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Training on Making Fermented Rice Straw for Animal Feed in Nepo Village, Wonomulyo District, Polewali Mandar Regency

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A B S T R A C T

Training on making fermented rice straw for animal feed in Desa Nepo Kecamatan Wonomulyo Kabupaten Polewali Mandar aims to provide understanding to the community about making fermented rice straw for animal feed. The methods used include providing education regarding fermentation technology for rice straw waste, then discussions with participants regarding the problem that occur and obstacles in handling agricultural waste, and finally direct training in making fermented rice straw. The result of this community service activity is that participants know how to make fermented rice straw for animal feed. The conclusion of the community service activities in Desa Nepo is that the participants were able to learn about fermentation technology that can be used to process rice straw waste into highly nutritious animal feed.

INTRODUCTION

Livestock development aims to increase the production of livestock products while increasing farmers' income, creating jobs, and improving livestock populations and genetic quality (Rasak, 2021). Eastern Indonesia has long been known as a supplier of national meat needs. The cattle developed are diverse, ranging from local varieties (Bali Cattle) to imported types (Limousin, Simental, Brahman, and so on) with various rearing patterns, namely extensive, semi-extensive, and intensive. Wonomulyo District is one of the food crop agricultural areas in Polewali Mandar Regency is one of the largest food crop producing areas in West Sulawesi Province with 3,340 hectares of rice fields. In addition, this area is also an area for livestock cultivation, considerable livestock, which refers to the suitability of land for pasture; this is because livestock commodities do not require specific soil and climate requirements. Wonomulyo sub-district has the potential to develop large livestock, small livestock, and poultry. The cattle population in Wonomulyo sub-district in 2022 was 3,437 heads (Dinas Pertanian dan Pangan Kabupaten Polewali Mandar, 2022). Especially for large livestock, marketing is through inter-island trade, while small livestock is for local consumption.

Nepo Village is one of the Wonomulyo Sub-district villages with a large area of agricultural land for food crops, especially rice. In addition, there are also many cattle in this village, so it is expected that the agricultural sector can support each other with the livestock sector by utilizing agrarian waste in animal feed. In addition, the community in this village, besides farming, also raises livestock. Generally, the livestock raised by the community in Nepo village still uses a semi-extensive system, so it is necessary to increase knowledge and skills in managing their livestock business. One of the wastes that can be utilized is straw. Rice straw is an agricultural crop waste with great potential as forage feed, especially in dry and barren areas. In the rainy season, rice straw is given in small amounts, while in the dry season, farmers generally give rice straw as a single forage. Rice straw contains little protein, fat, starch, and relatively high crude fiber due to high lignin and silica.

Efforts to increase the digestibility value of rice straw and the amount of consumption. Rice straw needs to be treated biologically using probiotics. According to (Kementerian Pertanian Republik Indonesia, 2022) , it is stated that probiotics are biotechnology products containing lignolytic, proteolytic, amylolytic, cellulolytic, lipolytic, and non-symbiotic nitrogen polymicroorganisms that can ferment straw so as to improve quality and digestibility value, besides cow dung is also odorless. What is done during fermentation is anaerobic (does not require the presence of air or oxygen). This community service activity aims to provide information and increase knowledge of using feed technology, especially processing feed derived from agricultural plant waste. This community service activity is expected to provide understanding to the community about making fermented rice straws for animal feed.

IMPLEMENTATION AND METHODS

Tools and Materials

The tools used in making rice straw fermentation are scales, tarpaulins, cutting tools, buckets, sprayers, plastic sacks, and raffia ropes. Materials used were dry rice straw, molasses, probiotics/EM4, water, and rice bran.

Method of Implementation

The implementation method in this service activity is providing education, discussion, and direct manufacturing training. The education provided is about the technology and purpose of fermentation and how to make rice straw fermentation for animal feed.

Implementation Procedure

The rice straw fermentation procedure starts with drying the rice straw, weighing as much as 100 kg, then mixing molasses, EM4, and water until dissolved. Next, mix all the ingredients while stirring well, finally, rice bran is added and then mixed until homogeneous. After that, it is put into a plastic sack, pressed until it is solid, and tied tightly. The fermentation process lasted for 21 days.

