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Analysis of the Potential of Beef Cattle Business Development in Indramayu District

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Abstract. This study aimed to analyze the potential for cattle business development in Indramayu Regency. The research locations selected using purposive sampling method were based on the following criteria: (1) Indramayu Regency is the 2nd largest rice producers in the Province of West Java, (2) The area covers 2,099.42 km^2 based on secondary data obtained from BPS Indramayu Regency in numbers and (3) The area of agricultural land is still larger than the area of resident housing. The data analysis method used the carrying capacity index (IDD) and Location Question (LQ) analysis formulas. The data were processed and explained descriptively. The results of this study resulted in carrying capacity values consisting of 3 patterns, namely the highest carrying capacity value > 20,000 AU (Gantar and Terisi). Medium carrying capacity value > 10,000 AU (Cikedung and Gabuswetan). Low value carrying capacity 5.000-10.000 AU (Haurgelis, Suyeg, Juntiyuat, Bongdua, Kertasemaya, Patrol, Kedokanbunder and Sindang). The results of the analysis of IDD > 2 there are 12 sub-districts, meaning that based on the availability of forage feed from agricultural land, it is included in the safe category to increase the population of beef cattle. The potential for beef cattle development in Indramayu Regency needs to be prioritized in 12 sub-districts with LQ > 1 and IDD > 2 accompanied by government policies to support investment in livestock marketing facilities and infrastructure for smallholders.

Keywords: beef cattle, agricultural waste, IDD and LQ

Abstrak. Tujuan penelitian ini adalah untuk menganalisis potensi pengembangan usaha ternak sapi di Kabupaten Indramayu. Lokasi penelitian yang dipilih menggunakan metode sampling purposive didasarkan pada kriteria sebagai berikut: 1. Kabupaten Indramayu penghasil beras no 2 di wilayah Provinsi Jawa Barat, 2. Luas wilayah sebesar 2.099,42 km^2 berdasarkan data sekunder yang diperoleh dari BPS Kabupaten Indramayu dalam angka dan (3) Luas lahan pertanian masih lebih luas dibandingkan dengan luas permukiman penduduk. Metode analisis data menggunakan rumus analisis indeks daya dukung (IDD) dan Location Question (LQ). Data diolah dan dijelaskan secara deskriptif. Hasil penelitian ini menghasilkan nilai carrying capacity terdiri dari: nilai tertinggi carrying capacity > 20.000 AU (Kecamatan Gantar dan Kecamatan Terisi).Nilai sedang carrying capacity > 10.000 AU (Cikedung dan Gabuswetan). Nilai rendah carrying capacity 5000-10.000 AU (Haurgelis, Suyeg, Juntiyuat, Bongdua, Kertasemaya, Patrol, Kedokan bunder dan Sindang). Hasil analisis IDD > 2 terdapat 12 kecamatan, berarti berdasarkan ketersediaan pakan hijauan dari lahan pertanian termasuk dalam kategori aman untuk meningkatkan populasi sapi potong. Potensi pengembangan sapi potong di Kabupaten Indramayu perlu diprioritaskan pada 12 Kecamatan dengan LQ > 1 dan IDD > 2 disertai dengan kebijakan pemerintah untuk dukungan investasi perlengkapan sarana dan prasarana pemasaran ternak untuk peternak rakyat.

Kata kunci: ternak sapi potong, limbah pertanian, IDD dan LQ

Introduction

Livestock sub-sector and agriculture are inseparable because 1) there is integration between the two sub-sectors where farmers could use agricultural wastes from the agricultural sector as livestock feed, and vice versa, farmers could use manure produced in the livestock sub-sector as an organic fertilizer. 2) Sub-livestock sector has a strategic role in the supply of animal food, labor courts, the community's economy in rural areas, and the development potential of the region (Zahara et.al, 2016).

The cattle business development has specific problems described as follows, 1) land use in Java has experienced narrowing of agricultural land and livestock land due to the increasing use of industrial business land and residential

land, leading to less opportunity for developing a cattle business. 2) about 90% of our farmers, large-scale traditional farms where the use of natural resources provision of fodder, the integration of agriculture with livestock between regions related to livestock development.

Indramayu district is one of the districts in West Java Province that has the smallest import production compared to other districts. Indramayu District has the potential for livestock sub-sector development. The cattle population in Indramayu district is 10,578 cows, 14 dairy cows, 407 head of buffalo, 314,219 sheep, and 88,958 goats. The total area is 2,099.42 km^2, paddy land is 117,686 Ha, non-paddy land is 56,760 Ha, non-agricultural land is 35,481 Ha (Central Bureau of Statistics, 2020). Indramayu district has the highest potential for livestock development, followed by Garut, Karawang, Subang, and Majalengka districts which are high rice-producing areas; thus, the availability of rice straw is substantial to meet the demand of livestock feed (Arief, 2012).

The development potential of the region, especially by analysis of the carrying capacity of an area that aims to find out about the availability of agricultural waste feed seen production agricultural waste, agricultural waste treatment, livestock population and evaluation of the area where a beef cattle base in Indramayu District . The current study aims to analyze the potential for the development of the beef cattle business in Indramayu District.

