ISRG Journal of Agriculture and Veterinary Sciences (ISRGJAVS)

ISRG PUBLISHERS
Abbreviated Key Title: ISRG. J. Agri.Vet.Sci.
ISSN: 3048-8869 (Online)
Journal homepage: https://isrgpublishers.com/gjavs/
Volume – III Issue - VI (November-December) 2026
Frequency: Bimonthly



The Effect Of Sunflower Seed Oil (*Helianthus annuus L.*) as a Source of Vitamin E on Estrus Quality and Artificial Insemination Succees in Thin-Tailed Sheep

Budi Purwo Widiarso[1], Fahmi Kamal[2], Raden Agus Tri Widodo[3]

[1, 2] Department of Animal Production Tecnology, Politeknik Pembangunan Pertanian Yogyakarta Magelang

[3] Department of Animal Feed Tecnology, Politeknik Pembangunan Pertanian Yogyakarta Magelang

| **Received:** 26.08.2026 | **Accepted:** 31.08.2026 | **Published:** 21.11.2026

***Corresponding author:** Budi Purwo Widiarso

Abstract

This study aims to determine the effect of sunflower seed oil (Helianthus annuus L.) as a source of vitamin E on estrus appearance and artificial insemination (AI) success in thin-tailed sheep. The study used 20 female thin-tailed sheep (DET) with 4 treatments and 5 replicates over 17 days. The treatments consisted of: P0 (no treatment), P1 (3 ml/sheep), P2 (6 ml/sheep), and P3 (9 ml/sheep). A completely randomized design (CRD) was used because the experimental animals were homogeneous. Parametric data analysis was performed using Analysis of Variance (ANOVA) for vulva temperature, vulva length, and vulva width. Significant data were further analyzed using Duncan's Multiple Range Test (DMRT), while non-parametric data were analyzed using the Kruskal-Wallis Test for vulva color and mucus secretion. Significant data were further analyzed using the Mann-Whitney U Test. The results of the study indicate that the administration of sunflower seed oil has a significant effect ($P<0.05$) on vulva color and vulva temperature, but no significant effect ($P>0.5$) on mucus secretion, vulva length, and vulva width. Based on the research results, it was concluded that the administration of sunflower seed oil as a source of vitamin E at doses of 6 ml and 9 ml had a significant effect on estrus quality (vulva color and vulva temperature) and a high pregnancy rate (80%) occurred at the 6 ml dose.

Keywords: Thin-Tailed Sheep, Estrus, Sunflower Seed Oil

1. INTRODUCTION

Sheep play a key role in ensuring the availability of animal protein. Raising sheep on both a small and large scale can help meet local food needs. Therefore, it is necessary to increase meat production by improving sheep performance so that these needs can be met.One measure that can be taken is to increase the sheep population in Indonesia. One way to boost sheep productivity and population is by improving sheep husbandry and breeding management in accordance with the sheep breeding guidelines set forth in Ministry of Agriculture Regulation No. 102/Permentan/OT.140/7/2014 of 2014 on guidelines for good goat and sheep breeding practices.The majority of farms in Indonesia

Copyright © ISRG Publishers. All rights Reserved.
DOI: 10.5281/zenodo.24412355

are smallholder farms. A common problem faced by smallholder farmers is difficulty in identifying signs of estrus in their livestock, which leads to improper timing of breeding. Signs of estrus are sometimes not clearly visible or may even be completely absent ("silent heat") during the livestock's reproductive cycle. Consequently, farmers struggle to determine the ideal time to breed their animals. According to Siregar et al., (2023), estrus detection is a critical factor in reproductive management, as errors in detecting estrus can lead to mating failure, whether through natural or artificial means. Farmers' limited capabilities, time, and manpower for observing estrus These issues can lead to a decline in the sheep population in Indonesia, but they can be resolved through intensive management, specifically by paying attention to the nutritional content of the feed provided. Properly balanced feed nutrition can improve the efficiency of the livestock's reproductive system. To support this, vitamin E must be provided in sufficient amounts. This is in line with Antariksa et al., (2024), who state that optimizing the reproductive process in sheep not only requires improvements in husbandry and breeding management but must also be accompanied by the provision of adequate feed nutrition. Among these nutrients, vitamin E plays a crucial role in supporting reproductive sustainability. According to Napitu et al. (2013), vitamin E—a key nutrient in the reproductive process of livestock—makes a significant contribution through its antioxidant activity. This nutrient helps maintain the stability of fatty acids, protects cell membranes from oxidation, and accelerates the release of hormones involved in reproduction. Yuliyantika et al., (2019) noted that vitamin E plays a role in maintaining intracellular balance and acts as an antioxidant.Vitamin E can be obtained from sources such as sunflower seed oil (*Helianthus annuus L.*). Putri (2020) notes that sunflower seed oil offers various benefits, including high nutritional value, being a source of unsaturated fats, vitamin E, protein, and organic compounds, particularly chlorogenic acid in its complex or protein-bound forms. Putri (2017) argues that vitamin E is also an antioxidant that can halt the chain reaction of free radical formation by releasing hydrogen. To prevent the essential omega-3 fatty acid (EPA) in the body from oxidizing along with vitamin E, it is converted into the hormone PGF2α (prostaglandin). This hormone serves to accelerate gonadal maturation and fertilization.Based on research conducted by Hastuttiningsih et al. (2024), it was found that the quality of estrus in goats can be improved through the supplementation of sunflower seed oil (Helianthus annuus L.) in their feed rations. Therefore, a high vitamin E content in the diet can accelerate the onset of estrus signs and shorten the estrus cycle, making the animals ready for breeding sooner (Fajrin et al., 2012). If animals can be bred during the optimal estrus window, this can increase the pregnancy rate (Putri et al., 2014). Based on the above, this study aims to determine the effect of sunflower seed oil as a source of vitamin E on estrus signs and the success of artificial insemination in sheep. The objectives of this final project are: To determine the effect of sunflower seed oil (*Helianthus annuus L.)* as a source of vitamin E on the quality of estrus signs in thin-tailed sheep; and to determine the effect of sunflower seed oil (H

