

# Analysis of Farming Business Density, Area Density, and Economic Density of Beef Cattle to Support Human Welfare in the Fulfillment of Animal Protein in 4.0 Industrial Revolution Era in Gorontalo District

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## ABSTRACT

This study aims to analyze farming business density, area density and economic density of beef cattle to support human welfare in the fulfillment of animal protein in 4.0 industrial revolution era in Gorontalo District. This research uses a literature study and survey methods. The data obtained were then calculated for the analysis of farming business density, area density and economic density of beef cattle in Gorontalo District. The results of the analysis of farming business density obtained 15 Sub-Districts with rarely categories and 4 Sub-Districts with moderate categories. Then the area density is 15 Sub-Districts with a rarely category, 1 Sub-District with a moderate category, 2 Sub-Districts with a solid category, and 1 Sub-District with a very solid category. Furthermore, the economic density of livestock in all Sub-Districts in Gorontalo District is in rarely category. This illustrates that farming business density, area density and economic density still has a great opportunity to be developed in Gorontalo District.

**Keywords:** Farming Business Density, Area Density, Economic Density.

## 1. INTRODUCTION

The livestock sector, especially beef cattle, as a meat producer for the fulfillment of community animal protein, is a very promising sector to be developed. This is due to increased demand related to food fulfillment [1] of high nutritional value, especially the need for animal protein, so that the production rate of beef cattle can increase in quantity and quality [2].

Gasification of beef cattle in its development has several variables, such as capital, land availability, feed and so on. Beef cattle can be integrated with food crops, so as to maximize local resources and regional program strategies [3], because the beef cattle business has a great opportunity to be developed [4].

Beef productivity can be seen from the recording of meat production [5]. In line with this, the

productivity of the local beef cattle business becomes the main concern of the government because beef cattle are the main supporter of the availability of meat in Indonesia, even though the amount available domestically is still insufficient and cannot even keep up with the national demand for meat. This is supported by research results [6], that the availability of beef in Indonesia has decreased every year.

The development of beef cattle can be seen based on farming business density, area density, and economic density, so that it can be used as a basis for policy making in the beef cattle sector in Gorontalo District. The review of several studies is very significant in determining areas for livestock business locations such as carrying capacity and its relevance to urban and regional planning [7], the value of sustainability of beef cattle farming in a complex environmental system [8] including the prospect of

beef cattle production [9], socio-culture of agricultural commodity production [10] as a source of animal feed so that the productivity of beef cattle can increase in relation to the fulfillment of meat supply for the community. In addition, geographical conditions, topography, human resources, feed, water, and government strategies, capital, level of knowledge, area, and management of beef cattle cultivation will certainly affect the profitability of the beef cattle business.

Broadly speaking, the production growth originating from beef cattle can be increased through a beef cattle development strategy based on farming business density, area density, and economic density, so as to realize integrated, harmonious and optimal beef cattle management.

Based on the explanation above, the writer intends to analyze farming business density, area density and economic density of beef cattle to support human welfare in the fulfillment of animal protein in 4.0 industrial revolution era in Gorontalo District.

**2. MATERIALS AND METHODS**

The research was carried out related to the analysis of farming business density, area density and economic density of beef cattle in 19 Sub-Districts in Gorontalo District from January to September 2020.

The research was conducted using descriptive methods accompanied by simple statistical analysis. The data collection methods are secondary data and primary data, namely area of harvest of food crops such as rice, corn, and soybeans which were carried out in 19 Sub-Districts in Gorontalo District. Then the data will be processed and analyzed in the form of parameters analysis of farming business density, area density and economic density of beef cattle [11] as follows:

**2.1. The Farming Business Density**

The farming business density is the number of beef cattle population per hectare of farm land, where:

$$\text{The Farming Business Density} = \frac{a}{b} \tag{1}$$

Information:  
 a = Total population of beef cattle (ST)  
 b = Farm area (Ha) in each Sub-District of Gorontalo District

The criteria used were very solid > 2, solid > 1 – 2, moderate 0.25 - 1.0, and rarely < 0.25.

**2.2. The Area Density**

The area density is the density of ruminants per km<sup>2</sup> for Gorontalo District:

$$\text{The Area Density} = \frac{a}{d} \tag{2}$$

Information:  
 a = Total population of beef cattle (ST)  
 d = Total area (km<sup>2</sup>) in each Sub-District of Gorontalo District

The criteria used for area density are very solid > 50, solid > 20 - 50, moderate 10 – 20, and rarely < 10.

**2.3. The Economic Density**

The economic density of beef cattle can be measured based on the number of beef cattle population in 19 Sub-Districts of Gorontalo District in 1000 (ST) inhabitants:

$$\text{The Economic Density} = \frac{a}{e} \tag{3}$$

Information:  
 a = Total population of beef cattle (ST)  
 e = Total population in each Sub-District of Gorontalo District

The criteria used were very solid (> 300), solid (100 - 300), moderate (50 - 100), and rarely (< 50).

**3. RESULT AND DISCUSSION**

**3.1. The Farming Business Density**

The farming business density in Gorontalo District can be seen in Table 1.

Table 1 above shows that farming business density in Gorontalo District only has two categories, namely the moderate category and rarely category. This shows that the number of livestock causes variations in farming business density. Overall farming business density category shows that the variation is not too different between each Sub-Districts in Gorontalo District where farming business density is still below number one. The

increase in beef cattle population can be increased through the development of land potential, human resources, feed, and feed models [12].

