



Research Paper

Effect of PGF2 α from Different Sources (Capriglandin and Lutalyse) On the Speed of Estrus, Estrus Long and Simmental Cow Estrus Intensity

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ABSTRACT

This study aims to determine the effect of pgf2 α from different sources (Capriglandin and Lutalyse) on the speed of emergence of estrus, duration of estrus and intensity of estrus. This study used 24 Simmental cows. This study used an experimental method designed with a completely randomized factorial design with two factors, namely the prostaglandin hormone preparations Capriglandin and Lutalyse and the dose factors were 3 and 5 ml, each treatment with 6 replications, treatment A = Capriglandin 5 ml; B = Capriglandin 3 ml; C = Lutalyse 5 ml; and D = Lutalyse 3 ml. Administration of prostaglandins by injection of a single dose intramuscularly, if there is a difference, further DMRT test is carried out. Parameters measured the speed of emergence of estrus, duration of estrus and intensity of estrus. The results of the analysis between the hormone preparations of prostaglandins and lutalyse with doses of 3 ml and 5 ml showed that the results were not significantly different ($P > 0.05$) on the speed of estrus emergence, duration of estrus and intensity of estrus.

Keywords: prostaglandins, estrus rate, estrus duration and estrus intensity.

Received 10 July, 2022; Revised 23 July, 2022; Accepted 25 July, 2022 © The author(s) 2022.

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I. INTRODUCTION

Livestock population in Indonesia has experienced an insignificant increase. Several factors are caused, among others, the livestock rearing system that is commonly found is still traditional and extensive system, violations are still found, namely the act of slaughtering productive cows so that it eliminates the opportunity to have children, complicated by the occurrence of livestock reproductive disorders such as anestrus, repeat breeders and genital abnormalities. In response to this, various efforts have been made by the government to anticipate the demand for meat in Indonesia, including running a program to increase the livestock population, namely the UPSUS SIWAB Program or Special Efforts for Pregnant Breeders since it started in 2014 which contributed 701,953 tons in the domestic meat supply (Fatimah, 2019).

Based on temporary data compiled by the Ministry of Agriculture and the Central Statistics Agency (2020), the total population of beef cattle, dairy cattle and buffalo in Indonesia in 2019 reached 18.12 million heads. The SIWAB program changed its name to SIKOMANDAN or cattle, the country's mainstay commodity for planning in 2020 which consists of estrus synchronization, Artificial Insemination and handling of reproductive disorders which are expected to increase the number of livestock populations in Indonesia.

The application of Artificial Insemination (AI) requires careful and accurate estrus detection so that pregnancy occurs in cows. In fact, in smallholder farms, estrus detection is not optimal because livestock farming in the community is still part-time so that estrus observations are not careful and cause AI success is still low. To overcome this, it is time to implement a companion technology in the application of IB such as estrus synchronization. Estrous synchronization in livestock is needed to increase the livestock population in Indonesia in achieving meat self-sufficiency. Various techniques in estrus synchronization require hormone preparations to bully the estrus. The use of estrus bully hormone content, one of which is prostaglandin or PGF2 alpha with the trademarks Capriglandin and Lutalyse. The use of these two is commonly used by the government in programs such as Synchronization of Passion, SIWAB, GBIB and Sikomando.

Many technical personnel in the field stated that Lutalyse was superior to Capriglandin. Even researched by Rambe (2017) that the results of the 2017 SIWAB analysis showed that estrus in giving Lutalyse

5 ml im in 1300 cows was 80.7%, Capriglandin 5 ml in 600 cows was 50%. Based on research from Fadiellah (2019) that giving Capriglandin a dose of 5 ml to cows had an estrus speed of 69 hours and an estrus duration of 17 hours, while the administration of Lutalyse with a dose of 5 ml to cows had an estrus rate of 56 hours and an estrus duration of 14 hours.

Based on the above, it is necessary to conduct an in-depth study of the two prostaglandin hormone preparations with the title of the study, namely the effect of giving pgf_{2α} from different sources (Capriglandin and Lutalyse). on the speed of estrus emergence, duration of estrus and estrus intensity of Simmental cattle.

II. MATERIALS AND METHODS

Research material The

experimental livestock used in this study were 24 Simmental cattle. The hormone preparations used in this study were prostaglandins (PGF_{2α}), namely Capriglandin and Lutalyse, gel to lubricate the ultrasound probe, liquid nitrogen for storage of cement straws, 24 Simmental beef straws, lukewarm water to assist the process of thawing cement straws, alcohol to sterilize tools, tissue to dry and clean IB guns, cement straws, and soap to sterilize hands.

