

A Case Of Delayed Ovulation In Belgian Blue Cattle

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Abstract

Crossbreed cattle are a cross between two breeds of cattle to produce superior livestock breeds. However, this cross has several drawbacks in its reproductive performance, namely delay in ovulation. Symptoms that appear are prolonged estrus and repeat breeding. This study aimed to observe and study the dynamics of ovarian follicular development in crossbred Belgian Blue (CBB) cattle diagnosed with delayed ovulation. This study was carried out using Ultrasonography (USG) to see the development of follicles carried out every day for one cycle. This study was carried out at BPTU HPT Sumbawa, Banyu sin, and South Sumatra. The results show that the development of follicles during one cycle has a larger size than normal cattle. The intensity of estrus experiences the same symptoms as cattle in general but has a cycle of 3 days and ovulation occurs the next day.

Keywords: Delayed ovulation, Follicles, Crossbreed cattle

I. Introduction

Crossbreed cattle are crosses between two breeds of cattle to produce superior livestock breeds. The cattle usually used for crossbreeding are the types of cattle from the *Bos Taurus* and *Bos Indicus* nations. The crossing of these cattle was carried out to obtain more perfect results from the two breeds of cattle. The government is also starting to develop cattle that have potential or are superior in the meat sector, such as Belgian Blue (BB) cattle. However, cross-breeding cattle has several drawbacks, especially in terms of reproductive performance. Weaknesses in crossbreed cattle are that they often experience abnormal estrus cycles, such as short estrus cycles, prolonged estrus cycles, nymphomania, and silent heat.

Reproductive disorders can affect the production of reproductive hormones in cattle, which causes their estrus to become more irregular [1]. One of the reproductive disorders found in cross-breed cattle is delayed ovulation, a condition in which cattle experience prolonged estrus, resulting in a delay in ovulation caused by the hormones progesterone, estrogen, and GnRH. This condition results in a decrease in preovulatory luteinizing hormone (LH) surges, which also causes the duration of estrus to become longer. High levels of progesterone cause negative feedback to occur in the hypothalamus, which results in inhibition of follicular development and ovulation [2]. The size of the ovaries and follicles during the preovulation period has an effect on estradiol levels, which function in inducing estrus behavior, oocyte maturity, increasing oocyte transport to the oviduct, improving the uterine environment in preparation for early embryo formation, and increasing luteinizing hormone receptors [3]. Based on this explanation, this study aimed to see and study the description of the dynamics of ovarian follicular development in crossbred Belgian Blue (CBB) cattle diagnosed with delayed ovulation.

II. Methodology

This study was carried out from November to December 2022 at BPTU HPT Sembawa, Banyuasin, South Sumatra. Examination of ovarian follicular diameter: (number of follicles and diameter of follicles), observation of estrus: (estrus intensity, estrus duration).

III. Observation of Follicles Using Ultrasonography

Observations were made using Ultrasonography 3000 WD made in China. Cattle are treated comfortably so that it is easy for the operator to operate the USG device. Furthermore, feces were removed from the cattle's rectum, then a manual exploration of the topography of the reproductive tract of the cow was carried out before USG was carried out. After that, the surface of the probe was smeared with jelly and covered with thin plastic so as not to irritate the rectal mucosa and to get a good USG image.

In the next stage, the probe was inserted into the cattle's rectum and directed to the cranial along the ventral part of the rectum down the reproductive tract to the uterus, which is in the ventral rectum above the bladder (*vesica urinaria*). The uterine body (*corpus uterus*), cervix, and vagina are midline in line with the cranial-caudal—and the temperature features are long.

When the probe was moved laterally to the uterine horn, it will be seen on the USG screen in a cross-sectional state [4]. The cattle used is a crossbred Belgian Blue (CBB) offspring 2 (F2) from crossbred Belgian Blue cattle as a sire and Brahman cattle as a dam. The crossing was carried out using artificial insemination (AI) techniques at BPTU HPT Sembawa, Banyuasin, South Sumatra. Cattle that were the sample of this study were diagnosed with delayed ovulation based on medical records through observations obtained from reports from assistant reproductive technique (ATR) officers.

