

Investigation of disposal methods of cattle farming waste in Ampara district

D.M.S.U.K. Dissanayaka^a, M.G. Mohamed Thariq^a and M.R.A. Rifath^a

^aDepartment of Biosystems Technology, Faculty of Technology

South Eastern University of Sri Lanka.

Abstract

Cattle farming waste disposal is an important concern with regard to promoting organic farming and environmental sustainability. The main objective of this study was to investigate the disposal methods of cattle farm waste in the Ampara district and to identify problems faced by cattle farm owners in disposing of the waste generated. Eight veterinary ranges in the Ampara district i.e., Akkaraipattu, Addalachchenai, Kalmunai, Samanthurai, Uhana, Pottuvil, Thirukkivil, Alayadivembu, Nintavur, and Sainthamarathu were selected for the study. The data were collected using a structured questionnaire and analysed. The study found that the waste materials generated were cow dung, urine, bedding material, wasted feed, wastewater, and placenta. The methods used to dispose of the waste materials are those of direct selling, giving away for free of charge, surface application as fertilizer, composting, draining out to crop fields, burning, and burying. The burying is practiced only for the placenta whereas the burning is practiced to dispose mainly of wasted feed materials. Lack of support from the government organization is the main problem faced by farmers to dispose of cattle farm waste. It is concluded that waste generated from cattle farms in Ampara district is utilized as fertilizer in a fairly sustainable manner indicating the awareness among the farmers about the value of the cattle farm waste materials. It is suggested that with the support of the government organization involved, the sustainability of cattle farms' waste utilization can be improved further.

Keywords: Farm waste utilization, Composting, Direct selling, Government support, Sustainability

1. Introduction

The livestock species play vital economic, social and cultural roles or functions for rural households since they contribute to enhancing the income and wellbeing of the farm family. Livestock helps with food supply, family nutrition, family income, asset savings, soil productivity, livelihoods, transport, agricultural development, agricultural diversification, sustainable agricultural production, family and community employment, ritual purposes, and social status [1]. Despite benefits, the large quantity of waste generated from livestock farming and its disposal is a major concern. Improper waste disposal methods will not only make large-scale pollution but also avoid nutrients and spread diseases and illnesses. A good understanding of waste disposal methods will enhance the efficiency of disposal of cattle farms and cattle waste management [2].

In today's world, the expansion and intensification of large-scale animal feeding operations have increased farm size and waste, posing severe challenges such as negative environmental and public health implications in rural areas [3]. Dung, urine, placenta, stillbirths, post-mortem debris, bedding, feed wastage, milk-house wastes or wash, dead animal's hair, hooves, and other types of livestock waste are common. Livestock waste is produced during the development of cattle i.e., during the growth, control, feeding, and cleaning processes. Solid types of animal farm waste include: Dung, feed, bedding, and carcass are all examples of waste.

Urine and washing water are examples of liquids. Methane, carbon dioxide, and ammonia are examples of gases [4]. Further, that generated waste is beneficial and used in surface application as fertilizer, direct selling, applied into the crop field and dry and provides smoke and fire. Properly converting livestock waste into biogas, compost, and vermicomposting can significantly boost crop yield and sustainability [5].

Improper disposal methods of farm wastes can lead to several environmental and health implications. According to Manna et al. [6], gaseous emissions and odor can be generated during the breakdown of manure, with detrimental repercussions for farmers' fields and livestock farms. Fanguiero [7] found that greenhouse gas emissions (NH_3 , N_2O , CH_4) occurred during manure storage. Animal farm waste contains a diverse spectrum of microorganisms that might pose a risk to people and animals. These microorganisms may contaminate food, trigger outbreaks, and endanger public health [8]. Therefore, sustainable waste management systems on farms must minimize risks to the environment associated with the storage, handling, and utilization of manure [6,9].

Cattle farming is one of the important activities in the Ampara district. Therefore, Cattle farming and slaughterhouse waste disposal seem to have been important topics with regard to environmental sustainability. Literature on how cattle farm wastes and slaughterhouse wastes are disposed in the Ampara district is not available. Further, there is information on cattle farms and cattle slaughterhouses since there is no information on the disposal of waste from cattle farms and slaughterhouses in the Ampara district. Therefore, the objective of this study was to investigate disposal methods of cattle farm and cattle slaughterhouse waste in the Ampara district and the problems faced by the farmers.

