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Reproductive Performance of Dairy Friesian Holstein Heifers (a Case Study in Enrekang, Indonesia)

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Abstract

The aim of this study was to know the reproductive performance of Holstein Friesian dairy heifers. This study was conducted on Holstein Friesian dairy heifers of dairy farmers in Enrekang Regency. A total of 27 dairy heifers were selected in the present study. All selected heifers were noted for the age, body condition score (BCS), and were examined clinically both vaginoscopically and palpation per rectum or ultrasonography (USG). Each heifer was determined for their reproductive physiology statuses as well as their reproductive disorders. Parameters measured in the present study were age, BCS, reproductive physiology statuses (ovarian activity), types for reproductive disorders, pregnancy rate, services per conception (S/C). The results of this study showed that there were high variation of heifers' age; ranging from 10 to 60 months with average (±SD; Standard Deviation) of 24.0 ± 13.6 months. A total of 17.6% heifers have less than 14 months of age, 35.3% heifers between 14 to 20 months, and 23.5% each for heifers with 21 to 28 months and higher than 28 months, respectively. BCS varied from 2.50 to 4.00 with median of 3.25. A total of 33% and 67% heifers had BCS <3.00 and ≥3.00, respectively. The present study also showed that there was 44.4% heifers become pregnant with S/C 1.83; ranged from one to four times inseminations. Those heifers that did not become pregnant, inseminations were performed from one to eight times with average of 3.27 times and 33% of these heifers were suffered from reproductive disorders; 80% had anestrus and 20% had uterine disorders.

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It can be concluded that reproductive performance of dairy heifers in this area was still very low. More attention is needed for the heifers with higher age that did not become pregnant as well as reproductive disorders.

Keywords: Heifers; reproductive performance; pregnancy rate; reproductive disorder.

1. Introduction

Fertility of dairy heifers is generally superior in comparison to the dairy cows [1], however, a number of potentially dairy heifers that are intended to replace the dairy cows could not be able to get pregnant due to failure to conceive or delayed conception [2]. Generally dairy cows have good reproductive potential. In general, dairy cattle can be breed for the first time at 14-15 months, and first calving at the age of 22-24 months. To achieve the maximum potential reproductive capacity of dairy cattle during their lifetime, reproductive management should be calculated on the basis of calving interval for about 13-14 months. To achieve the optimum calving interval, the cows should be re-breed within 75 days after calving with pregnancy rate per 21 days above 20%. Dairy cows have potential to become pregnant less than 115-125 days after calving with conception rate at first breeding above 40%. With these conditions, it can be ascertained that the development of dairy cattle can be maximized. However, some dairy farms; especially small holder farms prolonged the interval from calving to conception and first calving. This condition allows the lack of number of calves during their lifetime due to the declining the reproductive performance of the dairy heifers. Basically, the ability of dairy heifers as a replacement for the dairy cows to reach puberty, normal cycles, conception at the certain time, maintaining pregnancy, calving normally, and first lactation are critical components of dairy farming [3]. Therefore, each of these components should be a special attention in an effort to improve the reproductive performance of dairy heifers and finally it can be efficient for dairy farm business. In the first stage of these components, the achievement of puberty and the normal ovarian cycle of dairy heifers can generally be achieved within 9 to 12 months [4]. However, this condition is sometimes difficult to achieve with various limitations such as asynchrony of their reproductive hormonal mechanisms. In order to solve such condition, most producers use a variety of reproductive technologies, both estrous induction and synchronization. Application of this technology such as the use of progestin during the period from GnRH to PGF [5-7], and Ovsynch protocol [8] regardless of the reproductive physiology status of the dairy heifers at the beginning of the treatment and with varying success rate. In addition, the use of combined hormones affecting the amount of hormone price to be spent. Therefore, prior to the implementation of certain reproductive management to improve the performance of the dairy heifers, basic knowledge of the existing condition of reproductive performance of dairy heifers especially in small holder farms is necessary. Thus, this study aimed to know the reproductive performance of dairy Holstein Friesian heifers as a replacement for the dairy cows for the sustainability of dairy cattle productivity.

2. Materials and Methods

2.1. Location and Identification of dairy heifers

The present study was conducted in dairy Holstein Friesian heifers of the small holder dairy farms in Enrekang, Indonesia. Identification and determination of dairy heifers was performed together with the dairy farmers after

coordinating a number of dairy farmers. A total of 27 dairy heifers were selected in the present study. All the heifers were subjected for examination such as body condition, vaginoscopy, palpation per rectum and/or ultrasound (USG).

