

# SINGGIH

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# The Implementation of Technology (IbM) at CV Agrobiz Abadi Jaya in Gondangrejo Karanganyar

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**Abstract.** CV Agrobiz Abadi Jaya is a cow farming company with a population of more than 50 cows. In running the business, the company produced cow's farming waste in the form of cow's feces and cow's urine, which hasn't been managed well. Therefore, it is necessary to manage the cow's waste by making biostarter from cow's urine and organic fertilizer from cow's feces. The activity of science and technology for society (IbM) was conducted to two partners, namely Partner I (CV Agrobiz Abadi Jaya) and Partner II (Kelompok Tani Subur Makmur). The purpose of this activity is to improve the knowledge and skill of the two partners in handling cow's farming waste (urine and feces). The result of this IbM activity is the improvement of knowledge and skill of partner II (Kelompok Tani Subur Makmur) in handling cow's farming waste as 54,79 %, while partner I (CV Agrobiz Abadi Jaya) can carry out the making of biostarter from cow farming waste in the form of solid organic fertilizer branded "PUKTAN". Currently, the production of "PUKTAN" increased steadily due to the high demand of the market. The production of "PUKTAN" by Partner I is used by Partner II as biostarter in making solid organic fertilizer. Thus, it can reduce the cost of farming industry production.

**Keywords:** waste, farming, cow, biostarter, organic fertilizer

## INTRODUCTION

CV Agrobiz Abadi Jaya is a beef cattle farm located in Jeruk Sawit, Gondangrejo, Karanganyar with a population of 50 cows. This cattle farm still exists even though many other breeders are out of business. The price of cattle that plummeted due to the entry of imported cows forced the breeders to sell their cows at low prices.

On the contrary, the raise of feeding costs and the dependence on manufacturers' concentrate make high costs of production. As a result, many farmers lose and quit the business. The feed is one of the important factors in the livestock business; therefore, breeders need affordable yet high nutrient feed to meet the needs of livestock. Approximately 80% of the expenditure on livestock business goes on feed.

Regarding feed problems, CV Agrobiz owns a grass area of more than 5000 m<sup>2</sup> so that the availability of grass is guaranteed. The grass planted is a type of gajah grass. Gajah grass is a family of herbaceous grasses that have been known to be useful as natural ruminants. This grass is usually harvested by cutting down all the trees and then giving them as forage feed for buffaloes and cattle. Gajah grass can also be used as feed supplies through the process of preserving forage feed using silage and hay. Besides, gajah grass can also be used as good soil mulch. In addition to grass, the feed used is concentrate.

## Partner Problem

From the analysis of the partner's situation, it can be estimated that the amount of waste is in the form of feed residue, cattle urine, and cattle feces. Livestock waste is a waste coming from a livestock business activity such as livestock raising, slaughterhouses, processing of livestock products, and so forth. The waste includes solid waste and liquid waste. As the livestock business grows, waste production increases. The total waste produced by livestock depends on livestock species, size of the business, type of business, and floor of the cage. Cow manure consisting of feces and urine is the most produced livestock waste, and most of the manure is produced by ruminants such as cows, buffaloes, goats, and sheep. Normally, each kilogram of milk produced by dairy cattle produces 2 kg of solid waste (feces), and each kilogram of beef produces 25 kg of feces.

The pollution because of methane gas causes an unpleasant odor to the surrounding environment. Methane gas (CH<sub>4</sub>) comes from the digestion process of ruminants. This methane gas is one of the gases that cause global warming and ozone destruction at a rate of 1% per year and continues to increase. A study of water pollution by livestock waste reported that a total of 5,000 kg of cattle for one day, the manure production could contaminate 9,084 x 10<sup>7</sup> m<sup>3</sup> of water. Besides through water, livestock waste often pollutes the biological environment, namely as a medium for the breeding of flies. The water content of manure between 27-86% is the best medium for the growth and development of fly larvae, while the content of manure water from 65 to 85% is the optimal medium for laying flies. The presence of livestock waste in a dry state can cause pollution by causing dust. One result of water pollution by waste ruminants is increasing nitrogen levels. Nitrogen

compounds as pollutants have a specific pollution effect, in which their presence can cause decreasing water quality as a result of the process of eutrophication, a decrease in dissolved oxygen concentration as a result of the nitrification process that occurs in water which can result in disruption of aquatic life.