2. Methodology

The study was carried out in eight veterinarian ranges in the Ampara district, which is located in the low country dry zone. Those are Akkaraipattu, Kalmunai, Samanthurai, Alayadivembu, Addalachchenai, Pottuvil, Thirukkivil and Uhana. The questionnaire assessed 60 randomly selected farmers engaged in cattle farming and slaughterers in that veterinary range. Around 60 cattle farms in all eight veterinary ranges were selected in the Ampara District and observed waste disposal methods adopted by cattle farmers by the researcher. The cattle slaughterhouses in the selected veterinary ranges and relevant data were collected through observation by the researcher.

The structured questionnaire was used to obtain information on waste disposal methods in cattle farms in the Ampara District. The questionnaire consists Socio demographic information of farmers, types of breeds, purpose & reason of rearing, management systems, type of waste materials, waste disposal method, and problems of waste generated. The questionnaires were given to randomly selected cattle farmers and slaughterhouse workers to investigate the disposal methods of cattle farming waste in Ampara district. MS Excel was used to analyze the data; the results were presented in bar charts as well as in tables.

3. Results and Discussion

3.1 Demographic information

The Socio-demographic information of farmers is shown in Table 01. According to the data collected from eight veterinary ranges in Ampara District, 92% of the males and 8% of females engaged in cattle farming. The results may indicate that cattle farming is a male-dominated activity in Ampara district.

Table 1. Socio-demographic information of farmers

Features	Category	Percentage (%)
Gender	Male	92
	Female	8
Age	21-30	17
	31-40	20
	41-50	30
	51-60	18
	61-70	15
Ethnicity	Muslim	50
	Tamil	30
	Sinhala	20
Level of Education	Primary	38
	Secondary	55
	Tertiary	7

According to Table 1, the highest percentage of farmers (30%) fall in the age group 41-50. Most of the farmers fall between the age of 31 to 60 years, which was around 68%. The age groups mentioned were almost similar to the findings of the previous study (Vidanarachchi *et al.*, 2019). The results may indicate that those who engage in cattle farming are found in their most productive age. The ethnicity of cattle farmers is given in Table 01. Accordingly, 50% of the cattle farmers under our investigation were Muslims, 20% and 30% were Sinhalese and Tamils respectively. The highest level of cattle in the study area fell under the primary education level, which was 38%. The secondary level, advanced level, and tertiary education levels were 40%, 15%, and 7% respectively.

