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Full Length Research Paper

Analysis of value added on domestic livestock and livestock waste management revenue in Bali, Indonesia

I Nyoman Gede Ustriyana

Doctorate Program on Agricultural Science, School of Postgraduate Udayana University, Bali, Indonesia.
E-mail: komingbudi@yahoo.com

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Relatively localized farm will create pollution to the environment. This pollution is unwell due to management of waste, but if it is managed properly, these wastes will provide added value and revenue for farm business and surrounding environment. The research aims to find out how waste management results from breeder farms conducted by taking the case in the village of Babahan, Penebel District, Tabanan Regency. Data collected include waste processing through composting techniques, results and earnings from business conducted composting breeder. The results showed that livestock waste can be processed into organic fertilizer and has added value and revenue for farmers.

Key words: Management of waste, livestock waste, value added, operating revenue, composting fertilizer.

INTRODUCTION

A relatively big scaled and localized livestock business will raise problems toward the surrounding environment (Ministerial Decree of Minister of Agriculture, 1991). As an example, one cow that weighs 400–500 kg could produce solid and liquid wastes of 27.5–30 kg/day (Hidayatulah et al., 2005).

Generally, livestock wastes include the whole wastes produced by a particular livestock business activity, either solid or liquid, gas or waste of feed. Solid waste consists of any waste in solid forms or solid phase (livestock's feces, dead livestock animal or entrails from animal slaughter). Liquid waste consists of any waste in form of liquid or liquid phase (that is urine, water of equipment washing process). Gas waste is any waste in form of gas or gas phase.

The breeder usually generates their waste to the river without proper management, thus rising pollution on the environment. This particular pollution often leads to protests from the local people, especially due to the skin disease as itchy skin after using the polluted river water, as well as the unpleasant smell. Even in China livestock and poultry has been one of the main pollution sources (Su and Hongjuan Wen, 2013).

Serious problem will occur if the livestock waste is not properly managed. Air pollution from livestock farm were inversely associated with respiratory morbidity among neighboring residents (Smit et al., 2013). On the other hand, if it is well managed, it could generate value added. One particular effort to reduce the waste is to integrate the business with several other businesses, such as supplement usage on animal feed, fish breeding, rice field paddy farming, compost production business, thus they shall be a synergic system. The effort in order to integrate plants, livestock and fish on the farm has its ecologic and economic benefits.

Babahan Village at Penebel District is known as the centre of chicken egg farm and cow breed. Cow breed is conducted by two groups of breeders. They are Mandi Kencana Group and Dasa Wiguna Group, each consists of 24 persons. These groups were established in 2006 (Dasa Wiguna) and in 2007 (Mandi Kencana). In order to manage their livestock waste, they have been applying some efforts by converting the waste into organic fertilizer through composting technology or selling the waste directly in order to increase family's income.

Composting technology is not that complicated. As a well-known organic fertilizer, compost could be produced by farmer or farmer group with such simple technology (small – medium scale) and fertilizer industry using advanced technology. Today, various source of organic matters and composting microbes, both local and commercial, are largely available, therefore the opportunity of compost production is

widely open. The main concern of using decomposer microbes is the farmer or compost producer's reliability towards decomposer effectiveness and efficiency, related to the quality of the result, cost and difficulty level during the application.