IV. Observation of the Intensity of Estrus

Observations of estrus were carried out visually starting every day from before estrus was detected until estrus stopped in cattle diagnosed with delayed ovulation. Observations of the estrus cycle were carried out during 2 phases of the estrus cycle. The focus of attention during estrus observations was the duration of estrus and the intensity of estrus. The duration of estrus is the interval (distance) calculated from the first onset of estrus symptoms until the cessation of estrus symptoms in units (hours). Whereas, the intensity of estrus includes the physical changes that occur in the external reproductive organs of the cattle. The intensity of estrus was observed using the method [5] of giving a score based on the signs of estrus that appeared in cattle, namely: changes in the vulva, cervical mucus, behavior, and the degree of uterine tension.

Changes in the vulva

- 1 : The vulva is pink in color, the peripheral blood vessels are not clearly visible
- 2 : The vulva is reddish in color, the peripheral blood vessels are clearly visible
- 3 : The vulva is dark red, visible branching of the peripheral blood vessels

Cervical mucus

- 1 : Transparent mucus, little in amount, and hanging on the vulva
- 2 : Transparent mucus, quite a lot in amount, and hanging on the vulva
- 3 : Transparent mucus, abundant in amount, and hanging over the vulva, around the base of the tail, and floor.

Behavior

Seen from changes in behavior such as restlessness, yawning, and decreased appetite, as well as being on the top (mounting on) other cattle (bulling)

- 1 : Cattle do not show changes in behavior
- 2 : Cattle show one behavioral changes
- 3 : Cattle show 2 or more symptoms of behavioral changes

Degree of uterine tension

This observation was assessed using a score of 1 to 3, in cattle showing estrus symptoms.

- 1 : Weak
- 2 : Moderate
- 3 : Tensed

V. Results and Discussion

The following table is the identity of the cattle used in this study, which was carried out at BPTU HPT Sembawa. The cattle used is crossbred Belgian Blue cattle as a sire and Brahman cattle as a dam, and this cattle is the second cross (F2) which is presented as having 50% of the Belgian Blue breed.

Table 1. The identity of the cattle used as the object of this study

Information	crossbred Belgian Blue (CBB)
Cattle name	BB 1947
Offspring	F2
Age	4 years
Breed	Belgian Blue
Parity	0
BCS	4
Estrus period	23 days
AI history	11
Owner	BPTU HPT SEMBAWA BANYUASIN
Owner Address	BPTU HPT SEMBAWA BANYUASIN

Source: Primary research data

The crossing was carried out using artificial insemination (AI). The cattle is approximately 2 years old with a parity of 0 (dew), has a BCS of 4, with a history of AI of 11 times, with an estrus period of 23 days. Crossbreeding is carried out because Belgian Blue cattle are cattle that have double muscling. According to [6], Belgian Blue cattle have double muscling which medically means muscular hypertrophy because it is caused by the deletion of 11 nucleotides in exon 3 of the myostatin gene. Indonesia is a country with a high level of meat consumption.

VI. Follicle Diameter

Seen from day 1 of the cycle, the follicle in the cattle measured 0.4 cm, on day 2 measured 0.6 cm, on day 3 measured 0.9 cm, on day 4 measured 1.2 cm, on day 5 measured 1.4 cm, on day 6 measured 1.5 cm, and on day 7 measured 0.6 cm. On days 6 and 7, there was a change in the size of the follicles from 1.5 cm to 0.6 cm.

Table 2. Follicular diameter of crossbred Belgian Blue (CBB) cattle during one cycle

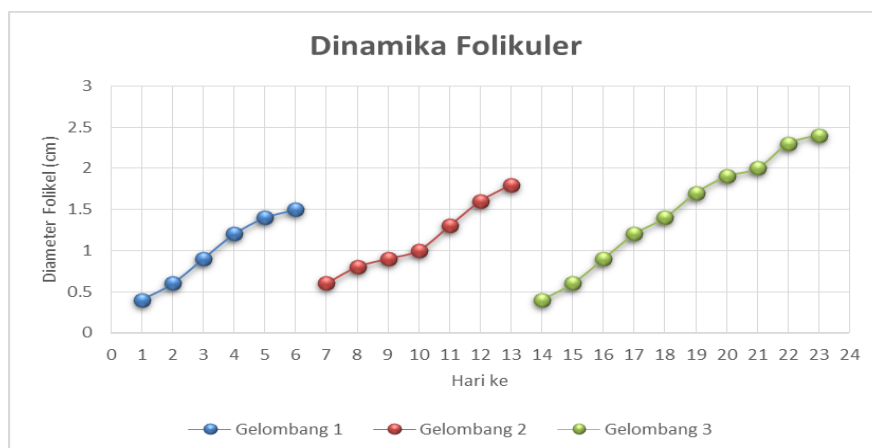
1	0.4cm	8	0.8cm	15	0.6cm	22	2.3cm
2	0.6cm	9	0.9cm	16	0.9cm	23	2.4cm
3	0.9cm	10	1.0cm	17	1.2cm	0	Ovulation
4	1.2cm	11	1.3cm	18	1.4cm		
5	1.4cm	12	1.6cm	19	1.7cm		
6	1.5cm	13	1.8cm	20	1.9cm		
7	0.6cm	14	0.4cm	21	2.0cm		

