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Potential Analysis and Development Strategies Based on Zoning For Beef Cattle Farming in Kepulauan Bangka-Belitung Province

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ABSTRACT

This research was aimed in determining the potency mapping and development strategies based on zoning for beef cattle farming in Kepulauan Bangka Belitung Province. This research was implemented by using two-stages survey method. The first stage was analyzing and making regional potency mapping from secondary data with potential index analyses. The second stage was observing the results of the observation, an in-depth interview, and focus group discussion towards 42 respondents consisted of 14 cattle farmers, 5 cattle sellers, 5 agriculture agency officers, and 18 officials who were in charge of the cattle function in regency/city. Purposive sampling was used to choose respondents. Meanwhile, the data analysis used SWOT analysis. The results of potency mapping showed that Bangka had the highest index (the most potential). Pangkalpinang had the lowest index (potential). The qualitative SWOT analysis resulted in the strategy of SO (Strength-Opportunity), WO (Weakness-Opportunity), ST (Strength-Treat), and WT (Weakness-Threats). Qualitative analysis of SWOT showed the internal factor -0,153 (x) and external factor 0,34 (y). The strategies were in quadrant III; changing the policies by minimizing the weakness to take advantage of opportunities. The analysis for RTRW documents and the result of SWOT analysis generated 6 (six) zones and development priorities. Thus, the development plan of beef cattle consisted of priority zones: 1) I: production center and product processing in Bangka Tengah; 2) II: Cattle farmer integration in Bangka, Bangka Barat, and Belitung Timur; 3) III: Cattle farming in a previously ex-mining land in Bangka, Bangka Barat, and Belitung Timur; 4) IV: production center with local based feed production in Bangka Selatan; 5) V: Modern cattle farm with technology-based in Pangkalpinang; 6) VI: Animal farm with agrotourism based in Pangkalpinang and Belitung.

Keywords: SWOT analysis, Potency mapping, Strategy priority, Beef cattle, Zoning strategy

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Introduction

Beef cattle of the the livestock sub-sector commodity as an integral part of livestock sector plays an importance role in supplying meat as a source of animal protein in Indonesia. It shows that beef cattle farms have a bright future since the demand for materials derived from livestock increase as the population, money, and people's awareness of the value of eating healthy food rises. Meat consumption in Indonesia every year also always increases, due to public awareness of the importance of consuming animal protein (Tadete et al., 2016). This condition is caused by important role of meat as a source of high-quality proteins, minerals and vitamins and other compounds, which was difficult to obtain in sufficient amount from other sources (Geiker et al., 2021).

Most of the beef production in Indonesia, 78% from the total of beef cattle production come from traditional livestock, 5% from imports, and 17% from live livestock imports, especially from Australia (Zakiah et al., 2017). The demand also always increases every year, as well as the number of beef cattle import which also continues to grow since domestic cattle farms have not been able to meet market needs. In addition, the quality of imported meat also has several advantages, such as being tenderer than traditional beef cattle, a high degree of marbling, so that it is favored by consumers (Priyanto et al., 2015).

In achieving a national increase in beef cattle population, it is necessary to support the regions in Indonesia which still have potential resources of cattle populations. Kepulauan Bangka Belitung Province (Babel), as the area with the lowest beef cattle population in Sumatra, has the potential to increase its beef cattle population.

Babel Province has natural resources in the form of land as a place for livestock keeping and forage production. Good quality and forage availability can increase production, especially for increasing body weight of cattle (Suhaema *et al.*, 2014). Forage producing areas in Babel Province include gardens (160,327), rice fields (25,093 Ha), palm plantation (48,351.9) and forests (43,661 ha). The beef cattle population in this Province during the 2014-2019 period continued to increase, ranging from 10,136; 10,557; 11,604; 12,664; 13,760; and 14,760 (BPS Provinsi Kepulauan Bangka Belitung, 2020). Until now, the annual increase in population has not been commensurate with the needs of beef cattle in the region, so Babel has to import livestock from outside region, either in the form of frozen meat or feeder cattle.

The development of beef cattle farms has become one of working program priorities of Kepulauan Bangka Belitung Governor, as detailed in the Regional Medium Term Development Plan (*Rencana Pembangunan Jangka Menengah Daerah / RPJMD*) for increasing beef cattle production. The Governor also targets Kepulauan Bangka Belitung Province to become a cattle center in the Sumatera and be able to reach meat self-sufficiency. Therefore, the local government through the Agricultural Agency of Kepulauan Bangka Belitung Province proclaimed the program of “*Babel Lumpat (Babel Lumbung Pangan Asal Ternak)*” which means the realization of Babel as the livestock center in the Sumatera region.

To achieve the target, an alternative strategy that matches each potential region should be formulated. The alternative strategies must be elaborated in terms of zoning strategy, because the condition of each regency/city is different, especially the Babel contour area which is an archipelago. Very few studies have been carried out on the development of beef cattle farming in the Babel region, because Babel is indeed known as a tin mining area, not an agricultural and livestock area. Research that had been conducted was about the potential of Belitung district as a beef cattle development area (Erbowo, 2013). The results of the research only explained the components, as well as the strategies needed in the development of beef cattle area in Belitung Regency. So far, there is no research and comprehensive analysis that had been conducted to determine the strategy to support the development of beef cattle in Babel. Therefore, this research was aimed at developing an alternative strategy based on zoning for beef cattle according to the potency analysis of each region in Bangka Belitung Province. The findings of this research were expected to provide a guide for local governments in developing the most appropriate program for beef cattle as an important sub-sector for regional development in Kepulauan Bangka Belitung Province.