2. MATERIALS AND METHODS

2.1 Materials and Equipment

The research was conducted at Yunan Farm, Losari Village, Pakis Subdistrict, Magelang Regency, Central Java. This study utilized 20 female thin-tailed sheep, frozen semen (straws), plastic sheaths, liquid nitrogen, tissues, insemination gel, sunflower seed oil, as well as vitamin supplements and deworming medication. The equipment used in this study included writing materials, an artificial insemination gun, a speculum, scissors, a digital thermometer, livestock tags, syringes, a vernier caliper, a BMV Farmcsan L60 ultrasound machine, and a thermos. Sheep consisted of 20 female thin-tailed sheep. The sheep met the following criteria: they had given birth once, weighed 25–35 kg, were in good health, and were not pregnant.

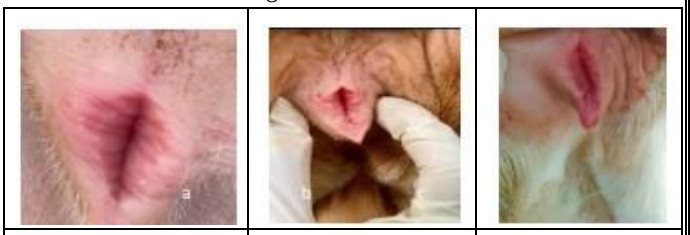
2.2 Research Variables

2.3 Estrus Quality

The variables under study are as follows: The parameters measured for the estrus variable include: vulva color, vulva temperature, vulva length, vulva width, and mucus secretions.

2.4 Vulva color

Measurements of vulvar color variables were conducted using a scoring system. The scoring system was divided into three categories: Score 1—pale red vulvar color with no change in color; Score 2—pink vulvar color; and Score 3—a change in vulvar color to red (Pangestuningrum et al., 2021). The vulva color scoring assessment is shown in Figure 3.



a. Score 1	b. Score 2	c. Score 3

Figure 1. Vulva color scoring (Hastuttiningsih *et al*. 2024)

2.5 Vulva temperature

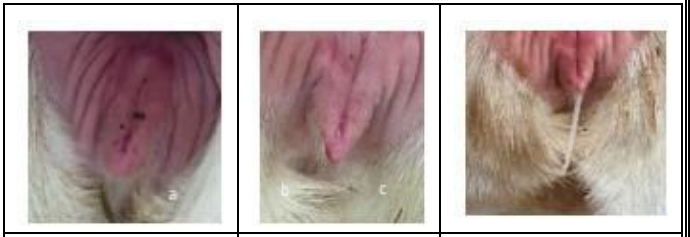
Vulva temperature is measured by inserting a digital thermometer into the vulva. The vulval temperature of ewes not in estrus is 38.54 ± 0.72 °C, whereas when in estrus, the vulval temperature tends to rise to 38.66 ± 0.86 °C (Dewi et al., 2011).

2.6 Vulva Length and Width

Measurements were taken using a vernier caliper with a measurement accuracy of one millimeter (mm). The length and width of the vulva were determined based on the distance between the ventral and dorsal commissures of the vulva (Leigh et al., 2010).

