

# Pedometry to Improve Reproduction

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## Factsheet

ORDER NO. 07-071 AGDEX 410/20 DECEMBER 2007

Pedometry offers the opportunity for medium- to large-sized dairy herds to improve heat detection and, at the same time, reduce dependence upon labour. A pedometer is a motion-detecting and -recording device, one of several precision dairy management tools that are providing opportunities to save labour, and improve individual cow care and management through the use of technology.

### HEAT DETECTION

Heat detection rate is a key factor in determining pregnancy rate and reproductive success in a dairy herd. This area has the most opportunity for improvement in dairy herds. Heat detection efficiency in dairy herds is less than 50%, and failure to accurately detect estrus costs the dairy industry millions of dollars each year.

The decision to breed a dairy cow is dependent upon using one of three management systems:

- systematic observational heat detection
- synchronization and timed artificial insemination (AI)
- use of pedometry or activity monitors

In high-producing cows, the period of mounting activity lasts an average of 5.8 hr, and some cows only stand to be mounted one to two times per heat cycle. Accurate heat detection requires observation of the herd by a trained individual three to four times per day, seven days per week. The biggest challenge to systematic heat detection is to be able to carry out observations consistently when required every day.

Synchronization protocols and timed AI, on the other extreme, offer excellent control and timing of breeding, as well as the opportunity to schedule workload, and addresses some of the 20% of cows that are anestrus in early lactation. The downside is cost, the need to maintain strict protocols and the reliance on drug treatments.



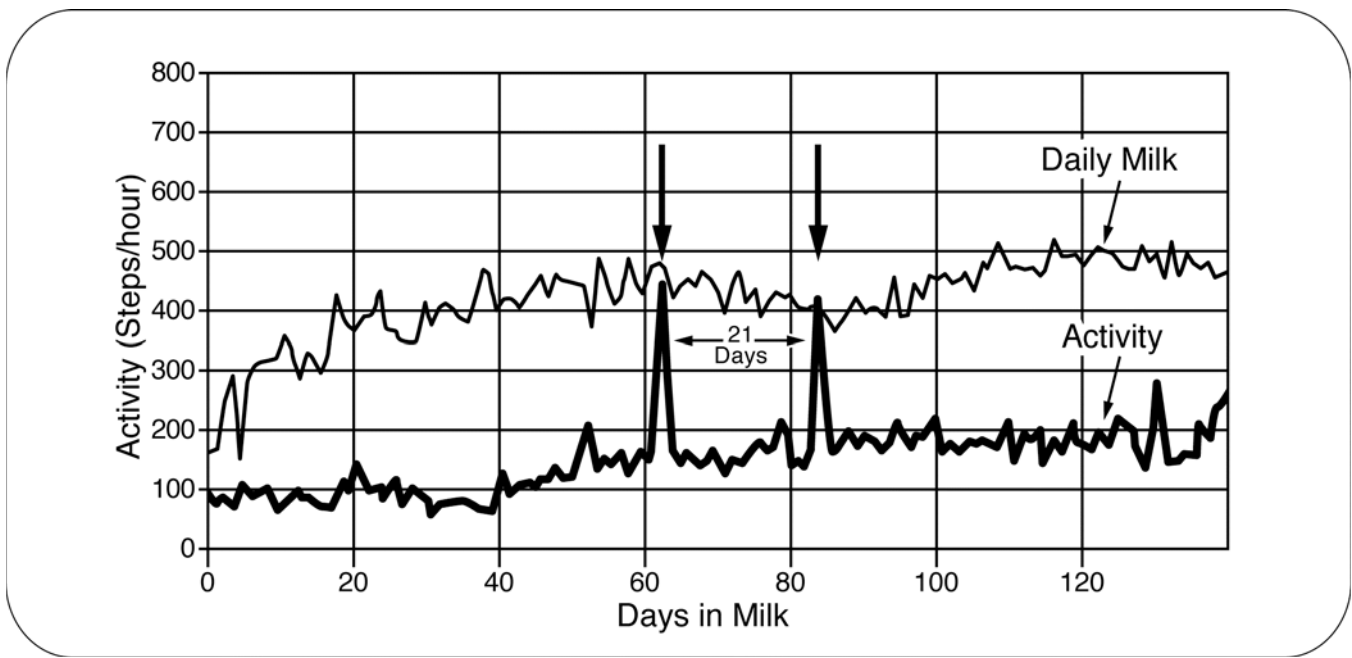
Figure 1. Activity monitors may be neck- or leg-mounted.

### HOW ACTIVITY MONITORS WORK

A pedometer is mounted by a strap around a cow's lower leg to detect and record motion such as walking. An activity monitor is attached with a strap to the cow's neck (Figure 1). The pedometry data in the monitors on each cow are accessed by a reader device, and the data are recorded in a dedicated computer.

Software is used to create reports on the activity of each cow over previous time periods. Cows show increased activity prior to the onset of standing heat by a factor of two to four times normal. Cows should be considered for breeding within 12–24 hr of being identified with increased activity by the pedometer system.

Pedometers and activity monitors provide the opportunity to identify cows coming into estrus while reducing the dependency upon labour. Studies have shown 80%–85% heat detection rates with pedometers when one animal is in heat and up to 90% when two or more are in heat.



**Figure 2.** Spikes in activity associated with heat cycles compared to days in milk.

### SYSTEM COSTS

Initial investment in a pedometer or activity monitor system can be significant, at about \$14,000 for a stand-alone system or an additional \$30,000 if added to an existing parlour ID system. Prices will vary, depending upon features of the system, number of readers and number of monitors. The initial capital cost can be justified in improved heat detection and labour savings.

With arm's length farm labour costs of \$13–\$16/hr, an observational heat detection program costs about \$6,000 per year. At 6.5% interest over 7 years, a \$30,000 investment in an activity monitor system would break even in labour replacement costs alone. Investing in a \$14,000 standalone monitoring system would pay if labour on the farm is valued at \$8/hr or higher.

Typically, activity monitors attain better heat detection rates than strictly observational methods, which would be further justification over savings in labour costs. Figure 2 shows how the cows activity levels spike associated with heat cycles compared to her days in milk.

When compared to a synchronization program, strictly on a cost-per-cow basis, the activity monitor program tends to be much cheaper and also has some economies of scale, which is not the case with synchronization protocols.

Other benefits of an activity monitor system include the tracking of activity over a number of days and its

integration with other production information on each cow to assist in management decisions. Sudden decreases in activity may indicate the onset of lameness or other illness. Other patterns of activity, such as increases followed by decreases, may be related to metabolic disorders.

### SUMMARY

Pedometers or activity monitors provide an alternative for heat detection in freestall-housed dairy herds, especially as a replacement to labour in a traditional visual heat detection system with as good and frequently better heat detection rates.

Pedometry systems tend to be integrated with milking parlour data systems, although some may be stand-alone as well. Pedometer systems have a higher capital cost, but they are a reasonable economic alternative to visual heat detection with its costly labour component, or a synchronization-based program with less reliance on injections and high associated costs per cow.

Pedometer/Activity monitor systems and related software provide valuable management information, along with other production data, for managing the dairy herd.

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POD  
ISSN 1198-712X  
Également disponible en français  
(Commande n° 07-072)



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