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Regional Development for Beef Cattle Farming Based on Agricultural by Product in Serdang Bedagai District, North Sumatra Province, Indonesia

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ABSTRACT: Serdang Bedagai is one district in North Sumatra Province, which potential as a producer of livestock and agricultural products. The purpose of this study was to determine the potential by product of food crops and regions that can be used as a development region of beef cattle in Serdang Bedagai. This type of research is a descriptive study to illustrate the potential of crop by product and zoning development of beef cattle using the LQ method, combined with the density and capacity increase in the region of livestock cattle population (KPPTS) by product food crops. The results showed that the region of the development of beef cattle is based on the potential by product of food crops is divided into groups of Deployment Region (WS) the District Tebing Tinggi. Group Stabilization Region (WM) the District Pantai Cermin, Dolok Masihul, Serbajadi, Sipispis and Pegajahan. Group Development Aregion (WP) the District of Kotarih, Silinda, Bandar Khalifah, Tanjung Beringin, Sei Rampah, Sei Bamban and Teluk Mengkudu. Group Support Region (WT) the District Perbaungan. It was concluded that from 17 districts, there are 14 districts have the potential as an region-based development of beef cattle and crop by product, 3 districts must use sources other than the by product feed crops to meet the needs of livestock such as planting grass or farm by product. It is expected for the formation of neighborhood beef cattle breeding business should be conducted in regions that have the potential of the region in terms of suitability, and the carrying capacity of livestock feed crops in the form of by product.

Keywords: Potential of feed, food crop by product, beef cattle, development region

INTRODUCTION

Business Region of beef cattle is an region that is specifically used for beef cattle farming activities; or beef cattle farming integrated as a component based on food crops, plantation, horticulture, and fisheries-oriented economy with sustainable agribusiness system is access to the upstream and downstream industries. Serdang Bedagai is one of the districts in the province of North Sumatra potential as a producer of livestock and agricultural products, and is a region that has a cattle population that is bigger than the other districts in North Sumatra that for the year 2012 range from 47 325 individuals (Dinas Peternakan Kab. Serdang Bedagai, 2013). The total region of Serdang Bedagai in 2012 is 1900.22 km2 and approximately 43.17% or 82.036 ha of the region is cropland (BPS Serdang Bedagai, 2013). Thus, there is by product food crops such as rice straw, corn straw, straw sweet potato, peanut straw, soybean straw and hay green beans, and cassava

shoots that can be used as cattle feed. Until now there is no accurate data and information on the development of the farm region to be stated and can provide an enormous boost to the people who chose the livestock sector as a leading sector in spurring an increase in income and welfare of the people, especially farmers as well as a major driver of economic development of the Serdang Bedagai District. Seeing the potential and carrying crops by product as a source of feed, seems to meet the needs in the provision of food for the number of cattle population.

In order for the development of beef cattle in this region be optimized so that the necessary studies and research in the region of business development programs beef cattle farms in the centers of growth (agribusiness region) is an region that can be selected based agribusiness beef cattle farms, and after it was known then arranged strategy and the development of better models.

MATERIALS AND METHODS

The location and design of the study

The research was conducted in Serdang Bedagai District, North Sumatra Province from April to August 2014. This type of research is a descriptive study conducted to assess the potential of agricultural by product, especially food crops by product to support the development of business regions of beef cattle farms in Serdang Bedagai.

Population and sample

Samples of the population in this study is sub-districts in Serdang Bedagai. The survey was conducted to determine the potential for beef cattle and forage, fodder and forage crops by product (rice straw, corn straw, straw of sweet potato, cassava shoots, peanut straw, soybean straw, hay and green beans) were analyzed by results of field studies and secondary data.

Methods of data collection

Data collected in the form of primary and secondary data. Primary data obtained by conducting surveys and direct observation and interviews spaciousness, while the secondary data obtained from the results of previous studies related to the conversion rate of cattle population and by product production of food crops.

Analysis of the data

Population Analysis and Comparative Advantage

Location Quation Methods (LQ). This method is used to analyze the state of the territory, whether an region is a sector basis or non-base, especially in the case of cattle population. Thus it can be known whether the region balanced or not in livestock production activities. To see the comparative advantage of livestock (LQ) according to the formula used by Budiharsono (2001)

$$LQ = \frac{SI}{NI}$$

SI = Comparison between the number of beef cattle populations (ST) of a particular region with a population in the same subdistrict

NI = Comparison between the cattle population by the number of residents in the District of Serdang Bedagai

The criteria used are:

- LQ> 1 means cattle 'i' in a region already has a comparative advantage (population exceeds the needs in the region that can be sold or exported outside the region).
- LQ = 1 means cattle 'i' in a region does not have a comparative advantage (population just

enough for their own consumption).