These problems need to be addressed. New ideas could be proposed in the context of handling livestock waste, namely the production of cow urine-based biostarter as well as biological fertilizers and the manufacture of solid organic fertilizer based on cow dung based and remaining cattle feed. To obtain maximum organic fertilizer, biofertilizers need to be added. Biofertilizer is an organic fertilizer that contains non-symbiotic microorganisms that are capable of nitrogen-fixing, mining P (phosphorus), or functioning as decomposers. [3] The use of fertilizers continues to increase in accordance with the addition of agricultural area, population growth, level of intensification, and the diverse use of fertilizers as an effort to increase agricultural products, which can have a negative impact. [4]

#### Target and Outcome

- Increased knowledge and skills of partners in handling cattle farm waste.
- Partners can make organic fertilizer from cattle farm waste.
- Partners can apply organic fertilizer in their farming

#### METHOD

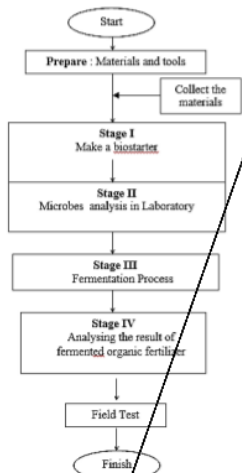


Figure 1. Flow Chart of Science and Technology Implementation Methods.

#### Stage I. Making Biostarter:

- Preparing microbes  
Microbial materials and media to use are Rummino bacillus, Sacharomyces cereviceae, Azotobacter, molasses, protein media, and the most important is cow urine.
- Making biostarter:

After the microbial materials and the media are ready, then the ingredients are mixed with the composition of Rummino bacillus (20 cc), Sacharomyces cereviceae (10 cc), azotobacter (10 cc), sugar cane drops (40 cc), protein media (5 grams), and urine (400 cc). All ingredients are mixed and then diluted using distilled water until it reaches 1000 cc. After that, wait for ten days while keep stirring the ingredients every morning with an anaerobic process.

#### Stage II. Microbial Analysis in the Laboratory

- The microbial analysis is conducted in the laboratory so that partners can find out the number of colonies contained in the biostarter.
- This stage uses an analysis of various types of microbes using certain bacteria.

#### Stage III. Solid Manure and Livestock Feed Fermentation Process

- Objective: to obtain quality solid organic fertilizer.
- Preparing materials that will be fermented, namely cow dung, dolomite, and leftover feed, then fermented for 30 days using a starter of microbes that have been tested in the laboratory.

#### Stage IV. Analysis of Organic Fertilizer Fermentation Results

- Objective: to know whether the nutrients contained in organic fertilizers meet the standards.
- Testing both micro and macro elements.

#### Field Test Stage

Objective: to use organic fertilizer products produced by Partner I.

#### RESULTS

##### Preparation

- Coordinating with partners to start the activity. The coordination was carried out by Partner I (CV. Agrobiz Abadi Jaya) and Partner II (Subur Makmur Farmer Group).
- Constructing a place for fermentation. This stage was carried out earlier so that the media is ready for use when the fermentation process is conducted.

##### Making Biostarter

Before visiting Partner I, microbes need to be prepared in advance, including Rummino bacillus, Sacharomyces cereviceae, azotobacter, molasses, and protein. The main ingredient in making the biostarter is cow urine, obtained from urine storage at the bottom of the cow cage.

After the microbial ingredients and the media are ready, then the ingredients are mixed with the composition of Rummino bacillus (20 cc), Sacharomyces cereviceae (10 cc), azotobacter (10 cc), sugar cane drops (40 cc), protein (5 grams), and urine (400 cc). All ingredients are mixed and then diluted using distilled water until it reaches 1000 cc. After that, wait for 10 days

while keep stirring the ingredients every morning with an anaerobic process.

#### Microbial Analysis in the Laboratory

After the biostarter making process is complete, then a sample is taken for microbial analysis in the laboratory.

Table 1. Results of Microbial Analysis Bio starter Content

Microbial	Media	Results (cfu/ml)
<i>Lactobacillus</i>	MRS	$6,9 \times 10^7$
<i>Azotobacter</i>	Jensens	$7,0 \times 10^7$
BPF	Pikof's Kaya	$5,8 \times 10^6$
<i>Asospirillum</i>	NFB	$3,2 \times 10^6$

#### Biostarter Production Process

The results of the microbial analysis in the laboratory showed that the biostarter made contained a large number of colonies so that the microbial content was high.

