Training on Processing Goat and Cattle Manure Waste Into Biogas for Kelompok Ternak Milenial

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Abstract

Majene is one of the districts in West Sulawesi Province that holds the potential for the development of cattle and goat farming. This is due to the fact that Majene District has a fairly extensive area of 1,713 hectares and a suitable natural environment for the breeding of cattle and goats. One of the areas with the largest population of goats and cattle in Majene District is in Pamboang Sub-district. The majority of the community in Pamboang Sub-district work as livestock farmers and are members of the Millennial Livestock Group community. Based on the results of interviews conducted with the Chairperson of the Millennial Livestock Group and local residents, it was found that there is a lack of knowledge among farmers in Pamboang Sub-district regarding the proper management of accumulated waste from goat and cattle farming. Additionally, the community has expressed concerns about the scarcity of LPG gas in recent months and its increasing price. This activity took place in Tinambung Village, Pamboang Subdistrict, Majene on August 19, 2023, and was attended by 25 farmers who are members of the Millennial Livestock Group community. The purpose of the activity was to address the main issues faced by the partners by enhancing their knowledge and technical skills. The approach method proposed to support the program's implementation consists of three methods: participatory counseling, training and guidance, and mentoring. Based on the socialization, pre-test, and post-test activities, it can be concluded that the farmers who are part of the Millennial Livestock Group community in Pamboang Subdistrict have understood the material presented by the speakers regarding the conversion of goat and cattle waste into biogas. Furthermore, this activity received positive responses and progressed according to the set objectives.

Keywords: Biogas, Millennial Livestock Group, Cattle, Goats



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PENDAHULUAN

Majene is one of the districts in West Sulawesi Province that holds potential for the development of cattle and goat farming. This is due to the fact that Majene District covers a substantial area of 1,713 hectares and possesses a natural environment suitable for the breeding of cattle and goats (Sukoco et al., 2022). One of the regions with the largest population of goats and cattle in Majene District is Pamboang Sub-district. According to data from the Department of Agriculture, Livestock, and Plantation of Majene District in 2020, Pamboang Sub-district housed 3,563 cattle and 10,011 goats. This clearly indicates that a significant portion of the local community engages in animal husbandry. People who rear goats and cattle generate a significant amount of waste in the form of manure on a daily basis, yet they seldom utilize this waste as organic fertilizer for agricultural or other purposes. Most of the time, they dispose of this waste indiscriminately, and many allow it to accumulate within their animal enclosures. This can become a serious issue, as accumulated animal waste can contribute to diseases affecting both humans and livestock, air pollution due to its odor, soil contamination, and other

related problems (Soprijanto et al., 2017). To mitigate these effects, the animal waste is transformed into a valuable economic resource—biogas. Biogas, often referred to as bio gas, is a gas produced when materials like animal waste, human waste, or refuse are soaked in water and stored in a closed or anaerobic (without oxygen from the air) environment. The chemical process of gas formation is intricate, but its generation can be achieved using straightforward technology (Sulistiyanto et al., 2016).

Several factors influence the process of biogas generation. One such factor is the C/N ratio, representing the carbon-to-nitrogen ratio in an organic material, which affects the performance of microorganisms. The C/N ratio percentage suitable for biogas production ranges from 10% to 30%. This range stimulates bacteria involved in the methanogenesis process (Wahyuni, 2017). Utilizing animal waste for biogas production is a prudent choice. Through this simple technology, animal waste that once polluted the environment can be converted into a highly beneficial renewable energy source (Siahaan, 2018). According to Muhammad et al.'s research (2017), goat waste possesses a C/N ratio value of 20.3%. C/N ratios between 20 and 30 yield relatively efficient methane production compared to other ratios. Cow waste, on the other hand, has a C/N ratio of 24. In Siahaan's study (2018), a mixture of goat waste (urine and feces) and rice straw in a 1:1 ratio resulted in a gas pressure of 19.1 N/m² and a gas capacity of 0.1675 m³/s. This research suggests that both goat and cow waste can be used as raw materials for biogas production.

METODS

The undertaken activity aimed to address the core issues faced by partners by enhancing their knowledge and technical capabilities. The approach methods employed to support program implementation consisted of three approaches:

- 1. Participatory Counseling Method: This method involved group meetings with a combination of lectures and discussions targeted at the millennial livestock group partners.
- 2. Training Method (Demonstration and Practical Activities by Participants): The training activities encompassed demonstrations and practical exercises for members of the millennial livestock group. During these practical sessions, participants were shown examples, and then they replicated the procedures.
- 3. Guidance and Mentoring Method by the Implementation Team: Institutional approach involving continuous guidance and mentoring throughout the program. This support aimed at assisting farmers and the livestock group in the proper conversion of goat and cattle waste into biogas.

Activity Plan Implementation Phases

- 1. Preparation Phase: Initial survey to assess the alignment of the activity location with the planned program.
- 2. Material Preparation Phase: Organizing the content to be delivered and arranging the necessary support equipment for the counseling sessions.
- 3. Counseling Activities: Education on the utilization of goat and cattle waste as biogas material. This session aimed to provide knowledge and skills to livestock farmers on converting waste into biogas.
- 4. Practical Biogas Production Training Phase: The implementation team provided a practical demonstration of the biogas production process. Technical personnel and engaged students assisted in this activity.
- 5. Guidance and Mentoring Phase: Aimed at guiding farmers in the proper conversion of animal waste into biogas.