2.2. Examination for body condition, vaginoscopy, palpation per rectum and ultrasound

All selected dairy heifers in the present study were recorded their age, body condition score (BCS), and internal reproductive organ. Examination for BCS was conducted at each dairy heifer following the procedure by Edmonson and his colleagues [9]. Vaginoscopy was performed following procedures of Gautam and his colleagues [10] and Yusuf and his colleagues [11].

First the dairy heifers were examined for the condition and the presence of mucus on the vulva or on the tail then followed by vaginoscopy examination. Vulva was washed with water then wiped with clean tissue then sprayed with PVP-Iodine 2% and wiped again using 70% alcoholic cotton. Vaginoscopy examination was done by using a glass speculum and lighting source (flashlight) to observe the internal condition of the reproductive organs until reaching the external side of the cervix. Presence of discharge or liquid during examination, they were collected using a plastic pipette and put in a Petri dish to be assessed. Mucus was categorized to be normal when it was clear or slightly cloudy in the absence of pus and odor. Otherwise, it was categorized uterine infection (metritis/endometritis) [12].

Palpation per rectum and ultrasound (USG) of the reproductive organs was performed to assess the condition of the uterus and ovarian structure. The heifer was categorized to have an ovarian cyst reproductive disorder when there was a structure like follicles > 25mm with or without corpus luteum (CL). An ovary with no structure or follicles with a diameter <10mm or CL was defined as an inactive ovary. Reproductive disorders of the uterine organ both normal, pyometra/asymmetric were noted on this examination.

2.3. Parameter of the study

Parameters measured in the study were age of dairy heifers, body condition score (BCS), reproductive physiology status (ovary activity), types of reproductive disorder, number of pregnant heifers, number of artificial insemination (AI) (services per conception; S/C) for pregnant heifers.

2.4. Data analyses

The data obtained in the present study was tabulated using Excel program and analyzed using software SPSS 16.0 for Windows. Descriptive statistics were used to describe the reproductive performance of dairy heifers.

3. Results and Discussion

Body condition score is a good parameter for dairy cattle on the adequacy of nutrients and feed required. The condition of dairy cattle body in this study is presented in Figure 1.

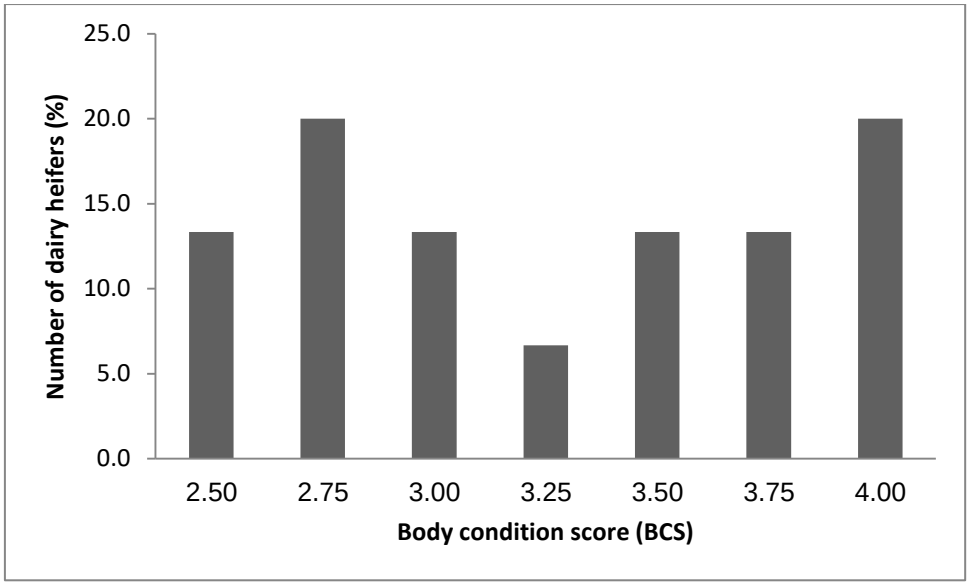

Figure 1: Body condition score of dairy heifers

In Figure 1 shows that body condition score (BCS) of dairy heifers used in this study ranged between 2.50 to 4.00 with the median BCS of the heifers was 3.25. Furthermore it can be seen that about 33% of the heifers had BCS <3.00 and 67% heifers had BCS ≥3.00. This indicated that most of the dairy heifers had good body condition as a result of feed adequacy. Basically, good body condition increases pregnancy rate. Yusuf and his colleagues [13] stated that high BCS results in high conception rates either by artificial insemination (AI) or with embryo transfer (ET). Therefore, maintaining optimal dairy cattle condition can increase pregnancy rate in dairy cows.

