Potency and strategy of cattle development based on feed resources in Tanjungbalai North Sumatera Regency

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Abstract. This research was carried out in Tanjungbalai North Sumatera Regency in two stages for three months. Stages I aims to identify and analyse the potential of feed resources for the development of beef cattle in Tanjungbalai regency. The method in this research is Survey. Data collection using purposive sampling method. The results showed that the feed resource potential in Tanjungbalai City came from forage between plants (coconut, oil palm), forage on rice fields, agricultural crop waste and agricultural / agricultural industry waste processing with a total feed production of 41,028,554 Kg DM / year and could accommodate 14,987 AU. Phase II aims to formulate a beef resource-based business development strategy in the regency of Tanjungbalai. Data was obtained from the Phase I studies and FGD method and then carried out a SWOT Analysis. General description of beef cattle development strategy is located in quadrant I, namely in areas that are strength and have opportunities. The strategy adopted is an aggressive growth policy (SO Strategy), namely: Build a beef cattle feed processing industry by utilizing feed resources, raw material industry, geographical location and government support.

1. Introduction
Nationally the population of beef cattle and meat production has not been able to meet consumer demand, as well as in the Provinces of North Sumatra and the Tanjungbalai regency, while natural resources in the form of large land that can produce animal feed in the form of forages and agricultural waste are one of the capital for business development.

Tanjungbalai regency has the potential to develop beef cattle based on feed resources, especially in four districts of the six existing districts. The four districts are: Datuk Bandar district, Datuk Bandar Timur district, Teluk Nibung District and Sei Tualang Raso District. The sub-districts are still suitable land available, a lot of forage, agricultural waste, industrial waste and agricultural processing industry / fisheries that produce good waste for animal feed. All of this has not been used optimally for the development of beef cattle.

According to statistical data for 2017, the number of cattle cut in animal slaughter housed of Tanjungbalai regency was 524 heads and outside of the slaughterhouses were recorded as many as 225 heads (a total of 749 heads) with a population of 631 cattle. This shows that Tanjungbalai regency has beef cattle production capacity is still very low compared to the growing demand for livestock products. This causes Tanjungbalai regency to become one of the livestock market areas from other regions. Fulfilment of beef cattle needs is generally in the area of Asahan and Simalungun Regencies. In addition, frozen meat is also circulating from abroad, both legal and illegal.
To find out how much the development potential of beef cattle based on feed resources and the strategies applied for its development, we consider it necessary to conduct research in order to identify and analyze the potential of feed resources for the development of beef cattle in Tanjungbalai regency and formulate strategies for developing feed-based beef cattle in Tanjungbalai regency.

2. Materials and methods
This research was carried out in two stages, the first stage was to analyse the potential for developing beef resources based on feed resources in Tanjungbalai regency. The method used in this research is survey method. Document retrieval using purposive sampling method. Forage sampling is done by random sampling in areas that have the largest area of coconut and oil palm plantations. The sample is taken as much as 10% of the area of the plantation. The sampling area is divided per one hectare. Each hectare selected 5 plots with a size of 1 m² at random and the average value was taken.

Sampling of rice straw, corn straw and sweet potato leaves was taken in areas that were harvesting rice, corn and cassava. For each harvested crop (at least ½ ha) three random plots will be taken and the average is taken. Sources of document in this study are primary document and secondary document. Primary document is obtained from direct observation in the field. Secondary document are document derived from BPS Tanjungbalai regency, Food and Agriculture Office of Tanjungbalai regency and other relevant agencies. Document analysed:

2.1. Location quation analysis (LQ)
LQ analysis is used to determine the area of Bases or Non-Base beef cattle in Tanjungbalai regency. The LQ method is formulated as follows:

\[ LQ = \frac{Si}{Ni} \]  

Note:
Si: The ratio between the population of beef cattle (AU) in a particular region and the population in the same region.
Ni: Ratio between cattle population in certain regions and the population in the same area

2.2. Calculation of crop waste and forages production

\[ \text{production per plot} = \text{Production sample } 1 \times 1 \text{ m}^2 \]  

\[ \text{Production/ha} = \frac{\text{Sample Area of 1 ha}}{\text{Sample area}} \times \text{production per plot} \]  

\[ \text{Production/year} = \text{Production/ha} \times \text{area} \times \text{Amount of harvest a year} \]  

2.3. Calculation of agricultural industrial production waste
Calculating the amount of all agricultural industrial production / waste that can be used for beef cattle feed.

