

Analysis of availability of ruminant feed in Tuban Regency, East Java

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Abstract. Tuban Regency had a large ruminant population of 336,063 or equivalent to 235,427.2 AU consisting of 334,143 beef cattle, 89 dairy cattle and 1,831 buffaloes (Fisheries and Animal Husbandry Department, Tuban Regency, 2017), but the productivity per individual and the rate of population growth in this region were quite low. The availability of ruminant feed in the Tuban Regency for the development of ruminants was still needed to be evaluated especially if it was associated with its productivity. The research was conducted in 20 sub-districts in Tuban Regency by both survey and secondary data analysis. Data analysis was focusing on ruminant animal's populations, land usage, food crop production, forage production, topography, and climate. Analysis of potency of ruminant feed consisted of potential feed from agriculture and plantation waste from a particular area such as grasslands, fields, forests, and others. Ruminant animal population conversion was carried out by equalization in animal units (AU), cattle = 0.7 AU; buffalo = 0.8 ST; sheep = 0.07 ST and goats = 0.08 ST. Feed requirements for each AU were 9.1 kg DM/day. The result showed that feed carrying capacity in 7 sub-districts in Tuban Regency has negative values and 13 other sub-districts were positive. The average value of feed capacity in Regency as a whole is -1236.563, which means that between feed availability and feed requirement was the deficit. It could be concluded that Tuban Regency still cannot develop a population of ruminants. It was recommended to overcome these problems by supplying of forage and agricultural wastes from outside the region around Tuban Regency, such as Bojonegoro, Lamongan, Rembang, and Blora Regency. Other efforts to overcome this problem were increasing of planting forages on marginal lands and applying feed preservation technology livestock.

1. Introduction

Tuban Regency is one of the district in East Java Province which has a large population of beef cattle, but the productivity per individual cattle in this region is quite low. The main constraint in livestock farming business is the problem of feed both quality and quantity. Failure to develop livestock populations in an area can occur because it does not take into account the available feed potential. Feed potential of an area for livestock is the ability of the region to accommodate a number of livestock population optimally. Tuban Regency consists of 20 sub-districts, 17 villages and 311 villages with large agricultural potential. In 2013 Tuban Regency was ranked as the 5th largest producer of beef cattle in East Java [1]. The beef cattle population reached 334,143 cattle [2], compared with total national population 16.4 million cattle. Farmers still rely on forages as the main feed source, but during the dry season ruminant feed supplies rely mostly on local vegetation availability such as field grass and

agricultural wastes which are generally of low quality. Carrying capacity of ruminant feed is an important basic information source for developing ruminant animal's population in a region [3]. Based on this background, it is considered necessary to conduct a mapping study of areas that are considered to have sufficient feed capacity and that are lacking in the livestock population in the Tuban Regency. Thus the development of livestock in the region will be more directed, effective and rational following the potential, constraints, and prospects that exist [4]. The purposes of this research activity are to identify livestock population in 20 sub-districts in Tuban, mapping the carrying capacity of feed to 20 sub-districts in Tuban regency, producing livestock area documents that are conducive to livestock development especially in this case beef cattle in regions that have carrying capacity appropriate feed. This research is expected to produce livestock areas that can support the development of livestock based on feed carrying capacity so that the development of ruminants in the Tuban Regency will progress rapidly and provide very significant support towards Indonesia having self-sufficiency in livestock products.

2. Material and methods

2.1. Material

The location of the activity was in 20 sub-districts in Tuban Regency, East Java Province from July to October 2018.

2.2. Methods

This research used survey methods and analysis of secondary data in the form of livestock populations, land use, food crop production, topography, and climate. Interviews were conducted with 10 farmers an respondent each Sub District, totally 80 farmers. The criteria for selecting respondents was farmers with ownership of livestock as many as 3 beef cattle. The questionnaire used for the interview contains the identity of the farmer, ownership of livestock and other businesses, the type of feed provided throughout the year and feeding management. Secondary data obtained from the Government of Tuban Regency, Bapedda and the Fisheries and Animal Husbandry Department of Tuban Regency.

2.3. Data analysis

Data from interviews were analysed using quantitative descriptive methods. It served to describe or give an overview of the object under study through sample data as it is without doing analysis and making conclusions that apply to the public [5].

2.4. The carrying capacity of ruminant feed

The potential of ruminant feed consists of two types, including the potential feed from agricultural and plantation waste and the grass was obtained in an area such as grasslands, moor, fields, forests, and others. Availability of feed from agricultural waste was calculated using the formula used in [6]:

- a. Rice straw = $(2.5 \times \text{land area} \times 0.70)$ ton DM/year
- b. Corn straw = $(6.0 \times \text{land area} \times 0.75)$ ton DM/year
- c. Soy Bean straw = $(2.5 \times \text{land area} \times 0.60)$ ton DM/year
- d. Groundnut straw = $(2.5 \times \text{land area} \times 0.60)$ ton DM/year
- e. Sweet potato leaves = $(2.5 \times \text{land area} \times 0.80)$ ton DM/year
- f. Cassava leaves = $(1.0 \times \text{land area} \times 0.30)$ ton DM/year