Flowchart of Fermented Rice Straw Production

The stages of making fermented rice straw can be seen in Figure 1 below:

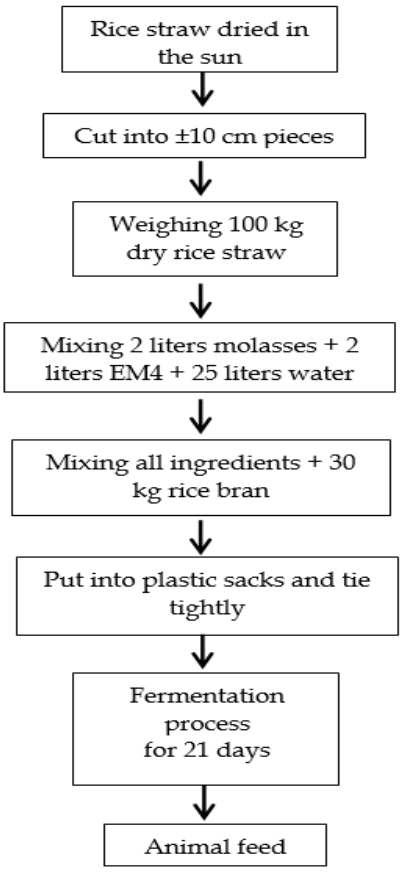

Figure 1. Flowchart of Fermented Rice Straw Production

RESULTS AND DISCUSSION

Providing Education

This community service activity was carried out on Tuesday, October 24, 2023. The participants of this activity were Nepo village officials and the community from several hamlets in Nepo Village, Wonomulyo District, Polewali Mandar Regency. Education about the purpose and benefits of agricultural crop waste fermentation technology and how to make rice straw fermentation for animal feed was carried out using material slides that were explained verbally.

Figure 2. Providing Education

The material provision activities took place safely and orderly. It took place in a comfortable and family atmosphere from the beginning of the action until the discussion between the participants and the community service team. The results of the team's meeting with the participants suggested that the rice straw was only burned all this time. For the participants, rice straw fermentation technology is a new thing for them that is interesting to apply. The fermentation method is processing straw as an animal feed that is cheap and easy to do. Research Liu et al (2015) Fermentation is one method to increase the nutritional value by the characteristics of rice straw because the process is relatively easy and the results are palatable, so it is easier to give to ruminants.

Preparation of Fermentation Tools and Materials

Before starting the manufacture of fermented rice straw, first the preparation of tools and materials to be used can be seen in Figure 3.

Figure 3.Preparation of Fermentation Materials

Fermented rice straw is made from the main ingredients of rice straw, molasses as a food source for bacteria, EM4 as a beneficial microorganism, water as a solvent and rice bran as an additional protein source. According to Bai et al., (2017) through, fermentation technology can increase the benefits of rice straw as animal feed and also be able to reduce air pollution due to the waste combustion process, which is expected to maintain ecological balance.

Table 1. Dosage of Rice Straw Fermentation

Material Name	Total
Rice Straw	100 kg
Molasses	2 liter
EM4	2 liter
Water	25 liter
Paddy Bran	30 kg

Making fermented rice straw for animal feed begins with preparing the ingredients needed according to the dosage of making fermented rice straw. Rice straw is dried in the sun, cut into ± 10 cm pieces, and weighed as much as 100 kg. Next, mix 2 liters of molasses solution, 2 liters of EM4, and 25 liters of water until dissolved. After that, all the ingredients were mixed, and 30 kg of rice bran was added, stirred until homogeneous, then put into plastic sacks while compacted and tied tightly, then stored for 21 days. Using rice straw as animal feed has shortcomings, namely digestibility and low nutritional value (Yanuartono et al., 2017). Low digestibility is due to the high content of lignocellulose, lignin, and silica, while low nutritional value is mainly due to the small content of energy, protein, minerals, and vitamins. Rice straw has a protein content ranging from

4.5-5.0%, lower than the protein content of grass (5-9%), so its long-term use as feed will have a negative impact (Bakhsi and Wadwha, 2017)

Making Fermented Rice Straw

Making fermented rice straw uses several ingredients, each of which has a role in fermentation. Rice straw comes from food crop waste and is abundant during harvest, but utilization as feed still needs improvement. According to Setiarto (2013) the availability of rice straw reaches 55 million tons per year, but only about 31-32% are utilized as animal feed. EM4 is a microorganism that can accelerate the fermentation process. According to Nana et al (2009) EM4 is a mixture of beneficial microorganisms that can increase the diversity and population of microorganisms in the fermentation process.