Materials and Methods

This research used a survey method which was executed by using 2 (two) stages. The first stage was to do an analysis on region potency mapping. The second stage was to create a formula for an alternative strategy.

The region potency analysis and mapping

This research was based on secondary data to analyze and map the potential development of beef cattle farming in each regency/city. The secondary data were gathered from the Ministry of Agriculture Republic of Indonesia, Central Bureau of Statistics (BPS), and the local Agency that was in charge in the cattle farming function in the research area. The data were gathered from the data of physical resources, human resources, social resources, and also from the supporting infrastructures which were taken from the Ministry of Agriculture Republic Indonesia, Central Bureau of Statistics (BPS), and the local Agency in the research area.

Carrying capacity was calculated based on the production of dry matter forage towards the minimum feed requirements of cattle (1 AU) in one year (Sulfiar *et al.*, 2020). The animal unit (AU) was a unit for the ruminant cattle population multiplied by the conversion factor. The conversion factor for beef cattle was 0,7 (Saputra *et al.*, 2016). Dry matter forage production was the amount of natural forage potential, potential agricultural waste, and potential forage from palm plantation, using equations of Yuniar *et al.* (2016), Suhaema *et al.* (2014), and Rizali *et al.* (2018). The minimum cattle feed requirements was estimated by using equation of Rizali *et al.* (2018). Natural forage potential (ton) = $\{(Ga \times 2.875) + (Fa \times 0.6) + (Cpa \times 10) + (Cfa \times 0.5) + (Cla \times 5)\} \times 0.5$ where Ga is garden area, Fa is forest area, Cpa is coconut plant area, Cfa is coffee plant area, Cla is clove plant area. The numbers in the formula are assumed to be natural forage potential produced per hectare of the land area.

Potential of agricultural waste (ton) = $\{(wr \times 0.4) + (fr \times 3 \times 0.4) + (cn \times 3 \times 0.5) + (sb \times 3 \times 0.55) + (pt \times 2 \times 0.55) + (sp \times 0.25/6) + (cs \times 0.25/4)\} \times 0.65$ where wr is wetland rice, fr is field rice, cn is corn, sb is soybean, pt is peanuts, sp is sweet potatoes, cs is cassava. The numbers in the formula are the assumptions about the potential waste produced from the production of each type of plant food.

Potential of palm plantation forage = $23 \times 0,007 \times 312 \times 36\% = 18$ ton dry matter/year where 23 is the amount of midrib; 0,007 is the weight of each midrib; 312 is the amount of working days; 36% is the dry matter of midrib. The numbers in the formula are the estimation about the potential dry matter produced from the palm plantation.

Minimum cattle feed requirements (R) = $3\% \times 200 \text{ kg} \times 365 = 2,190$ ton DDM/year/AU. R is minimum cattle feed requirements (1 AU) in tons of digestible dry matter for 1 year, 3% is the

minimum requirement for the number of forage rations (dry matter) on livestock weight, 200 kg is the live weight of 1 AU of beef cattle, 365 is the number of days in 1 year.

The population pressure value was calculated by using the formula of *Otto Soemarwoto Model III* (Herlindawati *et al.*, 2018) as follows:

$$TKt = (1 - \alpha t) \cdot zt \cdot \frac{ft \cdot P_0(1+r)^t}{Lt}$$

From the formula above, *TK* is the population pressure towards the agricultural land, *t* is the calculation of time, *z* is the land area that supports the life of a farmer at a desired level of living, i.e 0,78 ha/person (Nazam *et al.*, 2011), *f* is the farmer percentage of the population. *P₀* is the number of population in people reference time (people), *r* is the level average of annual population growth rate, and *L* is the extensive farming land which is available in the related area, *α* is the income fraction of non-farming (0.35). The classification of population pressure value of < 1 means that it had not experienced the population pressure in this particular area. The value of >1 means that the particular area had experienced population pressure that exceeds the land capacity (critical level).

The potency map of the area was analyzed by using the potential index analysis method by Ahmad and Sugiharto (2018), in which the potential index was determined by weighting each indicator and its variable based on the priority as determined by Expert Judgement towards 5 (five) respondents from the Agricultural Agency of Kepulauan Bangka Belitung Province who was considered well-informed about the condition of beef cattle farming in Babel. Before determining the potential index process was started, the equalization of each variable and indicator was conducted by using measurement scale application between 0 (0%) to 1 (100%).

The indexing measurement was conducted by using the formula:

X_{in} index variable:

The Variable of *X_i* District n-Minimum Value *X_i* All Districts
Maximum Value *X_i* All Districts-Minimum Value of *X_i* All Districts

Since the indicator of population pressure has a negative correlation, the reverse calculation was applied to be: (1-*X_{in}*). The result of the calculation shows the highest value and lowest value that can be used as the basic standard to determine 4 (four) potential criteria ([most potential, potential, less potential, and low potential) for the index in each variable and indicator.

Alternative strategy formulation

This research used primary data, secondary data, and previous results of the study. This research was aimed at formulating an alternative strategy that includes zoning, priority, and strategy development plan.

Purposive sampling was used to collect data from 14 cattle farmers, 5 cattle sellers, 5 Agriculture agency officers, and 18 officials who are in charge of the animal production in the regency/city. The primary data were taken from the in-depth interview, focus group discussion (FGD), and questionnaire. The primary data were collected from the internal factors, consisted of the strengths and weaknesses, also the external factors from the opportunity and threat towards the development of beef cattle farming. The qualitative and quantitative data were analyzed by using the SWOT method based on Rangkuti (2016).

