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The Reproductive Performance of Local Sheep Following Induced Superovulation With Cattle Hypophisa Extracts

Dwi Mei Hanifah[1], Suci Andanawari[2], Haris Tri Wibowo[3], Rosa Zulfikhar[4], Dwi Novrina Nawangsari[5], Sunardi[6], Dewi Pranatasari[7], Hendro Sukoco[8], Annisa Putri Cahyani[9*]
[1,6,7,9] Program Studi Teknologi Produksi Ternak, Politeknik Pembangunan Pertanian Yogyakarta
[2,3,4] Program studi Penyuluhan Peternakan dan Kesejahteraan Hewan, Politeknik Pembangunan Pertanian Yogyakarta Magelang
[5] Program studi Teknologi Pakan Ternak, Politeknik Pembangunan Pertanian Yogyakarta Magelang
[8]Program Studi Peternakan, Fakultas Peternakan dan Perikanan Universitas Sulawesi Barat
Corresponding Author: Annisa Putri Cahyani annisaputrica@gmail.com

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ABSTRACT

The aim of this study was to determine the effect of pituitary extract on estrous characteristics and the percentage of pregnancy in sheep. This study used a sample of 18 individuals. This study used 3 treatments 6 replications. The treatment used was the control treatment by giving 1 ml of PGF2α. Treatment 1 is by administering 1 ml of PGF2α, 1;0.5;0.25 ml of pituitary extract and 1 ml of PGF2α. Treatment 2 is by administering 1 ml of PGF2α, 2;1;0.5 ml of pituitary extract and 1 ml of PGF2α. The results showed that there was a very significant difference in the use of pituitary extract, this could affect the onset of estrus 0.00 (P<0.01), and there was also a significant difference (P<0.05) in the intensity of estrus.

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INTRODUCTION

The lack of development of sheep farming is caused by the low productivity of local sheep, which is influenced by environmental and genetic factors (Purnamasari et al., 2021). The hot tropical climate makes sheep stressed (Munandar et al., 2022), it causes a low number of births and low quality of children besides that inbreeding is one of the factors for the lack of income of farmers where farmers do not know about mating with Artificial Insemination (AI) Artificial Insemination activities have not been optimal in producing the number of children per birth. The low number of kids per birth is due to the synchronization preparations used usually cannot be maximized. Where ovulated eggs and FSH hormone secretion affect the number of offspring born, to maximize ovulated eggs, each cycle requires superovulation. Ovulation control comes from the hypothalamus through the pituitary gland in the brain (Siregar et al., 2013). Gonadotropin-realizing hormones from the hypothalamus stimulate the pituitary gland to secrete gonadotropin hormones, which control growth in the ovaries. However, the disadvantage of FSH is that the hormone is difficult to obtain in the market, the price is relatively high, and the administration must be repeated. The emergence of these problems makes bovine hypophysis an alternative preparation for synchronization preparations, where it is known that at least bovine hypophysis contains ten kinds of hormones, including FSH and LH produced by the anterior lobe of the pituitary that can induce lambing and increase reproductive efficiency in goats (Afriani, 2017).

LITERATURE REVIEW

Gonadotropin-realizing hormones from the hypothalamus stimulate the pituitary gland to secrete gonadotropin hormones, which control growth in the ovaries. However, the disadvantage of FSH is that the hormone is difficult to obtain in the market, the price is relatively high, and the administration must be repeated. The emergence of these problems makes bovine hypophysis an alternative preparation for synchronization preparations, where it is known that at least bovine hypophysis contains ten kinds of hormones, including FSH and LH produced by the anterior lobe of the pituitary that can induce lambing and increase reproductive efficiency in goats (Afriani, 2017).

METHODOLOGY

This research activity was implemented for 2 (two) months from 7 March 2023 to 31 May 2023. The location of the research activities was at Rahayu Farm in Dayugo Hamlet Rt 08/10, Banyusidi Village, Pakis Subdistrict, Magelang District, Canguk Slaughterhouse and Animal Health and Reproduction Laboratory of Polbangtan Magelang. The materials used in this study were: bovine hypophysis, Pgf2 α, aquabides, nacl, vigantol, dewormer, sample pot, syringe, filter paper, pregna drop, scalpel, glove, mask, tissue, frozen semen, liquid nitrogen and sheep urine.