2.7 Mucous Secretion

Mucus secretion was measured using a scoring system. The scoring system was as follows: score 1—no reaction or no mucus secretion; score 2—a small amount of mucus; and score 3—a large amount of mucus (Hastuttiningsih et al., 2024).



a. Score 1	b. Score 2	c. Score 3

Figure 2. Scoring mucus secretion

Copyright © ISRG Publishers. All rights Reserved.
DOI: 10.5281/zenodo.24412355

Conception rate

The conception rate is calculated using the Conception Rate (CR) formula. The percentage of female livestock that successfully conceive during their first mating is referred to as the Conception Rate (Kentjonowaty et al., 2023)

$$CR = \frac{\text{Amount of pregnant sheep first insemination}}{\text{Amount of Estrus sheep}} \times 100\%$$

2.8 Research Procedures

Preparation of sunflower seed oil (Helianthus annuus L.) samples

The process of preparing sunflower seed oil samples is carried out using the centrifugation method. The dried sunflower seeds are finely ground, then soaked in distilled water for 60 minutes at a ratio of 1 g to 10 mL. After soaking, the mixture is filtered using Whatman filter paper. The resulting filtrate is then centrifuged to separate the aqueous and oil phases. Centrifugation works by spinning the solution at high speed, producing two distinct layers: water and oil (Pramushinta et al., 2016).

2.9 Deworming and Vitamin Giving

Prior to treatment with sunflower seed oil, the livestock were administered the deworming medication albendazole and a B-complex vitamin supplement. This was a one-time administration, intended to rid the livestock of parasitic worms so that the nutrients in the sunflower seed oil could be properly absorbed.

Administration of sunflower seed oil (Helianthus annuus L.)

Sunflower seed oil (Helianthus annuus L.) was administered in the morning after feeding. Administration took place for 17 consecutive days at the dosage specified for each treatment. Sunflower seed oil (Helianthus annuus L.) was administered orally using a syringe.

Estrus quality assessment

Estrus quality assessment is conducted from day 3 through day 18. Estrus observations are made in the morning and afternoon by monitoring the appearance of estrus signs, which include changes in the length, width, color, and temperature of the vulva.

2.10 Artificial Insemination

Artificial insemination is performed on livestock in estrus after treatment. The semen used is from Dorper sheep.

2.11 Conception rate

The success of artificial insemination (AI) is assessed by determining the number of pregnant animals out of the total number of animals that underwent AI. Pregnancy checks are performed one month after AI using ultrasound. After the pregnancy checks are completed, the pregnancy success rate is calculated using the Conception Rate (CR) formula.

2.12 Experimental Design

This study employed a completely randomized design (CRD) with 4 treatments and 5 replicates. The treatments administered in this study were as follows:

1. Control group (P0) : 5 sheep that were not given any sunflower seed oil (*Helianthus annuss L.)*
2. First treatment group (P1) : 5 sheep that were given 3 ml of sunflower seed oil (*Helianthus annuss L.*) per sheep.
3. The second treatment group (P2) : 5 sheep that were given 6 ml of sunflower seed oil *(Helianthus annuus L.)* per sheep.
4. The third treatment group (P3): 5 sheep that were given 9 ml of sunflower seed oil *(Helianthus annuus L.)* per sheep.

2.13 Data Analyze

Data analysis used to assess the quality of estrus signs in thin-tailed sheep—specifically vulvar width, length, and temperature—was performed using Analysis of Variance (ANOVA). If the study showed statistically significant results ($P < 0.05$), the analysis would proceed to the Duncan Multiple Range Test (DMRT). The Kruskal-Wallis test was used to analyze data on mucus secretion and vulva color. If the study showed significant results ($P < 0.05$), the analysis would proceed to the Mann-Whitney U test. The analysis used to measure the success of artificial insemination (AI) employs descriptive analysis using the Conception Rate (CR) formula. The Conception Rate (CR) is calculated using descriptive analysis.

3. RESULT AND DISCUSSION

3.1 Vulva Color

Data collection used a scoring system divided into three categories: Score 1—pale red vulva with no visible changes; Score 2—pink vulva; and Score 3—a change in vulva color to red. One of the physical changes in the external genitalia that occurs during the reproductive cycle is a change in the color of the vulva (Hastuttiningsih et al., 2024). The external genitalia, or vulva, undergo physical changes as a manifestation of estrus, characterized by a red vulva (Lestari & Ismudiono, 2014). The results of observations on the effect of sunflower seed oil on vulva color are presented in Table 1.

Table 1. Result of vulva color examination

Treatment	Vulva color average
P0 (0)	$1,40 \pm 0,55^{a}$
P1 (3)	$2,40 \pm 0,55^{b}$
P2 (6)	$2,60 \pm 0,55^{b}$
P3 (9)	$2,00 \pm 0,71^{ab}$

Note: Superskrip^{a,b,ab} in the same column indicate significant differences (P<0,05)

Table 4 shows that there was a change in the color of the vulva in ewes treated with sunflower seed oil (*Helianthus annuus L.*); treatment P2 showed the highest average score of 2.60 ± 0.55. These results are not significantly different from those found by Putri (2017), who reported that flushing using mung bean sprouts as a source of vitamin E yielded a score of 2.21 and caused the vulva to appear redder when the animals were in the estrus phase. The results of the Kruskal-Wallis test indicated that the administration of sunflower seed oil (Helianthus annuus L.) had a significant effect ($P < 0.05$) on vulva color. The results of the Mann-Whitney post-hoc test showed that P0 differed significantly ($P < 0.05$) from P1 and P2 but did not differ significantly from P3. Meanwhile, P1 differed significantly from P3 but did not differ significantly from P2.