Materials and Methods

The materials used are secondary data, time-series data on land use and agricultural waste production at the district level from 2015 - 2019 from the District BPS in numbers and the Agriculture Service, Indramayu Regency Animal Husbandry Service. The research was conducted from July to August 2020 in Indramayu District.

The research samples were taken from Indramayu District based on 1. the lowest population density per agricultural land area, 2. The area region was 2,099.42 km^2. The descriptive method was used to analyze the data.

The Parameters Observed

The Potential of Agricultural Wastes

Based on Juarini *et al*. (2007) with formula as follows:

(ps x 0.4) + (pi x 3 x 0.4) + (jg x 3 x 0.5) + (kd x 3 x 0.55) + (((kh +kt) x 2 x 0.55) + (uj x 0.25/6) + (uk x 0.25/40) x 0.65

where: (ps = lowland rice; pi = field rice; jg = corn; kd = soybeans; kh = mung beans; kt = peanuts; uj = sweet potato; uk = cassava).

Minimum Feed Requirement

The need for feed for one livestock unit (1 AU) beef cattle in one year requires dry matter 6.25 kg/day or equivalent to 2.80 tons/year (NRC 1984). There are various types of cattle in the field namely Ongole, Simmental, Limousine breeds, assuming an average body weight of up to 400 kg. Therefore, for minimum feed requirements of ruminant livestock unit unity 1 AU is calculated according to Thahar et al. (1991) in [2] as follows: (with modifications)

K = 2.5% x 50% x 365 x 400 kg = 1.83 ton BKC/years/AU

where: K = minimum feed requirement for 1 (AU) in tons of digested dry matter or DDM (Digestible dry matter) for one year; 2.5% = minimum requirement for the amount of forage ration (dry matter) to a bodyweight of livestock; 50% = the average value of the digestibility of various types of plants; 365 = number of days in 1 year; 400 kg = 1 AU live weight, assuming various breeds of cattle: Limousin, Simmental, and Ongole crossbred breeds.

Table 1. Status criteria capability based agricultural waste (IDD)

Carrying Capacity Index	Criteria	Explanation
≤ 1	Very critical	There is no choice of utilizing the available resources. There is resource depletion in the agro-ecosystem. No natural forage and waste is recycled
> 1 – 1.5	Critical	Livestock have the option to use resources, but there are unmet conservation aspects
>1.5 – 2	Prone	The availability of organic matters derived from waste does not have a significant role in fulfilling animal feed needs
> 2	Safe	The availability of feed resources from waste is functionally sufficient for animal feed needs and is available in the environment efficiently

Notes : Juarini et al., 2007

Carrying Capacity of Agricultural Waste

The carrying capacity of the forage is intended to determine the carrying capacity of livestock by using the following: [2]

Carrying Capacity of Agricultural Waste (ST) = $\frac{Agricultural\ waste\ dry\ matter\ production\ (TON)}{Minimum\ Feed\ for\ Adult\ Cattle\ BK\ (\frac{Ton}{ST})}$

Carrying Capacity Index (IDD) Agriculture waste

This forage carrying capacity index aims to determine the level of safety of animal feed in an area, namely the following equation: (Juarini *et al*., 2007)

Carrying Capacity Index (IDD) Agriculture waste = $\frac{Agri\ waste\ dry\ matter\ production\ (Ton)}{T.Livestock\ Pop\ (AU)\ x\ Min\ Feed\ for\ Mature\ Cattle\ BK\ (\frac{Ton}{AU})}$

or

IDD Agricultural Waste = $\frac{Carrying\ Capasity\ (AU)}{Total\ Livestock\ Population\ (AU)}$

Analysis Location Quotient (LQ)

LQ method is an analysis to determine and identify the economic concentration are relatively larger locations or referred to the analysis of the economic base (Panuju dan Rustiadi, 2012), with the following equation:

$$LQ_{ij} = \frac{\left(\frac{X_{ij}}{X_{i.}}\right)}{\left(\frac{X_{.j}}{X_{..}}\right)}$$

where:

X_{ij} = The economic value of (j) the beef cattle commodity in the i[th] district

$X_{i.}$ = total economic value of all livestock commodities in District *i*

$X_{.j}$ = the total economic value (j) the beef cattle in all districts

$X_{..}$ = total economic value of all livestock commodities in the entire region

Criteria Value:

LQ> 1 means that the concentration of the activity concentration of commodity beef cattle in a region compared to other livestock commodities in the region.

LQ = 1 means that economic activity in the area of commodity cattle equivalent to the economic activity of other farm commodities.

LQ <1 means indicate that economic activity in the area of commodity cow is smaller proportion compared to other livestock commodities.