- LQ <1 means cattle 'i' in a region can not meet the needs of its own that need supplies from outside the region.

Analysis of Production Potential and Carrying Capacity of Agricultural By Product

To calculate the Yield Potential of Agricultural By products can be obtained from agricultural by product potential sources of fodder kg / ha. While carrying capacity of agricultural by products (DDLP) is the ability of a region to produce feed mainly in the form of forage that can accommodate the number of ruminant livestock population in fresh or dried form (dry matter = DM), without any treatment. Feed Capability Index (IDDP) is the ratio between the amount of by product feed crops available (ST) with a population of ruminants (ST) in a region. Index carrying capacity of agricultural by products (IDDLP) This value is calculated from the total feed of each of the available agricultural by product to feed the need for a number of beef cattle population in the region. Assuming one livestock unit (1 ST) can consume as much as 2,555 kg of fresh straw / year (Haryanto *et al.,* 2002), then by using the following formula:

$$\textbf{IDDLP} = \frac{\textit{(Total production of agricultural by product)}}{\textit{(population x average of fresh consumption1 ST / year)}}$$

The assumption used is that one livestock unit (1 ST) to ruminants require dry matter (DM) of 6.25 kg / day (NRC, 1984). Then the carrying value of crop by product (DDLTP) can be calculated by the formula:

DDLP based on DM = (DM Production (Ton/Year))/(Needs of DM 1 ST (Ton/year))
(Syamsu et al., 2006).

Analysis of Location Capacity

Analysis of the suitability of the location is done by looking at the capacities of the region development of beef cattle in Serdang Bedagai. For the calculation formula used Cattle Population Increased Capacity (KPPTS) refers to the method of Nell and Rollinson (1974) in (Syamsu *et al*., 2006), which calculates the capacities of ruminants, as follows: Potential development of ruminants in a region is calculated through Effective Livestock Development Potential method (PPE), refer to the guidelines of the Directorate General of Livestock and Livestock Research Center (1995) as follows:

PMSL = a LG + b KK + c KS

where:

PMSL = maximum potential by land resources (ST) based on land Resources
a = Capacity Beef cattle on arable land (a = 1.52 ST / ha of land field).
LG = region of arable land (ha).
b = Capacity cattle in Rubbe plantation (b = 0.5 ST / ha).
KK = region of rubber plantation (ha).
c = Capacity Beef cattle in Palm Oil plantation (1 ST / Ha)
KS = region of Palm Plantation (ha).

To calculate the capacity Improvement of Beef Cattle Population land resources used by the following formula:

KPPTS = PMSL - POPRIL

Remarks :
KPPTS (SL) : Capacity improvement of cattle population (ST) based on land resources
POPRIL : the real population of cattle (ST) at the time of the study

RESULTS AND DISCUSSION

The base regions of the development of beef cattle

Table 1 shows the development of the base region of beef cattle in Serdang Bedagai, is the value of LQ> 1 including Sub district of Bintang Bayu, Dolok Masihul, Serbajadi, Sipispis, Dolok Merawan, Pegajahan and Pantai Cermin.

Table 1. Regional base of beef cattle with LQ> 1 in Serdang Bedagai

No	Sub-District	LQ
1	Bintang Bayu	1.98
2	Dolok Masihul	1.71
3	Serbajadi	1.27
4	Sipispis	1.95
5	Dolok Merwan	3.22
6	Pegajahan	2.02
7	Pantai Cermin	1.99

Source: results of primary data processing (2014)

Sub district other than those shown in Table 1 as many as 9 subdistricts be regarded as non-base region of the development of cattle with a value LQ <1 including District of Kotarih, Silinda, Tebing Syahbandar, Bandar Khalifah, Tanjung Beringin, Sei Rampah, Sei Bamban, Teluk Mengkudu and Perbaungan (Table 2).

Table 2. Non-Base region of cattle with a value LQ <1 in Serdang Bedagai

No	Sub-District	LQ
1	Kotarih	0.36
2	Silinda	0.40
3	Tebing Syahbandar	0.68
4	Bandar Khalifah	0.88
5	Tanjung Beringin	0.13
6	Sei Rampah	0.36
7	Sei Bamban	0.35
8	Teluk Mengkudu	0.27
9	Perbaungan	0.62

Source: results of primary data processing (2014)

Carrying capacity of crops by product as a source of feed

Table 3 shows that the carrying capacity of the by product of food crops in Serdang Bedagai can accommodate and provide fodder for cattle production needs based on the calculation needs of dry matter (DM) in the amount of 161 505 ST. The sub-district which has the highest value of the carrying capacity of 25 887 ST is Perbaungan sub-District.

