

The Development of Beef Cattle Area Based on Potential Mapping of South Tapanuli Regency

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Abstract – The aim of this study is to determine the suitability of land for the dominant and potential cattle breeding, to find out the areas with the highest potential value for cattle farming in order to be used as the focus of the development of beef cattle, and to formulate the direction of the development strategy of beef cattle in South Tapanuli regency. This research uses theory in doing some analysis related to research literature by mixing and overlaying on primary and secondary data maps and SWOT analysis for policy strategies in livestock sector development. In the actual land suitability condition, all the land assessed in South Tapanuli Regency is Appropriate (S) as the ecological environment of beef cattle, namely Angkola Sangkunur covering 23,455.54 Ha, Batang Toru 28,762.03 Ha, East Angkola 13,832.83 Ha, Estuary Batang Toru 26,870.91 Ha, and South Angkola 16,353.34 Ha. Whereas in the case of potential land suitability, taking into account the natural conditions, it is found that all the land assessed in South Tapanuli Regency is suitable (S) as the ecological environment of beef cattle. The area that became the center of the development of large ruminant livestock (beef cattle) in South Tapanuli Regency based on the suitability of physical requirements and land suitability and supported the potential ranking and LQ analysis are Batang Toru, Angkola Sangkunur, Muara Batang Toru, East Angkola and South Angkola. Strategy that must be implemented in the framework of the development of beef cattle farming area for related stakeholders based on SWOT analysis result is tend to SO strategy, that is to make integrated policy and alignment of government program in the utilization of land area and natural resource potential and optimize community culture and utilization of technology and information.

Keywords – Agricultural Land Use; Livestock Area; Ecological Of Beef Cattle; Land Suitability; Location Quotient; SWOT Analysis And Policy Development Direction.

I. BACKGROUND INFORMATION

Natural resources are still the strongest superior product in sustaining local revenue so that the focus in South Tapanuli Regency development is placed on primary sector, especially agriculture sub sector. The agricultural sector, especially the livestock sector, is very potential to be developed in the South Tapanuli regency with the commodity of beef cattle. The role of beef cattle in livestock development is very important in the development of livestock mission, as: (a) animal food sources such as meat and milk; (b) sources of community income, especially farmers; (c) an indispensable foreign exchange earner to finance national development; (d) create the labor force (e) the objectives of environmental conservation especially land through recycling of manure; and (f) socio-cultural fulfillment of people in traditional / cultural ceremonies.

According to Susetyo (1980), in an effort to increase the production of ruminant livestock there is a triangular relationship between land, fodder and livestock which is an integral organic entity in farming.

Land is the main capital as a place to live ruminant livestock as well as a forage producer of fodder. Therefore, in order to achieve the optimum increase in livestock production, the appropriate land is needed as the ecological environment of livestock and able to produce forage feed in sufficient quantity and quality.

II. STATEMENT OF THE PROBLEM

Demand for livestock products in South Tapanuli regency continues to increase as a consequence of increasing population, the increasing proportion of urban population, education and community knowledge of the

need for quality and nutritious food and the support of improved income and welfare levels. On the other hand, farms are unable to provide meat and egg products to meet the needs of consumers, so that the dependence on imports is greater. The population of ruminant livestock, especially cattle has not been sufficient for the needs of this area. All the time the cows are imported from outside the area to meet the needs of meat.

The population growth of beef cattle has not met expectations. The socio-cultural problem of the population and the lack of manpower available in the countryside is one of the obstacles to the development of these cattle. Labor to raise cattle in this area is still rare, indigenous people are less accustomed to raising cattle; this work is mostly done by immigrants. This situation is a potential and an excellent opportunity for the development of beef cattle in plantation areas with an integrated system, namely the use of natural grass that is considered as a weed for oil palm crops and also the utilization of palm oil waste (such as leaves without lidi, midrib, solid, fibers and bunches) can be used as animal feed, because nowadays farming business faces constraints such as the availability of cheap and quality feed continuously.

The objective of the study:

The aim of this study is to formulate the direction of the development strategy of beef cattle farming in South Tapanuli Regency.

Research Question:

What is the direction of the development strategy of livestock breeding area based on the potential of available resources.

Significance of the study:

As input to the public/private sector engaged in beef cattle/farming/plantation business in South Tapanuli Regency in investing and learning process, especially in analyzing the potential of land resources for the development of beef cattle.

