Distribution of Cows by Days in Milk (DIM) at First AI and Calving to Conception
Interval in Dairy Cows

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ABSTRACT

The objective of this study was to show the distribution of cows by days in milk (DIM) at first artificial insemination (AI) and the interval from calving to conception. The study was conducted in 47 commercial dairy herds in Enrekang Regency from May to October 2011. Of 289 animals, 143 of them or 49.5% were dairy Holstein Friesian cows with parities one to seven; mean (±SD) 2.05±1.50. The cows were classified into six groups based on DIM at first AI; within 40 d postpartum, between 41 and 85 d, 86 and 115 d, 116 and 150 d, 151 and 210 d, and 211 days or more. The cows were classified into five groups based on the interval from calving to conception; within 85 d postpartum, 86 and 115 d, 116 and 150 d, 151 and 210 d, and 211 days or more. The results of this study showed that the interval from calving to first AI was 131.6±121.8 d. The percentage of cows inseminated within 85 d after calving was only 56.1%; significantly lower (P<0.01) than the percentage in the list of fertility management assessment standard. Likewise, cows conceived within 150 d after calving was only 32%. In conclusion, a longer average days in milk (DIM) at first AI in dairy cows was found in the present study, subsequently reduced the possibility of the cows to become pregnant in an optimum time, and reduced the reproductive performance of the herds.

Key words: days in milk at first AI, calving to conception interval, dairy cows

ABSTRAK

Tujuan penelitian ini adalah untuk menunjukkan distribusi ternak sapi perah pada inseminasi buatan (IB) pertama setelah melahirkan dan jarak antara melahirkan dan kembali bunting. Penelitian ini dilaksanakan pada 47 peternakan sapi perah dari bulan Mei sampai Oktober 2011 di Kabupaten Enrekang. Sebanyak 49,5% dari 289 ternak merupakan induk dengan paritas satu sampai tujuh. Ternak sapi diklasifikasikan ke dalam enam kelompok berdasarkan pelaksanaan IB pertama, yaitu waktu 40 hari setelah melahirkan, antara 41 dan 85 hari, 86 dan 115 hari, 116 dan 150 hari, 151 dan 210 hari, dan 211 hari atau lebih. Ternak sapi diklasifikasikan ke dalam lima kelompok berdasarkan jarak antara melahirkan dan kembali bunting, yaitu waktu 85 hari setelah melahirkan, antara 86 dan 115 hari, 116 dan 150 hari, 151 dan 210 hari, dan 211 hari atau lebih. Ternak sapi perah yang melahirkan dan kembali bunting, yaitu waktu 85 hari setelah melahirkan, antara 86 dan 115 hari, 116 dan 150 hari, 151 dan 210 hari, dan 211 hari atau lebih. Hasil penelitian ini menunjukkan bahwa jarak antara melahirkan dan IB pertama adalah 131,6±121,8 hari. Persentase ternak yang dipersentasekan dalam waktu 85 hari setelah melahirkan hanya sebesar 56,1%, sangat nyata (P<0,01) lebih rendah dibandingkan dengan standar persentase dalam daftar penilaian manajemen fertilitas. Ternak sapi perah yang bunting dalam waktu 150 hari setelah melahirkan hanya 32%. Dapat disimpulkan bahwa rata-rata IB pertama setelah melahirkan dalam penelitian ini terlalu panjang, sehingga menurunkan kemungkinan ternak untuk kembali bunting dalam waktu yang optimal serta menurunkan penampilan reproduksi ternak sapi perah.

Kata kunci: IB pertama setelah melahirkan, jarak antara melahirkan dan kembali bunting, sapi perah

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INTRODUCTION

Poor reproductive performance in dairy cows due to milk production is a worldwide problem and has been reported in many studies (Butler & Smith, 1989; Beam & Butler, 1999; Royal et al., 2000a; Nakada, 2006). Consequently, number of services per conception, delayed conception, and days open should have increased. Several factors have been recognized to reduce the reproductive performance in dairy cows. Study of Garcia-Ispierto et al. (2007) stated that risk factors for this problem included milking frequency, inseminator, inseminating bull, repeat breeding syndrome, lactation number and artificial insemination (AI) season. Likewise, occurrence of reproductive disorders as a limiting factor to improvement of reproductive performance was also suggested (Nakada, 2006). This sub-fertility has the highest economic cost and is the most difficult to treat (Royal et al., 2000b).

Reproductive performance is calculated using various indicators such as the number of days open (the interval between calving and successful of AI) or the interval between successive calving. For an adequate evaluation of reproductive performance in a dairy herd, Esslemont & Kossaibati (2000) has provided a list of fertility management assessment that we need to refer to certain standards. This list allows the producers to assess their herd performance grades from excellent to severe problem. For example, to be a good fertility management, 95% cows in the herd after calving must be served by keeping the average calving to first service interval to less than 70 d, more than 55% overall heat detection rate, and 50% or more of pregnancy rate. Therefore, to achieve an optimum standard of reproductive performance in a dairy herd, it is necessary to manage the herd and animals as appropriate manner.