3.2 Veterinary Ranges

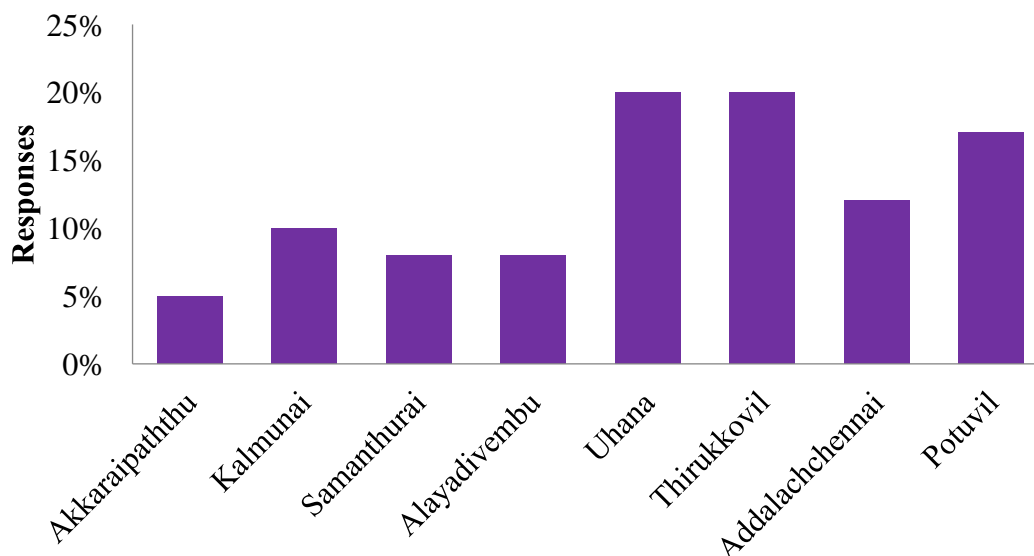


Figure 1. Veterinary ranges

Figure 01 shows the percentage of farmers in each veterinary range in this study. Accordingly, the highest number of cattle farmers were in Uhana and Thirukkivil in an equal percentage which was 20% followed by Pottuvil - 17%, Addalaichenai – 12%, Kalmunai – 10%, Alayadivembu, and Samanthurai both – 8% and Akkaraipattu 5%.

3.3 Information about the Cattle Farm

Table 02. Cattle and Cattle Farm management

Features	Category	Percentage (%)
<i>Types of cattle breeds</i>	Indigenous	42
	Cross	46
	Indigenous and cross	12
Reasons of cattle rearing	Main income	57
	Partial income	43
Herd scale	Small	96
	Medium	2
	Large	2
Management system	Intensive	7
	Semi intensive	93

Cattle farmers were inquired about the cattle breeds being raised by them. According to Table 02, around 46% of the cattle farmers rear cross breeds, 42% of the farmers rear indigenous breeds, and 12% of them rear both indigenous and crossbreeds. Further, cattle farming is the main source of income for 57% of the farmers while it was a partial income source for 43% of the farmers. Most of the cattle farmers (93%) were categorized as small-scale farmers with less than 50 numbers of animals whereas 5% of the cattle farmers were on a medium-scale with 50 – 150 animals and just 3% of them were found to be in large scale with more than 150 animals in the area studied. Table 02, shows that most of the farmers (93%) maintain their cattle farms under semi-intensive management systems whereas only 7% of the cattle farmers fall under intensive management systems. The study could not find farms with extensive management systems in the areas covered. Vidanarachchi *et al.* [10], found that the semi-intensive method is the most common 92%, and the intensive method is the least common 55%.

