

# Implementation of Sustainable Farming System as a Solution for Food Security at Oemah Wedus Banyumas

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**Abstract.** Sustainable farming systems are a solution to current food safety problems. Sustainable farming systems must pay attention to environmental, social and economic aspects. Livestock from upstream to downstream must have a responsible production process. Oemah Wedus is a sheep farm located in Banyumas, Central Java and implementing a sustainable farming system in the process. This paper aims to find out how to implement a sustainable farming system at Oemah Wedus. The method used to collect data is observation and literature study. The principles of the sustainable farming system at Oemah Wedus are applied starting from making animal feed, fattening, slaughtering, processing meat into culinary products to responsible waste processing. The implementation of sustainable agriculture not only helps in increasing quality food production and economic growth, but also helps improve the environment and quality of human life. This effort is a contribution to realizing Sustainable Development Goals (SDGs).

**Keywords:** sustainable farming system, food security, sustainable development goals, livestock, production.

## 1 Introduction

Based on BPS data, Indonesia's population is expected to reach 278,696.2 thousand people by mid-2023. For this to be successful, there must be enough food. Agricultural development in Indonesia aims at sustainable agricultural development as part of the implementation of sustainable development. Sustainable agricultural development (including rural development) is an important strategic issue of concern and debate in all countries. One of the challenges for future agricultural development is to maintain sustainability in order to realize food sovereignty and farmers' welfare.

Food security is defined as the availability of food of sufficient quantity and appropriate quality, provided through domestic production or import, to achieve a nutritional status in which all physiological needs are met at all times [1]. Food and nutrition security has four dimensions: (i) food availability, (ii) food access, (iii) food utilization, and (iv) food stability [1]. Food availability alone does not guarantee access to food containing sufficient calories and nutrients to meet nutritional needs [2]. Furthermore, high-quality foods are often traded at higher market prices, which can lead to increased global nutrition problems, especially for low-income groups who cannot afford these foods [3].

Currently, the issue of climate change is also being discussed frequently. The livestock sector is often linked to climate change because its waste produces methane gas which contributes to climate change. However, this environmental issue can be overcome with good livestock management from upstream to downstream. Climate change indicators include changes in surface temperature, precipitation, ocean temperature and sea level, as well as extreme climate and weather conditions that impact ecosystem changes. This has a direct or indirect effect. Indicators of climate change include changes in land surface temperature, precipitation, air temperature and sea level, as well as extreme climate and weather conditions that influence changes in ecosystems. It has direct and indirect effects on the physical and biological environment on the physical and biological environment [4].

Sustainable development, including agriculture, is a national obligation to implement it. Previous development focused on economic development, which led to environmental degradation and social problems. There are still numerous problems encountered in enforcing sustainable agrarian development, especially in developing countries, including Indonesia. The conception of sustainable husbandry is grounded on three aspects of sustainability: the sustainability of profitable gains, the sustainability of mortal social life (people), and the sustainability of natural ecosystems (earth).

A sustainable livestock system adheres to three main principles, namely reducing environmental damage, increasing livestock productivity and farmer income, and improving the quality of life of the community, especially farmers. Sustainable agriculture and livestock can reduce dependence on inorganic fertilizers and other chemicals. Livestock waste is reprocessed so as not to pollute the environment, namely by producing fertilizer from livestock manure. Livestock management is carried out by paying attention to sustainability aspects from upstream to downstream. Sustainable farming system is an effort to realize sustainable development goals 2030. Therefore, this paper will discuss the implementation of sustainable farming system in Oemah Wedus Banyumas.

## **2 Methodology**

The research methods used in this study are observational research method and literature review. The observation method is direct investigation. Observation is a data collection method that involves observing objects while recording their state and behavior. Observation refers to the systematic observation and recording of the symptoms examined [5]. Observation techniques are the systematic observation and recording of the phenomenon being studied. Actual observation in the broadest sense is not limited to observations made directly or indirectly. Currently, observational methods are defined as observing and systematically recording the phenomenon to be studied [6]. Observation is a data collection method in which researchers or their collaborators record information observed during a study [7]. From the above definition,

observation method can be understood as a method of collecting data by directly observing news and events on the ground [8].