2.4. Carrying capacity (AU) [6]

\[ \text{Carrying capacity (AU)} = \text{Dry material production} = (\text{kg year}^{-1}) \]  

2.5. Analysis of ruminant animal population enhancement capacity (KPPTTR)
KPPTTR calculations [12]

\[ \text{PSML} = \text{Kt.HMT} + \text{Kt.LI} + \text{Kt.LP} \]  

Note:
PSML: Maximum potential (animal unit = AU) based on feed resources
Kt.HMT: Capacity of forage (AU)
Kt.LI: Industrial Waste Capacity (AU)
Kt.LP: Agricultural Waste Capacity (AU)
The second stage, formulates the strategy for developing beef cattle based on feed resources that can be applied in Tanjungbalai District. Based on the results of the first stage research and discussion with the Focus Group Discussion (FGD) method to obtain a formula for the development of feed-based beef cattle in the regency of Tanjungbalai. The FGD participants were Food and Agriculture service stakeholders (head of livestock department, agricultural head of department, section head in the field of animal husbandry, head of the breeding nursery, slaughter house, field extension, IB officers, livestock entrepreneurs, slaughterers and breeders in Tanjungbalai regency. Number of participants The FGD was 8 [7][8]. For strategy analysis using the SWOT analysis [4][10].

3. Results and discussion

3.1 Base and non-basis areas of beef cattle in Tanjungbalai Regency
The beef cattle base area in Tanjungbalai regency is Datuk Bandar District and Sei Tualang Raso District. The base region is indicated by the Location Quation (LQ) calculation of the region having an LQ value ≥ 1. The list of base and non-base regions can be seen in Table 1.

| No. | Sub District          | Beef Cattle populations | LQ |
|-----|-----------------------|-------------------------|----|
| 1.  | Datuk Bandar          | 347                     | 2.5|
| 2.  | East of Datuk Bandar  | 45                      | 0.6|
| 3.  | North of Tanjungbalai | 0                       | 0  |
| 4.  | South of Tanjungbalai | 0                       | 0  |
| 5.  | Sei Tualang Raso      | 120                     | 1.3|
| 6.  | Bay of Nibung         | 119                     | 0.8|
|     | Amount                | 631                     |    |

3.2 Calculation of crop waste and forage production
Production of agricultural waste in Tanjungbalai regency is food crop waste and industrial plant waste, namely; rice straw, corn straw, cassava leaves, palm leaf midrib, coconut leaf midrib and others in small amounts. The total production of agricultural crops / industrial plants can be seen in Table 2.

| No. | Plant waste          | Harvest Area (Ha) | Fresh Production (kg year⁻¹) | Dry matter (kg year⁻¹) |
|-----|----------------------|-------------------|------------------------------|------------------------|
| 1.  | Rice straw           | 173               | 2,076,000                    | 793,447                |
| 2.  | Corn straw           | 12                | 396,000                      | 113,613                |
| 3.  | Cassava leaves       | 20                | 200,000                      | 65,020                 |
| 4.  | palm fronds          | 478.5             | 6,568,848                    | 2,438,357              |
| 5.  | Coconut leaf midrib  | 657.5             | 4,773,450                    | 1,572,357              |
|     | Amount               | 14,014,298        | 4,982,811                    |                        |
The number of livestock forage (HMT) production in Tanjungbalai regency can be seen in Table 3.

