Dairy Australia

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Managing automated heat detection under different calving systems

CASE STUDY 04
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Heat detection is an important driver of reproductive performance when using AI to join cows, so it must be done well. Cows that are not mated when they should have been due to a missed heat effectively have a 0% conception rate for that heat, as do cows AI'ed when they are not actually on heat. For any calving system, be it seasonal, split or year-round, heat detection is a critical task during the AI period.

Manual heat detection requires enthusiasm, dedication, time and skill. It is usually performed during the morning and afternoon milking periods, which ties extra labour to the dairy in many herds. Ideally paddock observations during the day are also made to help pick the cows with a weaker or shorter heat display but this is often impractical in large herds. It is challenging enough to be 100% accurate with every cow during the intense AI period in seasonal herds, but even more so in year-round herds where this job needs to be done every day of the year. Many farmers are turning to automated heat detection systems to assist them identify cows for AI. Automatic heat detection systems save time and are often more accurate than many farmers' manual systems. They can be a useful aid for improving reproductive performance.

This fact sheet combines the experiences of two farms with different calving patterns to highlight the benefits of automated heat detection systems: Brian and Elizabeth Chappell along with Brian's mother and stepfather, Robyn and Steve Mathers operate the Fairdale Jersey Stud near Coraki on the Far North Coast of NSW with a year-round calving pattern; Toby, Lyn and Nick Leppin milk a seasonal calving herd in the hills at Bena, South Gippsland, Victoria.

Table 1 Farm Description Fairdale Jersey Stud

Operating arrangement	Share-farmer
Business Phase	Growth
Effective milking area	180 hectares
Cow numbers	450
Breed	Jersey
Feeding system	Grain at milking time, partial mixed ration on a large feed pad
Production	18-20 L per cow per day
Calving pattern	Year-round
Joining length	9 weeks
Empty rate	14%

Table 2 Farm Description Leppin Farm

Operating arrangement	Owner/share-farmer
Business Phase	Steady State
Effective milking area	140 hectares
Cow numbers	380
Breed	Red
Feeding system	Grain at milking time
Production	536kg MS per cow per year
Calving pattern	Seasonal
Joining length	12 weeks
Empty rate	11%

The Fairdale Jersey Stud has around 450 Jersey cows. which are fed grain at milking time and receive a partial mixed ration on a large feed pad adjacent to the dairy. Cows graze tropical and/or rye grass pasture in varying combinations and quantity depending on the season. The average milk production is 18–20 L per cow per day. Cows calve all year round and most pregnancies are to AI from natural heats. Bulls are only used for repeat breeder cows and this is facilitated by hand-mating as the bulls do not run with the herd. Pregnancies are assumed by non-return to heat. Accurate heat detection is required to determine both the cows that are in season and the cows that are pregnant.

The team at Fairdale Jersey Stud have always worked hard to achieve good reproductive performance. However, they realised that increasing effort was required to achieve their desired results for heat detection. Cows were observed for heat multiple times a day for periods of 10–20 minutes at a time. Observations were made: when collecting the cows for morning milking; on the feed pad; when moving the cows to pasture; in the grazing paddock; when bringing the cows back to milking in the afternoon; and following the afternoon milking. Visual heat detection consumed much time and required commitment and diligence but even with frequent observations, the large size of the herd made it difficult to spot every cow on heat.

In August 2017, Fairdale purchased an automated heat detection system. The decision to invest in automated heat detection was driven more by a desire to save time and effort spent on manual heat detection, rather than a need to improve reproductive performance. This decision proved timely–shortly after the system was installed, Robyn, who did the bulk of heat detection, became ill and was no longer able to observe the cows.

The Leppins milk around 380 red-breed cows and the herd calves between mid-July and the end of September with a mating period of 12 weeks. Toby managed heat detection for many years, which meant he was tied to the farm because he had to be present in the dairy to identifying and draft cows on heat during mating. Both Toby and Nick sought a new way to heat detect as Toby was winding back from day to day management of the farm as Nick was stepping up. Nick was also keen to find a solution that offered him more flexibility with his work day.

Which system?

There are many heat detection systems on the market, with similar capabilities, pricing and quality. However, the compatibility of systems with herd management programs, milking systems, drafting gates etc. is variable. Being compatible with a farm's existing infrastructure is an important requisite.

Figure 1 Leppin farm exit race with Jantec autodraft system

For this reason, the Leppins chose the MooMonitor automatic heat detection system. As the MooMonitors were able to 'talk' to their Jantec herd management software, the heat detection system could be easily integrated with the auto-drafting and herd management capability of the farm. Other important considerations were cost, desire for easy maintenance and external collars that could be reused. Their system was installed in 2014.

The Fairdale dairy has a DeLaval milking machine, but as they did not use any herd management software, nor have a drafting gate or milk meters, they were not bound by these compatibility limitations. The system they purchased was Heatime®Pro, based on SCR Dairy technology, now owned by Allflex and sold in Australia by Semex. They choose these collars because of the additional health-associated measures such as rumination, feeding and resting time, in addition to the heat detection function. They expected these extra features would be helpful in identifying events such as calving, metritis, mastitis, milk fever and three-day sickness.