Results and Discussion

Geographical Conditions

Indramayu district is one of the districts owned by West Java Province. Geographically, the Indramayu district is located between 107052'-108036 'East Longitude and 6015'-6040' South Latitude. Indramayu district has

borders with: Northside - Java Sea; Southside - Majalengka district, Sumedang district, Cirebon district; Westside - Subang district; East - the Java Sea and Cirebon district. Indramayu district consists of 31 regencies with 317 villages/wards and an area of 2,099.42 km^2, 117,686 hectares of rice fields, 56,760 hectares of non-rice fields, 35,481 hectares of non-agricultural land. The livestock population is cows 10,578 heads, 14 dairy cows, 407 buffaloes, 314,219 sheep, and 88,958 goats. (Central Bureau of Statistics, 2020).

Indramayu district produces rice and secondary crops (corn, soybeans, peanuts, mung beans, cassava, and sweet potatoes). The abundant production of food crops and secondary crops can produce agricultural waste that can be used as animal feed and converted into DM (dry matter) using the formula, as shown in Table 2 below.

Production and Potential of Agricultural Waste as a Source of Feed

Agricultural waste has the potential to support livestock business development, especially in agriculture-based areas. The utilization of agricultural waste is a solution to overcoming feed shortages and is integrative between agriculture and animal husbandry aimed at zero waste production (Saputra et al., 2016). Rauf & Rasbawati (2015), agricultural waste production has a carrying capacity large enough to be used as an alternative source of

Table 2. Agricultural waste production (DM/ Ton/ years)

Sub-district	Agricultural Waste Production (Ton/DM/Years)						Total Agricultural Waste Production
	Rice field	Corn	Soybean	Peanuts	Cassava	Sweet Potatoes	
Haurgeulis	24,222.70	27.00	650.13	0.92	6.25	1.00	24,908.00
Gantar	47,711.52	10,287.48	6,370.94	23.87	10.36	0.28	64,404.45
Kroya	41,138.93	22,735.94	15,024,59	15.80	80.17	7.03	79,002.46
Gabuswetan	31,143.98	44.56	23.44	15.60	14.83	0.85	31,243.25
Cikedung	36,440.91	-	-	-	5.63	0.00	36,446.53
Terisi	33,422.02	14,882.01	9,458.55	60.42	86.30	1.49	57,910.79
Lelea	29,827.63	-	-	-	-	0.00	29,827.63
Bangodua	19,356.59	-	45.63	36.77	-	0.00	19,438.99
Tukdana	23,192.69	-	50.22	-	-	0.00	23,242.91
Widasari	15,887.49	127.75	-	57.06	-	0.00	16,072.30
Kertasemaya	17,630.38	-	-	29.57	-	0.00	17,659.95
Sukagumiwang	15,447.33	-	22.36	40.59	-	0.00	15,510.28
Krangkeng	20,547.51	-	95.45	-	-	0.00	20,642.96
Karangampel	11,280.01	-	-	34.84	-	0.00	11,314.84
Kedokanbunder	11,565.55	7.20	17.35	232.14	2.37	0.00	11,824.61
Juntinyuat	22,461.76	0.75	-	59.12	0.32	0.00	22,521.95
Suyeg	24,288.76	7.58	61.38	75.62	0.19	0.00	24,433.53
Jatibarang	17,272.73	8.37	15.35	2.95	-	0.00	17,299.40
Balongan	9,180.05	53.10	-	-	-	0.00	9,233.15
Indramayu	8,762.16	194.46	2.06	23.90	14.22	1.17	8,997.99
Sindang	10,388.92	-	-	0.66	-	0.00	10,389.58
Cantigi	7,991.24	-	-	-	0.78	0.00	7,992.02
Pasekan	4,585.24	-	-	-	-	0.00	4,585.24
Lohbener	13,164.46	-	6.98	97.46	1.00	0.00	13,269.90
Arahan	12,610.21	-	-	-	-	0.00	12,610.21
Losarang	25,534.11	8.54	0.45	-	0.44	0.00	25,543.54
Kandanghaur	24,150.59	-	-	-	-	0.00	24,150.59
Bongas	21,568.92	-	-	-	-	0.00	21,568.92
Anjatan	35,114.72	-	-	-	-	0.00	35,114.72
Sukra	18,270.04	-	-	-	-	0.00	18,270.04
Patrol	15,724.00	-	-	-	-	0.00	15,724.00
Total	649,883.15	48,384.73	31,844.87	807.28	222.86	11.83	731,154.72

Sources of Secondary Data Processed Data from BPS Indramayu Regency 2015-2019

beef cattle feed. The agricultural waste production calculated in the study consists of rice, corn, peanuts, mung beans, soybeans, cassava, and sweet potatoes converted into dry matter. The result of the potential of agricultural waste in Indramayu calculated in the current research came from rice straw, corn, soybeans, peanuts, mung beans, cassava, and sweet potatoes.

The most dominant agricultural waste (97%) in Indramayu Regency is rice straw, except for Gantar District, Kroya District, and Terisi District, only 74.08%, 52.07%, 57.77% where it is not only rice that is produced. Corn straw and soybeans have higher production of maize and soybeans than in other subdistricts. The potential for rice straw as animal feed can reach 91% or as much as 123,943 tons/year (Tiwow et al., 2016), as shown in Table 2.

