



DURATION OF ESTRUS TO CONCEPTION IN THE ARTIFICIAL INSEMINATION PROGRAM FOR SHEEP IN LANGKAT REGENCY, INDONESIA

Sukma Aditya Sitepu^{1*}, Media Agus Kurniawan, Julia Marisa¹ and Rahmad Hidayat¹

¹*Department of Animal Husbandry, Faculty of Science and Technology, University of Pembangunan Panca Budi, Medan, Indonesia*

²*Department of Agrotechnology, Faculty of Science and Technology, University of Pembangunan Panca Budi, Medan, Indonesia*

ABSTRACT

This study aimed to determine the distance between estrus and conception in the artificial insemination of sheep in Langkat Regency. Place and Duration of Study: Langkat Regency, Indonesia. Between January 2022 and July 2022. Methodology: Data collection was obtained through interviews, observations, literature studies, and the internet. Observational data were tabulated using the excel program. After that, the research data were analyzed using a t-test. Data analysis was carried out using Genstat software. Results: The duration of estrus after birth is 38 days, the first mating after birth is 90 days, and the service period is 66 days. The duration of estrus until the occurrence of conception in artificial insemination sheep in Langkat Regency is expected. However, maintenance management needs to be improved, mainly feed, to accelerate pregnancy in sheep.

Keywords: *Artificial Insemination, Conception, Estrus, Livestock Reproduction, Sheep.*

1. INTRODUCTION.

Livestock productivity reflects the achievement of livestock production and reproduction levels. High production levels are obtained from good reproduction results. Without reproduction, there will be no production, and the reproduction's level and efficiency will determine the production efficiency level. The breeding business is a livestock business that depends on the results of livestock reproduction. This business utilizes the results of excess livestock as the primary production. The higher the reproduction rate of the livestock group, the higher the economic value of a livestock business will undoubtedly be. Livestock breeding is essential to the sheep supply chain [1].

The level of reproductive efficiency is the basis of the selection of livestock in the breeding business, especially related to culling from the brood in the herd. Low reproductive efficiency will increase production costs in the nursery business. For example, a long service period will require higher maintenance costs compared to livestock that achieves a shorter



service period in producing one lamb. In other words, the cost of producing lamb is higher in cattle with low reproductive efficiency.

If the cattle that are kept can produce children every year, then the breeder will get a higher economic value when compared to the breeder who keeps the livestock with an interval of more than one year. The low reproduction efficiency is influenced by many internal and external factors in the environment where livestock are kept. Low reproductive efficiency is caused by reproductive disorders of both male and female livestock, while high reproductive power accompanied by good livestock management will result in high reproductive efficiency and ultimately impact achieving high productivity levels [2]. Another factor causing low reproductive efficiency is estrus. If there is no estrus in livestock, then copulation will not occur. The duration of estrus will affect the production of sheep breeds, and this will affect the profits of sheep breeding farmers [3].

The high reproductive potential of sheep indicates that sheep contribute significantly to the supply of meat for consumption for the people of Indonesia. Besides, sheep are small ruminants that contribute somewhat to increasing income and community welfare, especially in rural areas. Local sheep have several advantages, including the ability to give birth to twins (1.77 heads per mother) in Priangan sheep [4], 1.6 Fat Tail sheep [5], and the age of sexual maturity is fast and gives birth throughout the year.

Langkat Regency is where many people do sheep farming to increase their income. Breeders consider the livestock business only as a sideline; labor comes from family members. To sustain the development of livestock, especially sheep, increase sheep productivity to the maximum, objective, actual, and meet information standards. To determine the reproductive potential of sheep in Langkat Regency is necessary to evaluate the reproductive characteristics of sheep. This observation is needed to obtain detailed and in-depth data on sheep's level of reproduction and reproductive efficiency.

2. MATERIAL AND METHODS

2.1. Research Material

Material used in this study is 50 sheep related to all data and field studies obtained in the form of reproductive efficiency, including the length of estrus after birth, first mating after birth, and service period.

The research design is carried out by observing the difficulties that arise. The results of the observations are then made into scenarios that support and create a problem flow. The second stage is the data analysis stage. The third stage is data interpretation by interpreting the results of the predicted values of each variable and comparing them with the theory and results of previous



studies. Interpretation can prove the theory, challenge the theory, and develop new theories as a reference for research results. The next stage is drawing conclusions, where this stage concludes the results achieved and recommends them to related parties.

2.2. Place and Duration of Study

This research will be carried out from January 2022 to July 2022 in Langkat Regency because that area has excellent potential for developing the sheep farming business. The respondent's requirements are sheep breeders in the research area. The research method used is a survey method with a unit of analysis for farmers who keep sheep.

This type of research is descriptive quantitative research, namely, researchers who describe the condition of variables obtained by sheep farming business actors. The scope of this research is in Langkat Regency, North Sumatra Province. The method used in this study is direct interviews with farmers using a questionnaire made in advance. The research location was taken purposively (deliberately), considering that it is one of the areas with great potential for developing the sheep farming business.