The research method that will be used in this research is an experimental method using a completely randomized design (RAL). The number of animals in the study used as many as 18 sheep, divided into three groups, each treatment using six animals. The details of the treatments that will be used in the study are as follows:

a. P0 = Control treatment of PGF2α hormone administration with a dose (1ml) without the administration of bovine hypophyseal extract
b. P1 = Administration of PGF2α hormone at a dose of (1 ml), bovine hypophyseal extract (1;0.5;0.25 ml), and PGF2α (1 ml).
c. P2 = Administration of PGF2α hormone at a dose of (1 ml), bovine hypophysial extract (2; 1; 0.5 ml), and PGF2α (1 ml).

Superovulation Treatment

The treatment was done by injecting PGF2α 1 ml intramuscularly, the second two injections were given 10 days after the first injection. Oestrus was observed twice a day at 08.00 and 16.00 after the last PGF2α injection. Ewes ridden by males were said to be in heat and counted as day 0. In the control treatment (P0), artificial insemination was performed 36 hours after the last PGF2α injection. In treatment 1 (P1), sheep were injected with 1; 0.5; 0.25 ml hypophysical extract on days 9, 10, and 11 of the estrous cycle, followed by PGF2α injection of 1 ml two days later. In treatment 2 (P2), sheep were injected with pituitary extracts on days 9, 10, and 11 of the estrous cycle at decreasing doses of 2:1 and 0.5 ml intramuscularly at several sites of injection sites, followed by injection of 1 mg PGF2 α. Sheep in P1 and P2 were inseminated using artificial insemination with frozen sperm 36 hours after PGF2α administration.

Extract Preparation

The hypophyseal extract is made by collecting cow brains from the abattoir. The cow's brain obtained was put in a cooling box and immediately brought to the laboratory, the cow's hypophysis is under the front of the cerebrum which is protected in the sella tursika at the base of the skull, when collected, the hypophysis gland was cleaned of connective tissue and separated from the outer membrane. Then the hypophysical gland is cut into small pieces and mashed until evenly distributed, then 10 ml of distilled water is added for each gram of the hypophysical gland, then filtered with filter paper. The resulting solution was centrifuged at 3,000 rpm for 20 minutes, then the supernatant was taken. The centrifuged supernatant was the hypophyseal extract and stored in the freezer before use.

Diagnosis of Pregnancy

Diagnosis of pregnancy is done four weeks after artificial insemination. The examination is done by mixing 3 ml of urine with 3 to 5 drops of pregnadrop solution.

Data Analysis

Descriptive Analysis

The data is described descriptively to describe the object of study at this time (current condition) based on existing facts. Data is processed through several stages, namely, the activity of recapitulating and tabulating data aims to facilitate the processing of data that has been collected obtained. The method used is to enter data into the table by editing data to edit and delete those that are not appropriate, then coding or encoding data to make it easier to analyze, data entry is entering data into a computer, cleaning to double-check the data, and tabulating is entering data into the table. The next activity is to analyze the data by combining or collecting data from the previous actions to obtain the expected conclusions according to the objectives. The data analysis technique used is descriptive analysis, including data presentation in the form of graphs, tables, percentages, frequencies, diagrams, charts, and means. In processing data, computational tools such as Microsoft Excel Program, Statistical Page for the Social Sciences (SPSS) 20 Program can be used.

Statistical Analysis

Data on estrus onset and estrus intensity obtained in this study were analysed using variance analysis (ANOVA).

RESEARCH RESULT AND DISCUSSION

Onset of Estrus

The speed of onset of estrus is the time interval observed since the treatment of the onset of estrus symptoms. This is important to know because it has a considerable role in mating success. This is important to know because it is a significant part of the success of mating. This is related to the estimated time of ovulation and the accuracy of the timing of AI or natural mating that can be done.

Table 1. Results of Average Onset Of Estrus (Hours)

No	Treatment of Bovine Hypophysial Extract	Average
1	P0 (0 ml)	34:55±1:38[a]
2	P1 (1;0,5;0,25ml)	30:55±1:14[b]
3	P2 (2;1;0,5 ml)	27:45±1:42[c]

Source. Data processed (2023)

Based on the data obtained at P0, the average onset of estrus was 34 hours 55 minutes, while at P1 the average onset of estrus was 30 hours 55 minutes, and at P2 the average was 27 hours 45 minutes. Based on Table 1, it can be concluded that the dose of bovine hypophysial extract on the reproductive appearance of livestock in sheep has a significant effect ($P < 0.01$) with a probability value of 0.00 on the variable onset of estrus. Further tests on P0, P1, and P2 showed a significant difference after the injection of bovine hypophysical extract.

