Dynamic Population Base on Natural Increase and Output of Swamp Buffalo (Bubalus Bubalis) in Banyuwangi Regency

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Keywords: Structure of the population, reproduction, births, and deaths, output, natural increase

Abstract: The purpose of this research was to find the natural increase number of Swamp Buffalo in Banyuwangi Regency. This research was conducted in 3 subdistricts. The research material used was 122 breeders with a total number of 384 buffaloes. The method used was surveyed. Variable observed in this study is reproduction performance, the structure of the population, mutation, percentage of births and deaths, service per conception (S/C), conception rate (CR), anestrus postpartum (APP), days open (DO). Data obtained are tabulated with Microsoft Excel and average, the standard of deviation and then analyzed with descriptive. The results showed that the average value of the calving interval was 16.39 ± 0.42 months, Anestrus Postpartum was 4.78 ± 0.39 months, Service Per Conception was 1.3 ± 0.07, Conception Rate (CR) was 70.26 ± 8.30%, Days Open was 5.82 ± 0.35 months, output was 15.10% and the natural increase (NI) value of swamp buffalo in Banyuwangi Regency was 16,93%. Concluded that the value of the natural increasing number of buffalo in the Banyuwangi Regency is a low category, and out of balance with the number of Buffalo that comes out of breeding.

1 INTRODUCTION

Buffalo (Bubalus bubalis) is a large ruminant livestock that has high potential in the supply of meat. otherwise, it can be used as a source of labor. Buffalo in some areas is a symbol of social status and is used for traditional ceremonies. East Java Province is one of the regions in Indonesia which has the highest buffalo population, which is 27,304 head in 2016 (Timur, 2016). In the last five years, the population of buffaloes in the Banyuwangi Regency has a total of 4035 head buffaloes. In general, the factors that influence the decline in buffalo livestock population are mostly carried out extensively in livestock raising patterns, so that they rely on feed contained in grazing fields so that the mating system tends to be inbreeding. This will affect the reproductive ability of buffaloes at a productive age and will result in a lack of replacement seed in livestock breeding. Several factors influence the ups and downs of the population that are affected by births, deaths, and mutations of livestock. High birth rates greatly affect the composition of young children and young animals, determining the presence of replacement seedlings so that it has a good effect on the composition of adult livestock. Population increase every year (Natural Increase) is one of the benchmarks to increase the buffalo population, therefore good management and handling of mature female livestock are needed. Livestock population in a breed will remain constant if between the number of animals mutated in control with known output values. The buffalo cattle population will avoid extinction by limiting excessive outward mutations.

2 MATERIALS AND METHODS

The material used in this study were 122 breeders who had adult female buffalo. The total number of female buffaloes taken was 152 head. The method used in this study is a survey method, with the determination of the location of the study using a purposive sampling method, the selection is based on certain criteria, the criteria is that of the buffalo cattle population in the Banyuwangi Regency which still has good breeding potential. The variables observed in this study were animal mutation, population structure, service per conception (S / C),

Budiarto, A., Ciptadi, G., Nasich, M., Irsanti, P. and Darmawan, A.
Dynamic Population Base on Natural Increase and Output of Swamp Buffalo (Bubalus Bubalis) in Banyuwangi Regency.
DOI: 10.5220/0009586600960100
In *Proceedings of the 6th International Conference on Advanced Molecular Bioscience and Biomedical Engineering (ICAMBBE 2019) - Bio-Prospecting Natural Biological Compounds for Seeds Vaccine and Drug Discovery*, pages 96-100
ISBN: 978-989-758-483-1

conception rate (CR), natural increase (NI) and output in buffalo cattle in Banyuwangi Regency. The data obtained in the tabulation are then calculated as a percentage and average, then analyzed descriptively.

a) states that using the following calculation:

NI (%) = Percentage of births (%) - Percentage of deaths (%)

Output = remaining replacement + male and female cattle that are rejected

3 RESULTS AND DISCUSSION

Based on the survey results at the research location, it was found that the structure of the buffalo population detailed by young cattle (male and female) and adult animals (male and female) as presented in Table 1.

