



## DAIRY HERD FERTILITY

### CHALLENGE NOTE 2B - Heat Detection Aids

A high rate of heat detection is critical to achieving a successful breeding programme to artificial insemination (AI). While the only definitive sign of heat is a cow standing to be mounted, this is often difficult to see. Therefore it is becoming increasingly important to watch for the secondary signs of heat (see Challenge Note 2A: Heat Detection) and use aids to heat detection. This Challenge Note outlines the advantages and disadvantages of various heat detection aids available to dairy farmers.

## Contents

- Essential elements to good heat detection
- Breeding records systems
- Heat detection aids
- Physiological heat detection aids

### Essential Elements to Good Heat Detection

Two essential elements to good heat detection often overlooked are clear unique cow identification and an efficient breeding record system.

- Cow identification - While eartags are used in many herds, they are often difficult to read due to dirt or their small size. Freeze branding with large digits allows cows to be permanently identified with one number that can be read at a distance, helping to avoid recording errors. However, cows must be kept clean for them to be effective.
- Breeding records system - Previous records of heats and services can be used to anticipate future heats and provide an excellent starting point for heat detection, prompting closer observation of cows three weeks later.

### Breeding Records Systems

All herd recording systems can be useful aids to heat detection but to be successful systems they must be:

- 1) easy to use;
- 2) kept up to date;
- 3) available to all farm staff;
- 4) actively used.

The effectiveness of recording systems as aids to heat detection is variable. Paper-based systems with cows listed in calving date order are probably the most widespread, but do not allow easy identification of cows due on heat. Recording heats and services in a diary carried around in your pocket or on a circular breeding board is much more effective. A 21-day breeding diary identifying cows in heat three weeks previously has been developed for the Dairy Herd Fertility Challenge for this purpose.

Some computer based herd management packages can generate action lists of cows anticipated on heat, but also retain historical information for a more thorough analysis of herd fertility. However, a combination of a good paper-based recording system and a pocket diary, 21-day diary, calendar or breeding board allowing anticipation of heats can be just as effective.

### Heat Detection Aids

A wide variety of heat detection devices are available, ranging considerably in both price and effectiveness:

- **Tailpaint** - Tailpainting is one of the cheapest and most effective aids to heat detection for cows at grass, though less effective indoors. While specially formulated paints are available for this purpose, bright coloured emulsion paint is just as effective (Figure 1). Tailpaint should be applied in a 10 cm wide strip on the cow's tailhead, firstly by brushing against the hair growth and then by brushing with the hair growth. It can be used on either the whole herd or on cows not yet pregnant.

Different colours can be used to differentiate between cows not yet served, cows served but not confirmed pregnant, etc. At each milking, cows should be checked for tailpaint rubbed off and re-painted as necessary, especially in wet weather. Paint should be allowed to dry before cows are returned to the field.



Figure 1: Tailpainting with coloured emulsion paint.

Tailpainting is generally most effective in relatively tight calving pattern herds at grass when more than one cow will be on heat at any one time. Tailpainting in conjunction with three observation periods (that is early morning, before evening milking and around 9-10 pm) will detect approximately 90% of cows in heat.

- **Pressure strips** - These are mount detectors glued onto the tailhead of the cow (for example, Kamar strips, Bovine Beacon). When another animal mounts the cow, the pressure exerted ruptures an internal chamber expelling brightly coloured dye into a larger visible plastic chamber (Figure 2). Pressure strips are useful for identifying cows that are difficult to spot on heat, but are a little more expensive than tailpaint. Like tailpaint, they should be checked at each milking. Once activated they are no longer useful.



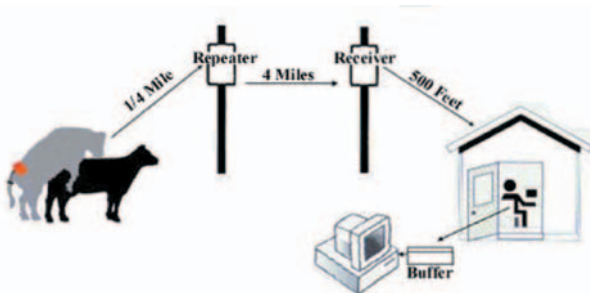
Figure 2: Pressure strips.