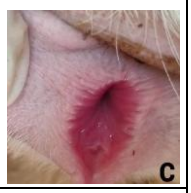
Copyright © ISRG Publishers. All rights Reserved.
DOI: 10.5281/zenodo.24412355



A) Score 1



B) Score 2



C) Score 3

Figure 3. Vulva color observation

Ewes with thin tails that were administered sunflower seed oil (Helianthus annuus L.) at a dosage of 6 ml per animal exhibited more pronounced changes in vulvar color. This is believed to be related to the vitamin E content in sunflower seed oil (*Helianthus annuus L.*). A study by Khotijah et al. (2014) states that vitamin E acts as an antioxidant that protects cells from oxidative damage, particularly in the reproductive system, thereby keeping reproductive tissues healthy and supporting optimal follicle development and estrogen production. In sheep, vitamin E can improve the quality of estrus, one of the signs of which is a change in vulvar color. The effect of sunflower seed oil (Helianthus annuus L.) on vulvar color changes is most likely related to its antioxidant vitamin E content, which plays a role in supporting the action of the hormone estrogen and influencing physiological responses in the reproductive organs (Hernández et al., 2013). Salsadava et al. (2020) reported that administering 400 IU of vitamin E increased vulvar coloration and estrus activity in sheep. Khotijah et al. (2020) also noted that the administration of linoleic acid from sunflower seed oil (*Helianthus annuus L.*) contributes to increased levels of arachidonic acid, which is subsequently used as a substrate in prostaglandin synthesis. Increased prostaglandin levels, particularly PGF2α, contribute to corpus luteum regression and the onset of estrus in sheep. Prostaglandin hormones influence estrogen levels in relation to changes in vulvar color and blood supply to vaginal cells (Ratna et al., 2011).

3.2 Vulva Temperature

Vulva temperature measurements are taken to help determine whether livestock are in estrus. Vulva temperature may rise due to increased activity in the reproductive organs as the estrus cycle progresses. At the peak of estrus, vulval temperature is typically slightly higher than normal (Akbar et al., 2020). The results of the study on the effects of sunflower seed oil on vulval temperature are presented in Table 2.

Table 2 Vulva temperature Thin Tailed Sheep

Treatment (ml/ekor)	Average of Vulva temperature (^{O}C)
P0 (0)	38,34 ± 0,29^{a}
P1 (3)	38,70 ± 0,12^{b}
P2 (6)	38,74 ± 0,27^{b}
P3 (9)	38,92 ± 0,29^{b}

Note : different Superskrip^{a,b} in the same column indicate significant differences (P<0,05)

Table 2 shows that there was an increase in vulvar temperature in ewes treated with sunflower seed oil *(Helianthus annuus L.).* Treatment P3 exhibited the highest average vulvar temperature, at 38.92°C ± 0.29, indicating that the ewes were in estrus. The vulva temperature values obtained in this study were higher than those reported by Dewi et al., (2011), which were 38.66 ± 0.86°C, and in a study by Putri (2017), who reported a vulva temperature of 38.35°C during estrus. According to Pangestuningrum et al. (2021), during the estrus phase, the vulval temperature of female livestock can increase by approximately 0.4°C from the normal temperature. Data analysis using ANOVA revealed that sunflower seed oil had a significant effect ($P < 0.05$) on vulva length. Results from the Duncan Multiple Range Test (DMRT) for treatment P0 showed a significant difference compared to P3 but no significant difference compared to P1 and P2. Meanwhile, P1 differed significantly from P3 but not significantly from P2.



Figure 4. vulva temperature examination

Thin-tailed sheep administered sunflower seed oil (*Helianthus annuus L.*) at a dosage of 9 ml per animal showed an increase in vulvar temperature. This is believed to be related to the vitamin E content in sunflower seed oil (*Helianthus annuus L.*). In a study by Hastuttiningsih et al. (2024), it was stated that an increase in vaginal temperature can be influenced by the administration of sunflower seed oil, which contains vitamin E as a natural antioxidant that plays a role in supporting the body's physiological responses. With the antioxidants present in vitamin E, follicular cells are protected from interactions with free radicals, allowing the process of follicle formation and development (folliculogenesis) to proceed properly, and enabling the follicles to produce the hormone estrogen. In a study by Pemayun et al., (2021), estrogen was found to increase blood flow to the reproductive organs, which ultimately leads to a rise in temperature in the vaginal area. High estrogen levels increase blood flow to the vagina and vulva, which ultimately triggers an increase in vaginal temperature (Rasad & Setiawan, 2017).

