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Introduction of the LEISA (Low External Input Sustainable Agriculture) System in Opaasi Village Comunities

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Abstract
This community service activity aims to increase the knowledge and skills of the people of Opaasi Village, West Ranomeeto District, South Konawe Regency, Southeast Sulawesi Province in implementing the LEISA system. Methods for implementing this community service activity include: 1) Socialization of the LEISA system concept; 2. Demonstration on making alternative feed for ruminants; 3. Demonstration of making organic fertilizer; 4. Monitoring and Evaluation. During the activity, the community was very enthusiastic in listening to the presentation of the socialization material and was active in discussions, especially during technical guidance on making animal feed and organic fertilizer. At the end of the activity, the community in Opaasi Village has begun to slowly implement the LEISA system concept on integrated cattle farming land by using organic fertilizer on vegetable and ornamental plants and feeding cattle with ammoniated straw on a small and limited scale. This community service activity can increase the knowledge and skills of the Opaasi Village community in implementing LEISA. The positive impact currently felt by local communities is that they can provide healthy vegetables for consumption and provide animal feed in the dry season.

Keyword: LEISA, agriculture, animal husbandry, integration

INTRODUCTION

Opaasi Village is located in West Ranomeeto District, South Konawe Regency, Southeast Sulawesi Province with an area of 2.77 km2 or 3.6% of the area of West Ranomeeto District. The livelihood of most of the people of Opaasi Village is in plantations and animal husbandry. The types of plantation crops cultivated by the local community are coconut (72.4 tons), coffee (4.8 tons), pepper (24.3 tons), cashew nuts (44 tons), cocoa (59 tons), and sago (4 .1 ton). The types of livestock kept include: cows (3,167 heads), goats (934 heads), pigs (826 heads), native chickens (22,993 heads), broiler chickens (76,600 heads), laying hens (12,860 heads) and ducks (165 heads). (BPS, 2022). The livestock rearing system in Opaasi Village is carried out semi-intensive and extensively by most breeders.

An extensive rearing system is a rearing system where livestock are kept freely with a composition of males and several females in one population and released to graze in nature (Williamson & Payne, 1993). In the intensive rearing system, livestock are kept in specially made cages by providing cut and carry forage, while the semi-intensive rearing system is a combination of extensive and intensive rearing methods and still requires human intervention (Parakkasi, 1999). Livestock businesses in rural areas are generally run conventionally as a part-time business and are not combined with crops so that during the dry season animal feed is not available (Muzani et al., 2004). As a consequence, many breeders are forced to sell their livestock even at low prices (Ilham et al., 2001). On the other hand, farmers tend to no longer pay attention to the balanced use of fertilizer because the selling price of agricultural production tends to

fluctuate and is detrimental to farmers due to high production costs. If this condition continues, it will cause the agricultural sector to no longer be attractive to farmers and have an impact on food security (Adnyana & Kariyasa, 2000). One effort to overcome this problem is the implementation of livestock crop integration (Crops Livestock System/CLS).

Agriculture with an integrated concept between crops and livestock is the most ideal agricultural system to be implemented in rural areas because waste from agriculture can become animal feed, then waste from livestock can become manure, thus creating a zero waste production system. The implementation of integrated crop-livestock farming can reduce farmers' dependence on various external inputs, by optimizing the use of local resources. This is in line with the LEISA (Low External Input for Sustainable Agriculture) concept. According to Asandhi et al. (2005), LEISA is an agricultural reference for optimizing the use of local resources with a synergistic combination of farming components and the use of external inputs as a complement to increase resource effectiveness and minimize environmental damage. LEISA principles include: optimizing the supply of soil nutrients to ensure healthy soil conditions through the use of organic materials, minimizing losses in environmental aspects and synergy in the use of genetic resources (Solahuddin & Sardin, 2018) and minimizing pest and disease attacks through safe methods (Yuwariah , 2015; Solahuddin & Sardin, 2018). Through LEISA, it is hoped that farmer behavior will improve so that agricultural production and farmer income will increase and the agricultural products produced will be much healthier.

Forms of implementing the LEISA system include: reducing the amount of inorganic fertilizer used (Setiyo et al., 2017), using organic waste as fertilizer and animal feed (Putra et al., 2023), using natural biofertilizers and local microorganisms (Hapsah et al., 2020), the use of liquid organic fertilizer (Pangaribuan, 2016) and vegetable pesticides (Jayanti & Suprapta, 2009). According to Hapsah et al. (2021), implementing LEISA is not easy due to changes in the environment and a decrease in production at the beginning of its implementation, but the amount of production will continue to increase in the following year if LEISA is implemented continuously. The implementation of LEISA will have an impact on increasing people's income because the selling price of organic products is more expensive than non-organic ones. The application of the LEISA system to farmer groups with good results has been reported by Asandhi et al. (2005) in Kemukten Village, Kersana District, Brebes Regency, Nuraini et al. (2015) in Cigadog and Mandalagiri Villages, Leuwisari District, Tasikmalaya Regency, Fadilah et al. (2020) in Samangki Village, Simbang District, Maros Regency, Hapsah et al. (2021) in Langsat Permai Village, Bunga Raya District, Siak Regency and Zahara et al. (2019) in Tarakan City.