Rice straw is more dominant, so that farmers use it more for livestock feed. Rice straw was chosen for breeders on the grounds because; 1) it is readily available, 2) no costs incurred, 3) it is available in large quantities and can be stored for later use. Rice straw has the highest carrying capacity compared to other food crop wastes.

Production of rice straw is abundant throughout the year and serves as a feed-forage replacement. Rice straw has low nutrient content and is high in fiber; thus the rice straw requires processing technology. (Sari et .al 2016; Suhaema, 2014).

The potential for agricultural waste in Indramayu Regency has fluctuated from year to year, especially in 2017, experienced a decrease in agricultural waste production by around 3-11% except for Patrol District (see Table 3 below). The decline in agricultural waste production can be caused by agricultural production experiencing crop failure, the planting area, the harvested area for each region is different. This is consistent with the results reported in a previous research (Rauf and Rasbawati, 2015) which explained that every zone has the potential different agricultural, caused by a harvested area will affect the amount of waste produced in agricultural production (Rauf and Rasbawati, 2015). Agricultural waste production depends on the climate, harvested area, livestock population, geographic location, and very diverse nutritional values. They can lead to the availability of forages so that a place is needed to store agricultural waste and need to handle feed processing technology to increase nutritional value (Sari et al., 2016). The potential carrying capacity of agricultural waste in the Indramayu district has fluctuated from year to year, this is due to the amount of production, puso , as well as planting and harvesting area. Rice straw is more dominant than other agricultural wastes because in Indramayu district, rice can be harvested 3-4 times a year, due to the vast agricultural area and good water availability, especially in the southern direction of Indramayu district. Indramayu district is the second-largest rice producer in West Java Province after Cianjur. Indramayu district has the highest development potential, followed by Garut, Karawang, Subang, and Majalengka districts which are high rice-producing areas. Therefore, the availability of rice straw is very high and can meet the need of livestock feeds. Other areas with considerable potential are the districts of Cianjur, Sukabumi, and Cirebon to be developed because they are still possible to develop in a large enough population (Arief, 2012).

Carrying Capacity and Carrying Capacity Index of Agricultural Waste

The carrying capacity of agricultural waste has the objective to measure the availability of forage fodder in an area by calculating the region, production of grass that has the potential to feed. The carrying capacity consists of a component of the calculation of agricultural waste product converted to DM (dry matter) and the quantity of mature

livestock feed required for one year. Mature livestock feed requirements is 1.83 ton of BKC/ton/year/AU assuming a cattle body weight average of 400 kg. The cattle breeds in raised in Indramayu district were Ongole crossbred, Simmental crossbred and Limousin crossbred.

The ten sub-districts with high potential carrying capacity of agricultural waste are: 1) Kroya, 2) Filled, 3) Gantar, 4) Gabuswetan, 5) Anjatan, 6) Haurgelis, 7) Lelea, 8) Juntiyuat, 9) Krangkeng, 10) Bongodua. The results of low carrying capacity were obtained in three districts which are 1) Cantigi, 2) Pasekan, and 3) Kandanghaur (see Table 4 below). The results obtained in calculating the carrying capacity of agricultural waste can be attributed to agricultural waste production, the types and varieties of existing agricultural waste. For example, Gantar, Kroya, and Terisi sub-districts have the highest value in the carrying capacity of agricultural waste due to: 1. Types of agricultural waste: rice, corn, soybeans, and 2. Production is higher than in other sub-districts 3. The large area of planting, 4. Livestock population. Arsyad (2012) reported that the carrying capacity of vulnerable categories, critical and very critical due to the population density of the livestock sector in the region and the production of waste and forage as well as the land held. Waste food crops, either in fresh or dried form, can be used for livestock crop waste production depending on food crops harvested in that area (Zahara et al., 2016).

Table 3. Total production of agricultural waste (DM/Ton/Years)