3.3 Vulva Height and Vulva Width

Vulva size can serve as an indicator of estrus or sexual maturity in livestock. Ewes in estrus experience swelling of the vulva, which can be observed through changes in its length and width (Wijayanti & Ardigurnita, 2020). The results of observations on the effects of sunflower seed oil administration on vulva length and width are presented in Table 3

.Table 3. Result of vulva length dan width(cm)

Treatment Result of vulva length dan width(cm)

(ml/head)	Vulva length	Vulva width
P0 (0)	2,16 ± 0,12^{ns}	1,30 ± 0,14^{ns}
P1 (3)	2,30 ± 0,13^{ns}	1,54 ± 0,22^{ns}

Copyright © ISRG Publishers. All rights Reserved.
DOI: 10.5281/zenodo.24412355

P2 (6)	$2,34 \pm 0,17^{ns}$	$1,51 \pm 0,19^{ns}$
P3 (9)	$2,28 \pm 0,16^{ns}$	$1,42 \pm 0,11^{ns}$

Note : The superscript ^{ns} indicates have significant effect ($P < 0.05$).

Based on the results of the ANOVA data analysis, the administration of sunflower seed oil (*Helianthus annuus L.)* had no significant effect ($P > 0.05$) on vulva length and vulva width. The results of a study by Nurfitriani et al. (2015) indicate that the vulva length of ewes during the estrus phase was 3.03 ± 0.54 cm. This suggests that the administration of sunflower seed oil *(Helianthus annuus L.*) was not potent enough to trigger morphological changes indicative of active estrus.



a) Vulva length



b) Vulva width

Figure 5. Measurement

One factor influencing no significancy results is the possibility that the dosage and duration of sunflower seed oil administration in the study had not yet reached the optimal level to elicit physiological changes. This occurred due to persistently low estrogen levels. Estrogen deficiency can lead to a loss of collagen, fatty tissue, and the vagina's ability to retain fluid, which ultimately causes atrophy of the vaginal walls. According to Wijayanti & Ardigurnita (2020), high estrogen levels contribute to increased vascularization in the female reproductive organs, which triggers vaginal swelling and changes in the vulval cleft during estrus. It is this increase in the number of blood vessels that facilitates blood flow to the reproductive tract. One cause of unclear estrus symptoms may stem from nutritional deficiencies in the feed, which disrupt the synthesis and regulation of reproductive hormones that play a key role in the manifestation of estrus symptoms (Suharto, 2003). Traditional husbandry systems still practiced on some farms—which involve tethering livestock and providing only limited amounts of forage—cause the animals to experience deficiencies in the nutrients needed to support reproductive function (Abidin et al., 2012). This finding is also supported by Suharto (2003), who demonstrated that livestock fed high-quality rations exhibit higher estrus intensity

Mucus Secretion

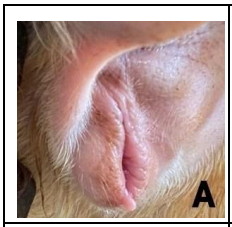
Data collection used a scoring system with the following values: score 1—no reaction or no discharge; score 2—slight discharge; and score 3—heavy discharge. Changes in the vulva showed a pattern similar to that observed in secretions (Zaenuri & Rodiah, 2016). Changes in color and swelling of the vulva during estrus were also associated with the volume of mucus secretions (Wijayanti & Ardigurnita, 2020). The results of observations on the effects of sunflower seed oil administration on mucus secretions are presented in Table 4.

Table 4. Data mucus secretion in Thin Tail Sheep

	Average mucus secretion (ml/head)
P0 (0)	$1,20 \pm 0,45^{ns}$
P1 (3)	$1,80 \pm 0,84^{ns}$
P2 (6)	$2,20 \pm 0,84^{ns}$
P3 (9)	$2,00 \pm 0,71^{ns}$

Note : The superscript ^{ns} indicates no significant effect ($P > 0.05$).

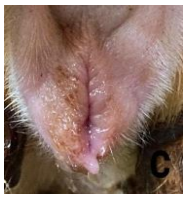
The results of the Kruskal-Wallis test analysis indicate that the administration of sunflower seed oil (Helianthus annuus L.) had no significant effect ($P > 0.05$) on mucus secretion. In Table 4, the highest average mucus secretion score was 2.20 ± 0.84, while the control treatment (P0) had the lowest score, at 1.20 ± 0.45. The results of a study by Wijayanti & Ardigurnita (2020) indicate that mucus secretion during estrus was 2.75 ± 0.50. Clear mucus secretions moistening the vulva serve as a sign that the animal is in estrus.



a) Score 1



b) Score 2



c) Score 3

Factors influencing the results include the possibilityof traditional rearing systems and inadequate nutritional intake. This is supported by the study by Zaenuri & Rodiah (2016), which states that the nutritional status of livestock can affect the quality of the mucus produced, while from a physical perspective, mucus volume consists primarily of water, protein, fat, carbohydrates, and minerals. Mucus quantity can be influenced by factors such as genetics, body condition, nutritional adequacy, and body condition score. Generally, livestock with a high body condition score exhibit a greater mucus volume compared to those in a lean condition (Pangestuningrum et al., 2021). Mucus production can occur as a result of cortisol stimulation of mineralocorticoid secretion, which leads to mineral retention and an increase in water volume toward the cervix, causing the fluid to accumulate in the cytoplasm of cervical goblet cells; when this fluid is expelled, it is referred to as mucus (Ondho et al., 2019).