Based on the amount of dry matter by product carrying capacity of 161 505 ST crops associated with cattle population as much as 47 325 ST, then in Serdang Bedagai still allows for the addition of cattle population or capacity increase cattle population as much potential 75161.76 ST. The value KPPTS that we can see in Table 3 shows that of the 17 districts in Serdang Bedagai, 14 districts have a positive value and 3 districts KPPTS is negative.

Table 3. The carrying capacity of crop by product as a source of feed and Capacity Improvement of Ruminant Livestock Population (KPPTR) cattle in Serdang Bedagai

Sub-District	Total DM of Crops By product (Ton/Year)	DDLTP (ST)	Real Population (ST)	KPPTS (ST)
Kotarih	3,652	1,601	226	1,375
Silinda	2,865	1,256	266	990
Bintang Bayu	1,199	526	1,666	-1,140
Dolok Masihul	17,874	7,835	6,555	1,280
Serbajadi	6,156	2,698	1,983	715
Sipispis	14,119	6,189	4,904	1,285
Dolok Merwan	761	333	4,366	-4,033
Tebing Tinggi	23,938	10,493	3,513	6,980
Tebing Syahbandar	3,212	1,408	1,734	-326
Bandar Khalifah	32,172	14,103	1,737	12,366
Tanjung Beringin	29,052	12,735	371	12,364
Sei Rampah	30,035	13,166	1,838	11,328
Sei Bamban	52,033	22,809	1,204	21,605
Teluk Mengkudu	27,198	11,922	898	11,024
Perbaungan	59,055	25,887	4,966	20,921
Pegajahan	27.303	11,969	4,315	7,654
Pantai Cermin	37.213	16,312	6,783	9,529
Total	368.432	161,505	47,325	114,180

Source: results of primary data processing (2014)

Region density of Livestock

Table 4 shows that the sub District of Pantai Cermin is the only region that has a density criteria are very dense region that has a value of livestock density> 50 ie 84.47. Region has a value of dense region density criteria namely Sub Dolok Masihul, Serbajadi, Sipispis, Dolok Merawan, Perbaungan and Pegajahan, because it has a density value of livestock 20 - 50. The region with the criteria moderate are sub district of Bintang Bayu, Tebing Tinggi, Tebing Syahbandar, Bandar Khalifah, Sei Bamban and Teluk Mengkudu. Region of sparse criteria are sub district of Kotarih, Silinda, Tanjung Beringin and Sei Rampah.

Table 4. Region Density of Beef Cattle in Serdang Bedagai

Sub District	Beef Cattle Population (ST)	Regions (Km^2)	Density of Beef Cattle	
			Value	Status
Kotarih	226	78.02	2.90	spare
Silinda	266	56.74	4.69	spare
Bintang Bayu	1,666	95.59	17.43	modest
Dolok Masihul	6,555	237.42	27.61	populous
Serbajadi	1,983	50.69	39.12	populous
Sipispis	4,904	145.26	33.76	populous
Dolok Merwan	4,366	120.60	36.20	populous
Tebing Tinggi	3,513	182.29	19.27	modest
Tebing Syahbandar	1,734	120.30	14.41	modest
Bandar Khalifah	1,737	116.00	14.97	modest
Tanjung Beringin	371	74.17	5.00	spare
Sei Rampah	1,838	198.90	9.24	spare
Sei Bamban	1,204	72.26	16.66	modest
Teluk Mengkudu	898	66.95	13.41	modest
Perbaungan	4,966	111.62	44.49	populous
Pegajahan	4,315	93.12	46.34	populous
Pantai Cermin	6,783	80.30	84.47	Very populous
Total	47,325	1,900.22	24.91	populous

Source: results of primary data processing (2014)

Region Development of beef cattle

Table 5 shows the regions of animal growth and development status in Serdang Bedagai, ie cattle development regions including Dissemination Region (WS) the sub District of Tebing Tinggi. Stabilization Region (WM) the Subdistrict Pantai Cermin, Dolok Masihul, Serbajadi, Sipispis and Pegajahan. Development Region (WP) namely Subdistrict Kotarih, Silinda, Bandar khalifah, Tanjung Beringin, Sei Rampah, Sei Bamban and Teluk Mengkudu. The last is Supporting Region (WT) is Perbaungan sub District.