Assumptions of the study:

Determination of potential land for development of beef cattle by land evaluation consisting of land suitability for ecological environment of beef cattle and land suitability for dominant forage feed. Land suitability for forage fed is reflected in the availability of forage in a region by calculating total forage of fodder. For more clearly the framework used can be seen in Figure 1.

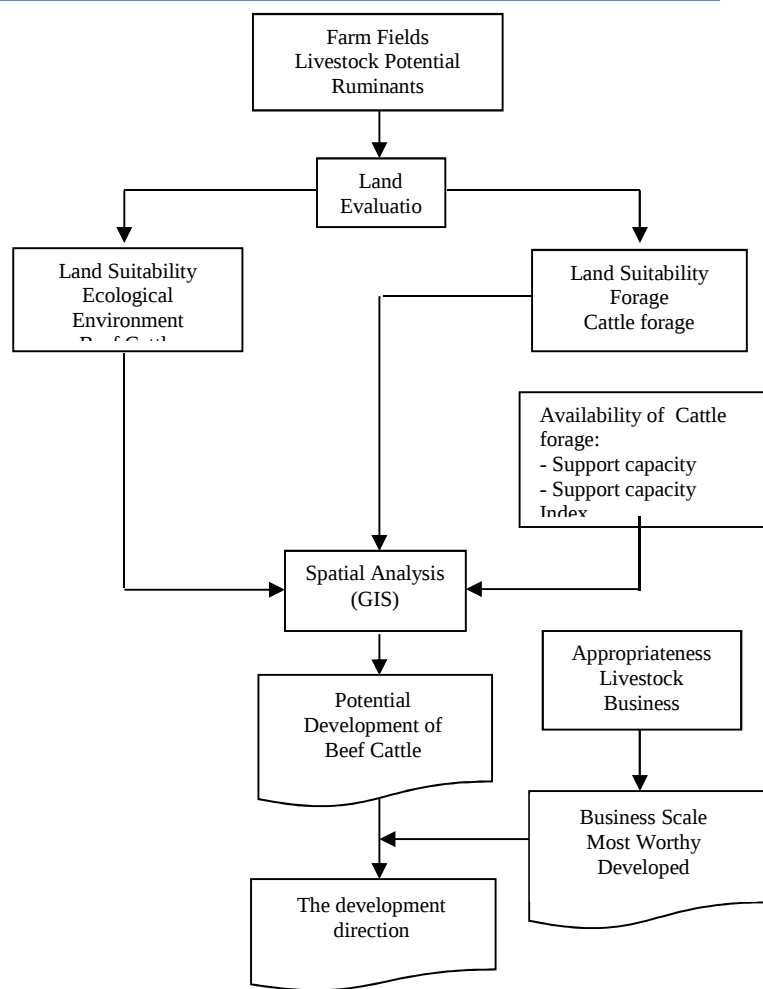


Figure 1. The Used Framework.

III. REVIEW OF LITERATURE

A. BEEF CATTLE

According to Reksohadiprodjo [1], cattle are a source of meat and labor milk and other products, especially in the tropics and symbols of family status for the purposes of ceremony and others.

A cattle or a group of cattle can produce various needs such as meat and other products such as fertilizer, skin, ones and so on [2].

B. LAND RESOURCES FOR RUMINANT LIVESTOCK

Land can serve as a place for the implementation of agricultural production activities such as cultivation, livestock rising and fish farming [3]. The development of livestock business will be better and profitable if done on main land or fertile land [4].

Based on land requirements, according to Suratman et al. [5], livestock business can be divided into two, land base agriculture and non-land base agriculture business.

According to the Directorate of Livestock Dissemination and Development [6], land use for livestock is based on: (a) land is a source of feed for livestock; (b) all types of land suitable for food sources; (c) land use for livestock is defined as the effort of harmonization between land use and agricultural system; and (d) the relationship between land and livestock is dynamic.