3.4 General Information of the Waste Generation and Disposal

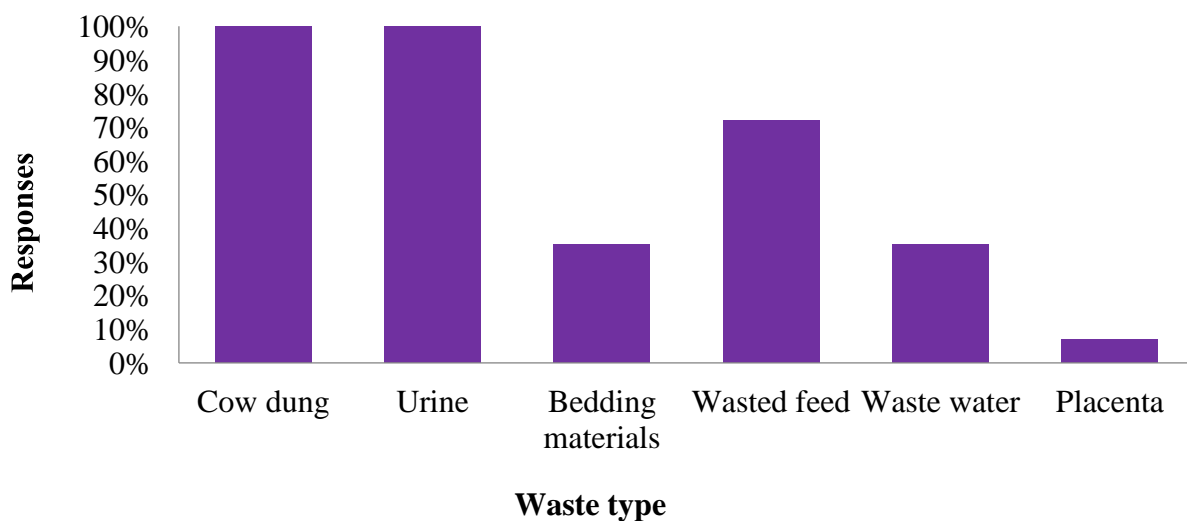


Figure 2. Types of waste generated during cattle farming

According to the information obtained from the Ampara District in 8 veterinary ranges, several types of waste are generated from cattle farms, namely cow dung, urine, wastewater, wasted feed, bedding materials, medical waste, chemical waste, and others. Solid types of animal farm waste include: Dung, feed, bedding materials, urine, and washing water have all been reported by [4]. Cattle dung and urine can be mentioned as the most generated waste from cattle farming, almost all the farmers (100%) said their cattle farm generates cow dung and urine. Furthermore, 72 % of the cattle farms generate wasted feed as waste material whereas 35% of farms generate wastewater and bedding materials as waste. Only 7% of the cattle farms generate placenta as waste (Figure 2).

3.5 Disposal Methods of Cattle Farming Waste

According to this study, cow dung and urine are used as fertilizer by 60% and 23% of the farmers respectively by practicing the surface application method in the study area (Figure 03). This result may indicate that the use of cow dung and urine as fertilizer in the cattle farmers' land is the main method of disposal of cow dung and urine.

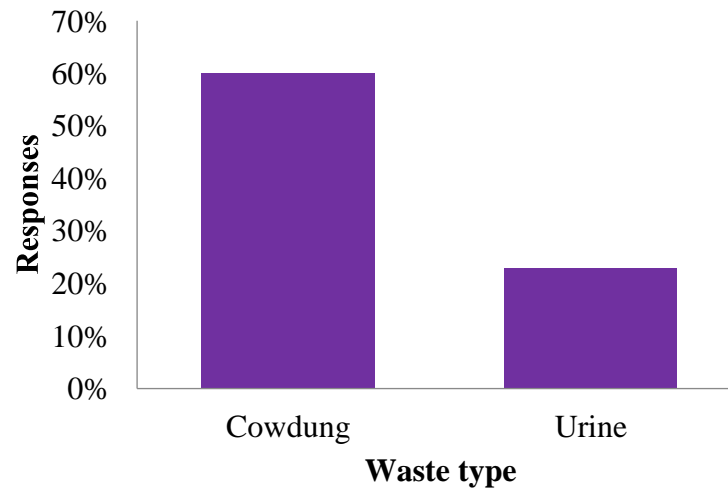


Figure 3. Surface applications as fertilizer for waste

Further, making compost is another way of utilizing the waste generated by the cattle farmers in the study area. The method of disposing of the cattle farm waste was reported by Sorathiya *et al.* [5] which is more or less similar in certain uses. Cow dung, urine, wastewater, wasted feed, and bedding materials are used to make compost by 18%, 18%, 10%, 17%, and 3% of the farmers respectively (Figure 4).

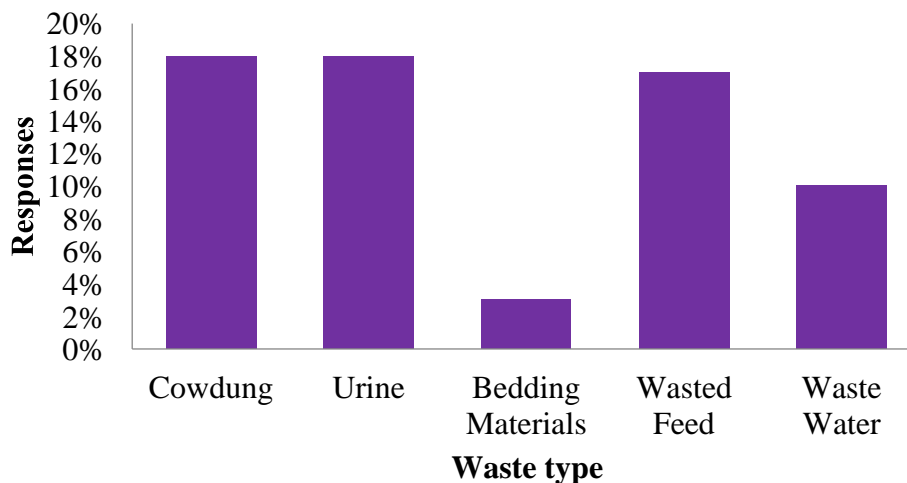


Figure 4. Composting

There were 73% of the farmers practice direct selling of cow dung as a waste disposal method. The cow dung is the only waste material sold directly by the cattle farmers in the study area. Another form of waste disposal method was, giving away free of charge that uses the waste generated from cattle farming. In that case, farmers give away only cow dung for free of charge which is about 33%.