Many studies have reported the reproductive performance in dairy cows at different locations (Macmillan et al., 1996; Washburn et al., 2002; Lopez-Gatius, 2003; Caraviello et al., 2006; Yusuf et al., 2010a). However, to our knowledge, it is still lacked information regarding the reproductive performance in dairy cows in South Sulawesi Province particularly the first inseminated time after calving and calving interval. Therefore, the objective of this study was to find out the distribution of cows by days in milk (DIM) at first AI and the interval from calving to conception.

MATERIALS AND METHODS

Herd and animals

The study was conducted in 47 small scale commercial dairy herds in Enrekang Regency, South Sulawesi Province during a period of six months; from May to October 2011. The herd size ranged from 1 to 15 animals (6.15±3.62 heads). In total 289 animals in all herds, 143 (49.5%) heads were dairy Holstein Friesian (FH) cows that intensively concerning for this study with parities one to seven (2.05±1.50). All the herds’ management records were collected from the owners/farm staffs and/or by the authors. The voluntary waiting period (VWP) was 40 d in all herds. Some cows which showed very clear signs of estrus were inseminated before VWP.

Reproductive Management and Artificial Insemination

In all herds, no estrous synchronization was used to induce estrus and detection of estrus was conducted by the farmers. Detection of estrus was based on secondary estrus signs due to that housing system in all herds were tie-stall. Cows detected in estrus were inseminated (AM/PM rule) by the designated inseminator using recto-vaginal technique with frozen/thawed semen from proven FH or the others sires when FH semen was not available at the time of estrus. The cows that did not show symptoms of estrus during the 60 d or more after insemination were examined by rectal palpation to determine the pregnancy.

Classification of Cows Based on DIM at First AI and Calving to Conception Interval

Based on DIM at first AI (calving to first AI interval); the cows were classified into six groups which were: less than 40 d postpartum, between 41 and 85 d, 86 and 115 d, 116 and 150 d, 151 and 210 d, and more than 211 d (Yusuf et al., 2011). Furthermore, based on the interval from calving to conception the cows were classified into five groups within 85 d postpartum, 86 and 115 d, 116 and 150 d, 151 and 210 d, and more than 211 d.

Statistical Analyses

All data were presented as mean ± SD (standard deviation). Descriptive statistic was used to calculate the mean interval from calving to first AI and from calving to conception. The difference between percentage first inseminated cows within 85 d after calving and the standard DIM at first AI provided by Esslemont & Kossaibati (2000) was analyzed using Chi-square test. Distribution of cows at different DIM at first AI, cumulative percentage of cows inseminated, and calving to conception interval were drawn.

RESULTS AND DISCUSSION

Reproductive Performance of Dairy Cows

DIM at First AI. The present study showed that calving to first AI intervals in dairy cows varies at different DIM. The mean interval from calving to first AI was 131.6±121.8 d, ranging from day 31 to 472. Figure 1 shows the distribution of cows by DIM at first AI and cumulative percentage of cows inseminated. The percentage of cows inseminated within 40 and 85 d after calving was 12.2% and 56.1%, respectively. The percentage of cows inseminated up to 210 d was 80.5% and the remaining 19.5% cows were first inseminated beyond 210 d after calving. These results were significantly lower (56.1 vs 90%; Chi-square=7.918; df= 1; P<0.01) than the list of fertility management assessment provided by Esslemont & Kossaibati (2000) and subsequently reduced reproductive performance in the herds.
The causes of delayed first AI after calving in the present study were not fully understood and it is necessary to find out the factors contributed in. Previous studies reported that the causes of delayed first AI after calving in dairy cows include management and the cow factors (Yusuf et al., 2011), in which could be break down to the factors such as extended voluntary waiting period (Arbel et al., 2001), infection of the reproductive tract (Dohoo, 1983; Gilbert et al., 2005; Yusuf et al., 2011), season of calving, herd and parity (Darwash et al., 1997; Yusuf et al., 2011), abnormal resumption of ovarian cycle (Lamming & Darwash, 1998; Yusuf et al., 2006; Yusuf et al., 2011), and negative energy balance (Lucy, 2001; Wiltbank et al., 2006). In this study, all cows were housed using tie-stall. This probably caused an extension of DIM at first AI. Cows in tie-stall herds have a significantly longer DIM at first AI in comparison with free-stall herds (Yusuf et al., 2011) and have a lower fertility index (Valde et al., 1997). Increased cow comfort in free-stall herds probably contributed to optimizing DIM at first AI (Bewley et al., 2001; Yusuf et al., 2011). Since there were so many factors can contribute to the delayed first AI after calving, it was difficult to generalized as to predominant causes, therefore, each cow must be considered individually.