C. EVALUATION OF LAND RESOURCES

FAO [7] defines land as a physical environment that includes soil, climate, relief, hydrology and vegetation, where they affect the potential for land use. The purpose of Land Evaluation or Land Assessment is to determine the value (grade) of a land for a particular purpose. According to Hardjowigeno and Widiatmaka [8], the relationship between land resource surveys and socioeconomic analyzes and the formulation of the recommended types of land use depends on the approach: (1) a two-stage approach and (2) parallel approach. Land capability is a potential land based on land suitability for general agricultural use ie agricultural areas, pastures (livestock), forests and nature reserves. The classification of land capability shows the great diversity of inhibiting factors, ie the soil is grouped into classes I to VIII. The higher the class then the risk of damage and the amount of inhibiting factor increases.

D. FORAGE

Forage is all the ingredients derived from plants in the form of leaves. Especially in Indonesia, forage material plays a special role because it can be given in large quantities. Livestock ruminansia such as cattle, buffalo, goats, sheep that only given forage, can still maintain their life and able to grow well and breed [9]. Forage capacity support can be used as a tool in a sustainable development activity. In animal species, support capacity can be defined as the maximum population that can be supported in a habitat [10]. Support capacity is determined by the abundance of plant organic material formed in the process of photosynthesis per unit area and time, called primary productivity [11].

E. LOCATION QUOTIENT

Location Quotient is a ratio of the role of a sector / industry in an area to the role of the sector / industry nationally. Basically this technique presents a relative comparison between the capability of a sector in the area under study with the same sector capability in the area of

reference. The unit used as a measure to generate LQ coefficients is the number of labor per sector of economy, the number of productions or other units that can be used as criteria [12].

F. SWOT ANALYSIS

The strategy itself is defined as a shared tool with the long-term goal to be achieved [13]. In the process of strategy formulation, it needs an in-depth and thorough analysis of the company's internal and external environment [14]. One way that companies can do in determining the appropriate strategy is to use environmental analysis. Environmental analysis is a systematic process used by strategic planners to monitor the environmental conditions that affect companies [15]

IV. RESEARCH METHODOLOGY

The research was conducted in South Tapanuli Regency of North Sumatera Province in August until December 2016. The effort to develop the commodity area was done by approaching regional development plan. Basically, there are 5 (five) main activity components that need to be done:

- a. Identify the type of land use with the desk study technique on the digital map of land cover / land use.
- b. Assessment of the suitability of the ecological environment land for the maintenance of beef cattle enclosure system conducted by matching the quality / characteristics of the land with the criteria of ecological requirements of beef cattle. In this study assumed that management is done at a moderate level that management can be done at the level of middle farmers and requires medium capital and moderate farming techniques.
- c. Classification of quality / land characteristics with land suitability requirements for each plant species of forage source, as follows (a) S1 (highly suitable); (b) S2 (moderately suitable); (c) S3 (marginally suitable and (d) N (Not suitable). Land suitability requirements follow criteria issued by the Bogor Research Center for Soil and Agro-climate (Djaenudin et al., 2003) and LREP II (in Hardjowigeno and Widiatmaka 2001).
- d. To further sharpen the potential of each sub-district that can be the basis of development area, one of them is the method of ranking the sub-district based on the scoring potential paramater. The main parameters are temperature, rainfall and slope, the comparative variable includes the number of

livestock population, soil type and livestock capacity (development) and not apart from the sociocultural aspects described descriptively. Scoring will see potential development parameters of each sub-district and supported variable comparison to produce sub-district rankings.

e. Location Quotient is a comparison of the role of a sector / industry in a region to the role of the sector / industry nationally. Here is the LQ formula in determining how big the role of beef cattle sector in South Tapanuli Regency:

$$\frac{\frac{xi}{pk}}{\frac{XP}{PN}}$$

Where: xi = sub-district population
pk = regency population
XP = province population
PN = national population

