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Effect of Body Condition Score Limousine Crossbred Cow on Cattle Oestrus Response Synchronized using PGF2 α Single Dose

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ABSTRACT

One of the strategies to increase the cattle population in Indonesia is the AI (Artificial Insemination) method. The AI program's improvement of reproductive efficiency can use the oestrus synchronization method. The purpose of this study was to evaluate the effect of body weight and body condition score on the oestrus synchronization response with the brand "lutelyse." This research was conducted in Senggreng Village, Sumberpucung District, Malang Regency. This research method uses experimental field experiments with a sampling technique of purposive sampling. This study took a sample of 21, aged 1,5 – 5 years, synchronized with PGF2 α as much as 5 ml, which was then carried out by observing oestrus behavior for 24 hours after synchronization. The results showed that, the percentage of oestrus in cows with body condition score (BCS) 4, which is 76.92%, is lower than cows with BCS 5, which is 100%. For the synchronization distance with the onset of oestrus in BCS 4 cattle, namely 3802.92 \pm 1007.80 (minutes) and BCS 5, namely 4081 \pm 884.91 (minutes) with the results of the conception rate of BCS 4 cattle of 38.46% and BCS 5 of 50%. Based on the results of the study, it was concluded that BCS 5 has a higher success pregnancy rate than BCS 4.

Key words: Body condition score, Conception rate, Limousin crossed cattle, Synchronization of oestrus

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Introduction

Beef cattle are one of the meat-producing commodities that need to be developed, due to demand that continues to increase along with the rising population in Indonesia. The increase in the beef cattle population in Indonesia can be done through the application of artificial insemination (AI) technology while improving the genetic quality of cattle (Susilawati, 2011). Bulls have a higher level of productivity compared to beef cows, therefore bulls are much preferred by breeders. Increasing the population of bulls can be carried out by AI using the sexing method, namely the separation of the X and Y chromosomes, in which they will produce superior breeds with sexes that match expectations (Fatahilah *et al.*, 2017).

Several factors that support the successful implementation of AI involved the physiological condition of beef cows, human resources including inseminators and breeders, use of feed, age, and BCS of cattle. Most of the cattle found on

a community scale have a thin body condition, this is since the feed is only in the form of agricultural waste, including sugarcane top, rice straw, or corn straw. According to Irmaylin *et al.* (2014), BCS and bodyweight of cows are closely related to the adequacy of energy reserved in the cow's body, this will affect the condition of reproductive hormones.

Oest synchronization is the uniformity of oestrus timing in cows to increase reproductive efficiency and optimize the implementation of AI (Ratnawati *et al.*, 2020). In the process of synchronizing oestrus, it is necessary to inject hormones that can help speed up the time of oestrus in cows. The hormones used are prostaglandins F2 α (PGF2 α) (Handayani and Hartono, 2014). This hormone use to lyse the corpus luteum, so that there will be growth and maturation of the follicles that synchronize oestrus where farmers can easily observe the time of oestrus in cows (Labetubun *et al.*, 2020). The results of research conducted by Ketawirawan *et al.* (2020) synchronization carried out on Bali

cattle showed the percentage of oestrus between treatments was 100%, while the percentage results of T0, T1, and T2 pregnancies were 42.86%, 71.43% and 85.71%, respectively. On the other hand, research conducted by Putri *et al.* (2014) in Ongole crossbreeds showed synchronization results of 100% oestrus percentage in all treatments, and for the percentage of pregnancy between treatments T0, T1, and T2, respectively, the results showed 25%, 0%, and 25%.

The purpose of this study was to evaluate the effect of BCS on the oestrus response of Limousin-crossed cattle after oestrus synchronization. The benefits of the study can be used to provide evaluations in improving the performance of female parents so that they can give birth every year based on BCS.

Materials and Methods

This research was conducted in Senggreng Village, Sumberpucung District, Malang Regency. The research used a field experiment method with purposive sampling technique. Materials used was 21 female limousine crosses on BCS 4, 13 heads and BCS 5 which are 8 heads. The beef cows used is not pregnant, and has given birth to BCS 4 and 5 on a scale of 1-9, aged 1.5-5 years. Feed improvement was executed for 30 days by giving 1 kg of concentrate per head per day. On the 14th day of feed treatment, prior to injection of the PGF2 α hormone, rectal palpation was done to determine the oestrus cycle that was being experienced by the cattle. The injection was completed using the PGF2 α brand "Lutelyse" as much as 5 ml/head intramuscularly, then observations were made from 24 hours post-injection to 72 hours post-injection. Artificial insemination was practiced using sexing semen from limousine cattle produced by the Singosari Center for Artificial Insemination, Malang, East Java.

