MENSTRUATION FREQUENCY AND ITS RELATION TO CONCEPTION IN DAIRY CATTLE

GEORGE W. TRIMBERGER

Dairy Husbandry Department, University of Nebraska, Lincoln

Among mammals, there is a marked variation in regard to menstruation and its relationship to conception. Examination of the literature reveals that the time in the sexual cycle at which menstruation takes place is well established in the different species but there is a marked individuality that is observed for each one and sometimes even within the species.

The human being (1, 7) is reported to have an exceptionally long menstruation period which lasts from two to eight days with an average of five days. If the occurrence is regular, the beginning of the menstrual period is half way between successive ovulations and is closely associated with estrus. Marshall (5), Howell (4), Schmaltz (7), and Reynolds (6), all agree that in the human, the mucous membrane thickens to several times normal as pre-menstrual congestion takes place. Although menstruation in the human being is a phenomenon of the uterus, and blood will escape only from the surface of that organ, the other reproductive organs share to some extent the vascular congestion exhibited by the uterus during this period.

The congested capillaries of the uterus break down or rupture in the superficial regions of that organ. The blood discharged at menstruation may be due to these small capillary extravasations and also to a process of diape-desis or seepage made possible by the congestion. Sometimes, when menstrual flow is very profuse in the human, there may be a considerable loss of surface epithelium. The vessels in the deeper tissue remain intact and none of the fluid is found free in the deeper tissue of the stroma. Howell (4) states that menstruation is a sign that fertilization has not taken place from the previous ovulation but Schmaltz (7) gives evidence that it is possible to have a certain amount of menstrual flow following fertilization.

Usually the experienced dog breeder knows that a bitch will, in most cases, have a pronounced flow of blood during the period of proestrus which usually lasts about ten days. As a rule, the bitch will not take the dog until bleeding has ceased and the best time for successful coition is soon after the cessation of this flow. Marshall (5) and Schmaltz (7) agree with this common view.

According to Marshall (5) occasionally blood has been observed in the mare's proestrus discharge but is not generally present. He also states that the ewe menstruates very little and usually shows no external signs. Very

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rarely, a small amount of bloody mucous is observed during proestrus. The sow likewise usually does not show any external signs but occasionally a bloody mucous flow has been observed during proestrus.

The cow (2, 3, 9) is reported to menstruate about two days after heat. Hammond (3) presents evidence to show that in the cow the menstrual fluid comes from both the vagina and uterus. He expresses the opinion that the blood flow in the vagina comes from the region situated just above the urethra and that in the uterus there is special engorgement of the placental areas; but bleeding can come from the surface of any part of these two organs.

A few authors express the opinion that if a heifer or cow menstruates a few days after service it is an indication that conception did not take place, but in most cases they present no definite data to support their belief. W. W. Williams (9) states “The non-pregnant cow ordinarily menstruates about the 48th hour after heat subsides. A little blood-tinted mucus stringing from the vulva at this time, or upon the cow’s tail, indicates that the service has been ineffective. The complete absence of any bloody discoloration of the vaginal mucus suggests that the cow has conceived especially if it has previously been noted that the cow menstruated normally at other periods.”

Another author, W. L. Williams (8), writes, “Within 24 to 48 hours after a cow has been bred she may menstruate. The sanious discharge emanating from the vulva may adhere to that organ, the tail and adjacent parts. If the cow has been bred and conceived, it is doubtful if there will be menstruation following. If she fails to conceive, menstruation is quite certain to occur. In many cases of serious sterility, the volume of menstrual blood is very great. Fertilization appears to inhibit menstruation, but menstruation may occur in spite of conception. The absence or presence of menstruation must not be accepted as final proof of conception or non-conception. It is, however, a valuable sign, and should always place the breeder and veterinarian on guard, with a rather definite expectation that the animal which has menstruated after breeding will again be in estrum in due course of time.”

Hammond (3) carefully observed four heifers after service to a fertile bull and states that all four menstruated at the normal time a few days later. Three of these had become pregnant and subsequent bleeding did not occur in these three. He refers to the fact that it is a common belief among herdsmen that bleeding does not occur two days after heat if fertilization takes place.

**EXPERIMENTAL PROCEDURE**

Because of the widespread belief among livestock men that menstruation in cattle occurring after service is an indication that conception did not take place, and because of the conflicting opinions expressed in the litera-
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It seemed that the problem was worthy of consideration. As a result, data have been collected in the University of Nebraska dairy herd as to the occurrence of menstruation following estrus in heifers and cows. The study covered the years 1937 to 1940 and included representatives of the Jersey, Guernsey, Holstein, and Ayrshire breeds. As used in this study, menstruation refers to the external discharge of a bloody fluid, usually mucus mixed with blood, from the genital tract following estrus.

A group of 100 heifers and a group of 100 cows were studied to determine the frequency of the occurrence of menstruation following estrus when they were not served. For comparison, two similar groups consisting of 100 cows and 100 heifers were inseminated during estrus and the frequency of subsequent menstruation and conception recorded. The amount of menstrual fluid discharged was also noted and given a rating of slight, moderate, and pronounced. Observations were made at six regular intervals each day for five days following estrus and any external signs of a blood-tinted discharge were noted.

