Reproductive performance and fertility index of swamp buffalo (*Bubalus bubalis*) in Ngawi regency, East Java

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Abstract. Reproduction is a significant factor in determining livestock productivity. The better reproductive efficiency seen from the low birth interval is expected to increase the population of buffaloes. The purpose of this research is to know the reproductive performance of productive ages of female swamp buffalo in Ngawi Regency, East Java Indonesia, including service per conception (S/C), length of pregnancy, days open (DO), birth interval, conception rate (CR) and fertility index. The material used in this research is 162 female buffalos by 40 breeders. The research method used surveys. The data obtained were analyzed descriptively. The results showed that the buffalo reproduction performances in Ngawi Regency were average service per conception (1.4±0.4) times, length of pregnancy (10.4±0.5) months, days open (3.8±0.7) months, birth interval (14.3±0.9) months, conception rate 68.5 percent and fertility index 62.6 percent. It was concluded that the reproductive performance is considered normal regarding fertility index. So that proper reproduction arrangements can increase livestock productivity both concerning production and reproduction.

1. Introduction

Java Island is one of developed areas for buffalo populations. According to the [3], Java Island holds around 21.95% of the national buffalo population. One of the regencies in East Java which has a reasonably high buffalo population is Ngawi Regency, which is about 974 buffalos. Ngawi Regency has the potential to develop buffalo livestock business because the area is widely used for rice fields and plantations. The area of Ngawi Regency is 1,298.58 km², of which around 40% or around 506.6 km² is in the form of paddy fields. This shows that the environmental conditions of Ngawi Regency can support the development of buffalo farms. In general, the buffalo population in Indonesia has decreased. The population of buffalo in 1986, which was 3.5 million, continued to decline until 2013, only 1.48 million [6].

Livestock productivity usually expressed as a function of the level of reproduction and growth. Productive female buffalo, which are female buffalo based on reproduction is said to have normal reproductive organs and can function as parent buffaloes in producing offspring. The productive period of buffaloes is very long up to 25 years, and reproductive power produces 10 to 15 tails during his lifetime [12]. The buffalo parent who has good reproductive and growth performance needs to be used as a seed so that the buffalo population can be increased. In connection with this, the management of fertile females is essential for buffalo breeding because productive females are a genetic resource in breeding livestock populations. Reproductive arrangements are essential in
managing adult female, to increase livestock productivity regarding production and reproduction. Reproduction is a significant factor in determining livestock productivity. The better reproductive efficiency seen from the low birth spacing is expected to increase the population of buffaloes. So that reproductive performance is critical to be considered in buffalo cattle. To support the increase in productivity of buffaloes in Ngawi Regency, a technical coefficient of reproductive performance is needed. Technical coefficients can be demonstrated through reproductive indices, which include spacing, marriage up to pregnant, length of pregnancy and empty time [2].

2. Materials and Methods
The study was carried out in three sub-districts in Ngawi Regency, namely Widodaren, Mantingan and Kendal District, for 30 days in October 2017. The material used in this study was farmers who were raising 40 buffaloes with a total of 162 productive female buffaloes. Estimation of buffalo age were determined based on the change of incisors in buffalo, namely PI-1 (2-3 years), PI-2 (3-4 years), PI-3 (4-5 years), and PI-4 (more than five years). The research method used in the survey method. Primary data was directed by snowball sampling, by asking questions in a structured manner with questionnaire tools. The variables observed were the performance of swamp buffalo reproduction, i.e., Service per Conception (S/C), pregnancy duration, Days Open (DO), pregnant intervals, Conception Rate (CR), and fertility index. The data obtained from the study are tabulated and processed in an Excel program, and then the average and standard deviation are calculated, followed by descriptive analysis.

3. Result and Discussion
The performance of Buffalo Reproduction data in Ngawi Regency as in Table 1. The average Service per Conception of buffalo in Ngawi Regency (1.4 ± 0.4) times. The S/C value is allegedly supported, among others, because marriages occur naturally, that is, male cattle can know much better than breeders in detecting the lust of female buffaloes. This S/C value is still ideal because the pregnancy is less than two times in a marriage. Likewise, according to [13], namely the number of services to bunting (S/C) which is optimum 1.8 months. According to [15], other factors that influence the S/C value are the accuracy between conducting detection of lust (estrus) with insemination. S/C scores in Ngawi Regency are low, meaning that the value of the number of mated per pregnancy shows higher fertility.

