

Heat Detection

One half of the pregnancy rate equation

Failure to detect cows in heat is the main source of reproductive inefficiency on most dairy farms. DHI data indicate that only about 40% of the heats which should be expressed are actually recorded. Combined with a typical conception rate of 40%, the formula shown below yields a pregnancy rate of only 16%.

Measuring reproductive performance

Commonly used measures such as average days open, first service conception rate, annual services per conception and calving interval can fail to detect changes in reproductive performance on a timely basis. Ultimately, the question of interest to dairy producers is, “How many of the cows eligible to become pregnant actually became pregnant in a given time frame?” Since the value is in the pregnancy, the most appropriate measure would reflect the rate at which pregnancies are occurring in eligible cows.

Recently, there has been much talk in the popular press about using pregnancy rate to assess reproductive performance. Pregnancy rate can be defined as the number of cows becoming pregnant in a given time frame as a percentage

of the cows eligible to become pregnant. A logical time frame would be 21 days, the typical length of an estrous cycle.

The pregnancy rate calculation above determines both how well cows are conceiving and how quickly they are conceiving. Furthermore, by subdividing the breeding program into 21 day intervals, the effect of any recent changes on the breeding program can be assessed. Pregnancy rate is often more simply defined as heat detection rate multiplied by conception rate without reference to any specific time interval. Although this ‘shortcut’ will sometimes give a reasonable approximation of the actual pregnancy rate, it can yield very misleading results, especially if typical DHI summary numbers are used. The reasons for this error include the exclusion of

culled animals, the exclusion of animals once they enter a bullpen, use of different time frames and different animals in the two parameters and the possibility of the same animal appearing more than once in a single 21 day time interval.

Heat detection

Three misconceptions have added to the challenge of catching cows in heat. These myths came about because early research studies were conducted with limited cow numbers. Current technology allows us to study the estrous behavior of more cows, more often. Recent research conducted at Virginia Tech has looked at over 5,000 heat periods in 20 different herds using the HeatWatch® system. This system allows for 24-hour continuous monitoring of estrus behavior and provides detailed information about the duration of estrus and mounting activity.

Myth #1: *Cows stay in heat an average of 12 to 18 hours.* HeatWatch records the first standing mount and the last standing mount for each cow. The average duration of estrus was actually only 8 hours. Individual cows varied a lot in duration, but herds did not significantly differ from one another. The duration

that Holstein and Jersey cows stand to be mounted by herd mates dif-

fered. Holsteins averaged seven hours, while Jerseys averaged nine hours. Over 50% of Holsteins stayed in standing heat for less than eight hours. In contrast, 35% of Jerseys had heat periods lasting more than 10 hours.

Myth #2: *Cows in estrus stand to be mounted 20 to 55 times.* Data collected from 1,110 cows (750 Holsteins and 360 Jerseys) showed far fewer mounts. In fact, the average number of mounts during the estrus period was only nine. Again, individual cows showed a wide variation in the number of mounts, and there were differences between breeds and less of a difference across farms. Holsteins averaged nine mounts, while Jerseys averaged 12 mounts. Almost 50% of Holsteins had less than five mounts, but over 60% of Jerseys had more than six mounts.

Pregnancy Rate =	
Percentage of cows detected in heat out of all cows eligible to be in heat during a 21-day period	x Percentage of cows inseminated during the same 21-day period that actually conceived

Myth #3: *Cows come into heat primarily at night.* Actually, data showed a uniform distribution of estrus onset throughout the day for both cows and heifers. Management events, such as milking and feeding, do have some effect on the onset of estrus, but these events did not significantly change the percent of cows coming into heat. An average of 4% of cows came into heat at any given hour of the day, and all but two hours fell between 2% and 6%. These peak times directly correspond with milking time and loafing time. In fact, the six highest peaks all occur during these times. At milking time, especially the midnight milking, cows leave the feed bunks and wait in wide gravel alleys for some time before they enter the holding area and before they re-enter their pens. At these times, the cows are not rushed in any way and more interaction with less distraction (caused by feed) encouraged estrus expression. The second highest peak corresponds to the time cows spend on dirt loafing lots. Again, they are away from the feed bunk and have increased interaction.

The bottom line

The pregnancy rate calculation proposed here allows an appraisal of not only how well cows are conceiving, but also how quickly they are conceiving. Heat detection is the most limiting factor in achieving high pregnancy rates. It is difficult to observe cows in heat because cows come into heat equally during all hours of the day, are not very active, and do not stay in heat very long. The equal distribution of the onset of estrus during the day combined with an average estrus duration of eight hours dictate that heat detection observations should occur three to four times daily, approximately six to eight hours apart.

Providing an environment that encourages cows to express heat and conducting frequent heat detection observations are essential to improve reproductive efficiency. Eight times out of ten, the area of reproductive management that needs improvement is heat detection. There are very few dairy farms that could not reduce the average calving interval and culling rate by spending a little more time and effort in detecting cows in heat.

source: Ray L. Nebel, Virginia Polytechnic Institute

Priorities for a Successful Heat Detection Program

- ✓ **Establish standard operating procedures:** Be sure your employees know when and where to watch for heats, what signs to look for, as well as who should be notified of cows in heat.
- ✓ **Use records:** Record every heat period and use breeding wheels, calendars, and heat expectancy charts to ensure special attention is paid to cows anticipated to be in heat.
- ✓ **Allow for group interaction:** Group open cows together whenever possible, as cows tend to congregate when approaching heat.
- ✓ **Minimize sore feet:** Mounting activity is more frequent in cows with 4 healthy feet. Provide a “concrete free” area for cows to spend at least a few hours daily.
- ✓ **More is better:** Observe cows three times a day, four times is better especially if performed every six to eight hours. Remember, the average heat only lasts eight hours.
- ✓ **Watch efficiently:** Cows are less likely to show heats during feeding or milking times. Avoid heat detection at these times, and ensure cows are not disrupted by the presence of an observer.
- ✓ **Location, location, location:** Make observations in areas where cows have good footing and few obstacles to hinder interaction.
- ✓ **Use aids wisely:** Heat detection aids, such as Kamar® or Beacon® heatmount devices, or paint/chalk should be used to supplement, not replace, visual detection. Be sure to manage the information these devices provide, and the heat detection system should be used for all eligible cows.
- ✓ **Use hormone treatments:** If hormonal treatments will be used, ensure the program is implemented correctly. It is especially important to observe cows three weeks after breeding to catch those that did not conceive.
- ✓ **Don't take shortcuts:** Write down heats and observe cows closely to ensure the cow is in heat.