The results of pregnancy diagnosis of the dairy heifers are presented in Figure 2.

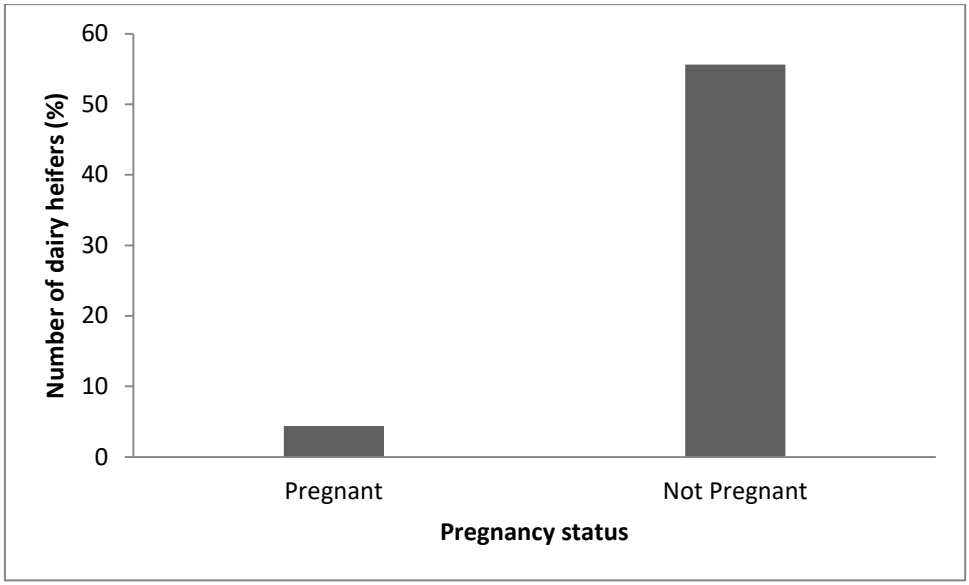

Figure 2: Pregnancy status of the dairy heifers

In Figure 2 shows that 44.4% of dairy heifers became pregnant with the number of artificial insemination (AI) per pregnancy was 1.83 with intervals from one to four times of AI. This condition is categorized as good with AI services of less than two for one pregnancy. However, in dairy heifers that have not become pregnant, the implementation of AI has been done at intervals of one to eight times with an average of 3.27 times. This requires more serious attention, especially reproductive management improvement in achieving high fertility to increase pregnancy rates in dairy heifers. This is in line with Pursley and his colleagues [14] stated that the ability to achieve fertility after AI has a major impact on the management of dairy cattle reproduction. For example, breeding cattle after synchronization of ovulation can control the AI program and decrease dependence on estrous detection prior to the implementation of AI. This achievement opens up some variations in AI management and calving intervals management. Furthermore they stated that ovulation synchronization with GnRH and PGF2α is an effective way of reproductive management in dairy cattle including cows and heifers.

On the other hand, to increase pregnancy rates in dairy cattle, Tenhagen and his colleagues [15] suggested doing AI twice at one estrus after estrous synchronization, although more straws are needed. Furthermore, effect of inseminator on pregnancy rates per AI in dairy cattle have also been reported [16].

The distribution of dairy heifers that did not become pregnant is shown in Figure 3. The heifers that did not become pregnant had a very high age variation with average (± SD, Standard Deviation) of 24.0 ± 13.6 months and intervals between 10 to 60 months. A total of 17.6% of heifers aged less than 14 months, 35.3% between 14 to 20 months, and 23.5% from 21 to 28 months and greater than 28 months, respectively (Figure 3). This indicated that most of dairy heifers in this area did not become pregnant that actually should be pregnant to achieve high reproductive efficiency. Another indication is that it can be predicted that the heifers will be difficult to obtain as many as calves as their potential during their lifetime. Subsequently, this condition may reduce the benefit to the farmers due to low pregnancy rates in dairy heifers.