3. ANALYZE RESULT.

The income of the breeding business is highly dependent on the reproductive efficiency of the livestock being cultivated. If the livestock reared can produce offspring every seven months, then the breeder will get a higher economic value when compared to the breeder who raises cattle with an interval of more than seven months of calving. The higher the reproductive power of the livestock, the higher the productivity of the livestock.

Table 1. The average level of reproductive efficiency of sheep in Langkat

No	Parameter	Value (day)
1.	Length of Estrus After Birth	38,00 ± 7,00
2.	First Mating After Birth	90,21 ± 11.32
3.	Service Period	65,66 ± 11.53

Source: Research Results (2022)



3.1. Length of Estrus after Birth

Table 1 shows that the first estrous ewes and average of 38.00 days after calving. This fact proves that the decrease in the ability of ewes to express estrus on time in the semi-intensive rearing system may be due to differences in the quality and quantity of feed received by the ewes. In contrast, in the semi-intensive rearing system, the feed supply cannot be guaranteed according to the needs of livestock. Sheep, so that their body condition becomes thin, which causes difficulty in estrus or increases the chance of silent heat.

CIDR in sheep estrus synchronization gives an excellent response and shows signs of estrus if the CIDR given works well [6]. CIDR is placed in the vagina for 12-14 days, during which the goat/sheep will not be in heat because of the low estrogen hormone due to increased levels of progesterone in the blood [7]. When the CIDR is removed, the level of progesterone in the blood drops dramatically, stimulating the simultaneous development of follicles and increasing estrogen levels. Increased estrogen hormone will stimulate the ovulation process and cause signs of estrus [8].

Failure to achieve proper post-partum estrus in sheep in a semi-intensive rearing system results from the lack of guaranteed feed availability, which directly affects the nutritional intake of post-partum ewes, which supports the emergence of post-partum estrus. This factor interferes with the reproductive process in semi-intensively reared ewes, which delays the appearance of the first post-calving estrus. Ewe who received rations with TDN content > 75% post parturition estrus faster than sheep that received rations with TDN content < 65% (59.25 ± 29.90 days vs. 135.20 ± 72.47 days) [9].

3.2. First Mating After Birth

This study showed that the appearance of the first estrus in reared ewes ranged from 16 to 40 days, averaging 38.00 ± 7.00 days. However, breeders do not immediately mate their livestock but wait until the second or third estrus because the conception rate is low if they are bred. To incomplete uterine involution, uterine involution in cows is achieved 35-45 days after calving [10].

The first mating ewes after giving birth is between 70 – 105 days, or an average of 90.21 ± 11.32 days [11]. The average breeder in Langkat Regency pays less attention to the time of calving spacing for breeding sheep. Breeders are less aware that it is essential to pay attention to the length of the first mating of the sheep after giving birth. The feed given to the mother sheep in Langkat Regency is quite diverse, so the time of first mating after giving birth is quite diverse.

Sheep that were intensively reared for the first mating after calving ranged from 65 – 103 days or an average of 88.33 ± 12.02 days, while the ewes that were reared semi-intensively had



their first mating after calving ranging from 54 – 115 days with an average of 94.67 ± 18.77 days. If you pay attention, it turns out that the ewes that were kept in semi-intensive mating were 6.34 days later than those that were reared intensively.

The emergence of the first estrus causes this after calving later in the ewes that were reared semi-intensively. In remote villages, fat lambs were bred again after giving birth for a long time, namely 87.88 and 87.23 days for low and medium lands, respectively [12]. One of the efforts that need to be made to improve reproductive efficiency in sheep in Langkat Regency is mating as soon as possible after giving birth. Through fast and timely marriage, it is hoped that sheep can give birth at least three times in two years. If the ewes can be on time for mating after giving birth, it is not impossible to produce children every seven months.

3.3. Service Period

The results of this study show that the service period of the sheep, which is kept semi-intensively, requires an average service period of 65.66 days. In semi-intensive ewes, the shortest service period is 47 days, and the longest is 90 days with an average of 70.23 ± 15.29 days, while the intensively reared ewes have a shorter service period, which ranges from 35 to 89 days with an average of $60, 43 \pm 14.24$ days.

The service period is the time interval between the appearance of the first estrus and the occurrence of conception in cattle. The longer the service period, the lower the efficiency of livestock reproduction. It will cause the income of farmers to decrease [13]. An extended service period will affect the length of the calving interval. That factor causes the length of the calving interval between the appearance of the first estrus and the occurrence of pregnancy [14]. The service period showed that semi-intensively reared ewes required a service period of 8.13 days longer than intensively reared DEG ewes [15].

The more extended service period for the ewes that are kept semi-intensively is due to the lack of quantity and quality of feed consumed, which causes the fertility of the ewes to decrease, which in turn will delay the emergence of post-delivery estrus. Cattle that are breastfeeding their children, if they are to be re-branded, need more energy, protein, and minerals so that it can cause estrus [16].

