Electronic ID (EID) systems for cows

1. Introduction

Electronic cow identification (EID) systems use radio frequency to collect coded signals from devices attached to or implanted in the animal. This Quick Note explains how the signals are retrieved and describes some of the hardware available. It does not detail the various systems that can make use of the collected information.

2. Interpretation and relevance to Australian conditions

When linked to management databases, EID systems offer fast and accurate identification of cattle. They do not replace ID systems that rely on sight but can integrate with automated management systems that can do many of the cow management task automatically. Using an EID system, a range of herd management tasks can be automated, improving the data quality and reducing the labour required.

The National Livestock Identification Scheme (NLIS) uses EID to permanently identify livestock and maintains a national database to keep cattle movement records for quality assurance purposes. This system became mandatory in Victoria in January 2002.

3. Relationship to CowTime goals

EID when combined with a computerised herd management system can greatly improve milking productivity, particularly in large herds. EID can also make herd test day simpler and enables the automatic drafting of cows.

4. Features of cow electronic ID systems

General comments

EID systems facilitate the collection of data for management reports and allow individual cows to be targeted for attention whilst still on the platform. The automation of the data collection provides improved data quality, more data and reduces labour required for its collection. These data can then be used by a variety of software programs to provide management reports or control automated tasks. The usefulness of the data collected is very dependent on the sophistication of the associated control systems.

How they work

Most electronic cow identification systems in use in Australia use radio signals to transfer the information from tag to reader. These systems have the advantage of being able to work in dirty, dusty and moist environments and do not require line of sight. Generally frequencies are in the range 30kHz to 500kHz. While cheaper than higher frequency devices (300MHz and above) they do suffer from shorter read distances and lower operating speeds.
Typically there are three elements to the identification system: a reader, a transponder (ear tag, leg band, neck pendant or rumen bolus) and a data processing unit. Figure 1 illustrates the operation cycle.

Types of transponders (tags)

Transponders may be passive or active. Passive transponders are energised by the signal received from the read antenna. Once enough energy is stored, the transponder transmits the unique identification code back to the read antenna. Active transponders have their own internal power source and may collect cow information, such as activity, which is downloaded by the reading antenna at each interrogation. Cow activity can be used as an aid in oestrus detection.

At present, EID transponders cannot be programmed by the user but technology is moving in this direction.

Half duplex and full duplex

Communication between antenna (reader) and transponder is via one of two protocols. In half duplex systems, the reader sends a short signal about four times per second. The reader waits to receive a signal from the transponder between each transmission. In full duplex systems the reader receives information from the transponder while transmitting a continuous signal.

Key features to look for

Very few EID systems can give perfect performance and the expectations held for the system need to be realistic. Standards regarding the reliability of the equipment should be set out in a supply contract and be checked once the

installation is complete. The key indicator should be the number of tags 'missed' and farmers should expect that this figure is less than 2% of cows that go past the reader.

EID systems can significantly reduce manual data entry requirements but integrating the EID system with automated tasks should give the best return on the initial investment. Make sure the system chosen can save time on key areas that require labour at milking (or on other aspects of herd management). Examples of automatic systems made possible by EID include automatic drafting, sample ID for herd testing, individual feed rationing, automatic weighing, in-line milk metering, abattoir feedback and real time identification of cows that need special attention (withhold milk, 3 titters, vet checks, mating etc).

5. Potential challenges with implementation

Correct installation is required if potential problems due to poor performance are to be minimised. Electronic interference from electric motors, metal poles and rails, fluorescent lights and electric fences can interfere with the operation of EID systems. Antennas work best when installed on wooden rails or paneling to reduce interference.

The reliability of data is commonly affected by read failures and cows changing order between ID capture and the collection of other data. Generally if the transponder is read the identification will be recorded correctly. Incorrect identification of animals at reading is unlikely to occur unless the incorrect animal has been allocated to a transponder's number.

Poor antennae placement, broken or missing transponders, mud, excessive animal speed or unusual animal posture at the time of reading are the usual reasons behind a failure to read. Correct transponder orientation is critical to successfully read the animal ID. Ear tags give less reliable positioning than necklaces or leg bands and it is inherently more difficult to achieve perfect read rates.

An excellent paper on trouble-shooting, fixing or avoiding problems with electronic ID on farms was published by Eicker et al (2001).

6. Robustness of this information

This general information is designed to support a farmer's own research on commercially available products. Product reliability and the integration with various control systems vary widely around Australia.

7. References and further reading

Eicker, S., Stewart, S. & Rapniki. P. (2001) Issues with electronic identification in milking parlors. In "Milking Systems and Parlors: Planning and Managing for Quality Milk and Profitability", NRAES Publication 131, Co-operative Extension, Ithaca, New York, USA, pages 116-126.

Kondinin Group (2000) Electronic cattle identification. Farming Ahead No. 101, pages 68-78, May 2000.

Manufacturer product brochures

National Livestock Identification Scheme – Permanent identification device standard (Cattle). Meat and Livestock Australia Ltd., Locked Bag 991, North Sydney, NSW, 2059.

ISO 11784 and ISO 11785, International Committee on Animal Recording (ICAR).

CowTime Guidelines for milk harvesting - Chapter 5 & 9. edited by Klindworth, D. et al (2003). Available on the CowTime website www.cowtime.com.au

Figure 1:
When an animal with an electronic transponder enters the read zone, the signal from the antenna energises the circuitry in the transponder. The energised transponder emits a unique signal. The antenna senses the signal and sends it to the computerised data processing unit for decoding. Once decoded the animal identification can be displayed and/or utilised by other automatic systems.