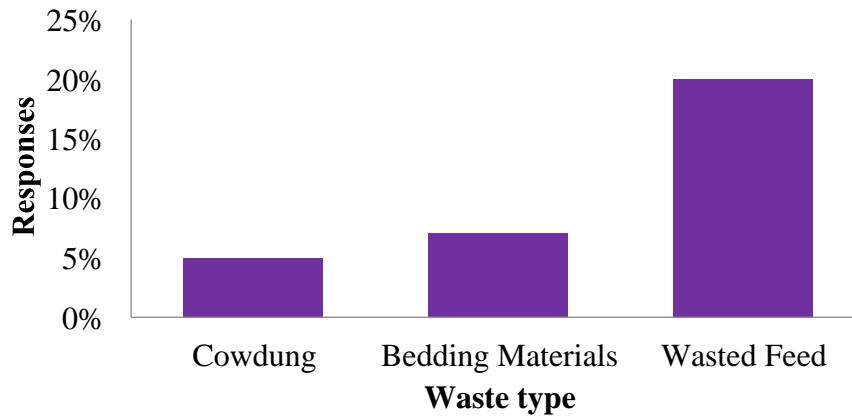


Figure 5. Burning

Part of cow dung, bedding materials, and wasted feed are burnt by certain cattle farmers to dispose. Around 20% of the cattle farmers burn wasted feed whereas 7% of the cattle farmers burn bedding materials while only 5% of the cattle farmers burn cow dung (Figure 5). Further, around 7% of the farmers practiced burying of placenta generated during the calving.

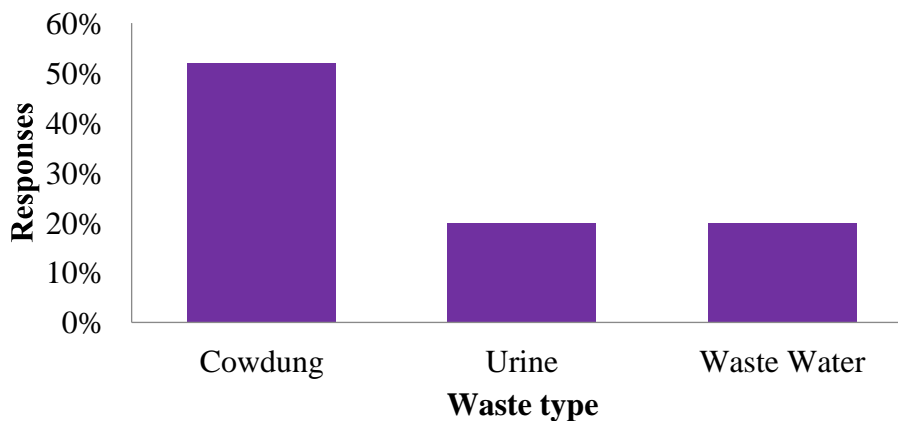


Figure 6. Drain out to crop field

Furthermore, cow dung, urine, and wastewater are drained out to crop fields as a method of disposing them. Cow dung is widely used for draining out to crop fields by farmers, which is 52%. An equal percentage of farmers drained out urine and wastewater i.e., 20% of them drained out to crop fields (Figure 06). Around 7% of farmers drain out cow dung and urine to other locations whereas 5% of the cattle farmers drained out wastewater to other locations (Figure 7).