Sub-district	Production of Agricultural Waste (DM/Ton/Years)					Total	Average
	2015	2016	2017	2018	2019		
Haurgeulis	14,571.31	17,834.59	10,569.56	16,300.52	21,811.35	81,087.33	27,029.11
Gantar	63,464.45	39,780.83	31,355.27	37,392.36	38,657.40	210,650.31	70,216.77
Kroya	94,203.04	55,357.35	35,586.76	45,177.54	29,583.62	259,908.31	86,636.10
Gabuswetan	18,275.82	23,663.12	18,201.26	21,904.09	19,501.19	101,545.48	33,848.49
Cikedung	24,012.34	23,446.69	22,562.50	24,125.54	24,304.16	118,451.23	39,483.74
Terisi	65,733.28	38,677.47	25,960.27	35,497.85	24,324.45	190,193.32	63,397.77
Lelea	19,427.72	19,555.82	18,454.05	19,869.09	19,633.14	96,939.81	32,313.27
Bangodua	12,556.27	14,609.66	9,190.22	12,880.06	13,950.07	63,186.27	21,062.09
Tukdana	16,640.76	18,559.23	10,140.25	13,228.24	16,981.50	75,550.00	25,183.33
Widasari	11,764.08	10,617.17	7,763.47	10,681.85	11,408.42	52,234.99	17,411.66
Kertasemaya	11,293.32	12,289.04	8,793.35	11,708.87	13,310.26	57,394.83	19,131.61
Sukagumiwang	10,229.50	11,884.19	7,487.53	10,346.93	10,464.94	50,413.09	16,804.36
Krangkeng	8,936.96	17,267.95	11,322.29	13,735.05	15,847.39	67,109.64	22,369.88
Karangampel	5,770.16	8,504.56	5,422.83	8,917.92	8,157.79	36,773.24	12,257.75
Kedokanbunder	7,016.69	8,184.75	6,770.46	7,954.51	8,507.19	38,433.61	12,811.20
Juntinyuat	12,195.35	16,226.53	12,309.01	15,949.57	16,515.89	73,196.35	24,398.78
Suyeg	12,660.40	16,788.02	14,364.33	17,433.46	18,175.62	79,421.83	26,473.94
Jatibarang	10,808.04	11,446.51	10,058.63	11,684.08	12,229.00	56,226.25	18,742.08
Balongan	4,715.82	7,304.83	3,958.34	6,735.94	7,292.80	30,007.72	10,002.57
Indramayu	5,085.58	6,104.15	5,054.07	6,688.83	6,311.25	29,243.89	9,747.96
Sindang	4,312.80	7,855.97	6,608.53	7,770.77	7,218.06	33,766.12	11,255.37
Cantigi	2,702.08	5,488.22	5,309.10	6,421.85	6,052.82	25,974.07	8,658.02
Pasekan	1,968.02	3,201.74	3,321.94	3,081.78	3,328.55	14,902.03	4,967.34
Lohbener	6,445.92	9,537.56	8,431.96	9,035.82	9,677.38	43,128.64	14,376.21
Arahan	6,203.85	9,491.06	8,083.18	8,099.05	9,106.03	40,983.18	13,661.06
Losarang	14,460.40	19,535.43	17,961.10	15,792.92	15,266.75	83,016.60	27,672.20
Kandanghaur	13,035.56	19,361.29	14,049.36	18,375.62	13,667.58	78,489.41	26,163.14
Bongas	14,640.63	16,305.54	9,904.86	13,585.33	15,662.66	70,099.00	23,366.33
Anjatan	26,475.29	25,122.20	16,892.28	20,315.74	25,317.32	114,122.82	38,040.94
Sukra	9,232.42	10,573.30	13,613.47	13,225.45	12,733.00	59,377.63	19,792.54
Patrol	9,668.57	8,322.24	10,189.71	11,277.88	11,644.59	51,102.99	17,034.33
Total	538,506.41	512,897.00	389,689.93	475,194.49	466,642.14	2,382,929.9	794,309.99

Sources of Secondary Data Processed Data from BPS Indramayu Regency 2015-2019

Table 4. Average carrying capacity of agricultural waste and increase of livestock capacity in Indramayu regency

Sub-district	Average of potential waste TON	Feed Needs for Adult Cows DM/Ton/Year/ST	Average of livestock population AU	Average of DD	Average of Increase livestock
Haurgeulis	27,029.11	1.83	433.59	14,770.01	14,336.42
Gantar	70,216.77	1.83	8,738.81	38,369.82	29,631.01
Kroya	86,636.10	1.83	3,124.84	47,342.13	44,217.29
Gabuswetan	33,848.49	1.83	925.32	18,496.44	17,571.12
Cikedung	39,483.74	1.83	9,323.34	21,575.82	12,252.48
Terisi	63,397.77	1.83	4,007.36	34,643.59	30,636.23
Lelea	32,313.27	1.83	2,636.33	17,657.52	15,021.20
Bangodua	21,062.09	1.83	669.12	11,509.34	10,840.22
Tukdana	25,183.33	1.83	2,877.36	13,761.38	10,884.03
Widasari	17,411.66	1.83	1,396.88	9,514.57	8,117.69
Kertasemaya	19,131.61	1.83	706.52	10,454.43	9,747.91
Sukagumiwang	16,804.36	1.83	2,086.01	9,182.71	7,096.70
Krangkeng	22,369.88	1.83	353.23	12,223.98	11,870.75
Karangampel	12,257.75	1.83	205.37	6,698.22	6,492.85
Kedokanbunder	12,811.20	1.83	722.65	7,000.66	6,278.01
Juntinyuat	24,398.78	1.83	611.60	13,332.67	12,721.06
Sliyeg	26,473.94	1.83	3,200.17	14,466.64	11,266.47
Jatibarang	18,742.08	1.83	3,083.35	10,241.58	7,158.22
Balongan	10,002.57	1.83	379.11	5,465.89	5,086.77
Indramayu	9,747.96	1.83	326.08	5,326.76	5,000.68
Sindang	11,255.37	1.83	350.57	6,150.48	5,799.91
Cantigi	8,658.02	1.83	2,688.50	4,731.16	2,042.66
Pasekan	4,967.34	1.83	1,404.10	2,714.40	1,310.29
Lohbener	14,376.21	1.83	348.76	7,855.85	7,507.09
Arahan	13,661.06	1.83	2,196.49	7,465.06	5,268.57
Losarang	27,672.20	1.83	3,053.78	15,121.42	12,067.64
Kandanghaur	26,163.14	1.83	7,639.17	14,296.80	6,657.62
Bongas	23,366.33	1.83	2,104.59	12,768.49	10,663.90
Anjatan	38,040.94	1.83	2,341.05	20,787.40	18,446.35
Sukra	19,792.54	1.83	1,985.37	10,815.60	8,830.23
Patrol	17,034.33	1.83	668.11	9,308.38	8,640.26