In the present study, all herds had no special recording for reproductive history of each cow. For this purpose, it is highly suggested to record all events in each cow during her productive time. This due to that in a small scale herds, a simple reproductive management such as recording is still difficult to conduct, resulting in difficulty to treat the individual cow. Furthermore, in order to improve the cows’ reproductive performance it is necessary to examine the cows regularly and to record all events with the designated veterinarians.

**Calving to Conception Interval and Number of AI.** Figure 2 shows the interval from calving to conception in dairy cows. The results in this study showed that cows conceived within 150 d after calving was only 32% (Figure 2), which was much lower than previously reported by Esslemont (1992), Darwash et al. (1997), Royal et al. (2000b), Yusuf et al. (2011). The average (±SD) interval from calving to conception in dairy cows in the present study was 179.2±93.9 d, ranging from day 75 to 394. These pregnant cows have been inseminated with average (±SD) of 1.94±1.54 times (Table 1). Contrary for not pregnant cows, AI was conducted at average (±SD) of 2.10±1.72 times at the end of the study. This indicated that not all cows in the herds showed poor reproductive performance. On the other hand, a proportion of cows in the herds had better reproductive performance, and the other proportion had poor reproductive performance. If only a proportion of cows have had poor reproductive performance, attributed to declining fertility at the herd level, we need to pay specific attention to these cows to improve the herd fertility (Yusuf et al., 2010b). Their study also stated that approximately 60% cows in a herd have had poor fertility, leading to extend the interval from calving to conception. Uterine infection and ovarian disorders were two major factors contributed to reduced fertility (LeBlanc et al., 2002; Runciman et al., 2008; Yusuf et al., 2010a).

**Reproductive Failure in Dairy Cows**

Among the cows that failed to conceive, we investigated the average number of AI and intervals from calving to first AI for the cows inseminated three times or more (Table 2). At the end of the study period, we found that a total of 19 cows had been inseminated in average (±SD) of 5.6±2.5 times, and the average interval from calving to first AI was 199.0±49.5 d. This indicated that

<table>
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<tr>
<th>Parameter</th>
<th>Pregnancy status</th>
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<tbody>
<tr>
<td>Number of cows (%)</td>
<td>70 (49)</td>
</tr>
<tr>
<td>Average number of artificial insemination</td>
<td>1.94</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>1.54</td>
</tr>
<tr>
<td>Confidence interval 95%</td>
<td>1.58-2.31</td>
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</table>
beside the cows was very late to inseminate, the cows also suffered from repeat breeding syndrome. This finding is in agreement with our previous study (Yusuf et al. 2010a) using 613 dairy Holstein Friesian cows that days in milk at first AI for the cows suffering from repeat breeding syndrome had longer than in normal fertility cows (194 vs 100 d).

In the present study, no attempt was made to investigate the incidence of repeat breeding syndrome in dairy cows and the contributing factors. However, in our previous study (Yusuf et al., 2012), reported that the incidence of repeat breeding in this area was very high. Therefore, an intensive study is needed to depict the factors which contributing to the incidence of repeat breeding syndrome of dairy cows in this area. Several factors that might potentially described the incidence of repeat breeding in dairy cows have been studied by Bartlett et al. (1986), Bage et al. (2002), Moss et al., (2002). The previous study (Yusuf et al., 2010a) indicated that herd, parity, season of calving, resumption of postpartum ovarian cycles, and days in milk at first AI might be contribute in repeat breeding syndrome. The incidence of repeat breeding in this area probably caused by heat stress due to the hot humid weather in tropical condition, resulting in reduce fertility (Yusuf et al., 2012). When dairy cattle are subjected to heat stress, the reproductive efficiency will decline. Cows under heat stress will reduce duration and intensity of estrus, altered follicular development, and impaired of embryonic development (Jordan, 2003), resulting in an increased the chance to be repeat breeders (Macmillan et al., 1996; Roche et al., 2000).

CONCLUSION

A longer average days in milk (DIM) at first AI in dairy cows was found in the present study, subsequently reduced the possibility of the cows to become pregnant in an optimum time, and reduced the reproductive performance of the herds.

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Table 2. Number of artificial insemination (AI) and interval form calving to first AI in cows that failed to conceive after three times insemination (n=19)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mean (± SD)</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yr)</td>
<td>4.8± 1.7</td>
<td>2-9</td>
</tr>
<tr>
<td>No. of AI</td>
<td>5.6± 2.5</td>
<td>3-10</td>
</tr>
<tr>
<td>Interval from calving to first AI</td>
<td>199.0±49.5</td>
<td>119-250</td>
</tr>
</tbody>
</table>

REFERENCES