Results and Discussion

Region potential mapping

The result of Expert Judgement in Table 1 showed the illustration of urgency level indicator and its variable in developing the beef cattle in Babel. The physical resources had the highest urgency level of 32.7%, and then human resources of 29%, social resources of 19.4%, and infrastructure of 19%.

Table 1. Indicator percentage and potential variable

Variable	* Weight (%)	Indicator	**Weight (%)
Physical Resources	32.7	Carrying Capacity	11.8
		Rainfall	6.2
		Population Pressure	7.4
		Temporarily unused land	7.2
		Total Farmers	3.5
		Total farmer in the productive age	3.6
Human Resources	29	Education	3.4
		Internet use	3.4
		Agricultural technology use	3.4
		Ownership of land	2.9
		Number of medic/paramedics veterinary	4.9
		amount of feed and breed supervisor	3.8
Social Resources	19.4	Total farmers group	4.8
		Total farmers group up to beginner class) (group)	4.3
		Total cattle farmers group	6.7
		Total agribusiness cooperative/unit	3.6
		Animal health center	6.7
		Artificial insemination center	5.1
Infrastructure	19	Slaughterhouse	2.5
		Veterinary laboratory	4.7

*The result of *expert judgement* with scale 0-100% from variable total

**The result of *expert judgement* with a scale of 0-100% from the percentage of each variable.

Table 2. Region potency map

Characteristic of potency	Regency / City							
	Bangka	Belitung	Bangka Barat	Bangka Tengah	Bangka Selatan	Belitung Timur	Pangkalpinang	Babel Prov.
Physical resources								
Carrying capacity (AU)	119,567.8	33,281.8	102.445	49.602,7	96.865,5	42.488,3	1.207,2	445.458,2
Rain fall (mm/year)	2,073.3	2,650	2.073,3	2.355,3	2.355,3	2.650	2.073,3	2.588,6
Population Pressure	0,9	0,4	0,5	0,6	0,7	0,5	9,6	0,6
Temporarily unused land (ha)	27,544	2,502	15,820	0	5,590	7,309	410	59,175
Potential criteria	Most Potential	Potential	Most Potential	Less Potential	Most Potential	Most Potential	Low Potential	
Human resources								
Total farmers (%)	19	10.6	13.3	15.2	21.4	18.1	2.8	14.3
Total farmers in productive age (%)	53.4	52	52.5	5.6	58.2	53.6	44	53.9
Total farmers undergraduate of highschool (%)	22.7	15.4	19.5	17.2	14.9	18.7	26.2	18.9
Internet use by farmers (%)	21.5	20.5	16.4	16.6	18.5	26	23.3	19.9
Ownership of land up to 0,5 Ha (%)	74.4	54.1	79.7	68.4	79.8	56.8	28	71
Agricultural technology use (%)	39.9	15.7	7.9	17.1	12.7	25	14.5	19
Amount of medic/paramedic veterinary (persons)	4	3	4	5	6	2	4	36
Amount of feed and breed supervisor (persons)	3	3	1	3	5	1	3	31
Potential criteria	Most Potential	Potential	Potential	Potential	Most Potential	Potential	Potential	
Social resources								
Total farmers group	1,026	351	1,210	1,044	959	445	96	5,131
Total farmers group up to beginner class (group)	18.9	10.8	5.6	27.2	5.3	0.9	20.8	12.8
Total cattle farmers group (group)	6.9	9.1	2.8	7.5	1	4.5	11.5	5
Total agribusiness cooperative (unit)	17	2	3	4	3	0	0	29
Potential criteria	Most Potential	Potential	Potential	Most Potential	Less Potential	Less Potential	Potential	
Infrastructure								
Animal health center (unit)	1	0	0	0	0	0	2	3
Artificial insemination center (unit)	0	1	0	1	0	1	1	4
Slaughter house (unit)	1	1	.0	1	0	1	1	5
Veterinary laboratory (unit)	0	0	0	0	0	0	2	2
Potential criteria	Potential	Potential	Low Potential	Potential	Low Potential	Potential	Most Potential	

The analysis result in Table 2 showed the potential index in each level. The condition of different resources produced the various potential index in each district/city. The highest index of physical resources with the "most potential" criteria is Bangka, followed by Bangka Barat, Belitung Timur, and Bangka Selatan. The best index of human resources with "most potential" criteria is Bangka followed by Bangka Selatan. The best index of social resources with criteria "most potential" is Bangka followed by Bangka Tengah. The best infrastructure potential index with criteria "most potential" is Pangkalpinang.

The potential region of beef cattle development in Babel can be seen in Picture 1. The analysis result showed that the regency/city in the Babel region had the potential to develop beef cattle farming, with index 4 (most potential) for Bangka, and index 3 (potential) for other regencies/cities. The difference of potential value in each region will be considered in the policy making. By using the region potential map, the comparative superiority of a region can be identified, thus it can be utilized in planning and developing the strategy (Badan Koordinasi Penanaman Modal, 2019).

Alternative strategy

The alternative strategy was taken from the SWOT analysis results qualitatively and quantitatively. It can be seen in Table 3 and Table 4. The qualitative SWOT analysis showed that there were 4 [four] types of strategies that could be applied, i.e the strategy of SO (Strength-Opportunity), WO (Weakness-Opportunity), ST (Strength-Threat), and WT (Weakness-Threats). The quantitative SWOT analysis showed that the average power – the average weakness was $2,890 - 3,043 = -0,153$ (x) and the average opportunity – the average threat is $3,244 - 2,845 = 0,34$ (y). The strategy matched in the development of beef cattle farming is turning around strategy (quadrant 3), i.e W-O (Weakness-Opportunity) strategy is to minimize the weakness in catching the available opportunities. The strategy of beef cattle development in Bangka Belitung based on SWOT analysis can be seen in Picture 2.