Source: Primary research data

This event is usually referred to as recruitment or changing the size of the follicles in the first wave (primary follicles). This also occurred on days 8 – 14 where on day 13 the follicle measured 1.8 cm and, on day 14, it became 0.4 cm. This is a change in the wave of follicles from the first wave to the second wave (secondary follicles). According to [7][8] the development of follicular follicles in cattle and sheep generally occurs in two or three waves of follicles in one estrus cycle phase, until small or large follicles develop or regress in the ovaries each time the estrus cycle occurs. In the next phase or towards the third wave (tertiary follicles), the following are the size of the follicles: on days 15 (0.6 cm), 16 (0.9 cm), 17 (.2 cm), 18 (1.4 cm), 19 (1, 7 cm), 20 (1.9 cm), 21 (2.0 cm), 22 (2.3 cm), and 23 (2.4 cm), and ovulation occurred the next day.

VII. Dynamics of Follicle Development

The dynamics of follicular development in crossbred Belgian Blue (CBB) cattle is shown in the following figure, in which the cattle was diagnosed with a delay in ovulation on days 1 - 7 but on days 8-14 developed normally due to recruitment of follicles. Then starting from days 15 - 22 large follicles developed (dominance). The development of follicular size and increased cycles in the cattle indicated that the cattle was having problems with its reproduction and the cattle was in estrus which lasted for 3 consecutive days starting on days 21 - 23 so that the next day the cattle experienced ovulation.



Graph 1. The dynamics of follicular development in crossbred Belgian Blue cattle

The length of the estrus period in cattle is 18 - 19 hours with ovulation 10 - 11 hours after estrus ends [9]. The length of the estrus period is one of the characteristics of cattle that experience delayed ovulation, as happened in crossbred Belgian Blue (CBB) cattle in this study showing estrus symptoms that are visible for more than 24 hours. [10] State that delayed ovulation is an incidence of reproductive disorders in livestock (in this case, cattle) that causes a prolonged estrus period, which is more than 36 - 48 hours until ovulation, a normal estrus cycle, and no abnormalities in estrus mucus in the reproductive tract. This shows that the crossbred Belgian Blue (CBB) cattle observed in this study show delayed ovulation reproductive disorder.

VIII. Intensity of Estrus

Observations of the intensity of estrus was carried out visually or directly. These observations also included a score showing the symptoms shown by the cattle during estrus. Observations of the intensity of estrus was carried out in 2 stages, namely in the morning and evening.

Table 3. Observations of the intensity of estrus of Crossbred Belgian Blue Cattle

Intensity of Estrus of Crossbred Belgian Blue Cattle	Scores
Abundant cervical mucus	3
Degree of uterine tension	3
Vulvar discoloration	2
Behavior changes	3

Source: Primary data from observations

In these observations, there was an abundance of cervical mucus reaching a score of 3, this was shown during the morning and evening observations where there was thick, clear mucus that hung on the vulva. The degree of uterine tension is also tensed (stiff), when palpating, there was tension in the uterus, this lasts for 3 days in the estrus phase. Likewise, there was a change in the color of the vulva which was reddish in the estrus phase. Furthermore, changes in behavior also occurred in the cattle, namely mooing and restlessness during the estrus phase. According to [11], the dam's responses during the period of heat are in the form of increased movement, voice expression, anxiety, clear discharge from the vulva, and reddish vaginal mucosa which felt warm when palpated. This period (usually) lasts 8 - 16 or 12 hours, but there are variations between cattle breeds.

XI. Conclusion

The conclusion of this study using ultrasonography (USG) to see follicular development and observe estrus of crossbred Belgian Blue (CBB) cattle diagnosed with delayed ovulation show that the cattle (used as the subject of this study) has a larger dominant follicle size than normal cattle, this is shown during the estrus phase that lasts for 3 days or more than 24 hours and ovulation that occurs at the end of the estrus phase.

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XIII. References

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