The Estimation of Natural Increase, Population Dinamics and Output of Beff Cattle in Klaten Central of Java

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ABSTRACT

The purpose of this study was to calculate the estimation of natural increase, population dynamics and output beef cattle in Klaten. This research was carried out from December 2015 until January 2016 at the District of Ngawen, Prambanan and Tulung, Klaten, Central of Java. The material used in this study was a questionnaire which contains the identity of the breeder, livestock production and reproduction data, death data, mutations, maintenance system of livestock and population data as well as the last 7 years in Klaten Regency, Central of Java. The research used census method by using the sample that is in accordance with the rules of research methodology. The selected district was the district with a high, medium and low population i.e. Tulung, Prambanan and Ngawen. From the three selected district then selected three villages which had a high, medium and low population of cattle. The numbers of respondents in this research were 951 people. The results showed that the natural increase of beef cattle in Klaten was 27.14 %. The estimation of population dynamics of beef cattle in Klaten Regency 2015 to 2019 respectively 115447, 119427, 123406, 127386 and 131365. The out put estimation of beef cattle in Klaten was 18.10% included in the low category. Total output in Klaten by 2015 to 2020 respectively 29670, 30693, 31715, 32738 and 33761. Factors that affecting the output of beef cattle was the number of cattle needs and the replacement. The natural increase and population dynamics affected by the birth, death and mutations. In conclusion, Klaten was one of the sources of beef cattle in Central of Java.

Keywords: Natural Increase, Population Dinamycs, Output, Beef Cattle

INTRODUCTION

One of national livestock assets in Klaten that very potential to be developed is beef cattle. An increase of the potential and productivity of beef cattle in Indonesia can improve employment, income and the revenue of the original area (PAD). Therefore information about production capabilities is indispensable so that the potential of the region as a source of beef cattle as a replacement can be preserved and enhanced. The natural increase (NI) was calculated based on the difference between the birth rates with mortality rate within a year (Hardjosubroto, 1990). Population dynamics was the study of the growth and arrangement of the population (Clapham, 1983). The potention or output of cattle was the amount of cattle that can be taken out to other area or slaughtered in certain area without disturbing cattle population balance (Hardjosubroto, 1994). Based on the previous study note that the Province of East Java, East Nusa Tenggara (NTT), South Sulawesi, and Southeast Sulawesi can be classified as the area of the development of beef cattle commodities. The results of the analysis can be used as the basis of the guidelines in developing an breeding area of cattle so that location worth mentioning as a source of germs. Therefore it needs to be done by output analysis activities in

the region, in particular for beef cattle. In the severals study showed that the output estimation of beef cattle in Klirong, Pesisir and Banyuasin respectively were 46,84% 20,25% and 24,30% (Sumadi et al., 2007; Putra et al., 2015; Susanti et al., 2015) The results indicate that each region can be called as the producer of beef cattle breeds. The potention of Klaten as the producer of beef cattle were still not known. Therefore we need to calculate the estimation of out put of beef cattle at the venue to know the development of population every year. In addition, this research has never been done before so that was very interesting.

MATERIALS AND METHODS

This research was carried out from December 2015 until January 2016 in Prambanan Ngawen and Tulung, Klaten Regency, Central of Java.

MATERIALS
The material that used in this study was a BPS (Badan Pusat Statistik) and questionnaire for the farmers. Respondent wich used in this research was 951persons consist of Prambanan 461persons, Ngawen Village 56 persons, and Tulung 434 persons.

METHODS
This research was descriptive with the survey method. Data that obtained includes the primary and secondary data. Primary data was taken with interviews directly to respondents, while data secondary data was obtained from the Department of agriculture and animal husbandry in Klaten. Primary data include composition of cow population structure, the average of cow ownership per year and reproductive management data. Primary data was used to calculate the natural increase (NI), the net replacement rate (NRR). The secondary data (population data) were used to calculate the population dinamics in Klaten

The Population
The cow population was calculated by the following model :
$$P = \frac{N(i) - N(f)}{2}$$
the initial population formula = N (f) + Di+ G – Bi – E
Where N was the number of population, N (i) was the initial population, N (f) was the final population, Di was the number of deaths against population per year, G was the number of livestock expenses per year, Bi was the number of calf births per year and E was the number of catlle entries per year.

Natural Increase (NI)
Natural increase was calculate by the following formula
NI = % the birth of calf per year - % the death of cattle per year (Sumadi *et al.,* 2011)
The birth of calf (%) = $\frac{the\ number\ of\ birth\ per\ year}{the\ number\ of\ population}$ x 100%
The death of cattle (%) = $\frac{the\ number\ of\ death\ per\ year}{the\ number\ of\ population}$ x 100%

Population Dinamics
The population dynamic was calculate by the analysis of *Time Series* with the smallest squares method (Sumadi, *et al.,* 2003).
The formula: $\hat{Y} = a + bx$
Where $\hat{Y}$ was the *time series* data and x was the time (the year)

Output
Output was calculated with the following formula :*Output* (%) = NI (%) –*Replacement* needs (%)

RESULTS AND DISCUSSION

Farmer identity

Total the respondent wich used in this research was 951persons consist of Prambanan 461persons, Ngawen Village 56 persons, and Tulung 434 persons Based on the result, the average age of cattle farmers ere $57,64 \pm 3,17$ years old. This age is still included in the productive age. The age of breeders is higher than the age of the cattle farmers in Wonosari, Gunungkidul (Sumadi et al., 2011) of $45,45 \pm 11,79$ years of with experience 6.97 ± 2.31 years. The majority of breeders last education was elementary school, it can be said that education level of the farmers still belongs to low. The aim of cattle maintenance was mostly for the side job ($99,35 \pm 0.93\%$), and for savings (0.65 ± 0.91 %). The education level will have an effect on the progress of their business and its revenues (Sumadi *et al.,*2003).

