



Evaluation of One Shot and Two Shot Prostaglandin Injection on Estrus Response in Bali Cattle

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ABSTRACT

The aims of this study was to evaluate the effect of synchronization system with prostaglandins F_{2α} (PGF_{2α}) on bali cows. Sixteen bali cows with good body condition and normal estrus cycles were divided into two group, each group consist eight animal. Groups I which received estrus synchronization using 5 ml PGF_{2α} (one shot prostaglandin) intramuscularly. Group II which received estrus synchronization consisted of two dose regimen injection on day 0 using 5 ml PGF_{2α} (two shot prostaglandin) intramuscularly. On day 11 (11 days after first injection), recieved repeated injection using 5 ml PGF_{2α}. All cows were monitoring the estrus occurrences twice times a day in the morning and afternoon by observing estrus symptoms. Out of 8 cow recieved one shot prostaglandin, six (75%) cow exhibited estrus. The on set of estrus was 79.83 hours and the intensity of estrus was 66.67% (4/8) exhibited normal, In two shot prostaglandin found, five cow (62.5%) exhibited estrus, The on set of estrus was 67.40 houers and the intensity of estrus was 80% exhibited normal. The results showed that there was no significant difference in estrus response, on set of estrus and estrus intensity in bali cattle cows after injection of one shot prostaglandin and two shot prostaglandin. It is concluded that The study concluded that prostaglandin in one shot and two shot system was effective to synchronize post partum bali cows.

Key words: Bali cattle, Prostaglandin, One shot, Two shot, and Estrus

INTRODUCTION

Meat production and consumption have increased rapidly in recent decades. Meat consumption is set to climb steeply as the world population increases. In Indonesia according to the Central Bureau of Statistics (2018), the average amount of beef consumed per person from around 2.9 kg in 2017 annually and slightly increased by 0.6 percent compared to that in 2016. However, in comparison to beef consumption in the neighboring countries, beef consumption in Indonesia is still low. The increase in average individual meat consumption means total meat production has been growing at a much faster than the rate of population growth.

Meanwhile, predicted beef consumption in Indonesia was approximately 613,110 tons in 2015 and is estimated to grow to 642,760 tons by 2019 equal to 3,657,000 head of cattle. To achieve beef self-sufficiency, Indonesia has implemented various programs to increased meat production for a decade. Livestock sector development program has been focusing on increasing number of beef cattle population.

Bali cattle is one of the cattle played an important role in livestock development in Indonesia (Puja *et al.*, 2018). Bali cattle are one of the only domesticated cattle species whose ancestors are still alive. Bali cattle have many advantages such as resistant to diseases and extreme environments Bali cattle have one of the highest carcass percentages in the world. Its meat has the lowest cholesterol level compared to other cows. Bali cattle have a very high reproductive ability, able to give birth every year, able to adapt to the marginal environment with dry climates (Sutarno and Setyawan, 2015).

The success of the increasing population, in addition, depends on the female reproductive performance, and also depends on the male reproductive performance. Reproductive performance of female is determined by days to first service, days to conception, calving interval, services per conception, conception rate, and pregnancy rate (Dayyani *et al.*, 2013).

In order to improve the reproductive performance of bali cattle, especially to increasing the birth of calves, new breakthroughs are needed in order to increase pregnancy rates.

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Estrus synchronization is an alternative way to controlling and manipulating reproduction (Ahlawat *et al.*, 2015). Estrus synchronization is a manipulation of the estrus cycles which offers several benefits. It reduces and in some cases eliminates the need to detect estrus and allows the herd manager to schedule breeding activities in a predetermined period (Chaudhari *et al.*, 2018). The synchronization systems currently used protocol is by using PGF2 α hormones (Gebrehiwot *et al.*, 2015) that are luteolytic for corpus luteum (CL) (Jamsawat *et al.*, 2015).

Many factors affect the successful implementation of estrus synchronization with prostaglandin (PGF2 α) including the time of injection, the materials used, the dose used, type of injection and the administration methods. Methods for PGF2 α administration can be done either by one shot prostaglandin or two shot prostaglandins. Each method will have a different effect on the mechanism of phase change in the estrus cycle based on the hormonal system.