The W-O strategy covered the improvement of quality and quantity of Human Resources in the agricultural sector. The condition of beef cattle production system in Babel, which is currently dominated by smallholders, requires

Table 3. Matrix of SWOT development of Beef Cattle Farm

	Strength (Strength-S)	Weakness (Weakness-W)
	<ol style="list-style-type: none"> 1. Natural grass potency 2. Cropland potency 3. Palm oil plantation land potency 4. Ownership of land by Farmer 5. Number of farmers (%) 6. Total farmers in the productive age 7. Internet use by farmers 	<ol style="list-style-type: none"> 1. Farmer's level education 2. Technology use by farmers 3. Cattle farm as side job and cattle farm as savings 4. Equity and money institutions reach 5. Cattle distribution location 6. Expertise limitation (number and access) 7. Farmer experience 8. Supporting Facility and Infrastructure 9. Product Diversification
Opportunity (Opportunity-O)	Strategy S-O	Strategy W-O
<ol style="list-style-type: none"> 1. The demand of meat and cattle supply 2. Untapped land availability 3. Supply chain performance efficiency 4. PDRB of agriculture sector always increases 5. No competition with big companies 6. The need for compost in the region is high 7. Climate conditions and geographics which are supported 8. Support from government 	<ol style="list-style-type: none"> 1. The utilization of region potency optimally (S1, S2, S3, S4, S5, S6, O1, O2, O3, O4, O6, O7, O8) 2. Market distribution network development (S5, S6, S7, O1, O3, O5, O8) 	<ol style="list-style-type: none"> 1. The quantitative and qualitative improvement of human resources in the agriculture sector (W1, W2, W3, W4, W7, O1, O2, O3, O5, O6, O7, O8) 2. Increase the number and quality of supporting infrastructure and facilities (W2, W8, W9, O1, O2, O3, O4, O5, O6, O7, O8) 3. Access Facilitation of equity and business relationship through synergy between cattle stakeholders (W4, W6, W8, W9, O1, O2, O3, O4, O5, O6, O7, O8)
Threat (Threat-T)	S-T Strategy	W-T Strategy
<ol style="list-style-type: none"> 1. Land conversion for tin mining 2. Cattle disease outbreak 3. Female productive slaughter 4. Soil pH condition is too acid 5. The number of regional policies related to beef cattle which is very minimum 6. Cattle theft in some areas 7. Natural disaster (flood) 	<ol style="list-style-type: none"> 1. The development of integrated beef cattle in former mining land (S1, S2, S3, S4, S5, S6, S7, T1, T4, T5, T7) 2. Mentoring and supervising in cattle farmer and <i>peternak rakyat</i> (S4, S5, S6, S7 T2, T3, T6) 	<ol style="list-style-type: none"> 1. Improve the agriculture and cattle sector investment (W4, W5, W6, W8, W9, T1, T2, T3, T5, T6) 2. Mining, cattle, and agriculture program evaluation (W1, W2, W3, W7, T1, T2, T3, T6) 3. Formulate the policy of mining land reclamation with the beef cattle land utilization as the basic (W5, W9, T1, T4, T7)

assistance through empowering human resources. Smallholder farmers often have limited access to the inputs, information and services they require to grow a better future. They need to be continuously empowered in terms of input technologies, financial support, information, and markets (Agus and Widi, 2018). Besides that, policies that need to be carried out to attract young people into the agricultural sector are intensive policies for young farmers (Arvianti *et al.*, 2019).

The next strategy was to increase the number and quality of supporting facilities and infrastructure. Livestock technology, as part of supporting facilities and infrastructure, had a huge impact on livestock development. Technologies such as Artificial Insemination (IB) and Embryo Transfer (TE) have a role in support animal husbandry (Rusdiana and Talib, 2019), so the existence of facilities such as animal health center and artificial insemination post is very important.

The next strategy is to facilitate the equity and business relationship. The government must be able to open up and make equity access, as

well as commercial relationships and partnerships to be more accessible and simple. Concrete efforts will be needed by government, universities, research centers, extension services, and producers themselves to overcome constraints. Commercialization should be increased in all sectors of the livestock industry and general population (Merkel, 2019). The example of equity access can be implemented through the Program of *Kredit Usaha Rakyat (KUR)* and Corporate Social Responsibility (CSR) which weredirected toward the development of beef cattle for society in Indonesia.

Zoning and strategy priority

The zoning and strategy priority is arranged based on the SWOT analysis result and the documents of spatial lay out and territory planning (*Rencana Tata Ruang Wilayah/ RTRW*). According to Rustiadi *et al.* (2011), the RTRW document has a role in spatial setup, hence it contributes significantly to the regional development program. This analysis identified six zonings and development priorities. These six