Natural Increase (NI)

Table 1 below showed the calculation of natural increase beef cattle in Klaten 2015. The composition of table includes the initial population, the population of late, the average population, the parent population natural increase the male, female and total.

Table 1. *Natural Increase* of beef cattle in Klaten on 2015

No.	Variable	Klaten			Total
		Prambanan	Ngawen	Tulung	
1.	The initial population	938,00	110,00	829,00	1591,00
2.	The final population	1240,00	130,00	1096,00	2466,00
3.	The average population	1089,00	120,00	962,50	2171,50
4.	The dam population	660,00	39,00	546,00	1245,00
5.	Natural Increase of male (%)	8,17	5,00	9,87	8,75
6.	Natural Increase of female (%)	16,35	10,83	18,39	16,95
7.	Natural Increase (%)	24,52	15,83	28,26	25,70

The average of NI in Klaten based on Table 1 was 25.70%. NI of males and females respectively 8.75% and 16.95%. This result was greater than Sumadi et al. (2014) in Kebumen 22.95%. The value of NI of this study was also higher than Tobensi et al. (2009) and lower than Sumadi et al. (2007) respectively of 21.72% and $46,68 \pm 9,16\%$. The value of NI was affected by the high rate of birth and the low value of mortality. The other factor that infuence NI was the percentage of birth against the population and livestock composition of adult males and adult female (Sumadi et al., 2004). The value of NI can reach a maximum in the percentage of high birth and death rates were low. The birth rate was influenced by the fertility and the management of maintenance. The death rate was influenced by the survival of livestock.

Population dinamics

The following Table 2 showed the recapitulation of beef cattle population in Klaten Regency by 2015.

Table 2. The recapitulation of beef cattle population in Klaten on 2015.

Sub	The number of cattle	BPS data	Selisih	Persentase (%)
Tulung	1096	1771	675	38.11
Ngawen	130	450	320	71.11
Prambanan	1240	1788	548	30.65
Total	2466	4009	1543	38.49

The population was decline caused by several factors, one of which the cattle mutations. It was also caused the big livestock expulsion to fullfill the needs of their economies. Based on the regression

line equation y=99530,2+3979,2x of Time series analysis results 2009 untill 2015, being estimated a population of beef cattle in Klaten Regency 2016 until 2020 (Table 3) with the same technical coefficients.

Table 3. The estimated of population dinamics in Klaten 2016-2020

Year	Populasi	Increase (%)
2016	115447	3.81
2017	119427	3.45
2018	123406	3.33
2019	127386	3.22
2020	131365	3.12
Average		3.39

The average rise in population of 3.39%. The highest increase was happened by 2015 to 2016 of 3.81% . The population of beef cattle in Klaten could be estimated will decline if not given attention by the local goverment. This can occur if the technical coefficients of beef cattle is not changed

Output

The result of output in Klaten Regency presented in table 4.

Table 4. Output of beef cattle in Klaten 2015

No.	Peubah	Kecamatan			Rata-rata
		Prambanan	Ngawen	Tulung	
1.	Culled cattle				
	a. Male (%)	0.00	0.00	0.00	0.00
	b. Female (%)	9.10	4.81	8.74	7.55
	Total (%)	9.10	4.81	8.74	7.55
2.	Remnant replacement				
	a. Male (%)	8.17	5.00	9.87	8.75
	b. Female (%)	7.25	6.02	9.65	9.40
	Total (%)	24.52	15.83	28.26	25.70

The total output of culled cattle and remain replacements was included in the category of low and medium. The result was lower than the previous research by 2014 in Kebumen Regency of 26.01 and 73.99% (Sumadi et al.. 2014). The highest output was found in Prambanan Sub-district while the lowest output was found in Ngawen Subdistrict respectively of 9.10 and 4.81%. In general. the replacement livestock output percentage was higher than culled cattle. This relates to the large amount of need and the availability of replacement cattle. The magnitude of culled cattle affected by replacement needs. The number of replacement cattle was higher than the needs of the cattle so the rest of the replacement can be culled (Sumadi 1999).

CONCLUSIONS

Conclussion

The average of NI in Klaten based on Table 1 was 25.70%. NI of males and females respecively 8.75% and 16.95%. There is an increase of dynamic population in Klaten (2016-2020) respectively was 115447, 119427, 123406, 127386 and 131365. The total output of culled cattle and remain replacements was included in the category of low and medium. Based on the result, Klaten was one of the sources of beef cattle in Central of Java

Suggestion

Its needed to do further research about output in Klaten with larger area and covers all area in that area.

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