A. TYPES AND DATA SOURCES

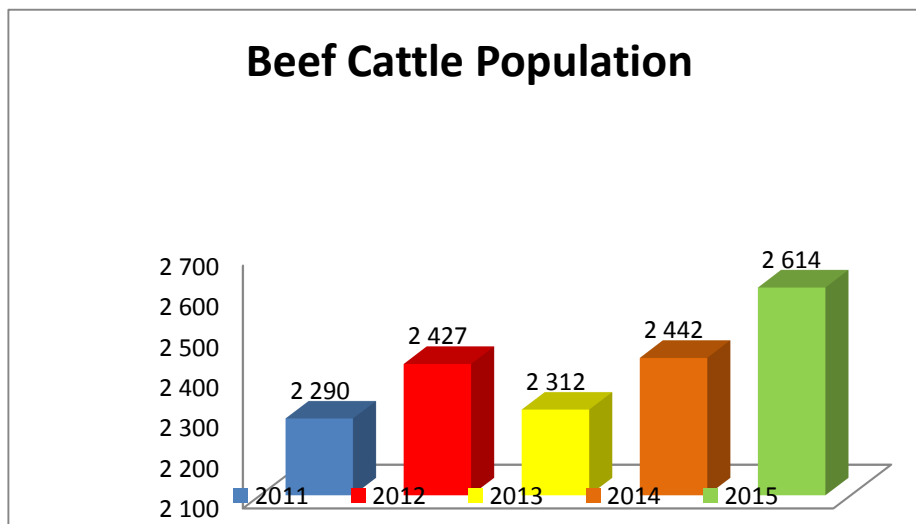
TABEL 1

No.	Data Type	Scale	Year	Form	Data source
1.	Map of Land and Land type	1 : 50.000	2014	Hardcopy	Regional planning agency of South Tapanuli
2.	Map of South Tapanuli regency Landuse	1 : 100.000	2014	Hardcopy	Regional planning agency of South Tapanuli
3.	Map of RBI (Rupa Bumi Indonesia)	1 : 50.000	2016	Tabular	Information Board and Geospatial
4.	Climate Data of South Tapanuli Regency	-	2014	Tabular	BMKG North Sumatera Province
5.	Livestock Data of South Tapanuli Regency	-	2011- 2015	Tabular	Disbunnak Tapsel
6.	Economic Social Data of South Tapanuli Regency	-	2010-2015	Tabular	Regional planning agency of South Tapanuli

To get data not found in secondary data then collected primary data, consist of:

1. Coordinate Point of Area and Location of Cattle Shed
2. Data of cattleman as sample (respondent) in base area.

Graph 1. The Development of Beef Cattle Population in South Tapanuli regency 2011-2015



While the sample is beef cattle in the subdistrict area that became the base of beef cattle which consists of 5 (five) areas, namely: Batang Toru Subdistrict, Muara Batang Toru, Angkola Sangkunur, East Angkola and South Angkola, the sample technique used is all population units. To determine the sample size of cattle farmers used Slovin formula.

B. POPULATION AND SAMPLING TECHNIQUES

The sampling technique for the farmer's respondents is done by simple random sampling, that is by randomly selecting the respondents at the research location that is all the beef cattle farmers found in the development area in South Tapanuli Regency. The total population is 1,257 cattle farmer (Plantation and Livestock Service of South Tapanuli Regency 2016).

TABLE 2. NUMBER OF CATTLE FARMER AND CATTLE POPULATION AT THE CENTER OF CATTLE IN SOUTH TAPANULI REGENCY 2016

No.	Sub-district	Amount		Cattle Ownership
		Beef Cattle (ekor)	Cattle farmer (head cow-herd)	
1.	Batang Toru	621	470	1,32
2.	Muara Batang Toru	238	60	3,97
3.	Angkola Sangkunur	887	490	1,81
4.	East of Angkola	450	80	5,63
5.	South of Angkola	182	50	3,64
Total		2.154	1.150	1,87

The number of samples taken is determined by the Slovin formula (1960) in Umar (1997), as follows:

$$n = \frac{N}{1 + Ne^2} \rightarrow n = \frac{1.257}{1 + 1.257 (0.1)^2} \rightarrow n = 74$$

Where: n = sample size

N = population size;

e = Percentage of inaccuracy due to sample errors that can still be tolerated / desirable that is equal to 10%.

From n = 74, 15 samples can be taken from each sub-district

C. DATA ANALYSIS METHOD

Processing and analysis of spatial data is done by using ERDAS Imagine and Geographic Information System (GIS)