PRESENTATION OF RESULTS

Table 1 presents data on the occurrence of menstruation following estrus in open and bred heifers and cows and its relation to conception.

<table>
<thead>
<tr>
<th>Group</th>
<th>Females menstruating within 5 days</th>
<th>Females conceiving and menstruating</th>
<th>Females not conceiving</th>
<th>Females not conceiving but menstruating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heifers (open)</td>
<td>100</td>
<td>100</td>
<td>52</td>
<td>39</td>
</tr>
<tr>
<td>Cows (open)</td>
<td>100</td>
<td>61</td>
<td>85.25</td>
<td>29</td>
</tr>
<tr>
<td>Heifers (bred)</td>
<td>100</td>
<td>81</td>
<td>52</td>
<td>39</td>
</tr>
<tr>
<td>Cows (bred)</td>
<td>100</td>
<td>61</td>
<td>50</td>
<td>11</td>
</tr>
</tbody>
</table>

Menstruation was observed in everyone of the 100 heifers not bred during estrus. In the group of 100 cows not bred during estrus, a total of 61 had a menstrual discharge. Of the lot of 100 heifers bred at estrus, a total of 81 menstruated. Sixty-one heifers conceived and of these, 52 or 85.25 per cent menstruated within five days while 9 or 14.75 per cent showed no evidence of menstruation. From the 39 heifers which did not conceive after breeding, 29 or 74.36 per cent menstruated while 10 or 25.64 per cent showed no signs of menstruation. In the group of 100 cows bred at estrus, 61 menstruated within five days. Seventy-two cows conceived and of these 50 or 69.44 per cent menstruated while 22 or 30.56 per cent did not men-
struate. Of the 28 cows which did not conceive after breeding, 11 or 39.29 per cent menstruated and 17 or 60.71 per cent did not menstruate.

The estimated amount of menstrual fluid and the time after estrus when this was discharged was recorded and these data are presented in table 2.

<table>
<thead>
<tr>
<th>Group</th>
<th>Females grouped according to estimated quantity of menstrual fluid</th>
<th>Females grouped according to time of menstruation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Slight</td>
<td>Moderate</td>
</tr>
<tr>
<td>Heifers (open)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heifers (bred—no conception)</td>
<td>22</td>
<td>31</td>
</tr>
<tr>
<td>Heifers (bred—conceived)</td>
<td>17</td>
<td>29</td>
</tr>
<tr>
<td>Cows (open)</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Cows (bred—no conception)</td>
<td>22</td>
<td>28</td>
</tr>
<tr>
<td>Total</td>
<td>108</td>
<td>169</td>
</tr>
</tbody>
</table>

In the above table, the data indicate that for the 303 individuals that menstruated, 108 or 35.64 per cent had a slight amount, 169 or 55.78 per cent a moderate, and 26 or 8.58 per cent a profuse amount of menstrual fluid. The second part of table 2 in which the females were grouped according to time of menstruation in days after estrus shows that 27 or 8.91 per cent menstruated on the first day, 225 or 74.26 per cent on the second day, 45 or 14.85 per cent on the third, and 6 or 1.98 per cent on the fourth day following estrus.

**DISCUSSION**

This study offers evidence that the common belief among livestock men and veterinarians that a heifer or cow which menstruates a few days after service did not conceive is erroneous. These data show to what a surprising degree this supposition is in error. The data presented reveal that of the 100 heifers which were bred, 61 conceived and that 85.25 per cent of those conceiving also menstruated. A group of 100 cows bred resulted in 72 conceptions and 69.44 per cent of those conceiving also menstruated. It was found that the frequency of menstruation in heifers is greater than in older cows. This may be due to the fact that heifers as a rule are more excited at heat than are older cows which may result in the genital organs becoming more engorged with blood. The genital organs of the cow also are longer and extend further forward and occupy more of an abdominal position as compared to the pelvic position in heifers and this may have a tendency to prevent the flow of the menstrual fluid from the vulva of some
of the older animals. Another point that might be mentioned is that the amount of menstrual fluid is possibly dependent on the thickness and toughness of the endometrium. This will vary with age and number of calvings and there will be some variation between individuals. The data presented indicate that of the 303 females that menstruated, 225 or 74.26 per cent passed off the menstrual fluid on the second day following estrus.

SUMMARY

Observations as to the external evidence of the occurrence of menstruation were made at six different times daily on each of five days following estrus, for four lots of dairy females each consisting of 100 animals. One hundred heifers and an equal number of cows were observed after estrus, when breeding did not occur, and 100 heifers and 61 cows showed evidence of menstruation. Two similar groups of 100 heifers and 100 cows were bred during estrus. Of the 100 heifers bred at estrus, 81 menstruated. Sixty-one of the heifers conceived and 52 or 85.25 per cent of those conceiving also menstruated while of the 39 that did not conceive, 29 or 74.36 per cent menstruated. Of the 100 cows bred at estrus, 61 menstruated. Seventy-two of these cows conceived, and 50 or 69.44 per cent of those conceiving also menstruated, while of the 28 that did not conceive, 11 or 39.29 per cent menstruated. The data do not indicate any definite relationship between breeding and conception as affecting menstruation. When external evidences of menstruation were observed a total of 303 of the 400 individuals menstruated and 225 or 74.26 per cent showed this menstrual discharge on the second day following estrus.

REFERENCES