The tools used in this study include: USG (*Ultra Sonography, Standard probe* : 6.5 MHz *transvaginal probe*), flash disk as a tool for documenting ultrasound results, one box of plastic gloves (100 sheets), *disposable* 5 ml pieces, one IB gun, 24 plastic sheets, one small thermos, field clothes and equipment, and a marking rope for cows that passed the selection.

Research Implementation

This research was conducted using experimental methods. The experimental design used was a completely randomized design with a factorial pattern (RALF) 2 x 2 with 6 replications. Factor A is the name of the prostaglandin hormone preparations, namely: A1 = Capriglandin A2 = Lutalyse while Factor B is the dose given, namely B1 = 3% and B2 = 5%.

Research Stages

1. Research Preparation

The preparation stage of this research begins by selecting cattle in groups of empty cows. Selection of livestock based on the results of reproductive records which include latest IB records, PKB or pregnancy checks, and medical records or livestock health records. Preparation for the next research is to prepare the location of maintenance for livestock that have been treated. Furthermore, preparing research livestock keepers as well as preparing one officer who carries out AI or artificial insemination on research animals that experience estrus.

2. Research Procedure The

stages of the research procedure that will be carried out are as follows:

- a. Research cattle that have been selected based on the recording will be collected and put into a narrow cage for inspection including checking the condition of livestock health and reproductive health.
- b. Reproductive health is done by rectal palpation and using ultrasound. The selected cattle are cattle that are not pregnant and have no symptoms of reproductive disorders such as endometritis, ovarian disorders and other indications of disorders in the reproductive tract and have given birth at least once.
- c. Cattle that pass are identified by using rope necklaces that have different colors, namely white rope necklaces for cattle that were given 3 ml of capriglandin IM, dark green rope necklaces for cattle that were given 5 ml of capriglandin IM, blue rope necklaces for cattle that given 3 ml of lutalyse IM, and green leash for cattle that were given 5 ml of Im
- d. Lutalyse Synchronization Treatment with Capriglandin A total of 12 Simmental and Lutalyse cattle were divided into two groups with a dose of 3 ml and a group with a dose of 5 ml. Administration of prostaglandin hormone preparations with *single* dose intramuscularly. Examination and observation using ultrasound in the luteal phase, namely CL on the ovaries.
- e. The basis for determining the dose of 5 ml was according to the procedure for administering prostaglandins in Capriglandin and Lutalyse packages, while the dosage of 3 ml was based on a study by Sariubang and Nurhayu in 2011.
- f. Observations of the estrus response were carried out 3 times a day, morning, afternoon and evening.
- g. Ovarian morphometric measurements were carried out twice, namely at the beginning and at the end of the treatment.
- h. All incidents of estrus emergence speed, estrus duration, estrus intensity, and ovarian and follicle size will be recorded and analyzed based on the observed variables.

Variables observed

1. Speed

speed of estrus emergence of livestock is the time interval required between hormone injection and the onset of the first estrus symptom (Sariubang and Nurhayu, 2011). The speed at which estrus occurs will vary. This is related to the body's response to hormones and fertility according to the fertility level of each animal. The time the first signs of estrus appeared were calculated between the time when the first estrus appeared for each hormone injection.

The time interval for observing the emergence of estrus was made four times, namely 24-48 hours, 48-72 hours, 72-96 hours and 96-120 hours after the synchronization action (Saili, *et al.*, 2014), made in the form of a score of 1-4 with the following details:

a. Score 1: given to cattle where the rate of onset of estrus is 96-120 hours after the last injection of the hormone PGF2α.

b. Score 2: given to cattle where the rate of onset of estrus is 72-96 hours after the last injection of the hormone PGF2α.

c. Score 3: given to cattle where the rate of onset of estrus is 48-72 hours after the last injection of the hormone PGF2α.

d. Score 4: given to cattle where the rate of onset of estrus is 24-48 hours after the last injection of the hormone PGF2α.

2. Duration of Estrus

The duration of estrus is the time interval between the onset of estrus until the completion of the estrus period (Hastono, 2000). The duration of estrus is the time interval since the onset of estrus symptoms in cattle until the disappearance of estrus symptoms in cattle.

3. Intensity of Estrus

Intensity of estrus is the level of estrus behavioral activity that occurs after hormone injection. The level of estrus intensity is determined by an estrus intensity score of 1 to 3, which is in accordance with the procedure according to Yusuf (1990), a score of 1 where estrus is not clear, a score of 2 where estrus is moderate, and a score of 3 is where estrus is clear. The details are as follows:

a. Score 1: given because of unclear estrus with symptoms in cattle that show symptoms of less mucus discharge, less clear vulva (swollen, wet, red), appetite does not decrease and no symptoms of riding other female cattle, silent when riding and does not show signs of phlegm (+).

b. Score 2: is given because estrus is considered moderate with all of the above estrus symptoms with the symbol (++) , including symptoms of riding other female cattle, silent when riding with an intensity that can reach a moderate level and clear mucus of little consistency.

c. Score 3: given because of clear estrus where cattle show all the symptoms of estrus clearly (lost appetite, moaning, clear, thick and abundant mucus, swollen vulva, wet, red, and silent when riding and likes to ride other livestock (+++)Effect

III. RESULTS AND DISCUSSION

Speed of Estrus Emergence

of giving pgf2α from different sources (Capriglandin and Lutalyse)on the speed of emergence of estrus in Simmental cattle can be seen in table 1.

