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Food residue recycling by swine breeders in a developing economy: A case study in Da Nang, Viet Nam

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ABSTRACT

This study provides a detailed description of food residue collection by swine breeders in Da Nang, Viet Nam. In January 2011, the study surveyed 30 swine breeders in two villages with respect to locations, methods, prices, quantities, and prospects for food residue collection. The sampled swine breeders regularly visited 55 locations in central Da Nang to collect raw food residue. They then transferred the food residue to their piggeries, boiled it, and fed it to their swine. A regression analysis revealed that the total amount of food residue collected by a farm depends on the number of swine in the farm and the number of collections made per day. Swine breeders in Da Nang were estimated to collect 26.3 metric tons of organic waste per day, which amounted to 4.1% of domestic waste collected by the local government. Among the sampled swine breeders, 93% answered that they would continue using food residue for the next five years.

1. Introduction

The International Monetary Fund (IMF) estimated that from 2001 to 2010, Viet Nam's real per capita GDP increased by 68% to 1173 US dollars (IMF, 2011). Speedy (2003) conducted a cross-section analysis of different countries and found that the main determinant of per capita meat consumption was per capita GDP. During the course of economic growth, swine breeding has become more popular among farmers in Viet Nam. According to the Food and Agriculture Organization (FAO), the number of domestic swine in the country increased from 21.8 million in 2001 to 27.4 million in 2010 (FAO, 2012). The same FAO statistics shows that domestic supply of pig meat increased by 74.2% between 2001 and 2007 (latest available data). Many believe that swine breeding offers a viable way to relieve the poverty of farmers in Viet Nam. For example, a local newspaper article featured a story of a rural family in the Mekong Delta whose income increased dramatically after the family introduced swine breeding into their farm; the increased income enabled the family to provide a better life for their children (Sunday Viet Nam News, January 2, 2011).

Despite the importance of the role played by swine breeders in food residue recycling in the country, their activities have not been systematically documented. The four central wards in Ha Noi have conducted a preliminary estimation of the amount of food residue collected by swine breeders (Osako et al., 2010). Based upon interviews with 20 restaurants and hotels in 2009 their rough calculation is that swine breeders recycled 6.5% of the 1100 metric tons per day of domestic waste discharged by the establishments. Other studies have focused on informal waste collectors in Viet Nam (Mitchell, 2008), but have not paid much attention to swine breeders. The extent of food residue collection by swine breeders was unclear; for example, we did not know how they collected food residue from households, restaurants, and hotels. We chose Da Nang City in Central Viet Nam as our study site and conducted a detailed survey of food residue recycling by local swine breeders. In 2010, Da Nang City had a population of 926 thousand (Da Nang Statistical Office, 2011). In 2008, the People's Committee of Da Nang publicized a plan to become "The Environmental City" by 2020; to achieve that goal, more appropriate management of solid waste is required there (Da Nang People's Committee, 2008). Integrating informal waste collectors into formal waste management organizations is an important option to consider when attempting to create a sustainable city in developing countries (Baud et al., 2001).

Food residue comprises a large proportion of municipal solid waste (MSW) discharged from large cities in Viet Nam. In 2007, the Kajima Corporation (2007a) randomly sampled waste from garbage trucks that arrived at the Khanh Son landfill in Da Nang City and reported that food residue comprised 43.7% of the wet weight of MSW. According to the Department of Natural Resources

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and Environment of Da Nang City (Da Nang DONRE, 2009), organic components comprised 56.85% of MSW in Da Nang in 2009. Note that this proportion of waste includes not only food residue but also organic components, such as pruned branches, which are difficult to decompose. The Kajima Corporation applied the aforementioned sampling procedure to Hai Phong City, as well, and the proportion of food residue there was 52.4% (Kajima Corporation, 2007b). In Hanoi City, the World Bank/MoNRE/CIDA (2004) mentioned that easily degradable organic waste comprised 51.9% of MSW.

