EXTENDED ABSTRACT

REUSE OF FOOD WASTE AS ANIMAL FEED IN SRI LANKA

Jayathilake N.,* Aheeyar M., and Drechsel P.

International Water Management Institute, Sri Lanka
* N.jayathilake@cgiar.org

(Published 15 October 2021)

Abstract

The use of food waste (FW) from food services as animal feed through informal agreements has been in practice for many years in Sri Lanka. However, data to show the scale of this practice are inadequate. This paper aims to study the extent of FW diverted to piggeries and the opportunities and challenges in reusing FW as animal feed. The data were collected via telephonic survey from 24 piggery farmers in the Western Province in May 2020. Results revealed that 50% of farmers were rearing 100-300 pigs. Farmers used FW as a major feed source to satisfy 82% of total feed requirement on an average. About 40% of the farmers collected the FW from multiple sources such as hotels, restaurants and canteens. Given that the piggery farms are located in peri-urban areas, the average distance traveled by the farmers is 38 km up and down which indicated the value of FW for them. FW was supplied mostly free of charge; however, 26% of the farmers pay LKR 2 to 40/kg when supplied by intermediaries. FW was collected daily, and the amount collected by the farmers varies 50 to 10000 kg/day depending on demand and supply, with 75% of farmers collected less than 1000 kg/day.

Keywords: Organic waste, safe reuse, regulation, guideline

1. Introduction

Reducing food waste and losses has been a priority more than ever with the commitments to achieve Sustainable Development Goals (SDG) 12.3, which calls to halve the per capita food loss and waste by 2030. It is also an important target in achieving other SDG targets in particular relating to food security, nutrition, and environmental sustainability (FAO, 2019). According to recent estimates, nearly 4000 tonnes of Food waste are generated in Sri Lanka per day which is about 57% of the total solid waste generated in the country (FAO and IWMI, 2021). Although treatment of organic (food) waste via composting etc. has been in the national agenda for several years, strategies for FW prevention, reduction, and reuse along the food chain have seldom been promoted or advocated in the country except for few policies and strategies including the latest food waste prevention and reduction road map developed by the FAO and IWMI and launched by the Ministry of Environment in August 2021.

Using food waste as animal feed is one of the preferred options for reducing food waste, a common practice at the household level and of particular relevance around metropolitan centers. In Sri Lanka, the food service sector, in particular, has been informally practicing this as a strategy for food waste management for many years (Reitemeier et al., 2021). The Western Province with the commercial capital of Sri Lanka, Colombo, generates the highest amount of solid waste (SW) in the country

amounting to 33% of the total SW which consequently represents the highest food waste generation within Sri Lanka (JICA 2016; FAO and IWMI 2021). With its international airport, the Western Province also has the highest number of hotels at the provincial level in Sri Lanka. Major hotels in Colombo Municipal Council (CMC) and suburbs have been a key source of food waste to feed piggeries. Related data are however not captured in any waste statistics.

This paper aims to understand the extent of food waste diverted as livestock feed (*i.e.* to piggeries), and the opportunities and challenges in reusing food waste as feed. The study also focuses on understanding the level of engagement of the key players in the industry.

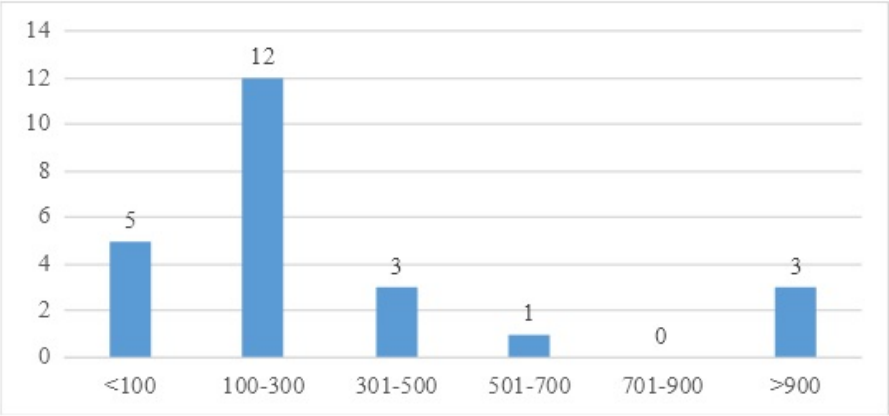
2. Methodology

For this study, we selected 24 farmers in the Western Province based on the purposive sampling method to be interviewed. A semi-structured questionnaire was used in May 2020 which focused on aspects such as the size of the farm, collection of food waste including amount, frequency, and distance, challenges, and opportunities faced by the sector. The majority of piggeries are scattered in Kaduwela, Welivita, Hanwella, Kosgma (in Colombo District) and Ja-Ela (in Gampaha District), and Maggona (in Kalutara District). Originally, a face-to-face field survey was planned but changed due to COVID 19 restrictions to a telephonic survey.