Availability of natural grass in each type of land was calculated using the formula used in Tanuwiria et al. (2007):

- a. Grazing land = $(0.23 \times 60 \text{ ton} \times \text{land area})$ ton DM/year
- b. Paddy field = $(0.77591 \times \text{land area} \times 0.06 \times 6.083)$ ton DM/year
- c. Dry land = $(1.062 \times \text{land area} \times 0.09785 \times 6.083)$ ton DM/year
- d. Forest land = $(2.308 \times \text{land area} \times 0.05875 \times 6.083)$ ton DM/year

Livestock population was expressed in Animal Unit (AU), including cattle = 0.7 ST, buffalo = 0.8 AU, sheep = 0.07 AU and goat = 0.08 AU [7]. Feed requirements for each AU are 9.1 kg DM/day [8]. Total ruminant feed requirements are calculated using the formula below:

Total requirement of ruminant feed = requirement x livestock population (AU)

The formula for calculating carrying capacity ratio was presented below [7] :

$$\text{Carrying capacity ratio} = \frac{\text{total feed availability}}{\text{feed requirement}}$$

3. Result and discussion

Based on data from Tuban District Government (2018), the area of Tuban Regency was 183,994,562 ha consisting of 54,860,530 ha of paddy fields and 129,134,031 ha of dry land with 65 km of beach stretching from Palang District to the west of Bulu Bancar District. The climate in Tuban Regency were rainy and dry with an average rainfall of 3,376 mm/year with the number of rainy days averaging 175 days per year [9].

The number of ruminants was large in Tuban Regency which was spread in 20 sub-districts and dominated by beef cattle. The total population of large ruminants in the Tuban Regency was 336,063 or equivalent to 235,427.2 AU consisting of 334,143 beef cattle, 89 dairy cows and 1,831 buffaloes [2]. Small ruminants in Tuban Regency also exist in large numbers. The population of small ruminants in the Tuban Regency is 16,814.61 AU which consists of 90,435 sheep and 131,052 goats.

Table 1. Feed carrying capacity for the livestock development of Tuban Regency

No.	Sud-district	Feed potential (ton DM/year)	Carrying capacity (AU)	The real number of livestock (AU)	Potential of livestock development (AU)
1.	Kenduruan	15,956.68	4,806.23	11,087.90	-6,281.67
2.	Bangilan	22,383.39	6,741.99	10,440.03	-3,698.04
3.	Senori	25,561.00	7,699.09	10,197.54	-2,498.45
4.	Singgahan	33,091.96	9,967.46	7,130.45	2,837.01
5.	Montong	83,135.34	25,040.77	18,457.40	6,583.37
6.	Parengan	43,465.23	13,091.94	14,501.10	-1,409.16
7.	Soko	48,505.10	14,609.97	16,336.15	-1,726.18
8.	Rengel	40,296.78	12,137.58	7,824.15	4,313.43
9.	Grabagan	42,608.42	12,833.86	10,012.25	2,821.61
10.	Plumpang	32,293.38	9,726.92	6,309.98	3,416.94
11.	Widang	30,043.14	9,049.14	2,950.50	6,098.64
12.	Palang	31,531.28	9,497.37	12,203.07	-2,705.70
13.	Semanding	65,045.24	1,9591.94	19,246.79	345.15
14.	Tuban	6,151.83	1,852.96	4,891.31	-3,038.35
15.	Jenu	42,098.18	12,680.17	15,22.23	-2,544.06
16.	Merakurak	47,793.92	14,395.76	18,663.12	-4,267.36
17.	Kerek	64,364.76	19,386.98	20,314.90	-927.92
18.	Tambak Boyo	35,48737	10,688.97	11,708.42	-10,19.45
19.	Jatirogo	25,072.06	7,551.83	16,259.07	-8,707.24
20.	Bancar	20,449.98	6,159.63	18,483.45	-12,323.82
	Total	755,335.03	227,510.55	252,241.81	-24,731.26

Based on the data from Table 1, potential feed in Tuban Regency was 755,335.03 tons DM/year with a capacity of 227,510.55 ST, while the real number of livestock in the Tuban Regency was 252,241.81 ST. The average value of feed carrying capacity in the Tuban Regency as a whole was -24,731.26. The

positive carrying capacity of feed indicates high feed potential to support the development of livestock populations [8]. The negative value of feed carrying capacity indicates that Tuban Regency was still unable to develop livestock populations. Forages available in the rainy season are elephant grass, local grass and legumes, while dry season farmers rely on agricultural waste such as rice straw and maize straw to substitute grass. Soybean, groundnut, cassava, and sweet potato are harvested in the dry season which means the leaves can be used as a roughage for ruminants.

4. Conclusion

Based on the result, Tuban Regency has a negative feed carrying capacity value. It was recommended to bring in forage and agricultural waste from outside the Tuban regency, especially in areas directly adjacent to Bojonegoro, Rembang and Blora Regencies to overcome that problem. Besides that, it could be applied fodder planting in roadside land, rice fields, yards, graves, soccer fields, under the forest plants and grazing land.

References

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