### Table 3. Total forage production in Tanjungbalai regency

| No | Forage                          | Fresh production (kg year\(^{-1}\)) | Dry matter (kg year\(^{-1}\)) |
|----|---------------------------------|-------------------------------------|------------------------------|
| 1. | Forage on oil Palm Plants       | 43,417,500                          | 19,099,359                   |
| 2. | Forage coconut plants           | 49,312,500                          | 13,694,082                   |
| 3. | the rice fields                 | 1,720,800                           | 352,076                      |
|    | **Amount**                      | **94,450,800**                      | **33,145,517**               |

#### 3.3 Increasing the ruminant population (KPPTR)

The capacity value of increasing the ruminant population (KPPTR) of Tanjungbalai regency is 14.399 AU, as shown in Table 4.

### Table 4. The value of Capacity KPPTR Tanjungbalai regency

| No | District                     | Feed production (DM year\(^{-1}\)) | Real population (AU) | Carrying capacity (AU) | Increasing the ruminant population (KPPTR) |
|----|------------------------------|------------------------------------|----------------------|------------------------|--------------------------------------------|
| 1. | Datuk Bandar                 | 20,217,256                         | 345                  | 7,385                  | 7,040                                      |
| 2. | East of Datuk Bandar         | 7,441,491                          | 50.9                 | 2,718                  | 2,667                                      |
| 3. | North of Tanjungbalai        | 13,417                             | 0                    | 5                      | 5                                          |
| 4. | South of Tanjungbalai        | 0                                  | 0                    | 0                      | 0                                          |
| 5. | Sei Tualang Raso             | 7,134,805                          | 95                   | 2,606                  | 2,511                                      |
| 6. | Bay of Nibung                | 6,221,585                          | 97.8                 | 2,273                  | 2,175                                      |
|    | **Amount**                   | **41,028,554**                     | **588.7**            | **14,987**             | **14,399**                                 |

#### 3.4 Internal strategic factors analysis summary (IFAS) and external strategic factors analysis summary (EFAS)

Evaluation of the factors that influence the development of feed-based beef cattle in Tanjungbalai regency, obtained evaluation results consisting of internal factor evaluation (IFAS) and external factor evaluation (EFAS), can be seen in Table 5.

The results of internal factor analysis show a positive value, this means that Tanjungbalai regency has greater strength than weaknesses, with the main strength lies in the availability of land that supports the development of feed, the availability of abundant feed sources and supporting geographical location. Weaknesses in the form of traditional farming, low knowledge of farmers about feed processing technology and low level of land ownership.

The results of external factor analysis (Table 6) show positive values, greater opportunities than threats. Demand for processed feed / concentrate tends to increase. This increase in demand shows the high interest of farmers using feed for beef cattle fattening and is the main opportunity for developing beef cattle feed processing business in Tanjungbalai regency. The other main opportunity is the regency of Tanjungbalai is a transit point for agricultural produce and animal feed. This is very beneficial because farmers are easier to obtain and sell agricultural produce and animal feed.

The government's support for the improvement of the quality and quantity of animal feed can be seen from the activities of the Food and Agriculture Agency to train farmers to process agricultural waste into better quality feed, help with feed processing equipment and help with high-quality animal feed.

There are several threats that need to be considered, namely limited skilled labour. Workers in the field of farming with simple skills, especially those skilled in processing beef cattle feed are very lacking, this causes the utilization of feed sources of beef cattle in the regency of Tanjungbalai is not
utilized optimally. The large number of farmers from outside the city who take forage in Tanjungbalai regency is a threat to local farmers. This is because the number of forage production in Tanjungbalai regency has not been utilized by local farmers. Another threat is that feed raw materials are sent out of the area, the conversion of smallholder agricultural / plantation land to the housing sector and settlements, industry and other public facilities that are classified as high in urban areas are serious threats to beef cattle consumption, especially for the provision of forage.