Table 5. Mapping of the development of beef cattle in Serdang Bedagai based LQ value, livestock region density and KPPTS of crops by product

Sub District	KPPTS (ST)	LQ	Region Density	Status of Beef Catle Region
Kotarih	1,375	0.36	spare	WP
Silinda	990	0.40	spare	WP
Bintang Bayu	-1,140	1.98	modest	-
Dolok Masihul	1,280	1.71	populous	WM
Serbajadi	715	1.27	populous	WM
Sipispis	1,285	1.95	populous	WM
Dolok Merawan	-4,033	3.22	populous	-

Tebing Tinggi	6,980	1.10	modest	WS
Tebing Syahbandar	-326	0.68	modest	-
Bandar Khalifah	12,366	0.88	modest	WP
Tanjung Beringin	12,364	0.13	spare	WP
Sei Rampah	11,328	0.36	spare	WP
Sei Bamban	21,605	0.35	modest	WP
Teluk Mengkudu	11,024	0.27	modest	WP
Perbaungan	20,921	0.62	populous	WT
Pegajahan	7,654	2.02	populous	WM
Pantai Cermin	9,529	1.99	very populous	WM

source : primer data processing (2014)
Note :
WP : Development Region; WM : Stabilization Region; WS : Dissemination Region ; WT : Supporting Region

To improve the farm, the first attempt was made in the development of beef cattle is increasing livestock population, so that selected regions of by product KPPTS value crops positive, because of the potential for an increase in livestock population and still have a supply of forage crops in the form of by product. This implies that the capacity increase ruminant livestock population that has a positive value means that the availability of food crop by product as feed for ruminants is sufficient and can be added a number of beef cattle population. From 17 subdistricts in Serdang Bedagai, as much as 14 districts have positive value of KPPTS crops by product and potentially as region development, while other 3 sub District 3 namely Bintang Bayu, Dolok Merawan and Tebing Syahbandar have KPPTS negative value. KPPTS negative value means an overpopulation of cattle in terms of the availability of agricultural by product as a source of food, so had to use sources other than by product feed crops to meet the needs of livestock such as planting grass or farm by product. This is in accordance with the opinion Matitaputti (2008) that the region in a state of negative KPPTS can utilize by product of food sources other than food crops to meet the needs of livestock in the region.

The region with the status of the development of beef cattle in Serdang Bedagai based on the regional potential Dissemination Region (WS) where LQ> 1, low livestock density regions and positive KPPTS is Tebing Tinggi sub District. This region meant that the region has been an region of beef cattle production with high levels of cattle population is relatively more in other districts appeal. This is in accordance with the opinion Hendayana (2003) which states that the LQ> 1 means that the region has a comparative advantage, where the population exceeds the needs of its region that can be sold or exported outside the region. In addition, the region still has the ability to increase the cattle population view of an region of great support to undertake the development of beef cattle, and the value of crop by product KPPTS positive indicates the amount of feed from by product food crops still available. Stabilization Region (WM) which is the value of LQ> 1, the high-density region and KPPTS livestock by product positive crops consisted of the sub District of Pantai Cermin, Dolok Masihul, Serbajadi, Sipispis and Pegajahan. When viewed from the value of LQ and its KPPTS then still support for the addition of the population, but the value of high-density livestock regions means that the productivity of cattle maintained, do not increase the population. This is in accordance with the opinion of Sumanto and Juarini (2004) that the consolidation region is the development of the districts that livestock can not be added

or only be maintained on pre-existing conditions. Development Region (WP), the value of LQ <1, KPPTR positive and low stocking density regions namely sub District of Kotarih, Silinda, Bandar Khalifah, Tanjung Beringin, Sei Rampah, Sei Bamban and Teluk Mengkudu. This means that the region is not a region of the base with the cattle population is still low, so it is necessary to increase the population of beef cattle because of the region and carrying food crops by product are still able to do the addition of the cattle population. Supporting Region (WT), the value of LQ <1, KPPTR positive and high-density livestock namely Perbaungan sub district. This means that the region is not a region of the base and high density region of livstock, so it has no potential for the addition of beef cattle, although the carrying capacity of crop by product is still available. This is in accordance with the opinion of Rajab (2009) which suggests that the beef cattle population development plan can not be separated from the carrying capacity of the region which includes two terms of availability of space where cattle and availability of fodder for survival.

CONCLUSION AND RECOMMENDATION

Development of beef cattle business regions in Serdang Bedagai based on food crops by product carrying capacity can be done through zoning scenarios of beef cattle into several categories region, namely: 1) Dissemination Region (WS) is District Tebing Tinggi. 2) Consolidation Region (WM), sub District of Pantai Cermin, Dolok Masihul, Serbajadi, Sipispis and Pegajahan. 3) Regional development (WP) namely Subdistrict of Kotarih, Silinda, Bandar Khalifah, Tanjung Beringin, Sei Rampah, Sei Bamban and Teluk Mengkudu. and 4) Supporting Region (WT), is Perbaungan Sub district.

Expected for the formation of the business region of cattle, should be done in regions that have the potential aspects of location and the carrying capacity of livestock feed in the form of food crops by product.

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