In Opaasi Village there are several problems including: farmers are still very dependent on the use of inorganic fertilizers, livestock rearing management is still not good and tends to use extensive maintenance patterns, the use of introduced grass and forage as animal feed is not optimal and the application of animal feed processing technology does not yet exist while waste Agriculture has not been utilized optimally and processing of livestock waste has not been carried out properly. This has an impact on the inefficiency of the livestock farming business carried out in Opaasi Village. Therefore, breakthroughs are needed to substitute the role of inorganic fertilizers with organic fertilizers from livestock manure, improve livestock rearing management, especially cattle and provide alternative feed from agricultural production residues.

METHOD

Location and Participants

This community service activity was carried out in Opaasi Village, West Ranomeeto District, South Konawe Regency, Southeast Sulawesi Province. The target audience who participate in this activity is the local community.

Implementation Method

Implementation of this community service activity is carried out through several stages:

Table 1. Stages of implementing community service activities

Activity	Method	Partner Role	Output
Providing knowledge about the LEISA system of integrated agriculture	Socialization	Prepare locations for socialization and demonstration activities and invite people to participate in the activities	Participants know and apply the integrated agricultural-livestock concept of the LEISA system
Providing technical guidance on processing agricultural waste as alternative feed for ruminant livestock	Live demonstrations and practice	Prepare the location and activity participants	Participants know and are able to apply alternative methods of making feed from agricultural waste
Providing technical guidance on processing livestock waste as organic fertilizer	Live demonstrations and practice	Prepare the location and activity participants	Participants know and are able to apply how to make organic fertilizer from livestock waste
Evaluate participants' abilities in making alternative feed for ruminants and making organic fertilizer	Evaluation and community acceptance	Applying methods for making alternative feed from agricultural waste and making organic fertilizer properly	Participants can provide alternative animal feed for ruminants and organic fertilizer for agricultural plants

RESULTS AND DISCUSSION

Implementation of community service activities in Opaasi Village, West Ranomeeto District is divided into several stages as follows:

Socialization of the LEISA system concept

The implementation of this socialization activity began with the introduction of the concept of integrated livestock farming which implements the LEISA system. The presentation of this concept was carried out to provide a general overview of the LEISA system on integrated farms. This system prioritizes the principle of zero waste by using as little external input as possible and as much internal input as possible. The LEISA system prioritizes optimal use of local resources without damaging the environment and external inputs are used only as complements. In this system, the provision of soil nutrients, prevention of pest and disease attacks is achieved through the use of organic materials. The agricultural and livestock products produced are healthy and have a high selling value compared to inorganic products so that farmers will make more profits and increase their income. The products produced using the LEISA system will continue to improve if this model is applied continuously.

Figure 1. Socialization of the application of the LEISA system concept to integrated farms

The enthusiasm of the people of Opaasi Village for the socialization activity of the LEISA system concept was clearly illustrated by the many questions that arose during the activity. The local community apparently does not know the concept of the LEISA system because agricultural waste and food crops in the form of rice straw, corn straw, soybean straw are only left or burned in grass gardens, as well as vegetables that cannot be consumed by humans only become waste that pollutes the environment even though these materials are can be processed as ruminant animal feed. Rice husks and livestock manure are simply left to pile up without further processing. In their agricultural business they tend to use inorganic fertilizers. Cattle are kept

short of feed during the dry season. This outreach activity opens up the horizons of the local community that agricultural production residues or livestock waste can be further processed and utilized efficiently in farming businesses. Leftover agricultural production in the form of rice straw, corn or soybeans can be processed into ammoniated straw and vegetable waste and rice bran can be processed into silage as cattle feed. Cow dung can be processed together with rice husks into organic fertilizer which is used as fertilizer for rice, corn, soybeans, vegetables, ornamental plants and so on. Cow urine and local microorganisms in vegetables can be used as botanical pesticides. Thus a closed cycle is formed which allows the use of low external input according to the LEISA system concept.

Training and Demonstration on Making Alternative Ruminant Animal Feed and Organic Fertilizer

Training and demonstrations on making alternative feed for ruminant livestock and organic fertilizer were carried out after the socialization and establishment of material introducing the concept of integrated farming and animal husbandry with the LEISA model had been completed.