Their first purchase was a special starter package that covered the cost of initial setup and 100 collars. Their original idea was to limit the number of collars and transfer them between cows so they were only used for the time starting near the end of their voluntary wait period until confirmed pregnant. However, they soon realised that moving collars between cows was time-consuming and awkward so more collars were purchased as the budget allowed. They now have 400 collars for the 450 cows in the herd.

Figure 2 Jersey cow with electronic collar on Fairdale Stud

Figure 3 Brian studying health alert activity data for the herd

Benefits of automated heat detection

Nick knows they have benefited from the MooMonitor system. Installation has freed an extra person from the dairy during mating. In fact, they now can take a few days away from the farm during mating if desired, by simply booking a relief milker and an external AI technician knowing the system will present the cows on heat. The MooMonitor provides the flexibility Toby and Nick were seeking, which is important when needing to attend to other essential jobs during the busy mating period such as cutting silage.

The automated heat detection has enabled them to easily AI the cows for the full joining period so they no longer need bulls. This is a benefit in itself and ensures they always have plenty of replacements for their herd. It has also generated an extra income stream from late-mated cows joined to produce specialist crossbreed (surplus) calves: Angus cross calves are in strong demand and return a premium, and they also occasionally contract mate some of their late-heat red breed cows to Jersey to fill orders from other dairy farmers.

The Heatime®Pro system flags when a cow starts its heat, when peak activity is reached and when heat activity begins to decline. This information is displayed and used to identify the optimal window for insemination to give the best chance of a conception. All this information helps Brian to decide if he should draft the cow for AI at the first milking following a heat alert or to delay insemination for a later milking.

The rumination monitoring has been a useful tool for observing changes in cow diet and health. Brian finds that the system can detect most sick cows, although it also creates a lot of health warnings that are not important. Because Brian spends a lot of time with his herd, he will often notice a cow experiencing an overt health event such as milk fever or calving, before the computer generates a health alert. This is because the cow needs to display a change in behaviour for a few hours before the system will trigger an alert. For health issues that have a slower onset and result in more subtle changes in cow behaviour, such as metritis, mastitis or an LDA, the computer will normally create an alert well before they are noticed in the herd.

Installing

Setup involved the installation of system software, placing antennas strategically and connecting the antennas to the computer. Brian's antennas are both located on the milking shed roof but it was more difficult for Nick due to the hills on his farm. Some trial-and-error was involved before Nick found the best spots for his base stations. Once the collars are applied to the cows, the collar must be matched to the computer. This had to be done manually for Brian's systems although some systems allow you to scan the collar and enter the cow identification using a smart phone. The SCR collar system sends the data at frequent intervals over distances of up to one kilometre or more to the receiver antennae atop the milking shed. This creates a near real-time flow of data and allows timely detection and decision making–especially for health alerts. The reception is reliable across most of the paddocks the cows graze and the feed pad, however there are several paddocks with limited reception. When grazing these areas, data is not retrieved until the cows come closer to the shed. This is not a big problem, but it reduces some of the real-time monitoring benefits of the system when cows are grazing distant paddocks. Nick's system only needs the data to be uploaded before the first cow reaches the exit at the rotary during each milking. The data is analysed and adjusted to the average amount of walking by each cow to then identify those cows with a surge in activity.

Tweaking

Adjusting the sensitivity of the system is important. So you need to understand how your system works and have some familiarity with its operation in your herd.

Nick's system is now working well and he is comfortable with the technology and the software. Nick does caution that you need some computer savvy if you are to control your system and not have the system control you. Whilst Nick is no computer boffin, he has the computer skills that he needs. He does wonder however, how a farmer without these skills would cope.

Fairdale did not have any previous herd management software but Brian has quickly taken to using the new platform. It took time to enter all the herd information into the program but it was well worth the effort. He enjoys the freedom of accessing herd and individual cow information from his smart phone app. Data entry is normally done on the base computer as his system does not provide full cloud computing unlike some other standalone systems. Such systems require cellular data reception (e.g. 4G mobile reception) at the receiver station. Brian's system can allow remote data entry if there is internet access to the base computer by, for example, TeamViewer.

Nick spends a lot of time maintaining his system, such as transferring collars from culled cows to replacement heifers, replacing flat batteries, fixing broken collars and keeping the records up to date on the computer. However, this is different work to the time previously spent manually checking his cows for heat and there is some flexibility in when this new work has to be done. Nick estimates he services around five to six collars a day during the first month after turning them back on prior to the start of mating.