Conception Rate

The pregnancy rate is the percentage of successful pregnancies following a pregnancy examination (Putri, 2017). The pregnancy rate is calculated by determining the Conception Rate (CR), which is the percentage of female livestock that become pregnant after their first mating (Sigarini et al., 2015). The success rate of artificial insemination in sheep varies. Several factors that determine insemination success include ram selection and management, semen collection and evaluation procedures, dilution and storage processes, transportation, insemination techniques, data recording, and evaluation of results (Supriyono et al., 2022). The results of pregnancy detection in thin-tailed sheep are shown in Table 5.

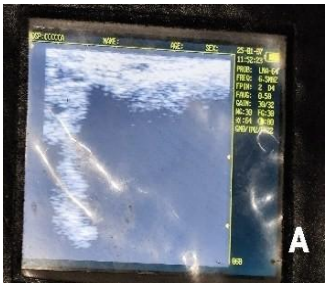
Copyright © ISRG Publishers. All rights Reserved.
DOI: 10.5281/zenodo.24412355

Tablel 5. Pregnancy detection on Thin Tailed Sheep

Replication	Treatment (ml/head)			
	P0 (0)	P1 (3)	P2 (6)	P3 (9)
1	-	-	+	-
2	-	+	-	-
3	-	+	+	+
4	-	-	+	-
5	+	-	+	-
Amount of pregnancy	2	2	4	3
Pregnancy Perecntage	20%	40%	80%	20%

Note : Pregnant (+), Non Pregnant (-)

Table 5 shows that the average conception rate (CR) in this study ranged from 20% to 80%. The highest pregnancy rate was observed in P2 at 80%. This indicates that the administration of sunflower seed oil (Helianthus annuus L.) can increase the pregnancy rate because it contains vitamin E, which acts as an antioxidant that protects cells—particularly in the reproductive system—from damage caused by free radicals. Thus, vitamin E helps maintain egg quality and supports follicular maturation. In addition, vitamin E also helps create a healthy and stable endometrial environment, allowing the embryo implantation process in the uterus to proceed smoothly.



a) Not pregnant



b) Pregnant

Figure 7. Pregnancy detection

According to Putri (2017), vitamin E protects omega-3 fatty acids (EPA) from oxidation, which in turn enables the formation of prostaglandins. These hormones play a role in accelerating gonadal maturation, enhancing fertility, and helping sperm reach the egg for fertilization (Afrianto and Luviawaty, 2017). A low conception rate is likely due to a lack of technical knowledge and practical skills related to the performance of artificial insemination. This is supported by Pradana (2013), who explains that conception rates are influenced by several factors, such as the physical condition of the livestock, the success in detecting estrus, the performance of artificial insemination (AI), and proper reproductive management. These factors collectively influence fertility and conception success. This is consistent with the findings of Widiarso et al.,(2023), who state that there are four main factors that determine the success of artificial insemination (AI): the inseminator (AI technician), the recipient (the female livestock being inseminated), the farmer, and the AI Participating Farmers' Group.Farmers rank third among the key factors in the success of AI, playing a crucial role in reporting the animals' estrus status to the inseminator so that the animals can be bred through artificial insemination. Ideally, the conception rate (CR) in a livestock population ranges from 60 to 70%. A high CR reflects optimal fertility, while a low CR indicates the opposite (Fanani, 2013). According to Wijayanti et al., (2020), poor reproductive management—such as delaying artificial insemination after the detection of estrus, insufficient feed, and hormonal imbalances—can lead to low pregnancy rates

4. CONCLUSION

Sunflower seed oil (Helianthus annuus L.) to thin-tailed sheep can have a significant effect on vulva color and vulva temperature, but has no significant effect on mucus secretions, vulva length, or vulva width. Sunflower seed oil *(Helianthus annuus L.*) at a dose of 6 ml/head resulted in the highest conception rate (CR), which was 80%.

CONFLICT OF INTEREST

The authors declared that all the material presenting in this manuscript are no conflict of interest regarding any financial issues.