The observed variables are: 1) the time of onset of oestrus after synchronization; 2) the number of cows in heat after synchronization. In addition, observations were made on clear cervical mucus, vulvar color, vulvar temperature, noise, and cow's appetite.

The data obtained were analyzed using an Independent T-Test with the parameter of the distance between synchronization and the onset of oestrus, while the analysis of the percentage of oestrus used a descriptive method.

Results and Discussion

Acceptor cattle feed consumption

Based on Table 1 BCS 5 cattle feed consumption is higher than BCS 4. Consumption of DM, CP and TDN in BCS 5 cattle was 10.54 ± 5.66 kg per head per day, respectively; 0.81 ± 0.32 kg per head per day and 4.88 ± 2.41 kg per head per day, while cattle with BCS 4 consumed DM, CP, and TDN, respectively, namely $8.90 \pm$

4.93 ; 0.76 ± 0.36 and 4.15 ± 2.12 kg per head per day.

The feed is provided by farmers following the conditions in the field, namely in the form of rice straw, corn straw, and dry corn straw. Fattening cattle breeders rarely use concentrate, they only use forage found in their environment. The content of concentrate feed given can be seen in Table 1, while the amount of feed consumption can be seen in Table 4. The feed requirement of brooders is 2.5% - 3% of the bodyweight of the cows according to the National Research Council (NRC, 2000).

Adequate intake of dry matter affects the hormonal system of the cow's body, considering the intake of feed with good content and in an amount according to the cow's needs will result in the condition of the cow's reproductive organs to accelerate uterine involution after childbirth, and affect the development of follicles to start the follicular phase. This is under what was conveyed by Meikle *et al.* (2018) which states that feed intake that is not following needs will delay cows from ovulation caused by a decrease in the frequency of LH.

Acceptor cows that were synchronized using PGF2 α were observed for oestrus starting at 24 hours post-injection until the appearance of oestrus. There is an increase in the FSH hormone which functions to stimulate follicular growth until the occurrence of heat post corpus luteum lysis. Irmaylin *et al.* (2014) stated that PGF2 α injection will cause obstruction of blood flow to the ovaries which causes lysis of the corpus luteum, resulting in a decrease in the hormone progesterone which response to the hypothalamus. The decline in these hormones will stimulate the secretion of FSH and LH which causes follicular growth and the occurrence of oestrus. Randi *et al.* (2021) stated that oestrus synchronization can increase the reproductive efficiency of female cows which serves to accelerate the postpartum anestrus period of cows with poor BCS, and can treat cows with persistent corpus luteum (CLP) cases. Cows with excellent reproductive organs and their feed needs are fulfilled will show a normal oestrus cycle due to the secretion of PGF2 α by the endometrium in the form of a hormone that functions to lyse the corpus luteum.

Percentage of oestrus

Based on the results of observations, BCS 5 caused a 100% oestrus response, this result was higher than BCS 4, which was 76.92%. The difference in the percentage of oestrus due to synchronization can be influenced by the functional CL conditions experienced by cows during the synchronization process itself. According to Balumbi *et al.* (2019), oestrus synchronization will be more effective if it is carried out with functional CL conditions, namely on days 7-18 in the oestrus cycle. Conforming to Hafez dan Hafez (2000) Cows that are not in the heat after PGF2 injection can be caused by the condition of small diameter CL as it has any

Tabel 1. Feed consumption of beef cows

Variables	Treatment	
	BCS 4	BCS 5
Consumption of DM	8.90 ± 4.93	10.54 ± 5.66
Consumption of CP	0.76 ± 0.36	0.81 ± 0.32
Consumption of TDN	4.15 ± 2.12	4.88 ± 2.41

Tabel 2. Respons of estrous after synchronization

Variables	Treatment	
	BCS 4 (n=13)	BCS 5 (n=8)
Percentage of oestrus (%)	76,92 (10)	100 % (8)
Distance between synchronization and the emergence of oestrus (minute)	3802.92 ± 1007.80	4081.63 ± 884.91