Several forms of observation, namely: Participant observation, unstructured observation, and group observation. Here's the explanation:

1. Participant observation is a data collection method used to collect research data by the researcher observing and recording the locations where the informants are involved in their daily lives.
2. Unstructured observation is observation conducted without the use of observation guidelines so that the researcher develops the observation based on developments in the field.
3. Group observation is an observation carried out by a group of research teams on a topic that has been raised as a research problem [9].

For this research itself, an unstructured observation method was used because it did not require information from the source directly, but the data and information obtained were deemed sufficient to provide accuracy in this research.

A literature review is a study conducted by considering various literature reviews necessary for the research [10]. The purpose of using the literature survey method in this study is to take the first step in a research plan by obtaining local data using literature without direct involvement. The data sources used as references in this research are related library materials (research materials, research reports, academic journals, etc.) as primary data sources and secondary data sources (national basic laws and regulations, books, etc.). After receiving the data source as a reference, content analysis is used to analyze the literature review data. In content analysis, the researcher examines the text objectively and provides a raw overview of the content without researcher intervention [11]. In this case, the researcher will carry out an in-depth discussion of the content of the information in the data source which requires setting time to read and examine the data so that there is a result. It is hoped that these results can answer the problem and be used as a consideration in the scope of implementing the sustainable farming system at Oemah Wedus Banyumas.

## **3 Results and Discussion**

### **3.1 Livestock and Food Security**

Food is a basic need for survival for all humans. In this case, food security is necessary to continue the human life cycle. Food security is a process that enables people to live healthy and work productively to meet their needs [12]. Meeting food needs is very important and strategic in order to maintain national sovereignty and avoid dependence on food imports from developed countries. Oemah Wedus plays a role in food security, especially animal protein sources. As the population grows, the need for food continues to increase. Regarding food supplies, not all food needs can be met as food production and distribution capacity is increasingly limited. This creates food insecurity between the needs of the population and their fulfillment. Food security is one of the key challenges for countries around the world to achieve zero hunger, the second goal of the Sustainable Development Goals. The issue of food insecurity due to the ever-increasing population is the basis for formulating this goal. Another problem that arises with

population growth is the decreasing ability of natural resources to meet human needs, especially food production capacity. Intensive use of external inputs is also carried out, such as the addition of chemical fertilizers and pesticides to optimize natural resources. After decades, the negative impact of global climate change has become a threat to meeting food needs. The productivity of agricultural products shows a significant decline due to the decline in the quality of natural resources. Environmental damage due to the use of chemical fertilizers and pesticides can be prevented by using solid and liquid organic fertilizers from livestock waste. Oemah Wedus processes animal waste into fertilizer and markets it to farmers. Organic fertilizer is an alternative to the increasingly expensive price of chemical fertilizer.

There are four main aspects when discussing food security. First, food availability is the supply side of food security and is determined by the level of food production, stocks, and differentials between food exports and imports. Second, access to food is measured by physical and economic access. This means that physical food must be available in sufficient quantities and affordable. Economic access to food means that consumers, especially food-insecure people, have sufficient purchasing power to obtain food. Third, there are aspects related to food utilization, nutritional adequacy and food safety. The fourth is stability from one dimension to three dimensions over time [13]. Oemah Wedus uses corn and agricultural waste to be used as animal feed. Livestock waste will also be processed into fertilizer so that it returns to agricultural land to fertilize plants.

### **3.2 Implementation of a Sustainable Farming System**

The concept of sustainable agriculture is based on three aspects of sustainability. Sustainability of economic efforts (profits), sustainability of human social life (people), and sustainability of natural ecosystems (earth) [14]. Integrating livestock into farming systems is important for the following reasons: 1) Ensure sustainable agriculture through diversification of activities that produce food for farmers' families. 2) Remove nutrients and energy between livestock and plants by using fertilizers and agricultural waste as food sources to create sustainable and environmentally friendly agriculture [15].



**Fig. 1.** Animal Manure Waste



**Fig. 2.** Making Fertilizer



**Fig. 3.** Plants given Oemah Wedus organic fertilizer

Food crops used to produce biomass can be used to feed livestock and, as a result, can be used to produce fertilizer, improve soil quality and ensure sustainable soil fertility. This creates an efficient, productive, profitable and environmentally friendly farming system. This creates an efficient, productive, profitable and environmentally friendly farming system. In order to become part of "organic agriculture", livestock farming needs to be further developed in an integrated manner. The large volume of biomass supports the development of livestock that saves land and water, apart from being able to overcome the problem of plantation waste, food crops, and horticulture. This concept has been widely applied in Indonesia [16]. Organic farming carried out well can quickly restore diseased soil caused by the use of agricultural chemicals. This occurs when soil fauna and beneficial microorganisms are restored to life [17].