Challenges of converting to an automated system

Setting alarm trigger points

Nick found that his cows had different activity levels depending on the stage of joining. In the first two rounds, most heats were strong, with high activity, whereas he found that as mating progressed the cows often barely exceeded or just fell below the activity trigger point. Nick studied these late-mating cows intensely. He was sure he found cows that were on heat but who were below the trigger point so not drafted out by the system. Nick found that the factory settings were too strict and he was missing cows on heat so he adjusted the trigger points to make the system more sensitive. He now understands the system is not 'set-and-forget' and does not rely solely on the auto-draft. He looks at the plots and checks what the computer tells him against what he sees on the cow. He checks drafted cows for rub marks and assesses body condition before he AI's them. He still keeps an eye out for cows showing signs of heat. Whilst the MooMonitors are monitoring the cows, Nick monitors the MooMonitors. He sees it as another piece of information to help him manage heat detection better.

Brian has also adjusted a few alert settings to suit his system. He reduced the sensitivity of distress alerts from high to regular to reduce the number of health alerts he was receiving and conversely, he increased the sensitivity of heat detection by lowering the alert threshold. He is happy to have a lot of heat alerts, including a few cows not on heat, rather than missing some cows truly on heat. Brian reviews each cow with an alert based on visualising their activity graph history, days in milk, days since last heat and visual observations such as rub marks. It sounds difficult, but is actually a quick and simple process and an accurate way to detect false heat alerts. This combination of setting the alert sensitivity high and reviewing the alerts manually seems to be the most effective way for Fairdale to get the most value out of their heat detection system.

Collars

Fairdale Stud has had no issues with cows losing collars, which Nick did initially because he was afraid of applying the collars too tight. This resulted in some collars slipping off the cows' heads whilst their heads were down grazing. Lost collars were a big hassle as they had to be identified (missing read), the actual collar has to be found in the paddock and then returned to the right cow.

Cows sometimes rub their necks against concrete feed troughs, but there has been no damage to collars or trauma to cows.

The Heatime®Pro sensor is fully encased to ensure durability and weatherproofing, and therefore, the battery cannot be changed. The collars come with a five-year full replacement warranty and are expected to last on average for seven or more years.

The MooMonitor batteries have a limited life so Nick decided that leaving the heat detection collars on all year simply wasted batteries outside of mating. By turning the collars off outside the mating period, the batteries now last two–three years instead of only one year, resulting in savings in battery costs and time spent replacing batteries. Nick turns the collars on one month before mating to allow time for any necessary repairs and to get a good handle on the cows' cycling patterns prior to mate-start.

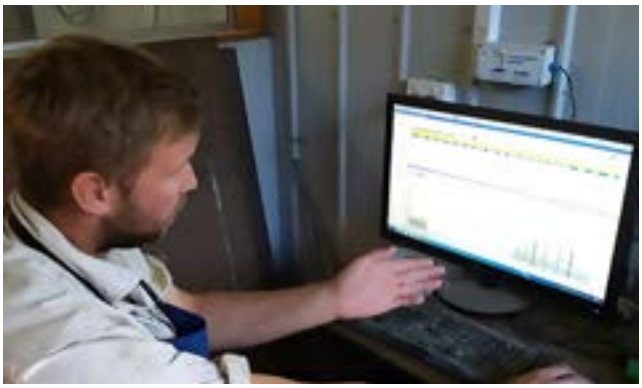
Figure 4 Cow with external electronic collar on Leppin farm

Things to consider

You need good service. Your local agents must know how the system is installed and how it has to be integrated into your system. This is a hardware skill. Nick thinks it is even more important for your local agent to be able to get the system's software working. This is about them being able to install and update the software, show you how to operate it and how to troubleshoot problems. It is important that someone from the company selling you the automated heat detection system can provide all of these services. You will need to learn how to drive the software and this is challenging, especially if you are not comfortable with computers. Farmers are often too busy to read manuals so need a skilled agent to show them how to operate the programs and demonstrate its features and capabilities. Some hand-holding during your first season is usually needed. These factors should be taken into consideration when deciding on your choice of system as it is important to be able to develop an effective and long-term service relationship with the provider.

This local trust was a factor in Fairdale's decision to purchase the SCR Dairy system. They had an established relationship with Karen, their local Semex representative and knew that they would receive help to install the system, iron out any operational problems and optimise the system for their herd.

Figure 5 Nick Leppin assessing cow activity



Verdict

Nick is convinced the benefits of his automated heat detection system outweigh their cost. He now has more flexibility in his management. He understands the role of automated systems, which support the farmer but do not and cannot replace the farmer. This thinking has him ready for the next automation suitable for his farm.

The Fairdale team are glad they invested in automated heat detection. They are confident it is working well and it is helping them to achieve their business goals. Now that the process of heat detection has been made easier, Brian and his team can see value in having an automated drafting system installed to draft off cows detected by the system. Fairdale have plans to upgrade the dairy so have delayed installing a drafting system. For now, Brian still must be present at every milking to identify which cows to draft manually as they exit. The purchase of an automated heat detection system may be just the first of a number of other strategic investments in technology for Fairdale. As they make further investments, the integration capability between each piece of technology will likely become a more critical part of their decision.

You will need to learn how to drive the software and this is challenging especially if you are not comfortable with computers. Farmers are often too busy to read manuals so need a skilled agent to show them how to operate the programs and demonstrate its features and capabilities

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