Molasses is a food source for microorganisms in the fermentation process. According to Bata (2008) molasses is a by-product of making cane sugar. Molasses is a source of readily fermentable carbohydrates in a mixture of feed ingredients. Rice bran acts as an energy source in the fermentation process. Research Nisa et al (2020) showed that bran contains relatively high carbohydrates that can be used as an energy source for lactic acid-producing bacteria in the fermentation process. The storage process of fermented rice straw runs anaerobically for 21 days. After 21 days, the fermented rice straw product can be used as animal feed. However, before giving it to livestock, it must first be allowed to stand for approximately 2 hours before it can be given.

Figure 4. Making Fermented Rice Straw

Figure 5. Storage of Fermented Rice Straw

The implementation of making fermented rice straw was directly carried out at the location where the participants showed high enthusiasm, as seen from the participants who made fermented rice straw. The discussion process during the activity was also exciting because the participants were very active in asking questions. This indicates the seriousness of the participants in participating in this activity. This activity is expected to provide new knowledge and increase the understanding and skills of the community in Nepo Village in processing rice straw waste so that it can be used as animal feed and can even reduce the cost of purchasing feed. This can make farmers and breeders in Nepo Village run efficiently and profitably.

Figure 6. Photo Together

After the counseling and training, there was an increase in the knowledge and skills of the Nepo Village Community of Wonomulyo Subdistrict about making fermented rice straw to be used as animal feed, especially cattle. This can be seen by comparing the scores of the initial and final questionnaire results from 26 training participants. In the initial questionnaire, 100 percent of group members needed help understanding the utilization or processing of rice straw into animal feed by fermentation and livestock production management. While

in the final questionnaire, the score increased to 84.6 percent. The percentage of knowledge of the Nepo Village community, especially farmers/ranchers, before and after participating in socialization, FGDs, training, and mentoring is presented in Tables 2 and 3.

Table.2 Knowledge of Nepo Village Community Before Training and Assistance in Making Fermented Rice Straw for Animal Feed

Understanding of the utilization of fermented rice straw for animal feed and production management	Frequency	Percentage (%)
Understood	0	0
Not yet understood	26	100
Total	**26**	**100**

Table 3. Percentage of Knowledge of Nepo Village Community after Training and Assistance in Making Fermented Rice Straw for Animal Feed

Understanding of the utilization of fermented rice straw for animal feed and production management	Frequency	Percentage (%)
Understood	0	0
Not yet understood	26	100
Total	**26**	**100**

Based on the data in Tables 2 and 3, there is an increase in the understanding of the Nepo Village community towards the training material that has been delivered. This is because the average training participant is still at a young and productive age supported by an intermediate education level of junior high to high school. The lack of knowledge and understanding of farmers regarding the utilization of agricultural wastes that can be used as animal feed in various ways or treatments, both by fermentation and others, is due to the lack of socialization by related parties, the lack of motivating people or influencers, and the absence of coaching and mentoring supported by linkages between research and service institutions on an ongoing basis. Through the activities of this village partnership program, it will become a pilot business for the surrounding community and in other villages in the context of increasing small and medium enterprises, with the hope of improving the community's economy and supporting government efforts to succeed in environmentally friendly agriculture and livestock programs.

CONCLUSIONS AND RECOMMENDATIONS

Community service activities in Nepo Village went smoothly. The participants of this activity learned the fermentation technology that can be used in processing rice straw waste into highly nutritious animal feed. Participants could make fermented rice straws that can be fed to livestock. The suggestion is that the Nepo village community make rice straw fermentation on an ongoing basis to support the regional economy.

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