Sources of Secondary Data Processed Data from BPS Indramayu Regency 2015-2019

The results of this study regarding the carrying capacity of agricultural waste can meet the needs of mature cattle feed in 5 regions, namely: Region I where the carrying capacity value is > 20,000 AU (Gantar, Kroya, and Terisi) sub-district; Region II Carrying Capacity Value 15,000 – 20,000 AU (Leela, Gabuswetan and Anjatan) sub-district; Region III with a carrying capacity of 11,000 – 15,000 AU (Haurgelis, Cikedung, Krangkeang, Juntiyuat, Sliyeg, and Losarang) Subdistrict; Region IV with a carrying capacity of 5,000 – 10,000 AU (Bongdua, Tukdana, Widasari, Kertasemaya, Sukagumiwang, Karangampel, Kedokanbunder, Jatibarang, Lohbene, Cagehaur, Bongas, Sukra, Patrol, Sindang, and Arahan) Subdistrict; Region V where the value of carrying capacity < 5000 AU (Balongan, Indramayu, Cantigi and Pasekan) sub-district. Carrying capacity results above imply that agricultural waste production, planted area, and the need for mature animal feed affect the size of the carrying capacity value.

There is an additional livestock population (5 regions) as follows: Region I where the addition of cattle can accommodate > 20,000 AU (Gantar, Kroya, and Terisi) sub-district; Region II attendant of cattle ranged from 15,000 –

20,000 AU (Lelea, Gabuswetan, and Anjatan) sub-district; Region III addition of cattle ranged from 11,000 – 15,000 AU (Haurgelis, Cikedung, Krangkeang, Juntiyuat, Sliyeg, and Losarang) Subdistrict; Region IV attendant of cattle ranged from 5,000 – 10,000 AU (Bongdua, Tukdana, Widasari, Kertasemaya, Sukagumiwang, Karangampel, Kedokanbunder, Jatibarang, Lohbene, Kandanghaur, Bongas, Sukra, patrol, Sindang, and referrals) Subdistrict; Region V the attendant of cattle < 5,000 AU (Balongan, Indramayu, Cantigi and Pasekan) sub-district. The addition of livestock capacity in an area is influenced by 1) agricultural waste production, 2) agricultural crop area, 3) mature animal feed needs, and 4) livestock population.

Indramayu Regency consists of 31 sub-districts with an IDD value > 2 are 29 sub-districts while three sub-districts (Cantigi, Pasekan, and Kandanghaur) with IDD values ranging from 1.5 to 2 are in the prone category, which can provide with additional livestock of less than 6,000 AU. That means that 89.98% of the Indramayu district is in the SAFE category for the availability of agricultural waste as animal feed. The results of this calculation are following the opinion (Arief, 2012) that the carrying capacity index value > 2 has the highest development potential in Indramayu Regency, Garut, Karawang, Subang, Indramayu, and Majalengka districts.

Table 5. Value of the carrying capacity index (IDD) of Indramayu Regency year (2015-2019)