Table 4. Internal and External Factors of Beef Cattle Development

	Strength	*Weight	**Rating	***Score	
	Support from government	0.164	3.65	0.598	
	Natural grass potency	0.148	3.26	0.482	
	Cropland potency	0.114	2.78	0.316	
	Palm oil plantation land potency	0.148	2.91	0.430	
	Ownership of land by Farmer	0.116	2.74	0.317	
	Number of farmer (%)	0.114	2.78	0.316	
	Total farmers in the productive age	0.116	2.83	0.328	
	Internet use by farmers	0.082	2.78	0.228	
	<i>Total</i>	1		3,015	
Internal Factors Strategy	Weakness	*Weight	**Rating	***Score	
	Farmer's low-level education	0.113	3.04	0.342	
	Farming technology use which is low	0.116	3.30	0.384	
	Cattle farming becomes a side job and saving	0.122	3.00	0.365	
	Equity limitation and money access	0.109	3.04	0.331	
	Cattle distribution which has small numbers	0.113	2.78	0.313	
	Limitation of experts (number and access)	0.114	3.00	0.343	
	Farmer experience	0.103	3.09	0.319	
	Supporting Facility and Infrastructure	0.105	3.09	0.325	
	Product Diversification	0.105	3.04	0.320	
	<i>Total</i>	1		3,043	
	<i>average of strength-weakness = 2,890 – 3,043 = -0,153 (x)</i>				
	External Factor Strategies	Opportunity	*Weight	**Rating	***Score
Cattle demand and supply are high		0.166	3.52	0.584	
Untapped land availability		0.151	3.30	0.499	
Supply chain performance efficiency		0.136	2.91	0.396	
PDRB of agriculture sector always increases every year		0.129	2.87	0.371	
Low competition with big companies		0.112	2.83	0.317	
The need for compost in the region is high		0.157	3.39	0.534	
Climate conditions and geographics which are supported		0.149	3.26	0.485	
<i>Total</i>		1		3,185	
		Threat	*Weight	**Rating	***Score
Land conversion for tin mining		0.170	3.04	0.517	
Cattle disease outbreak		0.140	2.96	0.414	
Female productive slaughter		0.137	2.87	0.394	
Soil pH is too acid for HPT	0.170	3.13	0.532		
Minim peraturan daerah tentang sapi potong	0.162	2.96	0.478		
Cattle theft	0.111	2.35	0.259		
Natural disaster (flood)	0.111	2.26	0.250		
<i>Total</i>	1		2,845		
<i>average of opportunity - threat = 3,244 – 2,845 = 0,399(y)</i>					

* The weight number of one strategy in one factor divided to total weight number of all strategies in one factor.

** The total rating strategies in one factor is divided to all available ratings.

*** Multiplication result of weight value and rating.

zones can be used comprehensively in the land development instruction to effectively organize the development of the beef cattle farming system.

The first priority zone is in Bangka Tengah regency, i.e. production and processing center of beef cattle, which were focused on increasing cow productivity to meet the demand for livestock products such as feeder cattle, meat, and compost. Because this zone had a high livestock population, it had a better potential of becoming a cattle production center. Other assets of this zone included the availability of farming land, ex-mining land, excellent human resource quality, and a high economic level due to its border to Pangkalpinang city. This zone will be able to solve the issue and problem about sustainable farming system. To achieve the sustainability, extensive production systems should be considered to be shifted to semi-intensive or intensive production systems (Dung *et al.*, 2019). Governments, communities (cattleman), and the private sector (investors) must have coordination and cooperation each other so that the development of sustainable beef

cattle farms can be achieved (Santoso and Prasetyono, 2020).

The second priority zone is in the Bangka regency, Bangka Barat, Bangka Tengah, Belitung Timur, and Bangka Selatan, i.e. the crop-livestock integration which was focused on the integrated cattle development with the agriculture sector. Integrated farming system is a system that combines two or more fields of agriculture, which was based on the recycling biological concept, and linked of input-output between the mutually commodities which approach of low-external-input utilization, which was done on the land, through the utilization of crop waste, animal manure, fish waste for the purpose of increasing the production and productivity so as to increase farmer income and create farming condition that are environmentally friendly (Mukhlis *et al.*, 2018).