Table 1. Average rate of emergence of estrus (hours)

Factor A (Prostaglandins)	Factor B (Dose)		Average
	B1 (3 ml)	B2 (5 ml)	
A1 (Capriglandin)	60.38 ± 47.97	46.20 ± 19.83	53.29
A2 (Lutalyse)	±	34.76 75.17 ± 54.16	57.75
Mean	59.07	60.68	

Note: not significantly different (P>0.05)

Table 1 shows the speed of estrus with the administration of prostaglandins and different doses ranging from 46.20 ± 19.83 hours – 75.17 ± 54.16 hours. The results of statistical analysis showed that there was no interaction (P>0.05) between the type of prostaglandin hormone (factor A) and the dose given (factor B) and each factor showed no significant effect (P>0.05) on the speed of estrus emergence. .

There is no difference between the type of prostaglandin and the dose given to the speed of estrus, this is because these two types of prostaglandins have the same ability to stimulate estrus and the dose interval of 3 ml or 5 ml has not been able to affect the speed of estrus. The onset of estrus due to administration of PGF2α is due to the lysis of the corpus luteum by the mechanism of action of PGF2α through the mechanism of apoptosis and the activation mechanism of protein kinase (PKC) which inhibits the conversion of cholesterol to progesterone (Maidaswar, 2007). As a result, the level of progesterone produced by the corpus luteum decreases in the blood. This decrease in progesterone levels stimulates the anterior pituitary to produce and release FSH and LH. Both of these hormones are responsible for folliculogenesis and ovulation processes, resulting in the growth and maturation of follicles. These follicles eventually produce the hormone estrogen which is able to manifest the symptoms of estrus (Jainudeen and Hafez, 2000).

The speed of the emergence of estrus is physiologically caused by several factors, among others, according to Fricke and Shaver (2007) that the emergence of estrus is caused by the influence of the increase in the hormone estrogen in the body produced by the ovum. Tagama (1995) stated that the rate of onset of estrus in cows with lower body weight will cause the protaglandin hormone to quickly reach the target organ and then carry out its function, while in fat cattle, the drug given is partially fat soluble. Fricke and Shaver (2007) showed that adult female cattle more often ovulated more than one egg. According to Saili, *et al* (2016) that injection of Capriglandin 3 ml showed that the group of cows with an age range of 5-6 years showed an earlier estrus response, namely 70.77 hours after injection with estrus quality tending to be better (2.6), while cows in the age group 3-4 showed an estrus response at 72.68 hours after hormone injection with an estrus quality of 2.4 (estrus quality scale 1-3).

Duration of Estrus

Effect of giving pgf2α from different sources (Capriglandin and Lutalyse)duration of estrus in Simmental cattle can be seen in table 2.

Table 2. Average duration of estrus (hours)

Factor A (Prostaglandins)	Factor B (Dose)		Average
	B1 (3 ml)	B2 (5 ml)	
A1 (Capriglandin)	60.42 ± 47.98	46.08 ± 19.83	53.25
A2 (Lutalyse)	57.75 ± 34.76	72.00 ± 56.91	64.88
Mean	59.04	59.08	

Note: not significantly different (P>0.05)

Table 2 shows the speed of estrus with the administration of prostaglandins and different doses ranging from 46.08 ± 19.83 hours – 72.00 ± 56.91 hours. The results of statistical analysis showed that there was no interaction (P>0.05) between the type of prostaglandin hormone (factor A) and the dose given (factor B) and each factor showed no significant effect (P>0.05) on the duration of estrus.

There is no difference between the types of prostaglandins and the dose given to the duration of estrus, this is because both types of prostaglandins have the same content, namely Dinoprost tromethamine in both products with not much different compositions. The composition of Capriglandin is Dinoprost tromethamine 5.5 mg and Benzyl alcohol 12.0 while Lutalyse is Dinoprost tromethamine 5.0 mg and Benzyl alcohol 16.6 mg. The duration of estrus is the time interval between the onset of estrus until the end of the estrus period. Data on the estimated duration of estrus according to Hafez (2000) in cattle ranges from 12-30 hours.