Sub-District	IDD					Total	Average	Criteria
	2015	2016	2017	2018	2019			
Haurgeulis	54.60	66.83	19.86	27.99	30.06	199.35	39.87	SAFE
Gantar	5.68	3.56	3.85	4.29	4.48	21.86	4.37	SAFE
Kroya	25.15	14.78	11.01	13.58	9.68	74.19	14.84	SAFE
Gabuswetan	20.86	27.01	15.36	17.99	21.41	102.62	20.52	SAFE
Cikedung	2.37	2.31	2.23	2.29	2.40	11.60	2.32	SAFE
Terisi	12.72	7.49	6.18	8.17	7.94	42.50	8.50	SAFE
Lelea	8.27	8.33	5.73	5.99	6.14	34.46	6.89	SAFE
Bangodua	38.87	45.23	8.79	12.12	15.34	120.35	24.07	SAFE
Tukdana	5.66	6.31	3.05	3.87	5.43	24.32	4.86	SAFE
Widasari	8.78	7.92	4.70	6.49	6.84	34.72	6.94	SAFE
Kertasemaya	20.89	22.73	9.97	12.99	13.27	79.84	15.97	SAFE
Sukagumiwang	5.22	6.07	2.78	3.75	5.11	22.92	4.58	SAFE
Krangkeng	37.54	72.54	24.49	33.51	27.06	195.15	39.03	SAFE
Karangampel	17.55	25.86	38.92	67.04	41.96	191.33	38.27	SAFE
Kedokanbunder	7.15	8.34	9.90	12.94	12.25	50.57	10.11	SAFE
Juntinyuat	22.21	29.55	15.14	18.75	28.15	113.80	22.76	SAFE
Sliyeg	3.73	4.95	4.01	4.71	5.27	22.67	4.53	SAFE
Jatibarang	3.47	3.68	2.89	3.28	3.39	16.70	3.34	SAFE
Balongan	13.80	21.37	8.82	14.48	15.26	73.72	14.74	SAFE
Indramayu	22.66	27.20	12.60	15.51	12.52	90.50	18.10	SAFE
Sindang	28.64	52.16	11.50	13.10	16.02	121.43	24.29	SAFE
Cantigi	1.02	2.07	1.74	2.04	1.88	8.75	1.75	PRONE
Pasekan	1.39	2.27	2.12	1.91	1.97	9.67	1.93	PRONE
Lohbener	20.67	30.58	20.24	21.12	21.92	114.54	22.91	SAFE
Arahan	2.90	4.44	3.30	3.22	3.27	17.13	3.43	SAFE
Losarang	4.74	6.41	5.23	4.47	4.18	25.03	5.01	SAFE
Kandanghaur	1.65	2.45	1.67	2.12	1.52	9.42	1.88	PRONE
Bongas	6.66	7.42	4.24	5.64	6.58	30.54	6.11	SAFE
Anjatan	12.41	11.78	6.22	7.23	8.37	46.01	9.20	SAFE
Sukra	4.46	5.11	6.37	6.04	5.30	27.28	5.46	SAFE
Patrol	54.76	47.14	7.83	8.03	19.41	137.18	27.44	SAFE

Sources of Secondary Data Processed Data from BPS Majalengka Regency, Indramayu Regency and Ciamis Regency 2015-2019

The IDD value of the results of this research showed a range of 1.75 – 39.87. The lowest IDD value was 1.75 AU in Cantigi sub-district, the highest IDD value was 39.87 AU in the Haurgelis sub-district. In Indramayu Regency, there are three sub-districts where the IDD score is in the category of "Prone" (IDD 1.5 – 2.0), there are three districts, namely Cantigi, Pasekan, and Kandanghaur sub-districts, meaning that the three sub-districts have an excess population while the supply of forage agricultural waste does not meet the needs of cattle. Cantigi and Pasekan Subdistricts have lower agricultural waste production, planted area, and harvested area for crops than other sub-districts. The potential for agricultural waste produced is less compared to other districts. This can cause a shortage of forage feed for livestock leading to underdevelopment of the cattle population.

Kandanghaur Subdistrict is different from Cantigi and Pasekan Subdistricts due to the planted area, agricultural crop harvested area, and livestock population three times more than that of Cantigi and Pasekan sub-districts. Kandanghaur Subdistrict has also exceeded its livestock carrying capacity, which is why the area is in the very critical category, resulting in breeders looking for feed from agricultural waste to other places.

The IDD value > 2 "Safe" category, there are twenty-nine sub-districts in the Indramayu Regency (2.32 – 39.87 AU) with the carrying capacity value 6,150.48 - 47,342.13 AU. Twenty-nine sub-districts in the Indramayu Regency still have the potential for high availability for livestock feed with an additional livestock capacity of 6,278.01 - 44,217.29 AU in twenty-nine sub-districts as shown in table 4 and 5. Additional IDD is required in an area to reduce dependence on imported beef cattle and regional support development so that there is an increase in the community's economy (Saputra et al., 2016). The carrying capacity of agricultural waste is related to the number of livestock population, livestock density, natural resources, especially for the provision of fibrous forage or from agricultural waste for feed and cultivation patterns (Arsyad, 2012).

Analysis Location Question

The results of the calculation of the value of LQ> 1 and IDD> 2 imply that these districts are the basis for the development of beef cattle and are safe in the availability of feed. It is still possible to increase the capacity of livestock tamping for 7,944.27 - 39,019.60 ST. The 12 districts that have IDD> 2 and LQ> 1 are: 1) Haurgelis, 2) Gantar, 3) Gabuswetan, 4) Cikedung, 5) Terisi, 6) Bongdua, 7) Kertasemaya, 8) Kedokanbunder, 9) Juntiyuat, 10) Sliyeg, 11) Sindang and 12) Patrol. The results of this study are similar to the results obtained in previous studies (Arsyad, 2012) and (Dewi, 2018) who reported that an area has an LQ value of> 1 because of the potential for land carrying capacity, especially for agricultural land. They argued that geographic conditions would lead to the production of various types of green feed resources and the provision of large quantities. Feed, land tenure per individual causes communal land use to be limited, and adequate facilities and infrastructure because cattle farming is a family business carried out from generation to generation in almost every household in the sub-district has cattle.