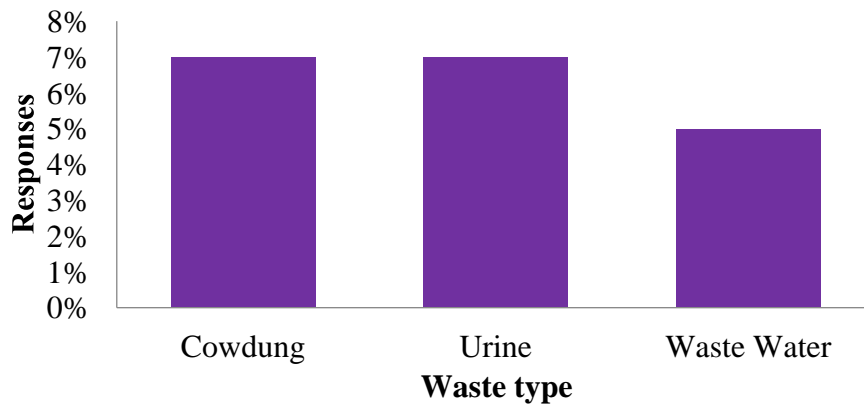


Figure 7. Drain out to other locations

3.6 Problems in Disposing of Waste Generated

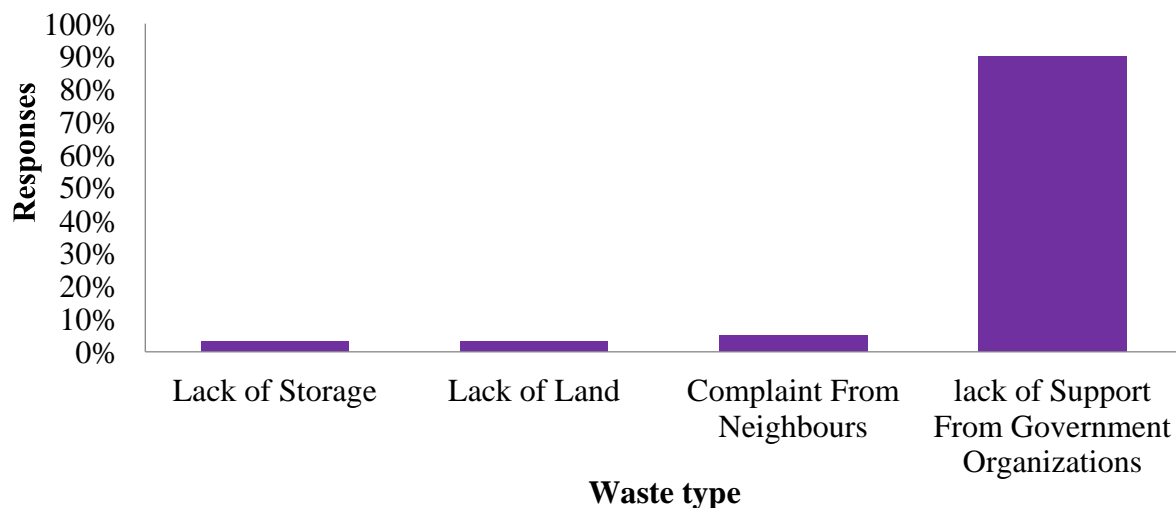


Figure 8. Problems faced by farmers

The problems faced by the cattle farmers are represented in figure 08. Accordingly, around 90% of the cattle farmers said lack of support from the government organizations is the main problem faced by them to dispose cattle farm waste. A few numbers of cattle farmers said a complaint from neighbors, lack of land, and lack of storage were also problems faced.

4. Conclusion

The waste materials generated from the cattle farms in the Ampara district were found to be cow dung, urine, bedding material, wasted feed, wastewater, and placenta. The methods to dispose the waste materials are those of direct selling, giving away for free of charge, surface application as fertilizer, composting, draining out to crop fields, burning, and burying. It was found that surface application as fertilizer and direct selling as major methods of disposal of cattle farm waste materials. The burying is practiced only for the placenta whereas the burning is practiced to dispose mainly of wasted feed materials. The study also found that the lack of support from government organizations was a major problem faced by cattle farmers in disposing of their waste. In overall, it is concluded that waste generated from cattle farms in the Ampara district is disposed by utilizing them as fertilizer in a fairly sustainable manner

indicating the awareness among the farmers of the usefulness of cattle farm waste materials. With the support of the government organization involved, the sustainability of cattle farms' waste utilization can be improved further.

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