The results of ANOVA statistical analysis showed that different doses of bovine hypophysical extract had a very significant effect of 0.00 ($p<0.01$) on the speed of onset of estrus. The rapid emergence of estrus in P2 is thought to be due to the higher injection of hypophysical extract than P0 and P1. This study is in line with research conducted by Isnaini and Suyadi, (2004), which states that hypophysical extract is able to induce estrus in dairy cows, Siregar et al., (2013), which says that bovine pituitary extract can generate estrus and increase the reproductive efficiency of goats. In addition, according to Isnaini and Research Siregar et al., (2016) also stated that the administration of hypophysical extracts can increase folliculogenesis activity by increasing the number of follicles and estradiol concentrations to stimulate the growth and development of the corpus luteum earlier.

Estrus Intensity

The intensity of estrus is the quality of an estrus with the number of symptoms that arise, the more estrus symptoms caused, the more qualified the estrus of the sheep. The intensity of estrus is intended to determine the level of mating behavior shown in the research animals. The power of estrus can be observed by giving a score based on clinical symptoms such as vulva swelling, redness, and mucus (Panicker et al., 2015). The intensity of estrus for each treatment can be seen in Table 2.

Table 2. Results of Average Estrus Intensity

No	Treatment of Bovine Hypophysial Extract	Avarage
1	P0 (0 ml)	6,3333±1,03280[a]
2	P1 (1;0,5;0,25ml)	8,1667±1,72240[b]
3	P2 (2;1;0,5 ml)	8,8333±1,16905[b]

Sumber. Data diolah (2023)

The calculation results obtained the average score of estrus intensity in sheep, namely P0 6.3333 ± 1.03280, P1 8.1667 ± 1.72240 and P2 8.8333 ± 1.16905. Based on Table 2 above, it can be concluded that the dose of bovine hypophysial extract on the appearance of livestock reproduction in sheep has a significant effect ($P <0.05$) with a probability value of 0.015 on the variable estrus intensity. In further tests P1 and P2 showed no significant difference, while P0 showed a very significant difference to P1 and P2.

The results showed that not all estrus animals can show all estrus symptoms with the same intensity or level. This can be seen from the substance displayed in Table 2. The level of estrus intensity in P0, P1 and P2 consecutively has a mean of 6.33 ± 1.03, 8.16 ± 1.72 and 8.83 ± 1.16. The analysis showed the effect of hypophysical extract on estrus intensity. These observations showed physiological signs of estrus: a swollen vulva, reddish vulva, and clear mucus. This follows the statement of Udin et al. (2016), where the leading indicators in determining estrus are changes in the appearance of the vulva (red and swollen) and the presence of thick mucus or mucus on the vulva.

Pregnancy Success

The results of artificial insemination showed that out of 18 treated sheep, ten were pregnant. This result was obtained by checking using Pregna Drop. Data on pregnancy success can be seen in Table 3.

Table 3. Pregnancy success data.

	P0	P1	P2
Number of each treatment	6	6	6
Number of Pregnant Livestock	2	3	5
Estrus Response	++++++	++++++	++++++
Estrus Presentation	100%	100%	100%
Pregnancy Percentage	33,3%	50%	83,3%