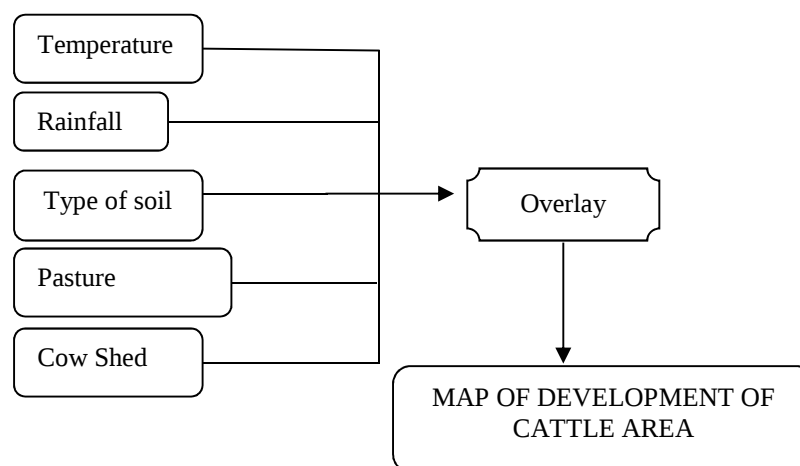
Arc View 3.3. For data (maps) that are not yet available in digital format, then processing is done by overlay

(overlapping) and other GIS operations on existing thematic maps.

D. OVERLAY

Data analysis technique used is mixed data analysis technique, by managing primary data and secondary data that data obtained through data collection then will be

interpreted in accordance with the research objectives that have been formulated. The overlay process itself is divided into 3 stages. First thematic map of temperature data, rainfall and soil type. Secondly, the map of the first overlay and land use map. Finally, a map of the second overlay and the map of the points of grazing and cattle farming.



V. RESULTS AND DISCUSSION

A. STRATEGY AND POLICY DIRECTION OF BEEF CATTLE FARMING DEVELOPMENT

TABLE 3 SWOT ANALYSIS

Strength	Weakness
1. Local government policy 2. The high interest of farmer communities 3. Sufficient farm area 4. Moderately suitable pasture 5. The presence of officers in charge of farming as a farmer's instructor	1. Farmer institutions have not been operating optimally 2. Inexperienced farmers 3. Lack of agricultural infrastructure 4. Low land productivity 5. There is still sectoral ego 6. The low capital of farmers 7. 8. Lack of post-harvest handling of livestock
Opportunity	Threat
1. Market demand 2. Climate and soil fertility 3. Livestock technology 4. Potential of natural resources 5. Access information 6. Main export commodities	1. Unstable price fluctuations 2. Climate change/weather 3. High cost of production 4. Decreased quality of natural resources 5. The high incidence of disease 6. Reduced productive land 7. Population increase

Based on the observation, documentation and analysis conducted, it can be concluded that the formulation of internal and external factors that influence the development

of beef cattle commodity in South Tapanuli Regency. This analysis is used to see how strategic directions can be used to see which priorities can be done as a policy.

VI. CONCLUSION

Based on the results of research conducted on the development of beef cattle in the region of South Tapanuli Regency can be concluded as follows:

1. In the actual land suitability condition, all the land assessed in South Tapanuli Regency is suitable (S) as the ecological environment of beef cattle, as Angkola Sangkunur covering 23,455.54 Ha, Batang Toru 28,762.03 Ha, East Angkola 13,832.83 Ha, Estuary of Batang Toru 26,870.91 Ha, and South Angkola 16,353.34 Ha. Whereas in the case of potential land suitability, taking into account the natural conditions, it is found that all the land assessed in South Tapanuli Regency is suitable (S) as the ecological environment of beef cattle.
2. Regions that become centers of development of large ruminant livestock (beef cattle) in South Tapanuli Regency based on suitability of physical requirements and land suitability and supported potential ranking and LQ analysis is Batang Toru Subdistrict, Angkola Sangkunur Subdistrict, Muara Batang Toru Subdistrict, East Angkola Subdistrict and South Angkola District.
3. Strategy that must be implemented in the framework of the development of beef cattle farming area for related stakeholders based on SWOT analysis result is tend to SO strategy, which is to make integrated policy and alignment of government program in the utilization of land area and natural resource potential and optimize community culture and utilization of technology and information.

VII. RECOMMENDATION

In connection with the results of research conducted, there are several suggestions:

1. Need further study on Development of Cattle Farm Based Geographic Information System (GIS) to South Tapanuli Regency Spatial Planning.
2. In responding to the developmental demands, especially in dealing with budget-based planning systems and implementing better governance, set forth in Law no. 26 of 2007 (Law 26/2007) on the spatial layers then that should be more attention for the Government of South Tapanuli Regency, not only in the livestock sector but the whole sector
3. The consequences of the presence of this livestock cluster should have a permanent strength so that in its implementation has a strong legal force.

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