- 6. Success Indicators: Success indicators were based on the farmers' acquisition of new knowledge regarding biogas production. The activity was considered successful if there was a minimum 70% increase in knowledge.
- 7. Evaluation Phase: Evaluation methods included pre-test questionnaires distributed before the activity and post-test questionnaires administered to the same participants using the same format after the awareness campaign. The questionnaire contained 10 structured questions/statements related to farmers' knowledge about biogas production. The survey instrument used a structured questionnaire with closed-ended response options on a Guttman scale. This scale gauged respondents' unequivocal response to two alternatives: Yes and No. "Yes" indicated knowledge about the biogas production process, while "No" indicated lack of knowledge about the biogas production process.

RESULTS AND DISCUSSION

Preparation Phase

The preparation phase commenced with a preliminary location survey to identify the issues faced by the local community. Based on interviews conducted with the Chairperson of the Millennial Livestock Group and the local residents, it was revealed that there was a lack of knowledge among livestock farmers in Pamboang Sub-district regarding the proper management of accumulated goat and cattle waste. Additionally, the community expressed concerns about the scarcity and increasing price of LPG gas in recent months. As a result, we initiated a socialization activity focused on providing training about the conversion of goat and cattle waste into biogas. The target audience for this activity was the millennial livestock group in Pamboang Sub-district, given that a significant portion of the livestock farmers in Pamboang Sub-district were members of the Millennial Livestock Group community.

Activity Implementation

The activity took place in Tinambung Village, Pamboang Sub-district, Majene, and was attended by 25 livestock farmers who were part of the Millennial Livestock Group community. The event was graced by the presence of the Chairperson of the Millennial Livestock Group, Mr. Yarfan Yamin, S.Pt, as well as university professors and students from the West Sulawesi University. The high turnout of participants demonstrated their keen interest and enthusiasm for the activity. The sequence of events during the activity included an opening prayer, welcoming remarks by the Head of the Community Engagement Team, introductory remarks and the opening of the event by the Chairperson of the Millennial Livestock Group. Subsequently, the program proceeded with a presentation by the guest speaker, Mr. Muhammad Irfan, S.Pt., M.Si, as depicted in Figure 1. The content presented during this socialization event focused on the training for converting goat and cattle waste into biogas. Following the presentation, practical demonstrations of biogas production were carried out, followed by a question and answer session with the participants. The participants displayed great seriousness in engaging with the training. A considerable number of them posed questions related to the training content. This clearly indicated their enthusiasm for the socialization program and their desire to acquire additional knowledge about converting animal waste into something more valuable, such as biogas. This heightened interest stemmed from the fact that they had never previously utilized waste to create something valuable, resulting in waste accumulation and the potential for it to become a breeding ground for diseases affecting both livestock and even humans.

This material is highly important for the community in Pamboang Sub-district, particularly since a significant portion of them engage in traditional or semi-intensive cattle

and goat farming, and they have not yet optimized the conversion of animal waste into valuable resources like biogas. Untreated animal waste can lead to environmental pollution, resulting in odors, air pollution, and diseases (Nurhapsa et al., 2020). Asmara et al. (2013) stated that untreated animal waste produces unpleasant odors and can contribute to the spread of diseases. Hence, proper treatment of livestock waste, including its transformation into biogas, is essential.

Biogas is the result of anaerobic fermentation of organic materials into methane gas (CH4). The CH4 gas obtained from biogas can serve as a gas fuel (Yahya et al., 2018). Biogas is a mixture of several gases, with its main components being CH4, carbon dioxide (CO2), a small amount of water vapor, hydrogen sulfide (H2S), nitrogen (N2), and carbon monoxide (CO). When using raw materials such as animal waste, human waste, or liquid waste from slaughterhouses, the CH4 gas produced constitutes about 70% (Nawir et al., 2018). The formation of CH4 gas results from fermentation processes assisted by enteric microorganisms (Yulianingsih and Pramono, 2019). In normal conditions, the anaerobic CH4 gas formation process takes approximately 35 days (Adiani et al., 2020).



Figure 1. Presentation of Material by Resource Person



Figure 2. Biogas Production Practices



Figure 3. Photo Session With Participants

Activity Success

The pre-test and post-test scores following the activity demonstrated an increased understanding among livestock farmers in Pamboang Sub-district regarding the training on converting animal waste into biogas. Furthermore, all participants expressed that this socialization activity was highly beneficial and contributed to their knowledge enhancement. Hence, it can be concluded that this activity garnered a positive response and effectively met its objectives. The knowledge improvement outcomes are presented in Table 1.

Participant	Pre	Test	Post	t Test	Keterangan
Serial Number	Yes	No	Yes	No	
1	0	10	2	8	Increase
2	0	10	5	5	Increase
3	0	10	3	7	Increase
4	0	10	6	4	Increase
5	0	10	5	5	Increase
6	0	10	9	1	Increase
7	0	10	8	2	Increase
8	0	10	6	4	Increase
9	0	10	6	4	Increase
10	0	10	0	10	Still
11	0	10	10	0	Increase
12	3	7	3	7	Still
13	2	8	7	3	Increase
14	3	7	4	6	Increase
15	0	10	7	3	Increase
16	1	9	8	2	Increase
17	0	10	6	4	Increase
18	0	10	3	7	Increase
19	1	9	5	5	Increase
20	0	10	1	9	Increase
21	0	10	6	4	Increase
22	0	10	2	8	Increase
23	0	10	8	2	Increase
24	2	8	2	8	Still
25	1	9	9	1	Increase

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Table 1 shows that the majority of post-test results experienced an increase in participants' knowledge by 88%. This is expected to serve as a foundation for enhancing participants' understanding regarding the conversion of animal waste into biogas.

CONCLUSION

Based on the socialization activity, pre-test, and post-test results, it can be concluded that livestock farmers who are part of the Millennial Livestock Group community in Pamboang Subdistrict have comprehended the material presented by the speaker regarding the conversion of goat and cattle waste into biogas. Furthermore, this activity received a positive response and achieved its intended objectives.

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