technical information and training. Similar findings were reported by Rathod *et al*. (2017) who observed that lack of knowledge and training significantly affects the adoption of improved poultry management practices. Bolan *et al*. (2010) also reported that effective utilization of poultry litter requires adequate knowledge regarding composting, nutrient management and environmental safety.

Economic constraints were also found to be significant, particularly the low or uncertain income from poultry manure and lack of subsidy support for waste management infrastructure. Poultry manure is a valuable organic fertilizer rich in nitrogen, phosphorus and potassium; however, the absence of organized markets reduces its commercial value. Nahm (2003) and Gerber *et al*. (2013) also highlighted that poultry waste has considerable economic potential but its utilization is often constrained by poor market linkages and financial support systems.

Social issues such as complaints from neighbours due to odour and flies also influence farmers' waste management practices. Improper disposal of poultry waste can lead to environmental pollution and public health concerns. Similar observations were reported by Gerber *et al*. (2007) who emphasized that livestock waste mismanagement can create conflicts between farmers and surrounding communities. Institutional constraints such as lack of extension training and weak regulatory awareness further limit adoption of improved waste management practices. Effective extension services and training programs are essential for promoting sustainable livestock production systems. Chaudhary *et al*. (2019) reported that regular training and technical guidance significantly improve adoption of improved livestock management technologies. Environmental constraints such as land scarcity and seasonal climatic conditions also pose serious challenges. Poultry farms located in densely populated areas often lack adequate space for composting or waste treatment facilities. Studies by Tao *et al*. (2021) indicated that improper poultry manure management may lead to groundwater contamination and environmental degradation.

Overall, the findings highlight the need for integrated interventions including capacity building, financial incentives, demonstration units and improved institutional support to promote scientific poultry waste management practices.

CONCLUSION

The present study examined the constraints faced by poultry farmers in the scientific management of poultry waste using the Garrett ranking technique. The findings revealed that farmers face several technical, economic, social, institutional, environmental and labour-related constraints.

Among the various constraints, shortage of land near poultry farms (73.60), lack of awareness about scientific waste management methods (73.80), unwillingness of family members to handle poultry waste (77.20), low income from poultry manure (71.40) and lack of extension training (70.40) as the most serious barriers. These constraints collectively hinder the adoption of sustainable and environmentally safe poultry waste management practices. Therefore, there is a need for strengthening extension services, establishing demonstration units, promoting low-cost waste management technologies such as composting and biogas production, and providing financial incentives through government schemes.

Promoting organized manure markets and encouraging farmer awareness programs can also improve the economic viability of poultry waste utilization. Addressing these constraints will help transform poultry waste from an environmental problem into a valuable resource for sustainable agriculture.

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