#### Solid Manure Fermentation Process

After the results of the microbial analysis are known, the biostarter is used for solid waste fermentation. Non-symbiotic microorganisms are used as biofertilizer, including *Azotobacter*, *Azospirillum*, and *Acetobacter*. Non-symbiotic microorganisms that are used as P and Minerals are *Bacillus* spp., *Penicillium* spp., & *Aspergillus* sp. [5]

Single phosphate solvent microbes can increase crop production by 20% -73% and are directly able to increase the dissolution of P-bound soils so that P is available in the soil increasing. [6]

Mycorrhizae can extend root to absorb nutrient deep down the soil, which could increase the plants' nutrient and crop yields. [7] Slightly similar, mycorrhizal fungi can increase water uptake and nutrients, and protect plants from root pathogens and toxic substances. [8]

The examples of market biostarter are EM-4 and MOL. (EM-4) can accelerate the decomposition of waste, increase the availability of plant nutrients, and allow the diversity of microbes that benefit and suppress pathogenic microorganisms. [9] According to [10] MOL is a collection of several micro-organisms that can be bred and served as a "starter" in making compost, liquid fertilizer, or animal feed

The bacterial parent is a starter MOL in which its use is based on the needs. [11]. To carry out the fermentation process, it is necessary to build the media first. Before that, materials such as cow dung and dolomite should have been prepared earlier. Next, the semi-aerobically is fermented for 14 days using starter microbes that had been tested in the laboratory.

The comparison of dolomite in cow dung, namely 7 kW of cow dung, was 10 kg of dolomite. At this stage, the team conducts fermentation in the range of 35 kW cow dung with 50 kg dolomite (5 sacks). After the mixture of cow manure with dolomite was sprayed with biostarter as much as 7 liters, then the fermentation process is carried out with four times reversal within four days for four weeks.

#### Analysis of Organic Fertilizer Results from

##### 4 Fermentation

The results of the analysis can be seen in the following table.

Table 2. Results of Analysis of Organic Manure Nutrient Powder

No	Nutrient	Results
1	A. Organik	23,77 %
2	BO	40,98 %
3	N	1,35 %
4	P <sub>2</sub> O <sub>5</sub>	1,01 %
5	K <sub>2</sub> O	3,04 %
6	Ca	2,15 %
7	Mg	1,98 %
8	Fe	1,65 %
9	C/N ratio	17,61
10	pH	6,76

#### Service to Partner II (Subur Makmur Farmer Group)

The service aims to introduce organic fertilizer products produced by partner I to Partner II.

**Counseling.** Before the outreach, the community service team conducted a pretest. After the pretest is finished, the service team provides counseling and delivery. The material presented was handled using cattle farm waste, while the production process of solid organic fertilizer using biostarter. At this stage, Partner II was very enthusiastic.

**Training.** In the training activity, the IbM Team and Partner I demonstrated how to make solid organic fertilizer using biostarter to Partner II. After completing the training, the community service team held a posttest.

#### Evaluation

The service activity aims at increasing the knowledge and skills of partners in processing livestock waste into organic fertilizer.

Table 3. The Average Understanding Level of Counseling and Training Participants

Items	The average level of understanding	
	before	after
Extension and training on organic fertilizer processing	1,825	2,825
		54,79 %

Score 1: Poor; Score 2: Basic; Score 3: Intermediate; Score 4: Advance

The pre-test results show that before counseling and training starts, participants do not understand the material delivered with an average score of 1,825; after the service team provided counseling and training, the average post-test score is 2,825, which means that the participants' understanding towards the material and training provided increased by 54.79%.

#### Mentoring of Partner

The community service team assists Partner I to produce ProPUKTAN biostarter and solid organic fertilizer, as well as gives marketing assistance so that the products are known by the local community or even broader area.

#### Organic Fertilizer Application to Field

Activities at this stage aim to apply organic fertilizer that has been produced by Partner I so that Partner II can use the organic fertilizer in their farming activities



continuously. As a result, agricultural production produced by Partner II can increase.

### Mentoring of Partner II

The community service team also assisted Partner II to make organic fertilizer using "PUKTAN" biostarter independently, so that it could reduce the cost of purchasing fertilizers and increase crop yields.

### CONCLUSIONS

- a. Partner I can produce a new brand of "PUKTAN" biostarter and organic fertilizer from cattle waste.
- b. There was an increase in knowledge and skills of Partner II in handling cattle waste by 54.79%.

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