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The optimum time of artificial insemination in Simmental cross cow

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Abstract. Artificial insemination (AI) conducted not at the optimum time might cause the low conception rate in beef cattle kept under extensive and semi extensive conditions. The aim of this research was to evaluate the optimum time of artificial insemination which shows a high conception rate in Simmental cross cows kept under semi extensive condition. There were 75 Simmental cross cows kept under semi extensive by farmers at Bone District, South Sulawesi, Indonesia. They were divided into 3 groups of 25 cows. Group 1 (G1) were inseminated 12 h after the onset of estrus, Group 2 (G2) were inseminated 24 h after the onset of estrus and Group 3 (G3) were inseminated 36 h after the onset of estrus. All cows inseminated using Simmental bulls frozen semen by 1 professional inseminator. The cows returned to estrus after the first AI was served for the second AI. The variables observed were conception rate (CR) and service per conception (S/C). The significant difference between the group was analyzed by chi-square analysis. Conception rate in G1 was significantly ($P<0.05$) lower (56%) compared to those in G2 (80%) and G3 (80%), respectively. A similar response was detected for S/C. Service per conception in the G1 group was significantly ($P<0.05$) higher (1.92) compared to those in G2 (1.28) and G3 (1.32), respectively. It can be concluded that optimum time for artificial insemination in Simmental cross breed cows was 24 h after the onset of estrus.

1. Introduction

Artificial insemination (AI) technics and crossing the locals and exotic breeds are still dominant methods to in supporting the Beef Self-Sufficiency Program in Indonesia. Supply of quality frozen cement at sufficient quantity and affordable price, expanding number of inseminators, improving VBC, profitable domestic cows' price, feed supply, and grazing land intensification are prerequisites for beef self- sufficiency achievement [1]. To improve the cattle breed quality, local breeds have been crossed with exotic breeds. [2] reported that the center kept some exotic breeds, especially beef cattle, for producing frozen semen. These breeds were Ongole, Brahman, Simmental, Limousin, Brangus, and Angus. Body performance of these breeds and their offspring are better than the local breeds. However, some of their reproductive performance under tropical conditions were not yet well known.

One of the most popular exotic breeds was Simmental. This breed is a dual-purpose, high growth rate, less fat in meat and high body weight. The average body weight in the female is about 800 kg and in male is about 1150 kg [3]. In Aceh, [4] reported that the quality of semen of Simmental was significantly lower compared to those in Bali and Aceh bulls. The conception rate (CR) of cows



inseminated with the semen of this breed was also significantly lower compared to the other two breeds. LH deficiency was correlated with the delay of ovulation and this may cause the Low conception rate (CR) and the increased of services per conception [5].

The LH deficiency was also related to the time of ovulation. The time of ovulation was correlated with the optimum time of artificial insemination. Mufti *et al.* [6] found that the time of AI in relation to the onset of estrus was correlated with the CR in Red Chittagong cows. In Holstein cows, there was no significant effect on the CR between the AI performed at the time of detected estrus (0 h) and 12 h thereafter in the temperate area in Venezuela, but in the tropical area, CR was significantly higher in cows inseminated 12 h after the onset of estrus in compared to that in 0 h [7].

There were few data concerning the optimum time for artificial insemination in cows, especially for those crossbred, in Indonesia. Therefore this research was conducted to find out the optimum time of artificial insemination in Simmental cross breed cows kept under semi extensive condition.