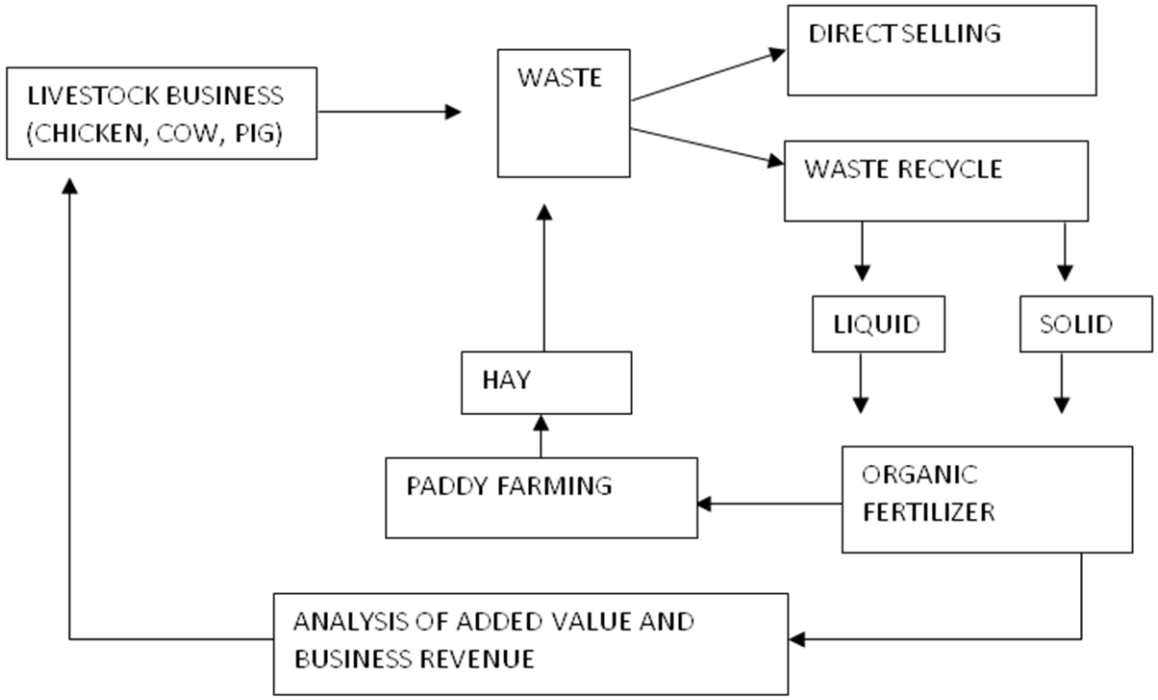

Figure 1. Research Framework of Analysis of Added Value and Livestock Waste Management Revenue.

The basic principle in organic composting process, as well as its procedures, is widely studied in various literatures. Composting process with aerobic procedure is a humiliation process of unstable organic matter (ratio C/N > 25) into stable organic matter, shown specifically by the heat and gas release from the composted substrate (Diaz et al., 1993; Husen et al., 2007).

This kind of waste management will provide added value as an increase of the breeder's income, also reduce the pollution towards surrounding environment. With the chicken livestock population between 600,000 – 800,000, thus the potential solid waste is estimated 15 ton/day (5 trucks/day). Yet as a matter of fact, the breeders at Babahan Village are scarcely managing their livestock waste. Most of them are directly selling to the collectors who come to the farm.

Considering the previous background, it is interesting to do an initial research to get the added value potency of livestock waste conversion into organic fertilizer revenue. The research result is expected to be a reference for the breeder to get added value of their livestock business.

RESEARCH METHOD

Framework

The research framework is shown in Figure 1. Based on that framework, it is shown that the breeders activity at Babahan Village, Penebel District, Tabanan Regency, is doing direct selling of their solid waste at the farm and convert it into organic fertilizer.

The next step is doing the analysis of added value and business revenue on that particular system. It is applied by looking at the comparison between revenue earned from direct selling and revenue earned through chicken and cow breeding waste management at Babahan Village, Penebel District, Tabanan Regency.

Composting Treatment

Organic waste composting is conducted under the bin of 5 x 8 meter. The materials used are organic matter/waste such as cow's feces (cow + chicken + pig), husk ash from the kitchen or paddy ash, wooden sawdust and dolomite. The composition for each material is 80% (organic matter), 10% (husk ash), 5 – 10% sawdust, 2 – 5% dolomite. These materials are put in layers up to 1.5 meter high. Commercial decomposer microbes used is Stardec, which application dosage based on the decomposer suggestion (Lembah Hijau Multifarm).

Decomposer microbes are applied on each layer surface which is 30 cm high per layer. Turn the

compost every week until its third week (21 days). If at the end of the third week the composting process has not yet heated up, thus the compost turning must be repeated until the fourth week (1 month).

Analysis of added Value and Business Revenue

The data is taken from an interview with a farmer who is

Table 1. Farm Analysis of Organic Fertilizer Production at Babahan Village, Penebel District, Tabanan Regency, Year 2010*

Explanation	Volume	Retail Price (IDR)	Total (IDR)
INFESTATION COST :			
- Place construction and equipment	1 pack	805,000	805,000
Total infestation cost (A)			805,000
FIXED COST :			
- Depreciable of place and equipment			80,500
Total fixed cost (B)			80,500
VARIABLE COST :			
- Livestock waste (cow, chicken)	2,400 kg	0	0
- Dolomite	60 kg	300	18,000
- Husk ash	300 kg	0	0
- Sawdust	150 kg	0	0
- Stardec	7.5 kg	15,000	112,500
- Wage on livestock waste	2 HOK	40,000	80,000
Transportation			
- Wage on compost turning	6 HOK	50,000	300,000
Total variable cost (C)			510,500
REVENUE			
- Organic Fertilizer Sales	3,000**	300	900,000
Total revenue (D)			900,000
Profit (D – (B + C))			389,500
R/C Ratio (D / C)			1.76

*) Primary data of Mr. Kadek
**) Composting calculation for one period (1 month).

still active in doing composting. The approach of added value and business revenue used is the one belonging to (Suharyo, 1980; Langitan, 1994).