N = total of cows.

indication that it is immature and not functional. The excessive percentage of oestrus in synchronized cows is associated with the reproductive conditions of acceptor cows, acceptor cows used in this study are cows that are not pregnant and have good reproductive organs, in that acceptor cows can secrete reproductive hormones properly. Signs of oestrus that appear include the discharge of clear cervical mucus in large quantities, swelling of the vulva, discoloration of the vulva to red, and swelling of the vulva which is influenced by the hormone estrogen in showing signs of oestrus estrogen hormone is a steroid hormone that is formed through the aromatization process of cholesterol which functions in showing signs of oestrus in cows (Susilawati, 2011).

Distance between synchronization and the emergence of oestrus

Based on the results of observations of the distance between synchronization and the emergence of oestrus, BCS 4 shows a time of 3802.92 ± 1007.80 minutes faster than BCS 5, which is 4081.63 ± 884.91 minutes. Statistically, however, there were no significant differences ($P > 0.05$).

The contrast in the timing of oestrus in cows is caused by differences in levels of estrogen hormone levels in the cow's body and variation in the growth phase of follicles, dissimilarity in hormone levels related to the physiological condition of livestock, conditions of the adequacy of animal feed which function as reproductive hormone precursors. Zumarni (2013) oestrus synchronization with 2 doses has the aim of synchronizing both oestruses and ensuring that all cows can be in heat together. The follicular phase experienced by cows is distinct, causing the cow to not be in heat at the same time. The oestrus synchronization method is a method used to increase reproductive efficiency, synchronization is carried out when there is a

corpus luteum since the purpose of synchronization is to regress the corpus luteum or the luteal phase. In accord with Malik (2019) stated that PGF2 α synchronized cows would be more effective when cows were in the luteal phase because PGF2 α would work more effectively to regress the corpus luteum, with an average of 2-5 days after injection.

Effect body condition score on conception rate

Observation results of pregnancy are presented in Table 3. Based on table 3, it can be inferred that cows with BCS 5 produced a better pregnancy of 50% compared to BCS 4 which was only 38.46%.

Body Condition Score has a positive impact on the success of pregnancy again after the postpartum period. The condition of BCS in cows describes the nutritional status obtained by cows. Cows that lack nutrition caused the hypothalamus difficulty in giving negative feedback effects from estrogen so that it inhibits the next ovarian cycle. This was conveyed by Nishimura *et al.* (2018) where the condition of the cow's body is the main factor affecting the return of the oestrus cycle after giving birth, cows with body condition <4 will have a lower success rate compared to cows with body condition >4. This is related to the nutritional status of cattle which will affect the production of reproductive hormones, basal feed between cattle in this study has different types, hence livestock have different levels of nutrient consumption. Adi *et al.* (2020) stated that BCS is a picture of a cow to evaluate the availability of body fat, the fat contained in the cow's body will be used as a precursor to the hormone estrogen which will affect the onset of oestrus signs shown by the cow. Pereira *et al.* (2018) said that cows with good body condition have more nutritional reserves than cows with low body condition. Nutrient reserves are used in metabolic processes as energy suppliers which

Tabel 3. Conception rate

Variables	Treatment	
	BCS 4 (n=13)	BCS 5 (n=8)
Conception Rate	38,46 (5)	50 (4)

N = total of cows.

will stimulate reproductive hormones to be secreted, due to the fact that nutrients will be used for general metabolism first and will be used for reproduction. The low pregnancy rate in limousine-crossed cattle is probably due to early embryonic death, which is closely linked to hormonal conditions. Adequate feed consumption and environmental conditions can affect hormonal conditions in cows. Feed contents such as protein, fat and carbohydrates are used for the synthesis of reproductive hormones.

Conclusions

Based on the results of the study, it was concluded that the oestrus of Limousin crosses with BCS 4 was 76.92% lower than that of cattle with BCS 5, which was 100%. The faster oestrus response was shown by BCS 4, which was 3802.92 ± 1007.80 (minutes) in comparison to BCS 5, which was 4081 ± 884.91 (minutes). The conception rate of cattle with BCS 4 is 38.46% lower than BCS 5, which is 50%. Thus, BCS 5 has a higher success rate than BCS 4.

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