Table 1. Performance of Buffalo Reproduction in Ngawi Regency

| Reproduction Performance | Average ± St.dev |
|--------------------------|------------------|
| Service per Conception (times) | 1.4 ± 0.4 |
| Pregnant Intervals (month) | 10.4 ± 0.5 |
| Days Open (month) | 3.8 ± 0.7 |
| Birth Intervals (month) | 14.3 ± 0.9 |
| Conception Rate (percent) | 68.5 |
| Fertility Index (percent) | 62.6 |

Based on Table 1, it is known that the average length of buffalo pregnancy in Ngawi Regency is (10.4 ± 0.5) months. The duration of pregnancy is thought to be influenced by sex, the age of the mother. The older the parents the longer the pregnancy occurs, as well as if the offspring has male sex, the pregnancy will get longer. The duration of the pregnancy is good because it is still in the range of 10-11 months. According to [7] the factors that affect pregnancy duration are the sex of the offspring, the age of the mother and the wider, the birth season and environmental conditions.

The length of the results of this study in accordance with [14] female Buffaloes generally experience a pregnancy duration of 10.5 months. According to [12] which states that the average age
of buffalo cattle is 311 days (10 months 11 days). Based on the results of the study, the duration of the buffalo pregnancy in Ngawi Regency is still relatively good because it ranges from 10 to 11 months. The average buffalo Days Open in Ngawi Regency is (3.8 ± 0.7) months. The Days Open value is allegedly caused by several factors such as the ideal S/C value, an ideal postpartum estrus. Along Days Open is caused by improper detection of lust which results in long marriages of the mother after giving birth. The Days Open scores in Ngawi Regency are not much different from [10], which states that ideal vacancies range from 85 to 115 days. Based on this statement, the Days Open in Ngawi Regency is still relatively healthy because it has an average of 3.8 months. The Days Open value is allegedly influenced by good maintenance management, namely weaning that is carried out by the breeders not too long and the timely marriage when the female’s lust. Farmers do this work with the reason that they are quick to produce more offspring. According to [16], the ideal or not of Days Open is caused by several factors such as weaning time, the period of marriage after childbirth, the number of S/C and age first mated. The difference in the distance between calving and pregnancy depends on postpartum estrus and the real conception that requires a one-time, twice, or more marriage until pregnancy occurs [7]. The longer the mated after birth (An estrus post partus) and the higher the S/C value, the longer the blank period will be, and the breeding distance will be long and make the farmer lose. This Days Open is a parameter that usually plays a vital role in achieving the target of birth intervals. Along Days Open causes long of birth interval [1].

The average distance of buffalo calves in Ngawi Regency (14.3 ± 0.9) months. Birth intervals are thought to be influenced by the duration of pregnancy and the dry period. The longer the dry period and the longer the pregnancy, the longer the breeding distance will be. The Days Open and pregnancy duration values in Ngawi Regency were 3.8 months and 10.4 months. The intervals of breeding, in Ngawi Regency is almost the same as the study of the standard coefficient of government k, which states that the distance of the calves of the buffalo is 12-14 months [5]. Likewise, according to [13] stated that the maximum intervals of buffalo breeds range from 13-14 months. Based on this statement the spacing of calves in Ngawi Regency is normal. Birth intervals indicate the efficiency or not of reproduction because the longer the breeding distance from livestock will cause an increase in livestock population in an area to below. According to [8], the success of livestock raising is related to its reproductive measured by its ability to produce calves in a certain period, meaning that the shorter the reproductive distance, the better its reproductive performance.

Conception Rate (Table 1), it is known that the Conception Rate of buffalo in Ngawi Regency is 68.5%. The factors that influence Conception Rate are the timing of marriage and the timeliness of marriage, in Ngawi Regency marriage occurs naturally where male cattle can know well in detected lust in females. The Conception Rate value in Ngawi Regency is by [17], which states that the best Conception Rate reaches 60-70%, while for the size in Indonesia considering of the natural conditions, the spread of management and distribution of livestock is considered reasonable if the Conception Rate value reaches 45-50%. Based on the statement, the Conception Rate value in Ngawi Regency is good. Generally, Swamp Buffalo can reach the success rate of Conception Rate above 45% [13]. The average S/C value influences the Conception Rate number in the livestock group, so that the lower the S/C, the higher the Conception Rate [9].

Based on Table 1, it is known that the buffalo fertility index in Ngawi Regency is 62.6 %. Factors affecting the fertility index are the percentage of pregnant animals in the first marriage. Pregnancy rates in the first marriage in Ngawi Regency were 68.5%. The breeding of buffalo is done naturally, i.e., livestock can be good at detecting lust compared to farmers so that the number of pregnancies in the first marriage becomes higher. The index of fertility in Ngawi Regency is in line with the opinion of [13], which states that the best fertility index results are at least 65 %. Based on the statement above the fertility index in Ngawi Regency is still relatively normal. Fertility rates that indicate the status of productive female buffaloes in Ngawi Regency are already reasonable. Based on these results, it can be concluded that reproductive management at the research location is included efficiently. According to [9] fertility status is determined by the amount of Conception Rate, Service per Conception and the Days Open.
4. Conclusion
The reproductive performance of female swamps buffalo (based on S/C, DO and CR) has a fertility index 62.6 percent, indicating reproductive efficiency is good.

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