The duration of estrus is influenced by age, body condition, and also the type of hormone used for synchronization or induction of estrus (Hastono, 2000). According to Toelihere (1985) that the length of estrus is influenced by various factors such as nation, age, season, temperature, and the method of observation used. According to Ismail (2009), the onset of estrus is faster in cattle that have given birth more than once compared to cattle that have given birth once or have never given birth at all. According to Fadiellah (2019) that giving 5 ml of capriglandin to cows has 17 hours of estrus, while giving 5 ml of Lutalyse to cows has 14 hours of estrus. Based on observations on cows treated with Lutalyse at a dose of 5 ml for 16 hours of estrus and Capriglandin at a dose of 5 ml for 15 hours of estrus, while giving a smaller dose such as a dose of 3 ml, the duration of estrus was shorter, namely Capriglandin at a dose of 3 ml for 12 hours of estrus and Lutalyse at a dose of 3 ml duration of estrus 12 hours.

Estrus Intensity

In table 3, it can be seen that the intensity of estrus with the administration of pgf2α from different sources (Capriglandin and Lutalyse) and different doses ranged from 1.96 to 2.58. Effect of giving pgf2α from different sources (Capriglandin and Lutalyse) on the estrus intensity of Simmental cattle can be seen in table 3.

Table 3. Mean Estrus Intensity (Score)

Factor A (Prostaglandin)	Factor B (Dose)		Average
	B1 (3 ml)	B2 (5 ml)	
A1 (Capriglandin)	1.96 ± 0.66	2.58 ± 0.72	2.27
A2 (Lutalyse)	2.17 ± 0.20	2.42 ± 0.38	2.29
Mean	2.06	2.50	

Note: not significantly different (P>0.05).

The results of statistical analysis showed that there was no interaction (P>0.05) between the type of prostaglandin hormone (factor A) and the dose given (factor B) and each factor showed no significant effect (P>0.05) on the intensity of estrus. There is no difference between the type of prostaglandin and the dose given to the intensity of estrus, this is due to the insufficient dose of hormone given to stimulate the target organs to respond perfectly, so that the ovarian follicles are less active in producing the hormone estrogen in exceeding the preovulatory LH threshold. which makes the cattle do not show symptoms of complete estrus. LH plays a role in stimulating the granulosa cells and theca cells in the de Graafian follicle to produce the hormone estrogen.

According to Kune and Solihati (2007), the intensity of estrus is less clear or moderate, due to individual factors related to hormones, especially the level of estrogen produced by granulosa cells and theca cells of the follicle in stimulating estrus. Whereas in treatment C there was a higher average intensity of estrus, this was because the injected PGF2α hormone was more optimal in regressing the corpus luteum making progesterone decrease, the decrease in progesterone gave negative feedback to FSH where FSH functions to stimulate follicular growth so that it has an impact on rising hormones. estrogen in stimulating estrus.

The intensity of estrus or the degree of appearance of estrus are signs that distinguish the appearance of estrus that is usually shown by female cows. According to Saili, *et al.* (2016) that 3 ml of Capriglandin injection showed that the group of cows aged 5-6 years showed an earlier estrus response, which was 70.77 hours after injection with better estrus quality (2.6), while the cows in the age group 3 -4 showed an estrus response at 72.68 hours after injection of hormone preparations with an estrus quality of 2.4 (estrus quality scale 1-3).

The factors that affect the intensity of estrus in female cows, among others, according to Yoshida and Nakao (2005) that the intensity of estrus is not influenced by parent parity but by management and environmental and physiological factors of the cow, especially the decrease in milk production caused by stress related to body temperature regulation, energy balance and hormonal changes. This disrupts the balance of estrogen so that it affects the performance of estrus intensity (Yoshida and Nakao, 2005).

According to Nalbandov (1990) what affects the intensity of estrus is a change in feed management that occurs in winter and summer in four seasons that cause stress. Lactation mothers have the ability to produce dominant follicles capable of ovulating more than one (double ovulating) compared to heifers. Follicular volume during estrus greatly affects the concentration of estrogen and this condition is actualized in the intensity of estrus. Follicular volume is influenced by the number of dominant follicles capable of being ovulated and this condition is especially greater for lactating cows than heifers. An increase in the concentration of estrogen and a decrease in the concentration of progesterone during proestrus and estrus takes place. This condition is influenced by management, environmental and physiological factors of the cow, especially the decrease in milk production caused by stress related to body temperature regulation, energy balance and hormonal changes. Differences relative to feed quality (forage and concentrate), decreased feed intake, milking process and milk production did not significantly contribute to the performance of estrus intensity.

IV. CONCLUSION

Based on the results of this study, it can be concluded that the use of Capriglandin and Lutalyse with doses of 3 ml and 5 ml did not significantly affect the speed of estrus emergence, duration of estrus and intensity of estrus. The best use of Capriglandin at a dose of 3 ml.

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