Table 1. Structure of swamp buffalo population at the study site

Component	Young old (PI0, PI1)		Adult (PI2, PI3, PI4, PI5)		total
	head	%	head	%	head
Male	45	11,72	65	16,93	110
Female	89	23,17	185	48,18	274
total	134	34,89	250	65,11	384

Based on Table 1, it is known that the percentage of adult female buffalo population is 48.17% and male buffalo is 16.92% (1: 3) meaning that 1 male can serve 3 females. The ratio is mostly found in cattle aged 4-5 years (PI4) as in Table 2, which means that at that age the potential is in the breeding group. The results of this study are still lower than the provisions stipulated by the Ministry of Agriculture comparison of male and female 1: (8-10) tail. One head buffalo male with good genetic quality mated with 8-10 buffaloes can improve buffalo productivity performance. Analysis of the potential for buffalo development in the Banyuwangi Regency can be further clarified by taking into account population structure based on the age group. The composition of livestock by age group can be seen in the following Table 2.

Table 2.

No	Age		PI0	PI1	PI2	PI3	PI4	PI5	Total
1	Male	head	30	15	19	21	19	6	110
	Percentage	(%)	7,81	3,90	4,94	6,03	4,94	1,56	28,6
2	Female	head	42	47	38	25	70	52	274
	Percentage	(%)	10,93	12,23	9,89	6,51	18,23	13,54	71,4

(Hafez, 2000) Performance reproduction of buffalo in Banyuwangi Regency as presented in Table 3 below: The reproductive performance of livestock can be measured by parameters, including Service per Conception, Days Open, spacing distance, and Conception Rate. Besides, the first age of mating, the first age of calf also influences the reproductive performance of the female buffalo. Female buffalo reproductive efficiency is said to be good according to reproductive efficiency is the maximum use of reproductive capacity. Reproductive performance at each age of livestock can vary due to many factors including genetics, sex, feed, climate, weather and so on. Increasing the value of reproductive efficiency can be done by improving overall maintenance management, including a recording of breeding, detecting lust properly, improving the quality and quantity of feed provided, good sanitation and maintaining the health of livestock that is maintained. One measure of increased reproductive efficiency in a female parent is an increase in birth rates which is strongly influenced by the fertility rate of the female parent and the fertility of males in a marriage. Breeding efforts are said to be efficient if the male is enough to marry one female until he has one pregnancy. The higher the S / C value the more inefficient the marriage is carried out. (Affandy et al., 2003) states that normal S / C values range from 1.6 to 2.0. The lower the S / C value of a parent, the higher the level of fertility and vice versa the higher the value of S / C, the lower the fertility value. The S / C results from the research were supported by a CR value of

70.26 ± 8.30%. (Toliehere. 1993) states that the best CR reaches 60-70%, whereas for Indonesia, taking into account the natural conditions, management, and distribution of livestock that is spread is considered good if the CR value reaches 45-50%.

Table 3.

Component	Age			Average
	3-4 years	4-5 years	› 5 years	
First of age breeding (months)	29,89 ± 0,70	30,00 ± 0,53	30,00 ± 1,11	29,96 ± 0,06
weaning age (months)	8,22 ± 3,86	7,73 ± 3,18	8,78 ± 3,59	8,24 ± 0,53
APP (months)	4,37 ± 2,11	4,82 ± 1,85	5,14 ± 2,21	4,78 ± 0,39
S/C (time)	1,32 ± 0,47	1,36 ± 0,49	1,22 ± 0,44	1,3 ± 0,07
CR (%)	67,57	63,64	79,57	70,26 ± 8,30
DO (months)	5,43 ± 2,02	5,91 ± 1,69	6,11 ± 2,13	5,82 ± 0,35

(Izquierdo et al., 2008) Based on Table 3, the average duration of female buffalo APP at the study site was 4.78 ± 0.39 months, this figure is high compared to the statement. Several factors can influence anestrus namely age, pregnancy, lactation period, feed, season, environment, and chronic diseases. (Pohan and Talib, 2010) states that the failure of lust or anestrus in buffaloes is a major symptom of many other factors that affect the lust cycle. Judging from poor feed conditions, especially those that occur in grazing or extensive maintenance systems that lack feed. (Desinawati and Isnaini, 2010) which stated that the duration of APP on cattle generally lasts for 2 months because of female cattle after giving birth experience uterine involution which takes about 45 days. The longer the Anestrus period, the lower the fertility and reproductive efficiency of these animals. The high APP value finally had an impact on the magnitude of the Days Open value of 5.82 ± 0.35 months. that the ideal length of time is 90-120 days. The empty period is the time interval between the female parent breeds until mated again and pregnancy occurs. The longer the empty period affects the reproductive efficiency of the female parent. (Yulyanto et al., 2014) stated that days open (DO) is the time interval between giving birth to being.(Putra et al., 2017).