3. Results and Discussions

The majority of the sampled farms (50%) were rearing 100-300 pigs while the total sample had an animal distribution of 10 to 5000 (Figure 1). Results revealed that piggery farmers use food waste as a major feed with an average of 82% of total feed. However, the proportion of food waste to conventional food used can vary based on the purpose and the type of pigs raised in their farms. Feed supply was reportedly collected mostly from entities located in CMC followed by the Kaduwela municipality area. About 26% of the farmers collect food waste from hotels and restaurants only, while another 26% are specialized on institutional canteens. However, a larger percentage (39%) collect the feed from multiple sources including hotels, hospitals, and institutional canteens to meet their demand.

([1] Most of fattening farms use food waste as their main feed source while breeder farms use more concentrated feed.)



Source: Authors' Survey Data, 2020

Figure 1. Number of pigs in surveyed piggeries. Source: Authors' Survey Data, 2020

It was noted that pig farmers collect fresh feed on a daily basis. Farmers travel on average 38 km up and down to collect the feed. This is because the piggeries are essentially located in the peri-urban areas in the Colombo and Gampaha districts and the feed supply is mostly from the larger business

entities located in urban Colombo. Although the distance appears to be considerable, it implies that the value of (low cost) food waste as a feed has been well recognized by the farmers.

The average amount of food waste collected per day by piggery farmers varies with factors such as the size of piggery and the availability of feed. The survey indicated a significant variation between 50kg to 10,000kg of feed collection among the farmers with the majority (75%) collecting less than 1000 kg of food waste per day (Figure 2)

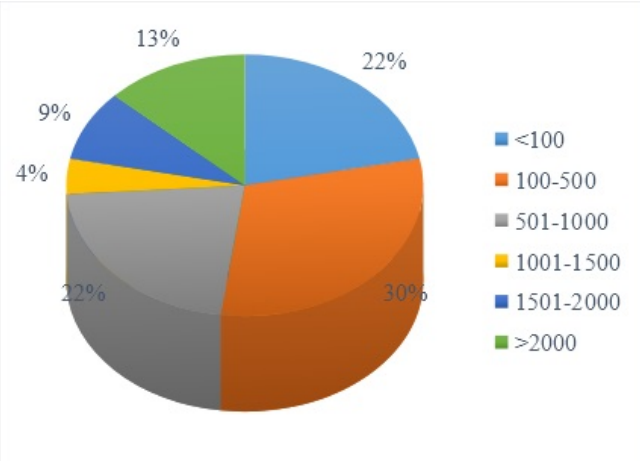


Figure 2. Average amount of FW collected by pig farmers (kg/day) Source: Authors' Survey Data, 2020

Given that the pig farmers mostly receive food waste free of charge, they use it as the major feed source over the commercial concentrated feed. However, the seasonal nature of the supply of food waste linked with tourism and festive seasons and inadequate supply of feed under the Covid-19 pandemic are key challenges encountered by these farmers. This has resulted in increased cost of operations for the farmers having to depend on the commercial feed.

A more technical challenge related to the food waste is that it has to be sorted to remove the nonfood materials such as plastic, polythene, and glass, which also created an additional labour cost to the farmers, as well as any meat residuals which are undesirable given the risk of foot and mouth disease (FMD) transmission unless the waste is processed (León, 2012, Salemdeeb et. al., 2017). FMD is a highly infectious viral disease that can get transmitted through consumption of contaminated meat waste. This has led in many countries to a ban on FW as feed to pigs or resulted in strict guidelines for feed preparation (Zu Ermgassen et. al., 2016; EC, 2002).

Although safety and hygiene of the feed have been a concern at the farmer's end from the business perspective and at the authorities' end from a health perspective, currently there are no national regulations guiding the use of food waste as animal feed. These are needed in particular to avoid FMD as the survey indicated limited awareness among the farmers related to feed hygiene.

Based on the data gathered during the survey, it was calculated that in total 34 tons of food waste from the Colombo area was absorbed daily by the surveyed piggeries. According to the 2019 database from the Department of Census and Statistics, 148 pig farms operated in the Colombo District, and more than 900 in the neighboring Gampaha district. Assuming that our surveyed sample was representative and all 148 pig farmers in Colombo district seek food waste as feed, it can be estimated that approximately 210 tonnes of food waste are currently absorbed by this sector. This is nearly twice the amount generated by restaurants within the Colombo Municipal Council area (FAO, IWMI and RUAF, 2016), which implies that also other parts of the Colombo district support catering the demand. Although these estimates need to be verified, a large number of piggeries within the district shows the significant potential of the sector to reduce volume of the food waste.