2. Methods

There were 75 Simmental Cross cows, 3-5 years old, kept under semi extensive by smallholder farmers (1-5 cows per farmer) at Bone District, South Sulawesi, Indonesia. They were allowed to graze during the day time and were housed with additional feed supplement of rice bran during the night. They were inseminated during the estrus with frozen semen of Simmental bulls. The onset of estrus was visually detected twice daily by the farmers. The cows were randomly divided into 3 groups of 25 cows. Group 1 (G1) were inseminated 12 h after the onset of estrus, Group 2 (G2) were inseminated 24 h after the onset of estrus and Group 3 (G3) were inseminated 36 h after the onset of estrus. The onset of estrus was considered to be occurred in between the time when the cows detected in estrus for the first and the previous estrus detection when the cows detected not in estrus. All cows were inseminated using Bali bull frozen semen by 1 professional inseminator. The cows who came in estrus after the first AI were inseminated for the second time. Pregnancy diagnosis was performed by a non-return rate at day 20-23 after the AI and by rectal palpation at day 60-70 after the AI. The variables observed were conception rate (CR) and service per conception (S/C). The significant difference between the group was analyzed by chi-square analysis.

3. Results and discussions

Conception rate (CR) during the first, second and third AI and service per conception (S/C) of the three groups of cows were shown in table 1.

Table 1. Conception rate (CR) during the first, second and third AI, and service per conception (S/C) of the three groups of cows.

Group	n	Conception rate (%) at			S/C
		First AI	Second AI	Third AI	
1	25	56	12	32	1.92
2	25	80*	12	8	1.28*
3	25	80*	8	12	1.32*

Groups 1, 2 and 3 were AI at 12, 24 and 36 after the onset of estrus.

*significantly different ($P < 0.05$) with the Group 1 at the same column.

CR in the G1 was significantly ($P < 0.05$) lower compared to those in G2 (80%) and G3 (80%). Similar data were detected for S/C, S/C in the G1 was significantly ($P < 0.05$) higher (1.92) compared to those in G2 (1.28) and G3 (1.32).

This research showed that the CR of S/C of Simmental cows at the first AI were ranging from 56-80% and 1.28-1.92, respectively. The optimum time of AI was 24-36 h after the onset of estrus. The CR of cows found in this study supported the conception rate of reported by [8] which stated that CR of more than 50% of cows in Indonesia was considered to be a good CR. Although this CR could be 60-70% under high fertility cows [9]. Therefore, the CR of 80 % found in this study indicated that the

fertility of cows kept under semi-intensive in this area was higher enough. The highest S/C of 1.92 (G1) found in this study was still lower than that stated by [10] of 1.6 to 2.0. S/C was an indicator of the fertility rate of the cows. The lower its S/C, the higher its fertility [11]. Lower S/C in this study indicated that the fertility rate was high for the cows kept under semi-intensive conditions used in this study. The significant difference of CR between groups in this study was similar that reported in dairy cows in the hot climate of Venezuela [7]. The higher CR in cows that were inseminated 24 h after the onset of estrus was also similar that reported in cows by [12] which reported that fertilization rate was 66 and 82% when cows inseminated at 12 and 24 h following the onset of estrus, respectively. However, he found that the increasing interval after the onset of estrus caused embryo quality to decline. Therefore he concluded that insemination at less than 24 h after onset of estrus provided a compromise in terms of maximizing fertilization and embryo survival rates. The higher CR in cows inseminated at 24 h after the onset of estrus reported in this study was in contrast to the higher conception rates of Red Chittagong Cows (RCC) when inseminated between 10 to >14 hours after onset of estrus and the value was 74.19%. On the other hand, the conception rates of RCC at 6 to >10 hours, and 14 to above were 50% and 58.82%, respectively, which differ ($P < 0.05$) significantly [6]. Reasons for discrepancy were not yet well known, but it might be due to the delay of ovulation for the animals used in this study. Putro [5] suggested that crossbred cows have a tendency to delay ovulation. The delay ovulation was affected by a low level of LH or a delay of LH surge which caused the prolongation of estrus. Feed deficiency of exotic breeds in the tropical countries might cause the hormonal in-balance [13]. Studies on the time of ovulation are needed in exotic breed kept in tropics for predicting the best time of AI.

4. Conclusion

The higher conception rate and the lowest service per conception in Simmental crossbred cows artificially inseminated 24 h after the onset of estrus. Therefore, 24 h after the onset of estrus will be the best time for AI in this breed.

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