Data Table 4 shows that young male cattle enter the breeding area by 2.94%, and those that breed out by 16.17%, in this case, it has the understanding that the area shows a breeding area because the percentage of outflows is greater than the cattle that enter breeding. So are for young females, but for the percentage of buffaloes the young females coming out are more resilient than incoming females, if there is no control there will be negative impacts for the breeding of the area surveyed because the stock of young livestock as replacements is a small percentage. (Putra et al., 2017) that if the percentage of livestock that comes out is higher than the percentage of cattle that enter, it means that the region is a producer of buffalo cattle.The following Table 5 is presented components to calculate the natural increase and output in the Banyuwangi Regency(Putra et al., 2017).

Based on the data in Table 5 above shows that the NI value of mud buffalo in Banyuwangi Regency is 15.92%, the NI value obtained from the study site can be concluded that the high number is caused by the composition of the population dominated by productive adult females, especially in the age group 4-5 years at 48.17%. The value of NI increases if it can maintain productive females with good management so that it can increase the birth rate and reduce the mortality rate in buffalo. NI value of 16.92% is categorized as moderate because in the range of NI values between 15.01-30.00%. This is in accordance with (Putra et al., 2017) which states that the range of NI values is between 0.00-45.90% with a range of NI values for each class that is low with a range of values of 0.00-15.00%, moderate with a range of values of 15.01-30.00%, and high with a range of values of 30.01-45.90%. (Hardjosubroto, 1994) states that the amount of output is influenced by NI, therefore the output is calculated based on the difference between NI and the need for livestock substitutes for one year. The output is the potential of the region in removing livestock leftover substitutes and rejected animals. In detail, the composition of buffalo cattle output can be seen in the following Table 6.

Data from Table 6 shows that several adult females that are classified as productive can give an idea that each year the natural population increase is 15.92%. Furthermore, to maintain and increase the buffalo population in the breeding group, efforts must be taken into account is the number of livestock as a prospective substitute (replacement), excessive outward mutation of livestock, therefore it needs to

be limited by the large value of livestock output. From this research, it is obtained that the maximum value of adult male and female livestock output is 15.10% if within this breeding area can be controlled the population will remain constant. (Putra et al., 2017) that the output can consist of male and female rejecting (adult) livestock, remaining young male and female substitutes. Population dynamics are population fluctuations that are affected by birth rates, deaths, and mutations. Population dynamics are known based on the data structure of livestock population by age group so that it can be seen the amount that must be removed from the breeding area and livestock as replacement stock while the natural increase is calculated based on the performance of livestock reproduction last year. Another factor that must be considered is the percentage of mutations going out and entering the breeding area, so the population can be predicted in the coming years. So that the performance of livestock reproduction last year can be used as basic data in estimating the development of the livestock population in the next few years

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Livestock population dynamics are a reflection of the performance of livestock reproduction. The better the performance of livestock reproduction, the more accelerating the increase in livestock population that comes from naturally increasing livestock (NI). Analysis of livestock population dynamics in an area is supported by calculating the value of NI and livestock output. This is useful as a reference in determining the amount of livestock expenditure from the nursery area so that there is no shortage of population seedlings. As a prediction of buffalo population in Banyuwangi Regency in 2015-2017 which continues to decline (successively 3,879 tails, 3,664 tails, and 3,479 tails) with technical coefficient data of the research results, then the population in 2018-2020 can be described as there will be a population increase of the natural increase obtained in 2018.

4 CONCLUSION

1. To maintain the dynamics of the swamp buffalo population increases every year, it takes a technical coefficient (as a basic data) population prediction in the coming year is needed optimal results, so that in the following year there is no decline in population due to mortality and output.
2. Based on reproductive performance data, the percentage of productive adult females and swam buffalo mortality obtained a NI value of 15.92% including that which will be used as substitute livestock by 14.83%. While from the composition of livestock based on age groups, the value of the output of male and female cattle due to age is no longer productive at 15.10%, the buffalo population inbreeding remains stable.

ACKNOWLEDGMENTS

This field action research was supported by the grant of *PTUPT* Program from Directorate General of Higher Education (DIKTI), Department of Research, Technology, Higher Education, Republic of Indonesia, 2017. Contract No**:** 063/SP2H/LT/DRPM/IV/2017

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