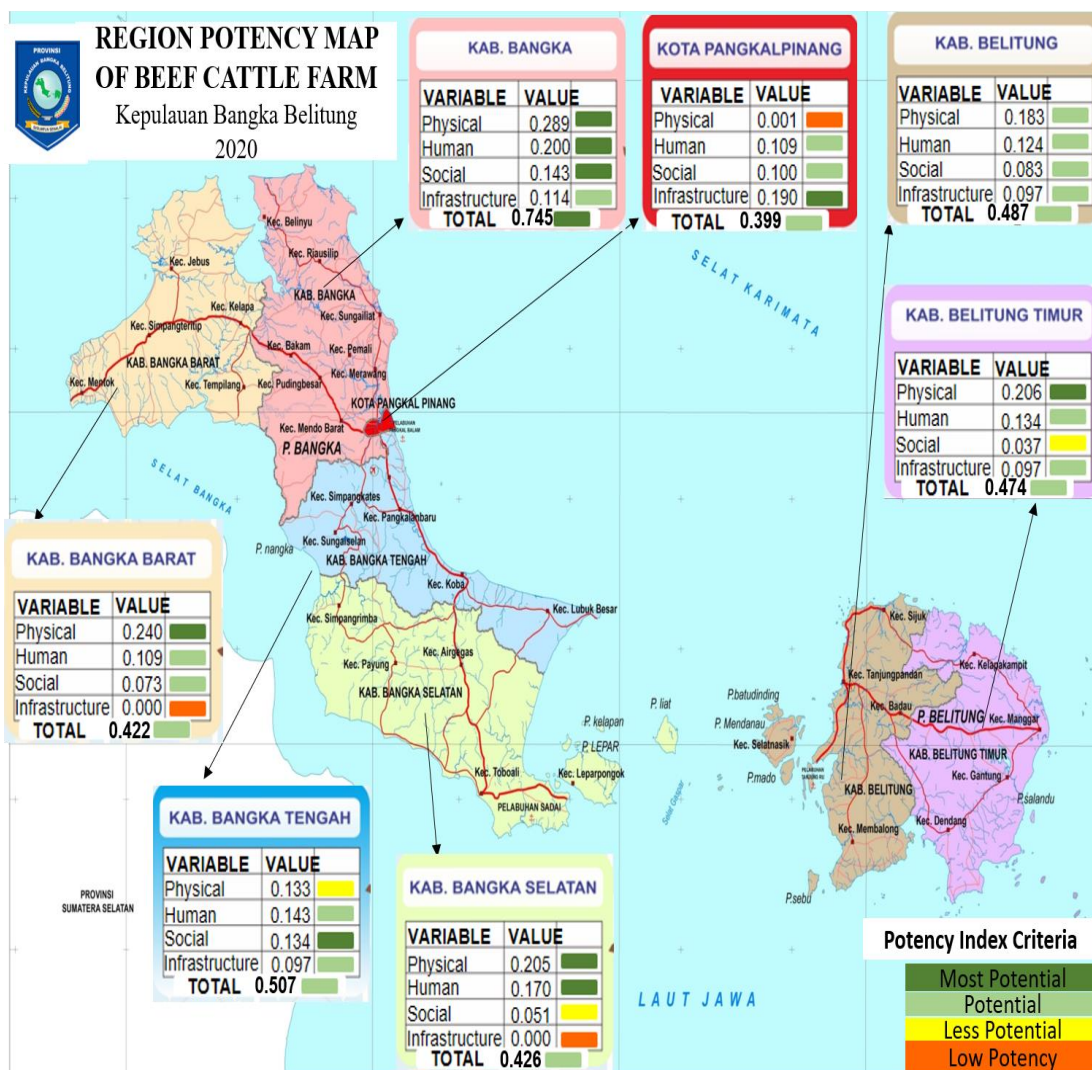
The third priority zone is located in Bangka, Bangka Selatan, Bangka Barat, Bangka Tengah, and Belitung Timur, i.e. cattle farming in ex-tin mining land which was focused on the utilization of the ex-mining land that has gone through the reclamation process and has not seen any mining

activities in a long time. The implementation of an integrated cattle system in the ex-mining land is a wise choice since it is the majority condition of which the implementation of the beef cattle system took place, related to the close relationship between cattle and plants. The biomass from the main crop commodity can be used as feed and the cattle manure can be used to improve the soil quality, while the underground water is used as the water supply in the agricultural activity (Asmarhansyah, 2017). In addition, this available land will be able to be one of the feed sources since the availability of unused land might be a location where forage grows (Rusdiana *et al.*, 2016).

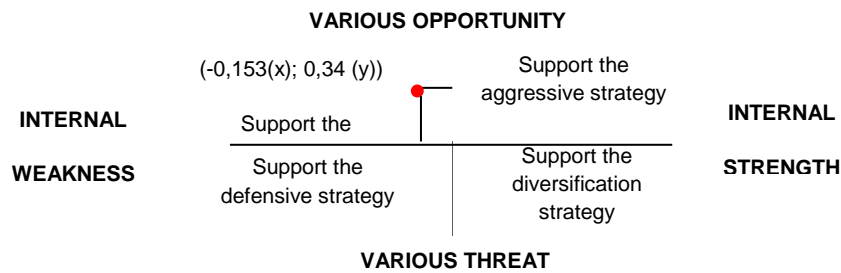
The fourth priority zone is located in the Bangka Selatan regency, i.e. a feed production facility based on local resources which were focused on producing cattle feed. The size of the farming area in this location was considered as the highest category). Biomass and byproducts of agriculture plant processing and plantation crop processing have a significant potential to be used

as feed sources, but the nutritional value in the available raw material must be improved with some treatments including physical, chemical and biological methods (Yanti and Yayota, 2017).

The fifth priority zone was in Pangkalpinang, i.e modern cattle farming with technology-based which was focused on the technology utilization based on the availability of human resources, was supported by the facilities and infrastructure to improve the cattle productivity and the efficiency level of land use. However, the livestock technology was the key to success to the beef production and distribution (Basyar, 2021). The farmer should be able to utilize the technology to increase the efficiency of resources utilization. Applied and simple technologies that were useful and easy to adopt by the farmers are a priority. Feed technologies, by-product technologies including compost management, and parasite control were among the simpler technologies required by farmers to improve cattle performance (Agus and Widi, 2018).



Picture 1. Region Potency Map of Beef Cattle Farm in Bangka Belitung Province.



Picture 2. SWOT analysis of beef cattle development strategy.

The sixth priority zone is located in Pangkalpinang and Belitung i.e the Cattle with agrotourism based, which was focused on the development of agrotourism based on livestock and agriculture sectors. The exploited ground and coastline shore, which can be developed as a beef cattle farming area, have the greatest natural potential in this zone. Pangkalpinang, the most populous city, and the Belitung district which has referred to as the tourism center in Babel have a big potential as the Regional Native Income (*Pendapatan Asli Daerah*) for Babel through the development of beef cattle based on agrotourism. Meanwhile, the development of beef cattle towards agrotourism can give the utilization either for the animal farmer and the tourism. On the other hand, by performing the cow farming activity directly for the tourist, the cattle farmer can improve their income from agrotourism and provide farming experience to the tourist. Raising cattle can also provide an attraction for tourists by using the offered services, and provided a source of income from selling the cattle (Jeczmyk *et al.*, 2021).