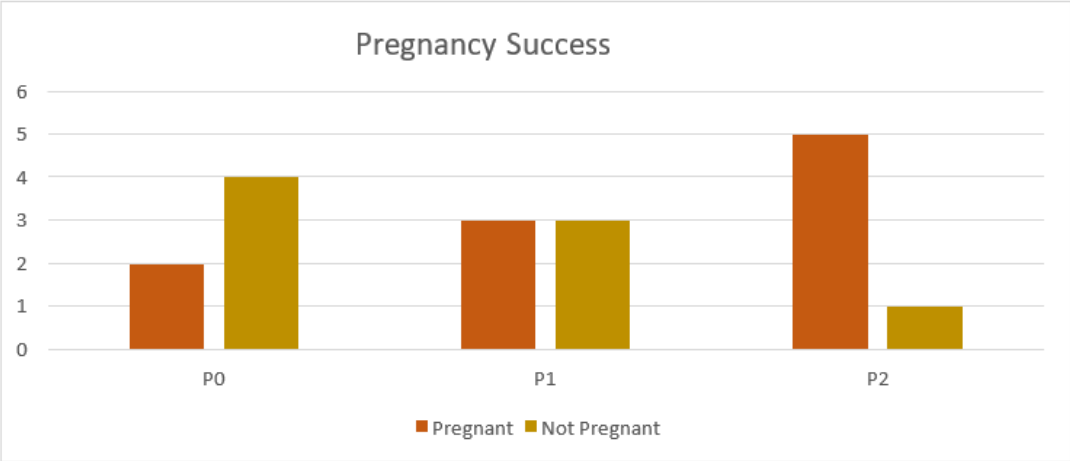

Figure 1. Pregnancy success data graph

Based on the data above, it can be observed that there are two pregnant sheep in the control treatment (P0), by giving 0 ml of hypophysical extract. In treatment 1 (P1), there were three pregnant sheep. In treatment 2 (P2), there were five pregnant sheep. From this explanation, it can be concluded that the highest pregnancy success occurred in treatment 2 (P2), which reached 83.3%. This result is higher than that reported by Siregar et al. (2013) in the provision of bovine hypophysis extract only resulted in a pregnancy percentage of 80%. The difference in pregnancy success is because the optimal dose for superovulation induction in local goats and sheep has not yet been found. In addition, the success of pregnancy can be caused by several factors, one of which is following the opinion of Widiarso, (2018). The existence of disturbances in the reproductive organs of female livestock causes the failure of artificial insemination.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of research on the use of bovine pituitary extract in this study, it can be concluded that: Research treatment 2 (P2), administration of the hormone PGF2α at a dose of (1 ml), bovine pituitary extract (2;1;0.5 ml), and PGF2α (1 ml).), had the highest score in providing faster estrus onset, estrus intensity, and higher pregnancy success compared to the other two treatments.

ADVANCED RESEARCH

As for suggestions from this research, further research is needed regarding the number of sheep giving birth, the number of twins born, more samples with varying doses of pituitary extract so that results with high validity and optimal administration doses are obtained.

REFERENCES

Afriani, T. 2017. Superovulasi Pada Ternak. Padang : Andalas University Press.

Isnaini, N. dan Suyadi. 2004. Pengaruh pemberian ekstrak hipofisa terhadap respons berahi dan respons ovari sapi perah anestrus ppostpartum. JIIP. 16(1):33-40

Munandar, I., Yamin, M., Astuti, D.A., Rahayu, S. 2022. Social Behavior of Local Sheep in Semi-Intensive Rearing System. Journal of Tropical Animal Science and Technology. 4(2): 110-116

Panicker, S.S., P. Kanjirakuzhiyil, R. Koodathil and R. Kanakkaparambil. 2015. Oestrous Response and Conception Rate in Malabari cross- bred goats Following Two Different Estrus Synchronization protocols. Journal Animal Health Production. 3(2): 39-42.

Purnamasari, L., Sari, I.W., Rahayu, S., Yamin, M. 2021. The Effect of Grass Substitution with Dry Kale and Sprout Waste on Garut Sheeps Performance. Jurnal Peternakan Indonesia. 23(1): 25-32

Siregar, T. N., H. Hafizuddin, M. Akmal, D. A. Arman Sayuti, J. Melia, T. Armansyah, S. Syafruddin, B. Panjaitan, dan D. L. Adani. 2016. Follicle dynamics of Aceh cattle during estrous cycle. Glob. Vet.17:424-429

Siregar, T. N., I. K. Siregar, T. Armansyah, dan A. Sayuti. 2013. Tampilan reproduksi kambing lokal hasil induksi superovulasi dengan ekstrak pituitary sapi. J. Vet. 14:91-98

Siregar, T.N., Siregar, I.K., Armansyah, T., Syafruddin., Sayuti, A., Hamdani. The Reproductive Performance Of Local Does Following Induced Superovulation With Cattle Pituitary Extracts. Jurnal Veteriner. 14(1): 91-98

Udin, Z., F. Rahim, Hendri dan Y. Yellita. 2016. Waktu dan kemerahan vulva saat inseminasi buatan merupakan faktor penentu angka kebuntingan domba di Sumatera Barat. Jurnal Veteriner, 17 (4): 501-509.

Widiarso, B. P. 2018. Faktor-Faktor Penyebab Kegagalan Inseminasi Buatan Pada Sapi Limosin Di Kecamatan Tegalrejo Kabupaten Magelang. Prosiding Ilmu Ilmu Peternakan