REFERENCES

1. Abidin, Z., Y. S. Ondho & B. Sutiyiono. 2012. Penampilan Berahi Sapi Jawa Berdasarkan Poel 1, Poel 2, Dan Poel 3. *Jurnal Animal Agriculture*. *1*(2): 86–92.
2. Afrianto, E., & R. Luviawaty. 2017. Peran Prostaglandin dalam Kematangan Gonad, Fertilitas, dan Motilitas Sperma Sapi Perah Friesian Holstein. *Jurnal Ilmu Peternakan*. 18(2): 99-104.
3. Akbar, F. A., D. Samsudewa. & Y. S. Ondho. 2020. Tampilan Vulva Sapi Perah yang Disinkronisasi dengan Hormon Prostaglandin pada Umur yang Berbeda. *Jurnal Sain Peternakan Indonesia*. *15*(1): 91–97.
4. Antariksa, A., B. P. Widiarso & B. Sudarmanto. 2024. Pengaruh Pemberian Minyak Kedelai terhadap Keberhasilan Inseminasi Buatan Domba Ekor Tipis yang Disinkronisasi Hormon Prostaglandin (PGF2α). *Prosiding Seminar Nasional*. *6*(2): 173–181.
5. Anwar, M., A. Riaz, N. Ullah. & M. Rafiq. 2008. Use of Ultrasonography for Pregnancy Diagnosis in Balkhi Sheep. *Pakistan Veterinary Journal*. *28*(3): 144–146.
6. Fanani, S. 2013. Kinerja Reproduksi Sapi Perah Peranakan Friesian Holstein (PFH) Di Kecamatan Pundak, Kabupaten Ponorogo. *Skripsi Sarjana Peternakan.* Fakultas Pertanian. Universitas Sebelas Maret, Surakarta.
7. Hastuttiningsih, W., Y. R. Kusuma & Sunarsih. 2024. Penggunaan Flushing Vitamin E Minyak Biji Bunga Matahari (Helianthus Annuus L.) terhadap Masa Involusi Uterus dan Kualitas Estrus Kambing Sapera. *Jurnal Pengembangan Penyuluhan Pertanian*. *21*(1): 85–97.
8. Hernández, J., F. I. Flores-Pérez, C. Hallal-Calleros & M. Pérez- Martínez. 2013. Macroscopic Morphometric Analysis of Genital Organs of Rabbit does with Differing Parturitions at 24 Hours Post-weaning. *International Journal of Morphology*. *31*(3): 991–996.

Copyright © ISRG Publishers. All rights Reserved.
DOI: 10.5281/zenodo.24412355

9. Dewi, R. R., W, W. & D. T. Widayati. 2011. Respon Estrus Pada Kambing Peranakan Ettawa

10. Kentjonowaty, I., N. Sholikah., N. Humaidah., O. R. Puspitarini., A. B. A. Mardhotilah & B. P. Mahardhika. 2023. Evaluasi Morfometrik dan Conception Rate (CR) Kambing PE yang di Inseminasi dengan Semen Pejantan Boer. *Jurnal Sains Peternakan*. *11*(1): 1–8.

11. Khotijah, L., N. Nurmiasih., & D. Diapari. 2020. Konsumsi Zat Makanan, Profil dan Metabolit Darah Induk Domba dengan Ransum Kaya Lemak Asal Minyak Nabati. *Jurnal Ilmu Nutrisi Dan Teknologi Pakan*. *18*(2): 38–42.

12. Leigh, O. O., A. K. Raheem & J. A. O. Olugbuyiro. 2010. Improving the Reproductive Efficiency of the Goat: Vaginal Cytology and Vulvar Biometry as Predictors of Synchronized Estrus/Breeding Time in West African Dwarf Goat. *International Journal of Morphology*. *28*(3): 923– 928.

13. Lestari, T. D., & Ismudiono. 2014. Ilmu Reproduksi Ternak. In *Journal of Physics A: Mathematical and Theoretical*. 44(8).

14. Napitu, R., L. Santoso & Sparmono. 2013. Pengaruh Penambahan Vitamin E Pada Pakan Berbasis Tepung Ikan Rucah Terhadap Kematangan Gonad. *E-Jurnal Rekayasa Dan Teknologi Budidaya Perairan*. *1*(2): 109–116.

15. Nurfitriani, I., R. Setiawan & Soeparna. 2015. Karakteristik Vulva Dan Sitologi Sel Mucus Dari Vagina Fase Estrus Pada Domba lokal. *Students E-Journal*. *1*(1): 1–10.

16. Ondho, Y. S., F. A. Akbar., D. A. Lestari & D. Samsudewa. 2019. Level Of Sodium Chloride (NaCl) And Profile Of Cervical Mucus Of Dairy Cattle At Various Age Synchronized By Prostaglandine. *Journal of the Indonesian Tropical Animal Agriculture*. *44*(4): 364–371.

17. Pangestuningrum, J., S. P. Madyawati., H. Eliyani., R. Damayanti & S. E. Rochmi. 2021. Etawa Goat Estrus Quality with Estrus Synchronization. *Journal of Applied Veterinary Science And Technology*. *2*(1): 15.

18. Pemayun, T. G. O., A. A. S. Kendran & I. W. N. S. Gunawan. 2021. Measurement of Ovarian Follicles and Vaginal Temperature of Bali Cattle That Experience Silent Heat. *Buletin Veteriner Udayana*. *13*(1): 34–38.