**Table 5.** Internal factor evaluation matrix (IFAS) of beef cattle-based development in Tanjungbalai regency

| Internal factor | Weight | Rating | Score |
|----------------|--------|--------|-------|
| Strengths      |        |        |       |
| The availability of abundant food sources | 0.131 | 4 | 0.524 |
| Availability of land that supports the development of feed | 0.135 | 4 | 0.540 |
| There is an industry producing feed ingredients | 0.088 | 3 | 0.264 |
| Supporting geographical location | 0.132 | 4 | 0.528 |
| The high motivation of farmers to study feed processing technology | 0.064 | 3 | 0.192 |
| Regional topography that supports the development of forage. | 0.093 | 3 | 0.279 |
| **Sub totally** | 0.643 | | 2.327 |
| Weakness       |        |        |       |
| Limited business capital | 0.050 | 2 | 0.100 |
| Traditional farming | 0.098 | 3 | 0.294 |
| Low knowledge of farmers about feed processing technology | 0.067 | 3 | 0.201 |
| Low level of land ownership | 0.072 | 3 | 0.216 |
| Limited access to company farmers producing feed ingredients | 0.035 | 2 | 0.070 |
| Low livestock population | 0.035 | 2 | 0.070 |
| **Sub totally** | 0.357 | | 0.951 |

**Table 6.** External factor evaluation matrix (EFAS) of beef cattle development in Tanjungbalai

| External factors                          | weight | Rating | Score |
|-------------------------------------------|--------|--------|-------|
| Opportunity                               |        |        |       |
| Demand for processed feed / concentrate tends to increase. | 0.107 | 4 | 0.428 |
| Development of feed processing technology | 0.069 | 3 | 0.207 |
| The price of processed feed is relatively stable | 0.078 | 3 | 0.234 |
| Is a place of transit of agricultural produce and animal feed | 0.104 | 4 | 0.416 |
| Government support for animal feed development | 0.095 | 2 | 0.190 |
| The area around Tanjungbalai regency is an agricultural and agricultural industry. | 0.124 | 2 | 0.248 |
| **Sub totally**                           | 0.576 | | 1.721 |
| Threat                                    |        |        |       |
| Many out-of-town farmers take forages in Tanjungbalai City | 0.091 | 2 | 0.182 |
| The high transfer of land functions       | 0.125 | 1 | 0.125 |
| Limited skilled labour                    | 0.079 | 3 | 0.237 |
| Seasonal flooding                         | 0.026 | 3 | 0.078 |
| Feed ingredients are sent outside the area. | 0.078 | 2 | 0.156 |
| Urban layout                              | 0.025 | 3 | 0.075 |
| **Sub totally**                           | 0.424 | | 0.853 |
3.5. General description of beef cattle development strategy in Tanjungbalai Regency

To make an overview of the strategy of developing feed-based beef cattle in the regency of Tanjungbalai from the results of the Internal Factor Evaluation Matrix (IFAS) and the External Factor Evaluation Matrix (EFAS) produce an S - O (Strengths-Opportunities) strategy. This category contains alternative strategies that are empowering the power to take advantage of opportunities. This strategy was chosen if the IFAS score was greater than 2 (2.327 + 0.951 = 3.278) and the EFAS score was greater than 2 (1.721 + 0.853 = 2.574).

The management of the power that is owned to take advantage of the opportunities that exist in the development of beef cattle based on feed resources in Tanjungbalai regency produces a strategy “Building beef cattle feed processing industry by utilizing feed resources, raw material industry, geographical location and government support.” utilizing feed resources, raw material industry and geographical location must be supported by an increase in livestock population, especially the provision of superior seeds and breeders' human resources. Intensive livestock maintenance by stimulating the use of available feed sources must be carried out immediately to accelerate the development of beef cattle farming. The strategic geographical location of Tanjungbalai regency in the trade route strongly supports the development of the animal feed industry because of the ease of obtaining raw materials and marketing.

4. Conclusions

The potential of feed resources can support the development of beef cattle in the regency of Tanjungbalai with a feed production of 41,028,554 DM/year and can increase the capacity of ruminant livestock population by 14,399 AU. The strategies that can be used for the development of beef cattle in Tanjungbalai regency are; Build a beef cattle feed processing industry by utilizing feed resources, raw material industry, geographical location and government support.

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