Making Alternative Feed for Ruminant Animals

Making alternative feed for ruminant livestock (ammoniated straw and vegetable waste silage) is carried out in the following stages (Table 2 and figure 2):

Table 2. Materials and procedures for making alternative ruminant feed

Material		Manufacturing procedure
Tools	Materials	
	Ammoniated Straw	
Scales Plastic bucket Machete Black plastic sheet Duct tape Mixer	100 kg rice straw 4 kg Urea 70 liters of Water	Straw is cut to a size of 2-5 cm Urea is dissolved using water in a plastic bucket The cut straw is put into a plastic container to form a layer 10-20 cm thick, after which the urea solution is sprayed evenly. The straw layer on the plastic container is then trampled until it is solid. The process of forming the straw layer is carried out until the plastic container is full The plastic container is filled with compacted rice straw and then tied and closed tightly so that no air can get in and out (anaerobic). On the 21st day the plastic cover is opened and it can be used as animal feed. Ammoniated straw is first aired before being given to ruminants
	2. Vegetable Waste Silage	
Scales Machete Plastic bucket Silo (black plastic sheet) Mixer Duct tape	Vegetable waste Molasses (3% of silage material) Fine bran (5% of silage material) Groats (3.5% of silage material Onggok (3% of silage material)	Vegetable waste is cut into 2-5 cm pieces and aired for 1 day to reduce the water content All ingredients are mixed evenly and put into a silo then compacted so that there are no air spaces The silo is closed tightly and stored anaerobically for 6-8 weeks Characteristics of good silage: the taste and aroma are sour, the color and texture of the feed produced is still clear, not moldy, not slimy or lumpy The resulting silage can last for more than 1 year The silage is aired first before being given to livestock Silos should not be opened frequently and must be closed again so that the silage is not easily damaged

Figure 2. Demonstration process for making ammoniated straw and vegetable waste silage

During the demonstration activity for making ammonia straw and vegetable waste silage, the community was very enthusiastic in listening and active in the discussion because this was the first time they had taken part in technical guidance on making animal feed. The manufacturing process, fermentation methods, storage methods and administration of ammoniated straw and vegetable waste silage are the main concerns of the local community. The use of materials for making ammoniated hay and silage is also an interesting topic of discussion. In making ammoniated hay and silage, molasses is needed, the use of which can be replaced with mera sugar or granulated sugar. Silage materials can use all types of vegetables that can no longer be sold or consumed by humans. As soon as the training activity ended, local people rushed to collect rice straw, corn and vegetable waste to be processed into ammoniated straw and silage. People want to practice it themselves and give it directly to the cows they raise.

Manufacture of Organic Fertilizer

The process of making organic fertilizer is carried out in stages (Table 3 and Figure 3):

Table 3. Materials and procedures for making organic fertilizer

Material		Manufacturing procedure
Tools	Materials	
Ember Botol Terpal Plastik hitam lembaran	EM4 Brown sugar Water Cow manure Rice husks Rice bran	Make a mixture of EM4 20ml/L water and molasses 20 ml/L water. Slightly wet cow manure, rice husks and rice bran are mixed evenly in a ratio of 1:1:1 then sprayed with the EM4 solution mixture made above. Ferment the compost for 2-3 weeks on a covered tarpaulin or black plastic so that it is not exposed to direct sunlight. The indicator of the compost produced is good if the smell of cow dung disappears, the color changes to blackish brown, the texture is crumbly and there is no more heat produced from the compost made

Figure 3. Demonstration process for making organic fertilizer

The demonstration of making organic fertilizer also caught the attention of the people of Opaasi Village. Many questions were addressed to the resource persons regarding the use of ingredients, manufacturing and fermentation processes, storage and use on agricultural land and ornamental plants. Livestock manure used as material for making organic fertilizer can come from cows, goats and poultry or a combination of all three. Rice husks that can be used are husks that have not been or have been burned. The use of organic fertilizer can be used on plants in pots or polybags by mixing it first with soil and sand in a ratio of 1:1:1.

Monitoring and Evaluation

Monitoring and evaluation is the final stage of implementing community service activities in Opaasi Village. In this activity, the service team provides assistance and helps people who experience difficulties in the process of making ammonia straw, vegetable waste silage and organic fertilizer so that the community can provide it themselves according to their needs. At the end of the activity, the community in Opaasi Village had started to implement the LEISA system concept by using organic fertilizer on vegetable and ornamental plants and feeding cows with ammoniated straw. Currently the amount of rice straw is quite abundant and Opaasi Village is experiencing a dry season so this service program is appropriate to implement because it can support the availability of cow feed. The Opaasi Village community is slowly starting to apply the LEISA system concept to agricultural businesses that are integrated with cattle farming on a small and limited scale. The positive impact currently felt by local communities is that they can provide healthy vegetables for daily consumption and provide animal feed in the dry season.

CONCLUSION

Community service activities can increase the knowledge and skills of the people of Opaasi Village, West Ranomeeto District, South Konawe Regency, Southeast Sulawesi Province in implementing LEISA. Communities are starting to become skilled at processing and utilizing the results of processing agricultural waste and food crops in the form of ammoniated straw and silage as a source of feed for ruminant livestock and livestock waste as organic fertilizer for agricultural, crop and ornamental plants.

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