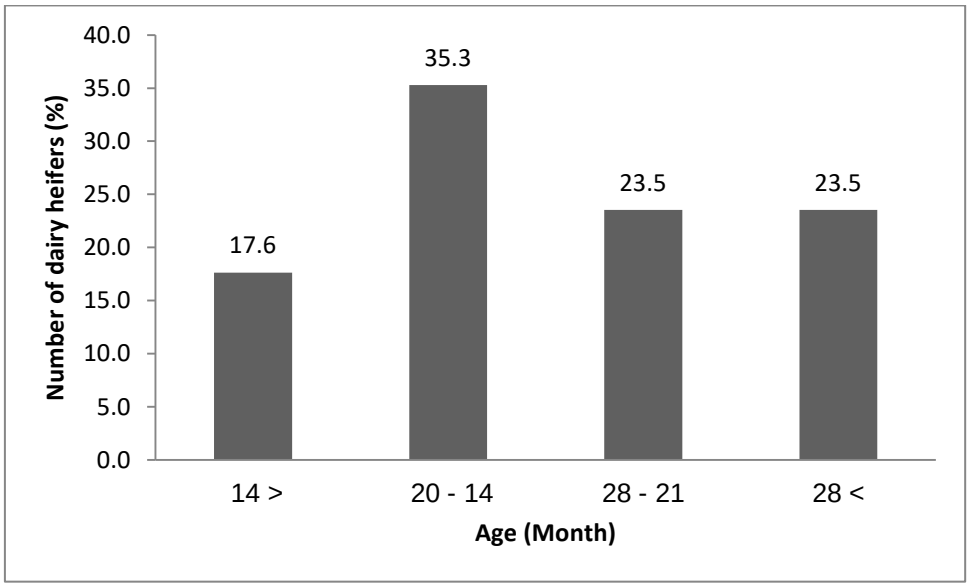

Figure 3: Distribution of age for non-pregnant dairy heifers

Basically, the age of dairy heifers affects pregnancy rates. Yusuf and his colleagues [13] showed that the higher age of dairy heifers resulting in a lower conception rate. As a result, the rate of AI services in non-pregnant heifers becomes higher. It is also confirmed in this study that the rate of AI in the non-pregnant heifers is still very high (3.27), causing repeat breeding which ultimately decreases the reproductive efficiency. The reproductive efficiency is the product of the detection of estrus and the rate of conceptions [17-18]. Therefore, maximizing estrous detection can improve overall pregnancy rates. Estrus is a consequence of coordination between follicular growths and increased the secretion of estradiol [19]. On the other hand, to achieve high conception rates, dairy cattle require increased body weight and have sufficient body condition at the time of AI [20]. Several factors influencing conception rates in dairy cattle have been documented in previous studies. Chebel and his colleagues [21] concluded that the weight of the cattle at the beginning of the breeding period did not having a correlation with the conception rates, but it is correlated with the rate of estrous detection. Cold shock affects the decline in conception rate and increases the mortality rate of the embryo/fetus. Furthermore, dairy cattle in cold stress around the beginning of the breeding program have low numbers in AI and become pregnant. Another factor that affects the number of conceptions in dairy heifers is the presence of reproductive disorders. Although reproductive disorders in dairy heifers are less common than in dairy cows. Reproductive disorders of dairy heifers in the implementation of this study are presented in Table 1.

Table 1: Reproductive disorders in dairy heifers

Parameter	Total (%)
Number of dairy heifers	15
Reproductive disorder	5 (33)
- Anestrus	4 (80)
- Uterine disorder	1 (20)

The results of clinical examination showed that from 55.6% of dairy heifers that did not become pregnant, 33% of them had suffering from reproductive disorder (Table 1). Most reproductive disorders in these heifers were anestrus (80%) and uterine disorders (20%). Therefore, for anestrous dairy heifers, proper reproductive management is needed in overcoming the problem, including hormonal use. The use of GnRH agonist injections followed by 7 days later by injection of PGF2α [22-24], has been used effectively in synchronizing of the estrus in cattle. This method combines synchronization of follicular growth and estradiol secretion with luteolysis contributing to proper timing and estrous behavior [22,24] compared with the synchronization method using PGF2α alone. GnRH agonist injections may induce ovulation of the dominant follicle [25-27], and when used after synchronization of follicular growth and corpus luteum regression (CL), ovulation programs occur and AI can be performed at a fixed-time. Based on the results and discussion, it can be concluded that the reproductive performance of dairy heifers in this area is still very low. The high age of the dairy heifers that have not become pregnant and reproductive disorders need special attention.

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