The analysis of added value and business revenue is done through simple way by calculating the cost spent to make the compost bin, materials and equipment and the human resources to manage the compost (making process, turning, lifting and drying the compost). The calculation is divided into fixed cost and variable cost. Fixed price covers the cost of making compost bin and purchase on tarpaulin, bucket and plastic sack. Variable cost is mainly determined by the cost of purchasing the materials and decomposer microbes.

RESULTS AND DISCUSSION

Organic Matter Composting Process

Composting by Mr. Kadek on its first layer is chicken's
feces and on the top of it is cow's feces. The height of each layer is 30cm at its maximum. The next layer is dolomite, which is used to increase the pH, as the microbes will properly grow in a high level of pH (not acid). Then, it is added with sawdust, which has an extreme high level of C/N. Then the husk ash is spread on it. The layers are continuously done until it is 1.5 meter high.

On the first day, the piles are mixed with a pitchfork, then it is spread with Stardec as much as 7.5 kg for 3 tons of mix. Next, the piles are left for a week without closure, yet it needs to be located where there are no direct heat and rain. On the seventh day, the piles are turned, so that it could gain oxygen supply during the composting process. The compost turning shall be repeatedly done on the 14th, 21st and 28th day.

Generally, a good process of composting will be indicated by a phase of temperature rising, > 40°C (thermophiles phase). Such phase is a crucial one in the aerobic organic matter degradation process and it would

Table 2. Analysis of Added Value and Livestock Waste Management Business Revenue owned by Mr. Kadek at Babahan Village, Penebel District, Tabanan Regency, Year 2010.

No.	Explanation	Value
1.	Production (kg)	3,000
2.	Raw Material (kg/production)	2,400
3.	Worker (HOK/production)	8
4.	Conversion Factor(1 : 2)	1.25
5.	Worker Coefficient (3 : 2)	0.003
6.	Average price (IDR/kg)	900
7.	Average wage (IDR/production)	126.67
8.	Price of raw material (IDR/kg)	343.5
9.	Other input contribution (IDR/kg)	-
10.	Product value (4 x 6) IDR/kg	1,125
11a.	Added value (10 – 9 – 8) IDR/kg	781.5
b.	Added value ratio (11a : 10) %	69.47
12a.	Worker payment (5 x 7) IDR/production	0.38
b.	Worker part (12a : 11a) %	0.047
13a.	Profit(11a – 12a) IDR/kg	781.12
b.	Profit level (13a : 10) %	69.43

occur again on the second week, as well as the third week after the compost turning, which then be followed by stabilization or cooling phase (Food Agriculture Organization (FAO), 2003).

A technical process of converting unstable organic matters into stable organic matters (finished compost) is specifically shown by the heat and production of CO_2. During the composting process, the microbes population composition is changing from the mesophyll phase (temperature 20 – 40°C) to thermophiles phase (the temperature can reach 80°C) and finally is stabilization or cooling phase. At the end of the stabilization process, the microbe population is increasing. FAO (2003) reported that the heat occurs during the thermophiles phase could kill the pathogen microbe (>55°C) and weed seed (>62°C), therefore compost often used as a seeding medium. Up to the fourth week of composting period (incubation phase), the compost texture is soft although there are some rough parts in dark brown color. Since the first week of compost turning, white hyphae had already grown on the compost. Contrast different biophysics characters were found on various compost odor, from the ammonia odor, then changing into a less-rancid odor and eventually alcohol odor.

Then, the finished compost is packed into sacks of 50 kg and ready to be sold. These products of compost management are bought by the organic fertilizer collectors, are then packed nicely using a brand of Green Valley located at Wongaya Gede Village, Penebel District, Tabanan Regency.

Analysis of Added Value and Business Revenue

Farm calculation of organic fertilizer production at Babahan Village, Penebel District, Tabanan Regency in 2010 is shown as in Table 1.

The result data of composting process is shown on the following table, Table 2.

According to the above calculation, it is shown that the livestock waste management used as organic fertilizer by applying compost technology could provide economic profit. The added value is IDR 781.5/kg, with profit level of 69.43 percent (IDR 781.12/kg).

An interview with a breeder from Dasa Wiguna Farm Group shows that the level of difficulty in composting process is not that hard. However, why does the breeder barely do it? There are two main reasons. First, composting process needs special time. Second reason is that the compost product takes time to be sold. The breeders want to get such immediate result, so that the composting process is not being the choice for the breeder.

CONCLUSION

Livestock waste management could provide economic benefit to the people as well as the environment if it is properly managed. The analysis of added value and business revenue show a significant profit gained from the organic fertilizer production. The local breeders are

scarcely to manage their livestock waste, as they consider it would take time and special treatment. A more comprehensive research is urgently needed, both on and off farm. Thus, the research result could provide as high benefit as it is possible, both for science development and the live of farmers and environment.

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