In Bali province, in order to support the UPSUS SIWAB orits extension mandatory cattle breeding program, PGF2 α hormone is used to stimulate ovarian activity and increase conception rates. The results of field observations show that the response of cattle to these hormones are varies. There is no research done to evaluate the effect of prostaglandin injections by one shot and two shot methods for estrus synchronization yet. Therefore, this study was conducted to find out the efficiency of the PGF2 α administration with one shot and two shot methods to estrus synchronization in bali cattle.

MATERIALS AND METHODS

Animals

A total 16 bali cattle cow were selected from two organized farm in Tampaksiring District, Gianyar Regency, Bali Province. The selected animals were apparently clinically healthy and with good body condition >3.0. The cows aged 4 to 6 years, have a normal estrus cycle, had at least one calf and not pregnant at the moment and pregnancy test prior to hormone administration by rectal palpation. The reproduction status were observed with rectal palpation. Parameters observed were Corpus luteum and follicle.

Estrus synchronizaiaon

Cattle were divided into two groups. Groups I (one shot prostaglandin) consists 8 bali cattle cow in the luteal phase which received estrus synchronization using 5 ml PGF2 α (Capriglandin^R, 5.5 mg/ml Dinoprost Tromethamine, Capri, Indonesia) intramuscularly. Group II (two shot prostaglandin) consist 8 bali cattle cow in follicular phase which received estrus synchronization consisted of two dose regimen injection on day 0 using 5 ml PGF2 α (Capriglandin^R, 5.5 mg/ml Dinoprost Tromethamine, Capri, Indonesia) intramuscularly. On day 11 (11 days after first injection), recieved repeated injection using 5 ml PGF2 α . All cows were monitoring the estrus occurrences twice times a day in the morning and afternoon by observing estrus symptoms

Estrus occurrences detection

Cows in each treatmen were observed for onset of estrus and intensity of estrus. The estrus response, the onset

of estrus and the intensity of estrus in each group were recorded by observing the estrus signs at 24, 48, 72, 96, 120 and >120 hours.

Statistical analysis

The data obtained are then tabulated, the number of cows were observed for estrus expression was computed into percentages (estrus response). The onset of estrus is analyzed using the Independent T test and intensity of estrus were analyzed by the Chi-Square test (Heath, 2000).

RESULTS

Estrus response

Out of 8 cow recieved one dose regimen using 5 ml PGF2 α , six (75%) cow exhibited estrus while two cattle (25%) showed no symptoms of estrus. Cow in recieved two dose regimen of PGF2 α , 5(62.5%) exhibited estrus while three cow (37.5%) did not show any symptoms of estrus (Table 1). The results showed that there was no significant difference in estrus response in bali cattle cows after injection of one-shot prostaglandin and two shot prostaglandins.

Onset of estrus

In this present study exhibited that the fastest onset of estrus or estrus interval after injection one shot prostaglandin was recorded 56 hours (33.33%) and the latest was 103 hours (16.67%). In two shot prostaglandin methods, the fastest onset of estrus was 34 hours (20%) and the latest was 103 hours (20%). The mean estrus interval of cows after injection were 79.83 hours in one shot prostaglandin and 67.40 hours in two shot prostaglandin method (Table 2), respectively. Statistical analysis showed that there was no significant difference ($P>0.05$) in onset of estrus between one shot prostaglandin and two shot prostaglandins.

Estrus intensity

The intensity of estrus in recieved one shot prostaglandin found to be 33.33% (2/8) showed weak, 66.67% (4/8) exhibited normal, and no cows exhibited high intensity. In two shot prostaglandins found found cow (80%) exhibited normal and one cow (20%) with a high intensity of estrus (Table 3). The results showed that there was no significant difference in estrus response in bali cattle cows after injection of one shot prostaglandin and two shot prostaglandin.

DISCUSSION

The estrus synchronization methods used in cattle available based on the use of various hormones. Currently, the synchronization system used in cattle like prostaglandin, progesteron and their various combinations with othe hormone. Prostaglandin that are luteolytic for corpus luteum (CL) and was effective to synchronize post partum cows and heifers (Kabede *et al.*, 2013). Administration of Prostaglandin can regress the corpus luteum (CL) of the animal before the time of natural luteolysis (Chaudhari *et al.*, 2018).