4. CONCLUSION

The time interval between estrus and conception in sheep in Langkat Regency is still normal. However, maintenance management needs to be improved, especially feed to accelerate pregnancy in sheep. The authors would like to thank the University of Pembangunan Panca Budi, which has funded this research, and all sheep breeders in Langkat Regency who have been willing to help provide the data needed for this research. Authors have declared that no



competing interests exist. This work was carried out in collaboration between all authors. Sukma Aditya Sitepu designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Julia Marisa and Media Agus Kurniawan managed the analyses of the study. Rahmad Hidayat managed the literature searches. All authors read and approved the final manuscript

REFERENCES.

1. Marisa, J., Sitepu, S. A., and Kurniawan, R. 2022. *Budaya Organisasi dan Integrasi Rantai Pasok Ternak Domba*. Tahta Media Group.
2. Inounu, I.B., Tresnamurti, Subandriyo dan H. Martojo, 1999. Produksi anak pada Domba Prolifik. *Jurnal Ilmu Ternak dan Veteriner* 4(3)
3. Noor, R.R., A. Djayanegara and L. Schuser, 2001. Selection to Improve Birth and Weaning Weight of Javanese Fat Tailed Sheep. *Arch. Tier Dummerstorf* 44(6)
4. Sitepu, S. A., dan J. Marisa. 2020. *Manajemen Usaha Ternak Perah Kambing Peranakan Etawa*. Mitra Cendekia Media.
5. Wirartha, I. M. 2006. Metodologi penelitian sosial ekonomi. *Yogyakarta: CV Andi Offset*.
6. Hastono dan Masbulan E. 2001. Keragaan reproduksi domba rakyat di Kabupaten Garut, Dalam : Prosiding. Seminar Nasional Teknologi Peternakan dan Veteriner. Bogor, Indonesia, 17-18 September 2001. pp 100-105.
7. Toro-Mujica, P., García, A., Gómez-Castro, A. G., Acero, R., Perea, J., Rodríguez-Estévez, V., and Vera, R. 2011. Technical efficiency and viability of organic dairy sheep farming systems in a traditional area for sheep production in Spain. *Small Ruminant Research*, 100(2-3)
8. Sukma, A. S. 2019. *Pengaruh Suplementasi Minyak Atsiri Kulit Jeruk Manis Dengan Berbagai Antibiotik Pada Bahan Pengencer Tris Kuning Telur Terhadap Kualitas Semen Post-Thawing dan Fertilitas Kambing Boer* (Doctoral dissertation, Universitas Andalas).
9. Affandy, L., U. Umiyasih, D. Pamungkas dan D.E. Wahyono, 1997. Respon Reproduksi Domba Ekr emuk Terhadap Perbedaan Level Energi Ransum. Instalasi Penelitian dan Pengkajian Teknologi Pertanian GratiPasuruan. Seminar Nasional Peternakan dan Veteriner



10. Sitepu, S. A., and Zaituni, U. 2018. Improved quality of frozen boer goat semen with the addition of sweet orange essential oil on tris yolk and gentamicin extender. In *IOP Conference Series: Earth and Environmental Science* (Vol. 122, No. 1, p. 012125). IOP Publishing.
11. Pamungkas, D., LAffandy, D.B. Wijono dan K Ma'sum, 1996. Karakteristik Peternakan Domba Ekor Gemuk di Daerah Sentra Bibit Pedesaan di Jawa timur. Pros. Temu Ilmiah Hasil-hasil Penelitian Peternakan, Ciawi, Bogor.
12. Latief, A., Rahardja, D.P., Yusuf, M., 2004. Meningkatkan Efsiensi Reproduksi Sapi Potong Melalui Percepatan Munculnya Birahi Post Partum. Jurusan Produksi Ternak. Universitas Hasanuddin.
13. Marisa, J., and Sitepu, S. A. 2020. Relationship analysis between production factors with business production of beef cattle livestock in Binjai Barat District, Indonesia. *Asian Journal of Advanced Research and Reports*, 1-7.
14. Ashari, M., Suhardiani, R. A., dan Andriati, R. 2018. Analisis Efisiensi Reproduksi Domba Ekor Gemuk Di Kabupaten Lombok Timur. *Jurnal Ilmu dan Teknologi Peternakan Indonesia Volume*, 4(1), 207-213
15. Dixon, A. B., Knights, M., Winkler, J. L., Marsh, D. J., Pate, J. L., Wilson, M. E., and Inskip, E. K. 2007. Patterns of late embryonic and fetal mortality and association with several factors in sheep. *Journal of Animal Science*, 85(5)
16. Slingsby, L. S., and Watterman-Pearson, A. E. 2002. Comparison between meloxicam and carprofen for postoperative analgesia after feline ovariohysterectomy. *Journal of Small Animal Practice*, 43(7), 286-289.