The principles of the sustainable farming system at Oemah Wedus are applied starting from making animal feed, fattening, slaughtering, and processing meat into culinary products to responsible waste processing. The following is a scheme for implementing a sustainable farming system at Oemah Wedus.



**Fig. 4.** Scheme of Sustainable Farming System at Oemah Wedus Banyumas



**Fig. 5.** Oemah Wedus opens up employment opportunities and has a number of employees



**Fig. 6.** Oemah Wedus provides training for livestock groups



**Fig. 7.** Buying and selling livestock based on livestock weight

In the economic dimension, Oemah Wedus minimizes expenses by maximizing the resources. Derivative products from livestock can generate more profits. Oemah Wedus formulates quality feed to produce good livestock. Some slaughterhouses are in the process of halal certification. Oemah Wedus serves various dishes from lamb such as satay, tengkleng, and etc. Oemah Wedus also produces organic fertilizer for use at Oemah Wedus and for sale to farmers.

**Table 1.** Sheep Price List 2020-2023

Year	Female	Male
2020	IDR 42,000 - IDR 45,000	IDR 50,000 - IDR 55,000
2021	IDR 44,000 - IDR 49,000	IDR 54,000 - IDR 58,000
2022	IDR 48,000 - IDR 55,000	IDR 57,000 - IDR 65,000
2023	IDR 52,000 - IDR 58,000	IDR 60,000 - IDR 70,000

In the environmental dimension, Oemah Wedus uses livestock manure to process it into organic fertilizer. Organic fertilizer given to plants will repair the soil structure damaged by chemical fertilizers. Chemical fertilizers are expensive and hurt the soil if used excessively. By processing it into fertilizer, environmental pollution due to methane gas from livestock can also be minimized. Fertile soil after being given organic fertilizer will be profitable for farmers because it increases the quality and quantity of production. Oemah Wedus is trying to implement the principles of a sustainable farming system to reduce the impact of climate change.

**Table 2.** Total Fertilizer Production January-September 2023

Month	Production (Kg)
January	1,500
February	1,500
March	1,500
April	1,500
May	1,500
June	2,000
July	2,000
August	1,500
September	1,500

In the social dimension, Oemah Wedus strives to reduce unemployment, reduce social inequality, empowering farmers, help the community with affordable food prices. Most of the sheep farms in Indonesia are smallholder farms. Oemah Wedus helps farmers in marketing their livestock. One of the problems that often occurs is that the majority of farmers cannot sell their livestock, so this situation is exploited by brokers and middlemen to buy livestock from farmers at very cheap prices and sell at market prices. Oemah Wedus buys livestock at market prices. Oemah Wedus opened a partnership with the core plasma system, inviting smallholder farmers as partners so that maintenance is good and livestock productivity increases. The sale and purchase of sheep are carried out based on the weight of the livestock. So there is already an understanding of prices between Oemah Wedus and its partners. Over the past three years, Oemah Wedus has collaborated with many partners, the number of which increases every year.

**Table 3.** Number of Plasma Partners in 2021-2023

Year	Amount
2021	8
2022	13
2023	20



## 4 Conclusion

Challenges to Indonesia's food security remain, particularly in terms of production and increasingly unequal access to food. The causes are increasing population growth, changes in land functions, degradation of land resources and water, environmental pollution, and climate change. Sustainable agricultural systems based on animal husbandry offer opportunities for small and medium-sized farmers to increase economic yields per unit area and unit time. This system effectively recycles waste by combining the appropriate components. This minimizes the impact on the environment. Recycling of products, by-products and waste in integrated farming systems is a key component of the sustainability of agricultural systems. To sustainably meet the animal food needs of the Indonesian population, it is necessary to develop innovations in the livestock sector that apply the principles of sustainable farming systems. Oemah Wedus strives to achieve food security by implementing the principles of sustainable agricultural systems, especially through animal protein sources. This is one form of his Oemah Wedus contribution to achieving the 2030 Sustainable Development Goals.

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