In this study, one shot prostaglandin method efectively stimulated estrus in six cow (75%) and in two shot prostaglandin method to be 62.5% (5/8) cow. The percentage of estrus response in this study is higher than

Table 1: Estrus response after injection of one shot and two shot prostaglandin F2 α (PGF2 α)

| Estrus | Treatment | | Total |
|--------|------------------------|------------------------|-------|
| | One Shot Prostaglandin | Two Shot Prostaglandin | |
| Yes | 6 | 5 | 11 |
| No | 2 | 3 | 5 |
| Total | 8 | 8 | 16 |

Table 2: Onset of estrus after injection of one shot and two shot prostaglandin F2 α (PGF2 α)

| | Treatment | | Mean |
|------|------------------------|------------------------|-------------|
| | One Shot Prostaglandin | Two Shot Prostaglandin | |
| 1 | 80 | 34 | |
| 2 | 103 | 88 | |
| 3 | 56 | 103 | |
| 4 | 56 | - | |
| 5 | 92 | - | |
| 6 | - | 56 | |
| 7 | 92 | 56 | |
| 8 | - | - | |
| Mean | 79.83 hours | 67.40 hours | 73.61 hours |

Table 3: Intensity of estrus after injection of one shot and two shot prostaglandin F2 α (PGF2 α)

| Intensity of Estrus | Treatment | | Total |
|---------------------|------------------------|------------------------|-------|
| | One Shot Prostaglandin | Two Shot Prostaglandin | |
| Weak (+) | 2 | - | 2 |
| Normal (++) | 4 | 4 | 8 |
| High (+++) | - | 1 | 1 |
| Total | 6 | 5 | 11 |
| Mean | 1,67 | 2,2 | |

estrus response reported by Ahlawat *et al.* (2015), which is 25% in one shot prostaglandin method and 53% in two shot prostaglandin method. The result of this study showed in one shot prostaglandin to be 75% and in two shot prostaglandin to be 62.5% estrus response rate lowest than 75.9% reported by Yeshimebet *et al.*, (2017). The estrus response that received one dose regimen was higher compared with cow that received double dose regimen, however this difference was statistically non significant. Differences in estrus response between these two methods can be caused by the functional status of the corpus luteum in the ovary when the injection of prostaglandin F2 α (PGF2 α). The poor response of estrus in two shot prostaglandins in this study may be due to the treatment synchronizes follicular growth only by regulating the life span of the corpus luteum (Ramana *et al.*, 2014).

In this study, the mean oestrus interval of cow after injection one shot prostaglandin method was 79.83 hours while in two shot prostaglandin method was 67.40 hours. The oestrus interval of cows in this study showed that was the same result was reported by Ahlawat *et al.* (2015). The onset of estrus after a one shot prostaglandin injection is 70.24 hours while in two shot prostaglandin 56.86 hours (Ahlawat *et al.*, 2015). The mean oestrus interval in this study (79.83) was higher for local cows (51 hours) following administration of PGF2 α (Kabede *et al.*, 2013). Other study showed that, estrus exhibited 48-72 hours after PGF2 α injection (Lemaster *et al.*, 2001). Lam *et al.* (2001) reported the mean oestrus interval usually 60 to 72 hours following administration of PGF2 α . This variation in the onset of estrus is created in part by differences among cows in the rate of regression of the corpus luteum following

treatment (Kavwanga *et al.*, 2016). The interval after from PGF2 α injection to estrus has also been related to the time required for an ovulatory follicle to develop (Murugavel *et al.*, 2003). Other study have reported that differences in the onset of estrus in cattle probably caused by non-treatment factors such as cattle conditions, individual factors, work activities, cattle interactions, and parity between cattle (Saili *et al.*, 2011), also influences by nutritional that affects hormone secretion (Irmaylin *et al.*, 2012).

In this present study, the effect of one shot prostaglandin injection on the intensity of estrus showed that 66% exhibited normal and 80% normal in two shot prostaglandin. This result was slightly lower with study by Ramana *et al.* (2013), however slightly higher than study by Sahatpure and Patil. (2008). The variation in estrus intensity might be due to individual hormonal levels and genetic makeup. Kune and Solihati (2007) reported that estrus with low or normal intensity is due to individual factors which may be related to hormonal patterns, especially the level of the hormone estrogen which plays a role in stimulating the estrus.

Conclusions

The study concluded that prostaglandin in one shot and two shot system was effective to synchronize post partum bali cows. There is no significant difference the effect of prostaglandin injection on estrus response, on set of estrus and estrus intensity.

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