**Table 1.** The Farming Business Density in Gorontalo District

Sub-District	The Farming Business Density	Category
Asparaga	0.10	Rarely
Batudaa	0.10	Rarely
Batudaa Pantai	0.14	Rarely
Bilato	0.12	Rarely
Biluhu	0.15	Rarely
Boliyohuto	0.27	Moderate
Bongomeme	0.10	Rarely
Dungaliyo	0.20	Rarely
Limboto	0.12	Rarely
Limboto Barat	0.16	Rarely
Mootilango	0.14	Rarely
Pulabala	0.06	Rarely
Tabongo	0.17	Rarely
Telaga	0.25	Moderate
Telaga Biru	0.22	Rarely
Talaga Jaya	0.53	Moderate
Tibawa	0.12	Rarely
Tilango	0.57	Moderate
Tolangohula	0.12	Rarely

Source: Processed data, 2020.

The assessment of farming business density in 19 Sub-Districts in Gorontalo District shows that farming business density is still dominated by rarely category with an area of Gorontalo District of 2.125.47 km<sup>2</sup> [13]. The strategy that can be done in using the diversity of natural resources is by increasing integrated farming [14].

### 3.2. The Area Density

The area density in the 19 Sub-Districts of Gorontalo District listed in Table 2. Table 2 shows that the area density for all Sub-Districts in Gorontalo District has four categories, namely very solid, solid, moderate, and rarely but still dominated by rarely categories. This shows that the average area in each Sub-Districts in Gorontalo District has a low number of Animal Units (AU) so that it does not really affect the density of area. This is in accordance with the opinion [15], that in order to identify an area it is

necessary to use a systematic functional method approach and place all aspects that function and have a position in supporting the mission of livestock sector.

**Table 2.** The Area Density in Gorontalo District

Sub-District	The Area Density	Category
Asparaga	7.11	Rarely
Batudaa	2.74	Rarely
Batudaa Pantai	5.61	Rarely
Bilato	1.75	Rarely
Biluhu	2.75	Rarely
Boliyohuto	13.79	Moderate
Bongomeme	4.25	Rarely
Dungaliyo	2.13	Rarely
Limboto	8.09	Rarely
Limboto Barat	3.02	Rarely
Mootilango	4.80	Rarely
Pulabala	1.99	Rarely
Tabongo	4.08	Rarely
Telaga	2.61	Rarely
Telaga Biru	4.87	Rarely
Talaga Jaya	6.00	Rarely
Tibawa	7.93	Rarely
Tilango	28.32	Solid
Tolangohula	105.28	Very Solid

Source: Processed data, 2020.

The results of the calculation of area density in 19 Sub-Districts in Gorontalo District show that area density in this case the wide availability of land and potential of agricultural waste produced are very promising opportunities to be developed and utilized for development in livestock area, especially beef cattle in Gorontalo District. This is in accordance with the opinion of Mukson [16], that one of the factors that plays an important role in the development of beef cattle is 92.3% due to the land area, the adequacy of the available forage for beef cattle, labor, and available capital.

### 3.3. The Economic Density

The following is the economic density of livestock in Gorontalo District, which can be seen in Table 3. Based on Table 3 above, it is known that the economic density of all is in rarely category in 19 Sub-Districts of Gorontalo District. The economic density description also informs that the population and population of beef cattle in each Sun-Districts are

different. Efforts to develop animal husbandry which are important to support the increase in people's income in this area should be directed at Sub-Districts that have low levels of economic and

**Table 3.** The Economic Density in Gorontalo District

Sub-District	The Economic Density	Category
Asparaga	17.68	Rarely
Batudaa	14.76	Rarely
Batudaa Pantai	3.65	Rarely
Bilato	16.26	Rarely
Biluhu	6.93	Rarely
Boliyohuto	27.82	Rarely
Bongomeme	14.70	Rarely
Dungaliyo	42.46	Rarely
Limboto	26.06	Rarely
Limboto Barat	74.14	Rarely
Mootilango	42.02	Rarely
Pulabala	43.64	Rarely
Tabongo	26.57	Rarely
Telaga	20.07	Rarely
Telaga Biru	30.94	Rarely
Talaga Jaya	9.68	Rarely
Tibawa	28.39	Rarely
Tilango	16.61	Rarely
Tolangohula	26.73	Rarely

Source: Processed data, 2020.

technical density [17]. The number of beef cattle population that is different for each Sub-Districts shows that there are still obstacles faced by breeders, one of which is capital. The decline in beef cattle maintenance can be influenced by many factors, such as low capital and the lack of farmer's ability to organize his beef cattle business [18]. Furthermore, suggest that the carrying capacity of a beef cattle business can be caused by land resources and plant products whose waste can be used as an alternative to animal feed [19].

#### 4. CONCLUSION

The results obtained indicate that the analysis of farming business density obtained 15 Sub-Districts with rarely categories and 4 Sub-Districts with moderate categories. Then the area density is 15 Sub-Districts with a rarely category, 1 Sub-District with a moderate category, 2 Sub-Districts with a solid

category, and 1 Sub-District with a very solid category. Furthermore, the economic density of livestock in all Sub-Districts in Gorontalo District is in rarely category. This illustrates that farming business density, area density and economic density still have a great opportunity to be developed in Gorontalo District.

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