Our survey results show that food residue recycling by swine breeders in Da Nang is done in a primitive manner. Food residue is collected in the urban center, transported to piggeries and boiled well, and then served for swine. Many swine breeders add rice bran and/or vegetables when they prepare feed rations. In the past, this kind of primitive treatment of food residue was also seen in developed countries. In his work, Ackerman (1996) summarizes the history of feeding raw food waste to swine in the USA between the mid-18th century and the 1950s. However, now in developed countries, there is a strong concern about the biological/chemical hazards and nutrition imbalance of feeding food residue to animals. Garcia et al. (2005) is cautious about the use of household food residue as feed since their samples taken at Madrid, Spain, contained cadmium (Cd) and lead (Pb). The Swine Health Protection Act of the United States is an example of the regulation of food residue recycling in the swine industry, and it aimed at keeping certain swine diseases out of the country (Taft et al., 2000). In addition, the Taiwanese government has developed regulatory and restrictive measures to decrease the use of food residue when breeding swine in order to prevent diseases and environmental pollution (Tsai, 2008). However, a more sophisticated approach in feeding food residue to livestock has been pursued in developed countries. For example, in 2009, Japan began requiring the certification of quality, safety, and environmental load of feed produced from recycled food residue (Sugiura et al., 2009). A description of modern procedures for producing liquid rations by sterilization with heat and dry rations by dehydration is mentioned in Ogino et al. (2006). Correspondingly, the primitive form of feeding food residue to swine in Da Nang may not last much longer. Nevertheless, the Da Nang case is worth investigating because swine breeders accrue a non-negligible amount of food residue in comparison to the Da Nang Urban Environment Company (Da Nang URENCO), a public company of the Da Nang City Government.

The primary goal of this paper is to illustrate, through a case study, the role of swine breeders in food residue recycling in Da Nang. To the best of our knowledge, this is the first study to measure the amount of food residue collected by swine breeders in Viet Nam. Such a study will provide a more thorough understanding of the current situation of food residue recycling and will assist in the formulating of future policies to mitigate the environmental

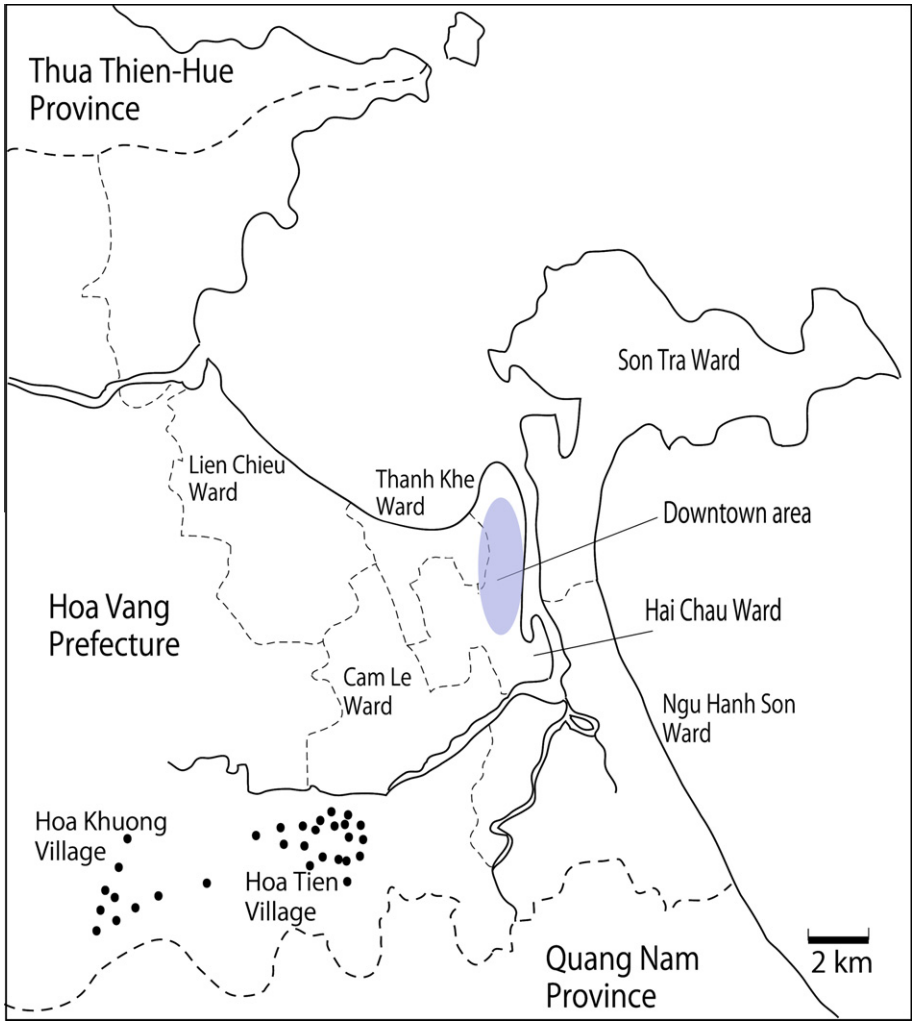

Fig. 1. Location of swine breeders surveyed.