19. Pradana, A. F. 2013. Penampilan Reproduksi Sapi Peranakan Ongole Berdasarkan Paritas di Kota Probolinggo Jawa Timur. *Skripsi Sarjana Peternakan.* Fakultas Peternakan. Universitas Brawijaya, Malang.

20. Pramushinta, I. A. 2016. Pembuatan Minyak Biji Bunga Matahari Menggunakan Metode Sentrifugasi. *Journal of Science*. *9*(2): 8–11.

21. Putri, A. M. 2020. Perbandingan Aktivitas Antioksidan Terhadap Biji Bunga Matahari (Halianthus Annuus L.) Dengan Tumbuhan Lainnya. *Journal of Research and Education Chemistry*. *2*(2): 85.

22. Putri, A. N., S. Suharyati & P. E. Santosa. 2014. Pengaruh Paritas Terhadap Persentase Estrus Dan Kebuntingan Sapi Peranakan Ongole Yang Disinkronisasi Estrus Menggunakan Prostaglandin F2a (Pgf2a). *Jurnal Ilmiah Peternakan Terpadu*. *2*(2): 32–36.

23. Rasad, S. D., & R. Setiawan. 2017. Cytological Characteristics of Mucose Cell and Vaginal Temperature and pH During Estrous Cycle in Local Sheep. *Animal Production*. *19*(1): 21.

24. Ratna, D. 2011. Pengaruh Prostaglandin F2α Terhadap Kadar Estrogen dan Perubahan Warna Vulva Serta Suplai Darah Vagina pada Mencit. *Jurnal Veteriner*. 12(1): 31-36

25. Salsadava, D. D., T. Iriani & E. Kusumawati. 2020. Pengaruh Pemberian Vitamin E Dan Selenium Terhadap Performa Reproduksi Domba Betina. *Jurnal Ilmu Ternak Janabadra*. 9(1): 38–43.

26. Sigarini, D., A. Purwanto & T. Widiyono. 2015. Perhitungan Conception Rate (CR) dan Faktor-Faktor yang Berpengaruh pada Sapi Perah Friesian Holstein di Jawa Barat. *Jurnal Peternakan.* 36(3): 189-194.

27. Siregar, M. N., M. Y. Sumaryadi., A. P. Nugroho & C. N. Hidayah. 2023. Persentase Dan Intensitas Berahi Kambing Sapera Yang Disinkronisasi Hormon Prostaglandin Pada Berbagai Paritas Yang Berbeda. *Journal of Animal Science and Technologi*. *5*(1): 124–134.

28. Suharto, K. 2003. Penampilan Potensi Reproduksi Sapi Perah Frisien Holstein Akibat Pemberian Kualitas Ransum Berbeda dan Infusi Larutan Iodium Povidon 1% Intra Uterin. *Tesis Program Studi Magister Ilmu Ternak*, Universitas Diponegoro. Semarang.

29. Supriyono, Yulianto, A., & Y. Karmila. 2022. Keberhasilan Inseminasi Buatan Pada Sapi Bali Di Kabupaten Muaro Jambi Provinsi Jambi. *Stock Peternakan*. *4*(1): 1–7.

30. Widayati, S. 2016. Identifikasi suhu vulva sebagai indikator estrus pada kambing Peranakan Etawa. *Jurnal Peternakan Indonesia*. 18(1): 37- 42.

31. Widiarso, B. P., A. A. Nugroho., I, U. N., & K. B. Utami. 2023. Pengaruh Pola Injeksi PGF2α terhadap Waktu Birahi pada Sapi Friesian Holstein dalam Program Inseminasi Buatan. *Jurnal Sain Veteriner*. *41*(3): 361–370.

32. Wijayanti, D., & F. Ardigurnita. 2020. Kualitas Tampilan Vulva dan Tanda- Tanda Berahi pada Kambing Peranakan Etawah yang diberi Ekstrak Buah Parijoto (Medinilla speciosa). *Sains Peternakan*. *18*(1): 31–37.

33. Yuliyantika., R. Iswari & A. Marianti. 2019. Daya Proteksi Ekstrak Tauge Kacang Hijau terhadap Kualitas Spermatozoa dan Kadar Enzim Superoksida Dismutase Mencit yang Terpapar Transfluthrin. *Life Science*. *8*(2): 138–149

34. Zaenuri, L. A., & Rodiah. 2016. Efektifitas Progesteron Kering dan Basah Sebagai Perangsang Birahi Ternak

Copyright © ISRG Publishers. All rights Reserved.
DOI: 10.5281/zenodo.24412355

Kambing. *Jurnal Ilmu Dan Teknologi Peternakan Indonesia*. *2*(1): 129–133.

Copyright © ISRG Publishers. All rights Reserved.
DOI: 10.5281/zenodo.24412355