

*Poster*



## **Determining Suitable Area for Dairy Farm Using Model Builder (Case Study: Lombok Island)**

**Sujoni<sup>1</sup>, Hartrisari Hardjomidjojo<sup>2</sup>**

<sup>1</sup>MIT for Natural Resources Management  
Bogor Agricultural University  
Bogor, Indonesia  
Joni\_drh@yahoo.co.id

<sup>2</sup>MIT Study Program  
Bogor Agricultural University  
Bogor, Indonesia  
sari@biotrop.net

### **ABSTRACT**

*The consumption of milk in Indonesia is high, but yet milk products are not produced in high enough quantities. The difficulty to increase milk product is that local dairy cattle production is very low caused by breeding and management factors. The other important factor is that the location of dairy cattle farm was not determined correctly because dairy cattle are sensitive animal to environment. In other wise, 98% dairy cattle were distributed in Java. Geographic Information System (GIS) is the forms of information technology that have been increasingly used in agricultural technology. The objective of this study is to mapping the suitable area for dairy cattle farm from available data in Lombok, West Nusa Tenggara. We used digital elevation model (DEM), slope, landuse map, ArcGIS desktop, and Model Builder in this study. The model for determining suitable area of dairy cattle farms was used the formula based on some factors that affecting the growth of dairy cattle. The proportion of elevation is the most criteria, because it's affecting almost the suitable area for dairy farm and related to temperature and humidity. We conclude that it is possible to develop dairy farm in Lombok Island, West Nusa Tenggara based on some factors that influence the growth of dairy farm using model builder.*

**Keywords:** *dairy farm, model builder, Lombok Island, geographic information system*

### **I. Introduction**

Indonesia has been developed livestock to fulfill animal products needs, especially milk. But yet milk products are not produced in high enough quantities. More than 50% of milk consumption of Indonesia is gained from import. For example, national production was 646 tons while import milk was 2,346 tons in 2008 (Directorate General of Livestock 2010).

The Indonesian Government has tried to increase milk production by encouraging the development of dairy cattle farm. The difficulty to increase milk product and develop the dairy cattle farm is that local dairy cattle production is very low. This may be caused by breeding and management factors. The other important factor is caused by the location of some dairy cattle farm development was not determined correctly, because dairy cattle is sensitive animal to environment. In other wise, 98% dairy cattle were distributed only in Java.

The effort to increasing milk production can be done by improving management system and

breeding system to keep dairy cattle health and increase the number of dairy cattle, also develop a new dairy farm especially outside Java Island. Therefore, we can combine management system and computer-based technology to increase our milk production.

Geographic Information System (GIS) has been used for agriculture, animal disease epidemiology, and livestock industries. Model builder is a tool in ArcGIS which can be used to help in planning and applying the model. A good and representative model that can be applied directly to determine suitable area for animal development especially for dairy cattle is required.

If dairy cattle are managed well and location of animal development is chosen in the right way, Indonesia will be a very potential area for animal production. It's mean that we can decreased import of milk products from other countries.

## II. Objective

The objective of this study is to mapping the suitable area for dairy cattle farm from available data in Lombok, West Nusa Tenggara.

## III. Material and Method

We used three parameters for this study; they are Digital Elevation Model (DEM), landuse map, and slope. We use ArcGIS desktop and Model Builder as software to calculate and processed the model. Suitable area for dairy cattle farm is affected by many factors such as type soil, altitude / elevation, and water supply.

Soil type has a close relationship with animal, for example pasture supply because more than 60% dairy cattle consuming forage. Soil type also related to soil fertility and kinds of flora that can grow in the area.

Elevation is related to temperature, humidity, and kind of flora that can growth in the area. Usually dairy cattle can growth well in 500 to 1500 meter above sea level. The higher elevation, temperature will be decrease, suitable area for growing dairy cattle. Water for animal is also very essential because dairy cattle farm needs a sufficient water supply.

The model for determining suitable area of dairy cattle farms was use the formula based on some factors that affecting the growth of dairy cattle. The formula for suitable area of dairy cattle is formulated as follow:

$$SA = (0.3 * l) + (0.2 * s) + (0.5 * e)$$

Where:

- SA = Suitable Area
- l = Landuse
- s = Slope
- e = Elevation

We divided the elevation into three classes, less than 500 meter, 500 to 1500 meter, and above 1500 meter above sea level. The best elevation for dairy cattle is 500 to 1500 meter above sea level. The proportion of elevation is the most criteria, because it's affecting almost the suitable area for dairy farm. Elevation has related to temperature and humidity.

We also divided slope into three classes, less than 15°, 15 to 30°, and more than 30°. For dairy farm, we choose slope less than 30°. We determine the land use that potential for dairy cattle farm is from open land, bush land, and field. The model builder diagram for suitable area for dairy cattle farm is shown in Figure 1.

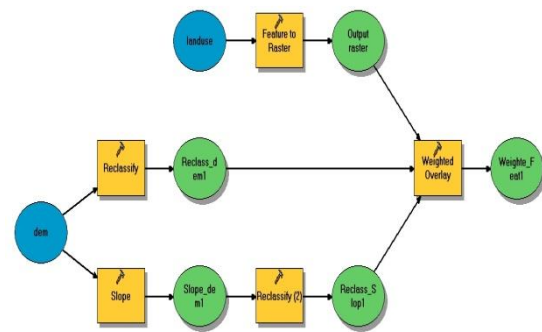


Figure 1. Model Builder Sutable Area for Dairy Cattle

## IV. Result and Discussion

The result of suitable area for dairy cattle farm in Lombok Island is shown in figure 2. The suitable area is show in dark green color, while light green and orange is not suitable for dairy cattle farm. The red color shows the water body, such as lake.

Almost suitable area for dairy farm in Lombok Island located in West Lombok Regency and East Lombok Regency. It is possible to develop the dairy cattle farm in Lombok Island, based on the factor elevation, slope, and land use.

This model can help government to increasing the national milk production, especially increasing the population of dairy cattle outside Java Island. Therefore, government can be decreased the milk product import from other country.

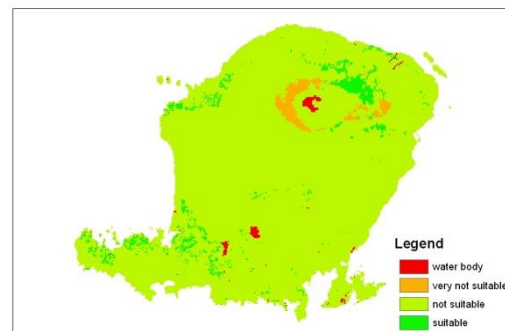


Figure 2. Sutable Area for Dairy Farm

For the next research, we suggested to determine suitable area not only from elevation, slope, and landuse, but also should be add other parameter such as social economic, culture of local people, and technical factor which related to the infrastructure.

## **V. Conclusion**

It is possible to develop dairy farm in Lombok Island, West Nusa Tenggara based on some factors that influence the growth of dairy farm using model builder.

## **Reference**

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