The development plans

The development plan of beef cattle farming in Bangka Belitung Province has been formulated in 10 years (2021 – 2030) based on the development priority zone. It is started with the development of a production center and cattle product processing in the first priority zone, because it is matched with the main target of local government to reach meat self-sufficiency, and also make Babel as one of the cattle centers in Sumatera. The first priority zone will be attempted as the cattle barn in the province so it can produce cattle feeder and beef cattle for other regions. To achieve the goal, it is necessary to use field farm potential and available ex-mining land in the second and third priority zones through cattle farmer integration in the area. If farming land and ex-mining land were used optimally, the fourth priority zone, a feed production center based on local resources, can be realized. By having the feed availability quantitatively and qualitatively, the fifth priority zone as the cattle farming with technology-based can be realized. The last is the sixth zone, which can improve the value-added in beef cattle. It is not only as a feed product supplier for the cattle, but it also can boost society's economy through the integration of cattle farming

and agrotourism based. It will have a beneficial influence for the cattle farmer and agricultural farmer, as well as for another society.

The participation of all stakeholders in implementing all strategies and solutions determines the level of success of all agriculture development plans in all zones. There must be a synergy between central government, local government, and also all social elements so this development plan can be established. Effective communication and possible outcomes is important, especially for policies with heterogeneous impacts, multiple outcomes, long timescales and large uncertainties. If this complexity does not handled properly, will hinder the potential livestock sustainable development and make it difficult to achieve (Mehrabi *et al.*, 2020).

Conclusions

Bangka regency has the highest potential index with the most potential criteria, while the Pangkalpinang has the lowest total index, though it has "potential" criteria. The alternative strategy in the beef cattle development plan consisted of 6 [six] zones and strategic priority. The first priority zone was the production center and cattle product processing in Bangka Tengah. The second priority zone was the cattle farmer integration, in Bangka, Bangka Barat, and Belitung Timur. The third priority zone was the beef cattle farming in ex-mining land in Bangka, Bangka Barat, and Belitung Timur. The fourth priority zone was the feed production center with local based at Bangka Selatan. The fifth priority zone was the modern beef cattle with technology-based in Pangkalpinang. The sixth priority zone was the cattle with agrotourism based in Pangkalpinang and Belitung.

References

- Agus, A. and T. S. M. Widi. 2018. Current situation and future prospects for beef cattle production in Indonesia - A Review. *Asian-Aust. J. Anim. Sci.* 31: 976–83. <https://doi.org/10.5713/ajas.18.0233>.
- Ahmad, A. A., and M. Sugiharto. 2018. Peta pengembangan sapi potong di Kabupaten Banjarnegara. *Eko-Regional* 9: 106–115. <https://doi.org/10.20884/1.erjpe>.

