

Efficiency evaluation of two estrous synchronization protocols on reproductive performance of crossbreed ewe

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Abstract. The study aimed to determine the effectiveness of spon progesterone and CIDR estrous synchronization protocols on the reproductive performance of crossbreed ewe. Fifty crossbreed ewes were divided randomly into two groups. The first group was given estrous synchronization using Controlled Internal Drug Release for 14 days and supplemented with Zn 20 mg/head by peroral. The Second group was given estrous synchronization using a sponge with medroxi progesterone acetate 60 mg for 14 days and supplemented with Zn 20 mg/head by peroral. The estrous observation was conducted every 6-hour interval up to 48 hours after release. Response estrous using CIDR and sponge progesterone with Zn supplementation was 100% and 100%. The quality of estrous response is divided into three groups (low, medium, and maximum). Using the CIDR and sponge progesterone, the estrous quality showed that 76% and 60% of the ewes exhibited medium estrous quality, and 24% and 40% exhibited low estrous quality. The data were analyzed using an independent sample T-test. The T-test analysis showed no significant difference ($P>0.05$) in the estrous response and estrous quality between the two estrous synchronization protocols.

1 Introduction

Sheep is essential in economic activities, poverty alleviation, and household income [1]. Anestrous and silent heat makes it challenging to detect estrous in ewes, resulting in incorrect insemination timing and fertilization failure. Ewes do not show estrous signs when separated from rams [2]. Estrous synchronization is a reproductive technology that helps synchronize estrous in a group of female livestock, thus facilitating the timing of Artificial insemination (AI). Estrous synchronization is essential for improving sheep reproductive management [3].

Estrous synchronization in small ruminants with progesterone can be achieved using medroxyprogesterone acetate, fluoro progesterone acetate, and Controlled Internal Drug Release (CIDR). The sponge impregnated with MAP is commonly used for estrous

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synchronization in ewes [4]. The typical dose of medroxyprogesterone acetate used in ewes is 60 mg. The sponge with 60 mg MAP is implanted for 12-14 days to synchronize estrous in ewes [5]. The advantages of using progesterone sponges are that there is no difference compared to CIDR in response to estrous, and they are more economical and easier to obtain. Controlled Internal Drug Release (CIDR) is an estrous synchronization device made of silicone in the shape of the letter T, containing 1.9 gr of progesterone for large ruminants and 0.33 gr for small ruminants.

This research aims to compare the effectiveness of the two protocols in causing estrous, which is hoped will make it easier for inseminators to carry out fixed-time AI.

2 Material and methods

2.1 Research location

The research was conducted at AJ Wonder Farm, located at Jl. Beteng, Area Sawah, Sukorini, Manisrenggo, Klaten, Central Java.

2.2 Experimental animals

The standard ewes used in the study were healthy, disease-free, with a body score of 3, and good reproductive performance. Preparation of the ewes included environmental adaptation, wool shearing, deworming to prevent parasite infections, and pregnancy checks to ensure the ewes were not pregnant [13].

2.3 Experimental design

The study used 50 local ewes. The ewes were divided into two equal groups: the first group consisted of 25 ewes synchronized with CIDR (Eazi Breed, New Zealand) intravaginal administration for 14 days, and the second group consisted of 25 ewes synchronized with an intravaginal sponge for 14 days [5]. Both groups were supplemented with Zn (20 mg elemental zinc per ewe) orally, administered 7 times at 2-day intervals [14]. Estrous observations were made every 6 hours after release, up to 48 hours. Estrous observation monitored changes in the vulva, mucus, and animal behavior [13].

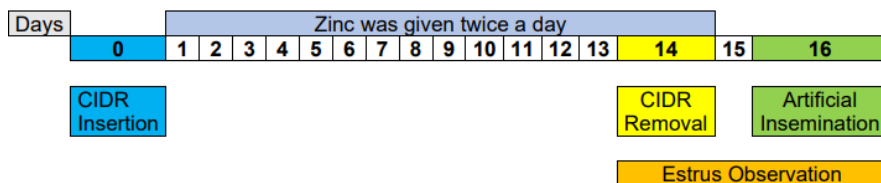


Fig. 1. Estrus synchronization protocol with CIDR.

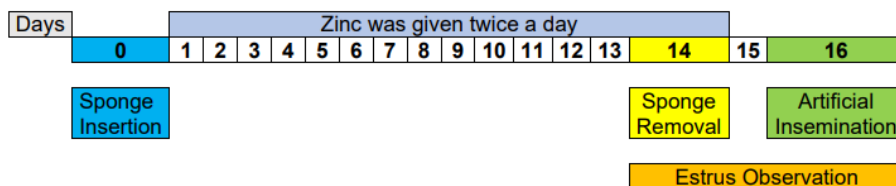


Fig. 2. Estrous synchronization protocol with sponge progesterone.