- **Electronic mount detectors** - These are essentially an electronic development of the pressure strip, where a small electronic device slips into a pouch glued onto the tailhead of a cow. The device incorporates a switch or button that is pressed during mounting activity. The simplest devices (for example Eco-Dec, MountCount) require a number of mounts to activate the device which then flashes or beeps to indicate cows in heat, the number of sequential flashes being proportional to the number of hours from onset of activity giving an indication of when to inseminate (Figure 3).



**Figure 3:** Electronic mount detectors which

More complex electronic devices (for example, HeatWatch) transmit a unique radio signal when depressed which is linked to one individual cow. Signals received are logged on a computer based herd management system with date, time and duration (Figure 4). These systems are currently being tested on research farms and have had limited use to date on commercial farms, and like all electronic systems of heat detection are more expensive heat detection aids.



**Figure 4:** The Heatwatch System.

- **Pedometers** - These devices are attached to the leg of a cow to monitor activity (Figure 5). Since cows on heat are generally more restless than usual, the pedometer will pick up increased activity compared to the average for that cow and the herd as a whole on a particular day, indicating possible heats.

Pedometers are available commercially and cost approximately £10,000 for a 100-cow herd. Results from Greenmount Campus indicate that calving interval has been reduced by five days and 2% fewer cows were culled not-in-calve, allowing the system to be paid within 4-5 years.



**Figure 5:** Pedometer to monitor cow activity.

- **Surveillance-sensor applications** - Systems using optical-electronic sensors, digitised video surveillance and integrated software are currently being developed for the detection of heat. One such system is being developed by Fionn Technologies in Northern Ireland and is being tested at the Agricultural Research Institute. However, it is likely to be some time before it is commercially available.
- **Other electronic systems** - Numerous other systems of aiding heat detection have been considered including temperature monitors, closed circuit television (CCTV) and time-lapse photography and milk sensors. However, such systems are often prone to false positives due to other factors influencing the results, for example bullying, over-crowded housing etc.

### Physiological Heat Detection Aids

Other aids to heat detection linked to animal activity and hormones include:

- **Teaser bulls and detector animals** - Vasectomised bulls incapable of breeding a cow can aid heat detection. Teaser bulls are routinely used in the Republic of Ireland where heat detection rates as high as 84% have been reported. Small dairy herds or herds with spread calving patterns could benefit most from the use of detector animals as cows are difficult to see on heat. However, such animals should only be used for one year before replacement, and like bulls they may be dangerous, favour specific cows and transmit sexual disease. Beef cross animals should be used as teasers as they are generally less aggressive.
- **Milk progesterone testing** - Progesterone concentrations fluctuate during the oestrous cycle but are low in the days around time of heat (Challenge Note 4B: **The Oestrous Cycle**). The measurement of milk progesterone has been used to assess other heat detection aids. Progesterone testing kits are available and routinely used by veterinary practitioners as part of herd fertility programmes, but the results need careful interpretation as low milk progesterone concentrations do not necessarily indicate that a cow is on heat.

Biochemical sensors for measuring milk progesterone concentrations in-line in milking parlours are currently being developed. These should allow the development of action lists of non-cycling cows and cows likely to be on heat.

- **Scoring systems based on secondary signs of heat** Scoring systems based on secondary signs of heat (see Challenge Note 2A: **Heat Detection**) have been developed in Holland to aid heat detection for housed cows. The herd is observed for a specific number of periods each day for a specified duration each time. Each secondary sign of heat has an allocated score and the sum of these scores for individual cows during a 24-hour period is compared with a threshold, above which a cow is assumed to be on heat. These systems are both practical and accurate for researchers, and are informally applied by many dairy farmers with high standards of stockmanship in Holland.

### Rules for Good Heat Detection

It must be remembered that all the aids and devices discussed in this Challenge Note are only aids to heat detection and that they should be a supplement to visual observation of heats. Cows should be observed for signs of heat activity from at least twice a day for at least 30 minutes each time (see Challenge Note 2A: Heat Detection).

## Summary

- Shorter heats with fewer mounts has made the use of heat detection aids more important.
- Two key elements to good heat detection are clear unique cow identification and an effective system of keeping breeding records.
- Anticipation of future heats based on previous heats and services is one of the most effective aids to heat detection.
- A wide range of heat detection devices are available, ranging from the cost effective use of tailpaint to sophisticated electronic systems.
- All the aids discussed in this Challenge Note are aids and are no substitute for visual observation of heats