- 2014.9.1.483.
- Arvianti, E., Y. Masyhuri, L. R. Waluyati, and D. H. Darwanto. 2019. Gambaran krisis petani muda di Indonesia. *Jurnal Sosial Ekonomi dan Kebijakan Pertanian* 8: 168–80. <https://doi.org/10.21107/agriekonomika.v8i2.5429.g3878>.
- Asmarhansyah. 2017. Inovasi teknologi untuk peningkatan produktivitas lahan bekas tambang timah. *Jurnal Sumberdaya Lahan* 11: 91–106. <https://doi.org/10.2018/jSDL.v11i2.7305>.
- Badan Koordinasi Penanaman Modal. 2019. Strategi Pengembangan Potensi Daerah Dalam Peningkatan Iklim Investasi. <http://dpmptsp.riau.go.id/media/file/Strategi-Pengembangan-Potensi-Daerah-Dalam-Peningkatan-Iklim-Investasi.pdf> (January 15, 2021).
- Basyar, B. 2021. Beef cattle farm development policies to overcome beef distribution problem in Indonesia: A Literature Review. *American J. Anim. Vet. Sci.* 16: 71–76. <https://doi.org/10.3844/ajavsp.2021.71.76>.
- BPS Provinsi Kepulauan Bangka Belitung. 2020. Provinsi Kepulauan Bangka Belitung dalam Angka 2020. Badan Pusat Statistik, Kepulauan Bangka Belitung.
- Dung, D. V., H. Roubik, L. D. Ngoan, L. D. Phung, and N. X. Ba. 2019. Characterization of smallholder beef cattle production system in Central Vietnam -Revealing Performance, Trends, Constraints, and Future Development. *Trop. Anim. Sci. J.* 42: 253–60. <https://doi.org/10.5398/tasj.2019.42.3.253>.
- Erbowo, B., L. Cyrilla, and R. Priyanto. 2013. Potensi Kabupaten Belitung sebagai kawasan pengembangan sapi potong. *Jurnal Ilmu Produksi dan Teknologi Hasil Peternakan* 1: 1–7. <https://journal.ipb.ac.id/index.php/ipthp/article/view/15472>.
- Geiker, N. R. W., H. C. Bertram, H. Mejbom, L. O. Dragsted, L. Kristensen, J. R. Carrascal, S. Bügel, and A. Astrup. 2021. Meat and Human Health-Current Knowledge and Research Gaps. *Journal Foods* 10: 1–17. <https://doi.org/10.3390/foods10071556>.
- Herlindawati, A., L. Trimo, and T. I. Noor. 2018. Analisis tekanan penduduk terhadap petani padi sawah (Suatu Kasus di Kecamatan Cilamaya Kulon, Kabupaten Karawang, Jawa Barat). *Jurnal Pemikiran Masyarakat Ilmiah Berwawasan Agribisnis* 4: 12–24. <http://dx.doi.org/10.25157/ma.v4i1.715>.
- Jeczmyk, A., J. Uglis, and R. Steppa, 2021. Can Animals Be the Key to the Development of Tourism: A Case Study of Livestock in Agritourism. *Journal Animals* 11: 1–15. <https://doi.org/10.3390/ani11082357>
- Mehrabi, Z., M. Gill, M. V. Wijk, M. Herrero, and N. Ramankutty. 2020. Livestock Policy for Sustainable Development. *Journal Nature Food* 1: 160–65. <https://doi.org/10.1038/s43016-020-0042-9>
- Merkel, R. 2019. Smallholder Livestock Commercialization. *Wartazoa* 29: 43–50. <https://doi.org/10.14334/wartazoa.v29i1.1952>
- Mukhlis, M. Noer, and M. Nofialdi. 2018. The integrated farming system of crop and livestock: A Review of Rice and International Journal of Sciences. *Basic and Applied Research (IJSBAR)* 42: 68–82. <https://www.gssrr.org/index.php/JournalOfBasicAndApplied/article/view/9477>
- Nazam, M., S. Sabiham B. Pramudya and Widiatmaka. 2011. Penetapan luas lahan optimum usahatani padi sawah mendukung kemandirian pangan berkelanjutan di Nusa Tenggara Barat. *Jurnal Agro Ekonomi* 29: 113–41. <http://dx.doi.org/10.21082/jae.v29n2.2011.113-145>.
- Priyanto, R., A. M. Fuah, E. L. Aditia, M. Baihaqi, and M. Ismail. 2015. Peningkatan produksi dan kualitas daging sapi lokal melalui penggemukkan berbasis sereal pada taraf energi yang berbeda. *Jurnal Ilmu Pertanian Indonesia* 20: 108–14. <https://doi.org/10.18343/jipi.20.2.108>.
- Rangkuti, F. 2016. Teknik Membedah Kasus Bisnis Analisis SWOT Cara Perhitungan Bobot, Rating, dan OCAI. PT. Gramedia Pustaka Utama, Jakarta.
- Rizali, A., Fachrianto, M. H. Ansari, and A. Wahdi. 2018. Pemanfaatan limbah pelepah dan daun kelapa sawit melalui fermentasi *Trichoderma* Sp. sebagai pakan sapi potong. *Enviro Science* 14: 1–7. <http://dx.doi.org/10.20527/es.v14i1.4886>.
- Rusdiana, S., U. Adiat, and R. Hutasoit. 2016. Analisis ekonomi usaha ternak sapi potong berbasis agroekosistem di Indonesia. *Agriekonomika* 5: 137–49. <https://doi.org/10.21107/agriekonomika.v5i2.1794>.
- Rusdiana, S. and C. Talib. 2019. Kebijakan pemerintah mendukung peningkatan usaha sapi potong di peternak. *SOCA: Jurnal Sosial Ekonomi Pertanian* 13: 380–95. <https://doi.org/https://doi.org/10.24843/SOCA.2019.v13.i03.p08>.
- Rustiadi, E., S. Saefulhakim, and D. R. Panuju. 2011. Perencanaan Dan Pengembangan Wilayah. Cerpen Press, Jakarta.
- Santoso, B. and B. W. H. E. Prasetyono. 2020. The regional analysis of beef cattle farm development in Semarang Regency. *Trop. Anim. Sci. J.* 43: 86–94. <https://doi.org/10.5398/tasj.2020.43.1.86>.
- Saputra, J., I., Liman, and Y. Widodo. 2016. Analisis potensi pengembangan peternakan sapi potong di Kabupaten Pesawaran. *Jurnal Ilmiah Peternakan Terpadu* 4: 115–23. <http://dx.doi.org/10.23960/jipt.v4i2.p%25p>.
- Suhaema, E., Widiatmaka, and B. Tjahjono. 2014. The regional development of beef cattle based on physical and forage land

- suitability in Cianjur Regency. *Tanah Lingkungan* 16: 53–60. <https://doi.org/10.29244/jitl.16.2.53-60>
- Sulfiar, A., E., T., B. A. Atmoko, B. Gunoro, and I. G. S. Budisatria. 2020. Study of pasture productivity for semi-intensive cattle system during dry season in South Konawe Regency, Southeast Sulawesi. *Buletin Peternakan* 44: 85-91. <https://doi.org/10.21059/buletinpeternak.v44i3.52741>
- Tadete, M., A., F. H. Elly, L. S. Kalangi, and R. Hadju. 2016. Pengaruh pendapatan masyarakat terhadap konsumsi daging sapi di Desa Kotabunan Kecamatan Kotabunan Kabupaten Bolaang Mongondow Timur. *Jurnal Zootek* 36: 363–371. <https://doi.org/10.35792/zot.36.2.2016.12538>
- Yanti, Y. and M. Yayota, 2017. Agricultural by-products as feed for ruminants in tropical area: nutritive value and mitigating methane emission. *Agricultural Science* 5: 65–76. <http://dx.doi.org/10.7831/ras.5.65>
- Yuniar, P., S., A. M. Fuah, and Widiatmaka. 2016. Carrying capacity and priority region for development of beef cattle production in South Tangerang. *Jurnal Ilmu Produksi dan Teknologi Hasil Peternakan* 4: 64–268. <https://doi.org/10.29244/jipthp.4.1.264-268>
- Zakiah, A. Saleh, and K. Matindas. 2017. Gaya kepemimpinan dan perilaku komunikasi gppt dengan kapasitas kelembagaan sekolah peternakan rakyat di Kabupaten Muara Enim. *Jurnal Penyuluhan* 13: 133–42. <https://doi.org/10.25015/penyuluhan.v13i2.14977>