2.4 Evaluation of estrous quality

Estrous quality was categorized into three levels: Low: There is a change in vulva swelling, pink vulva, and a small amount of mucus, with no changes in estrous behavior. Medium: Swollen vulva, red vulva, a large amount of mucus, with no changes in estrous behavior. Maximum: Swollen vulva, red vulva, a large amount of mucus, with changes in estrous behavior.

2.5 Data analysis

The data were analyzed using an independent sample T-test method in SPSS 16.0. The observations' results were explained descriptively.

3 Results and discussion

The estrous phase is a crucial period for mating through artificial insemination. Estrous in ewes occurs quickly, requiring a rapid and accurate estrous detection method. In this study, we compared the differences between two estrous synchronization protocols in ewes using CIDR and sponge progesterone for 14 days with the addition of zinc minerals. Our findings confirmed no significant differences in estrous response, quality, and conception rate between the two estrous synchronization protocols by progesterone. The results of estrous response, estrous quality, and conception rate are shown in Table 1.

Table 1. Results of estrous response and estrous quality from the two estrous synchronization protocols

Parameters	CIDR	Sponge progesteron
Estrous Response	100%	100%
Estrous Quality		
Low	76%*	60%
Medium	24%*	40%
Maximum	0%	0%

*No significant difference ($P > 0.05$)

The estrous response of ewes using CIDR for 14 days with zinc supplementation was 100%. Estrous synchronization in Lori ewes using Controlled Internal Drug Release (CIDR) for 14 days resulted in a 100% estrous response, as reported by [15]. The estrous response using a progesterone sponge with 60 mg medroxyprogesterone acetate for 14 days with zinc supplementation was also 100%. Estrous synchronization in ewes using an

intravaginal sponge impregnated with 60 mg medroxyprogesterone acetate for 12 days with the addition of inorganic zinc oxide resulted in a 100% estrous response [9]. The results of this study show better outcomes compared to previous research. Estrous response using CIDR with 0.3 grams of progesterone for 14 days resulted in a 92.59% response, while the estrous response in ewes synchronized with an intravaginal sponge (60 mg medroxyprogesterone acetate) for 14 days was 61.53% [5]. The estrous responses using CIDR and the sponge were 85.7% and 100%, respectively, as reported by [16].

The results obtained from the statistical test indicate that there was no difference in the estrous response between estrous synchronization using CIDR and using a progesterone sponge ($p>0.05$). There was no significant difference in the estrous response between synchronization using CIDR and sponges containing 60 mg medroxyprogesterone acetate (MAP) [6]. This estrous response shows that both methods provided promising results in estrous synchronization. Estrous synchronization with CIDR is equally effective as the MAP sponge in inducing estrous [17]. Estrous synchronization in ewes using progesterone with the addition of zinc effectively induces simultaneous estrous. Oral administration of Zn has improved reproductive performance in ewes [9].

The estrous quality of ewes synchronized using CIDR for 14 days with zinc supplementation was 76% of ewes showing medium estrous quality and 24% showing low estrous quality. The estrous quality of ewes synchronized using a sponge with 60 mg medroxyprogesterone acetate for 14 days with zinc supplementation was 60% of ewes showing medium estrous quality and 40% showing low estrous quality. Estrous in ewes occurs due to the progesterone implant, which physiologically increases progesterone levels, and the progesterone concentration decreases by day 14. Long-term progesterone administration protocols provide good synchronization levels in ewes [18]. The rise in estrogen levels is followed by an increase in Follicle-Stimulating Hormone (FSH), leading to ovular development. The increase in ovarian follicles to the follicle de Graff stage causes the appearance of estrous signs. Estrogen-induced estrous expression, such as reddening of the vulva, swelling, and secretion of vaginal mucus [19]. Estrous detection in ewes is challenging to monitor when separated from the ram. Based on research, the estrous quality of ewes synchronized with progesterone did not show maximal estrous quality, as the ewes did not exhibit estrous behavioral change. Estrous behavioral changes in ewes were not very prominent [13].

The results obtained from statistical tests showed no significant difference in estrous quality between synchronization using CIDR and using a progesterone sponge ($p>0.05$). There was no significant difference ($P>0.05$) between the CIDR group and the sponge group in terms of reproductive parameters. The estrous quality of ewes synchronized with progesterone and supplemented with zinc resulted in good estrous quality. Good estrous quality was observed from the changes in the vulva and the amount of mucus produced. Zinc supplementation can enhance the reproductive performance of ewes by affecting the development of granulosa cells, which are involved in estrogen production. Estrogen induces estrous expression, such as redness of the vulva, swelling, and vaginal mucus secretion [19].

4 Conclusion

This study indicates that two estrous synchronization protocols by progesterone with supplementation minerals Zn can improve the reproductive responses of local ewes, particularly estrous response, and estrous quality. Control internal drug release (CIDR) and sponge progesterone 60 mg medroxi progesterone acetate for 14 days and supplemented Zn 20 mg/head orally are recommended for estrous synchronization in local ewes. There was no significant difference between the two estrous synchronization protocols in the estrous response and quality.

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