This is a win-win situation also for the food service sector as the waste gets removed in a reliable way, daily, and at no cost. While the majority of the farmers received the feed supply free of charge,

26% of the farmers pay a price ranging from LKR 2 to 40 per kg with more than 50% paying LKR 10 per kg if the waste gets supplied through intermediaries. This practice was also reported from the neighboring Negombo Municipal Council where approximately 1 to 2 tons of food waste is collected by private traders to sell as animal feed for piggery farmers (Karunarathna et. al., 2019).

4. Conclusions and Recommendations

The results of the survey revealed an existing triple-win situation.

1. Piggeries in Colombo's vicinity save on commercial feed by absorbing large amounts of food waste from the food service sector.
2. This significant demand for otherwise wasted food by the livestock sector is reducing the waste volume to be collected and processed by the city.
3. Although the food waste is often given away for free, the food service sector benefits from this practice as their waste volumes would anyway require a daily collection service while the weekly or bi-weekly municipal collection service is provided at a nominal fee. The food service sector certainly benefits from the reliability of the informal sector as the farmers have a fundamental and daily business interest in the waste, a commitment the municipal service is unlikely to match.

The survey also showed common challenges related to this practice as mixed quality of the feed, fragile linkages between supply and demand, and lack of regulation and guidelines to assure feed safety and quality. To overcome these challenges, national guidelines to ensure the safe reuse of food waste as animal feed, improved source segregation, and strengthening linkages between pig farmers and the food business operators are necessary. These strategies demand formalizing the practice of reusing food waste as animal feed. However, the implications of formalizing this practice need to be well-assessed prior to implementation.

Reusing otherwise wasted food as animal feed without compromising animal and public health is of paramount importance. Necessary safe and hygienic practices need to be well adopted in converting food waste to animal feed with the consultation of key actors such as local veterinary and health authorities to ensure safe reuse. Countries such as the UK have stipulated policies on animal feed, which can be referred to in formulating guidelines. In addition to the direct transactions between the waste suppliers and the farmers, feed supply is sometimes carried out through intermediaries. These different operating models need to be further explored to find viable business models for the benefit of all stakeholders.

5. Acknowledgement

Authors would like to acknowledge Rural-Urban Linkages flagship of the CGIAR Research Program on Water, Land and Ecosystems (WLE) and Food and Agriculture Organization (FAO) for funding this study. Special thanks are due to Ayomi Bandara for supporting the data collection and analysis.

References

FAO and IWMI. (2021). Quantitative analysis of food waste (i.e. wholesale to households) in the Megapolis area of Colombo - Sri Lanka. *Food and Agricultural Organizations and International Water Management Institute.*

FAO (Food and Agriculture Organization). (2019). The State of Food and Agriculture 2019. *Moving forward on food loss and waste reduction.*

FAO, IWMI and RUAF. (2016). *City Region Food System Situational Analysis. Colombo, Sri Lanka.*

EC, (2002). Regulation (EC) No 1774/2002 of the European Parliament and of the Council of 3 October2002 *Laying Down Health Rules Concerning Animal Byproducts Not Intended for Human Consumption.*

JICA (Japan International Cooperation Agency). (2016). Data collection survey on solid waste management in Democratic Socialist Republic of Sri Lanka. *Japan International Cooperation Agency*.

Karunarathna, A. Singh, R.K., Rajapaksha, T. Premakumara, D.G.J. and Onogawa, K. (2019). State of Municipal Solid Waste Management in Negombo city, Sri Lanka. *United Nations Environment Program*.

León E.A. (2012). Foot-and-Mouth Disease in Pigs: Current Epidemiological Situation and Control Methods. *Transboundary and Emerging Diseases* 59: 36–4.

Reitemeier, M.; Aheeyar, M.; Drechsel, P. (2021). Perceptions of Food Waste Reduction in Sri Lanka's Commercial Capital, Colombo. *Sustainability* 13: 838.

Salemdeeb, R. Erasmus K.H.J. Zu Ermgassen, Kim, M. Balmford, A. and Al-Tabb A. (2017). Environmental and health impacts of using food waste as animal feed: a comparative analysis of food waste management options. *Journal of Cleaner Production* 140: 871–880.

Zu Ermgassen, E.K.H.J., Phalan, B., Green, R.E., Balmford, A., (2016). Reducing the land use of EU pork production: where there's swill, there's a way. *Food Policy* 58: 35e48.