Indramayu Regency has begun to focus on these eleven subdistricts for planning the development of an increase in the number of ruminant livestock populations by paying attention to various aspects, namely cultivation techniques, farmer knowledge, and skills and socio-economy through a more focused approach by taking advantage of various institutional functions both capital institutions, educational institutions, and marketing institutions. The animal market is not just providing physical assistance (cows, making cages, chopper machine tools, etc.). According to the research findings of Arief (2012) what need to be planned to develop ruminant

livestock populations in West Java Province are: a) The distribution of large ruminants in areas with potential for feed availability by optimizing carrying capacity, b. utilization of local forage in the surrounding area, c. provision of superior seeds through livestock counters, d. reproductive improvement and artificial insemination power, e. Preparation of development guidebook for development areas, f. Empowerment of farmer groups, g. Increased cooperation with financial institutions. The findings of research by Suhaema (2014) showed that the development of beef cattle must involve regional conditions because this affects the comfortable environmental conditions of the livestock so that it does not cause stress, feed carrying capacity, and social and economic components of society.

Table 6. Analysis LQ of Indramayu Regency (2015-2019)

Sub-district	LQ Cattle					Total	Average
	2015	2016	2017	2018	2019		
Haurgeulis	1.38	1.38	1.59	1.67	2.45	8.47	1.69
Gantar	2.01	2.01	2.31	2.32	3.14	11.78	2.36
Kroya	0.41	0.41	0.64	0.63	0.42	2.50	0.50
Gabuswetan	1.62	1.62	1.79	1.76	1.29	8.08	1.62
Cikedung	1.07	1.07	0.98	0.99	0.90	5.01	1.00
Terisi	3.23	3.23	2.91	2.96	3.07	15.41	3.08
Lelea	0.80	0.80	1.10	1.08	1.03	4.81	0.96
Bangodua	1.61	1.61	1.07	1.02	0.54	5.86	1.17
Tukdana	0.94	0.94	0.91	0.89	0.64	4.31	0.86
Widasari	0.16	0.16	0.22	0.12	0.08	0.74	0.15
Kertasemaya	0.66	0.66	1.75	1.72	2.11	6.89	1.38
Sukagumiwang	0.65	0.65	1.23	1.20	0.32	4.06	0.81
Krangkeng	0.28	0.28	0.59	0.10	1.20	2.44	0.49
Karangampel	0.61	0.61	0.95	0.74	1.90	4.81	0.96
Kedokanbunder	1.76	1.76	1.88	1.60	2.11	9.11	1.82
Juntinyuat	2.16	2.16	2.74	2.67	2.51	12.23	2.45
Sliyeg	1.98	1.98	1.71	1.69	1.69	9.05	1.81
Jatibarang	0.20	0.20	0.36	0.36	0.34	1.47	0.29
Balongan	0.14	0.14	0.35	0.34	0.37	1.34	0.27
Indramayu	0.83	0.83	0.40	0.41	1.00	3.47	0.69
Sindang	0.93	0.93	1.82	1.79	1.31	6.79	1.36
Cantigi	0.15	0.15	0.16	0.15	0.14	0.75	0.15
Pasekan	0.04	0.04	0.01	0.00	0.07	0.16	0.03
Lohbener	0.43	0.43	0.29	0.27	0.32	1.74	0.35
Arahan	0.01	0.01	0.09	0.07	0.37	0.55	0.11
Losarang	0.15	0.15	0.08	0.08	0.11	0.57	0.11
Kandanghaur	0.01	0.01	0.02	0.03	0.06	0.12	0.02
Bongas	0.33	0.33	0.26	0.25	0.13	1.30	0.26
Anjatan	0.32	0.32	0.49	0.48	0.74	2.34	0.47
Sukra	0.10	0.10	0.17	0.17	0.43	0.96	0.19
Patrol	1.14	1.14	2.71	2.72	1.70	9.40	1.88
Total	1.38	1.38	1.59	1.67	2.45	8.47	1.69

Sources of Secondary Data Processed Data from BPS Indramayu Regency 2015-2019

Conclusions

The results of this research resulted in carrying capacity values consisting of 5 region, Region I > 20,000 AU (Gantar, Kroya, and Terisi) sub-district; Region II carrying capacity ranged from 15,000 – 20,000 AU (Lelea, Gabuswetan, and Anjatan) sub-district; Region III 11,000 – 15,000 AU (Haurgelis, Cikedung, Krangkeang, Juntiyuat, Sliyeg, and Losarang) Subdistrict; Region IV carrying capacity ranged from 5,000 –

10,000 AU (Bongdua, Tukdana, Widasari, Kertasemaya, Sukagumiwang, Karangampel, Kedokanbunder, Jatibarang, Lohbene, Kandanghaur, Bongas, Sukra, patrol, Sindang, and referrals) Subdistrict; Region V carrying capacity < 5000 AU (Balongan, Indramayu, Cantigi and Pasekan) sub-district. The results of the analysis of IDD > 2 and LQ > 1 are in 12 sub-districts, implying that based on the availability of forage feed from agricultural land, they are included in the safe category to increase the population of beef cattle. The potential for beef cattle development in Indramayu Regency needs to be prioritized in 12 sub-districts with LQ > 1 and IDD > 2 accompanied by government policies to support investment in livestock marketing facilities and infrastructure for smallholders.

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