ELECTRONIC IDENTIFICATION AND ITS USE IN THE BEEF INDUSTRY

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SUMMARY

Electronic identification (EID), automatic recording of weights and semi-automatic recording of other information, storage and processing power of the computer and electronic communications are the basis of information systems that will benefit intensive and extensive beef enterprises. To date the physical demands for the capture, storage and processing of data have prevented beef producers using this information. Such systems can also integrate information about the performance of the live animal, its carcass and genetic history. The improved decision making capability this information provides can make a significant difference to increasing reproductive performance and production of carcasses more suited to market needs and thus influence property productivity. EID coupled with automatic handling technology will enable information collection and treatment of cattle to occur in the paddock in the absence of humans.

Investigations carried out so far show that EID is capable of meeting these expectations. However, its widespread adoption, and hence benefit to the industry, is limited initially by such factors as price, hardware incompatibility and lack of software. Suggestions are made about overcoming these difficulties. Pending further research implantable transponders should be placed in the ear beneath the Cartilagos scrutiformis tissue.

Keywords: automatic, identification, electronic, management, cattle.

INTRODUCTION

The time and resources required to collect, store and process information have prevented all except scientists, stud breeders and some enthusiastic producers from keeping anything but a minimum of written records. However, the rapid advance in electronic technology is making possible comprehensive, easy record keeping. Identification of individual animals is fundamental to a high level of herd management for it links together the history of the animal from birth to carcass. Once an animal can be identified it can receive individual evaluation and treatment. This paper describes the role of EID as the basis for information systems that can provide for the management of beef herds to meet the needs of developing markets. Reference will be made to work being carried out by the authors and its significance to the adoption of EID.

ELECTRONIC IDENTIFICATION

Current identification methods, for example ear tags, tattoos and branding, have the disadvantages that they require constraint of the animal for reading and are subject to loss and error in reading. In addition branding mostly only identifies groups or properties. These disadvantages are magnified in any situations where cattle are unaccustomed to handling. Ear tags are unsatisfactory for long term identification because losses can be as high as 10%. Transcription errors can occur even with the most conscientious operator.

EID is a non-manual means using electronic technology to obtain the individual identity of an animal. Radio transmission is currently used for animal identification. Identification devices were large and mounted on collars. They are now much smaller which allows them to be implanted into the animal or mounted on objects attached to the animal, for instance ear tags. Interrogation involves a reading device (reader/interrogator) signalling the identification device (transponder) causing it to transmit back its unique number. Transponders may be battery powered or ‘passive’. With passive devices the energy to transmit is obtained from the interrogator signal. The devices being used by the authors are ‘passive’.

EID provides accurate identification with little effort and labour and because there is no need to restrain the animal for reading, it suffers minimal stress. Handheld readers can interrogate transponders in stationary animals and readers with antennae attached to the side of a race can interrogate transponders in moving animals. Interrogation distances range from 10 cm to 100 cm depending on the electronics in the transponder and its orientation to the antenna; stationary readers provide longer interrogation distances.

Beef producers perceive a need to identify animals in the paddock or yards at distances much greater than 1 metre. Because of energy constraints it is unlikely that implantable passive devices will be capable of interrogation at long distances. Thus, for a long range reading it appears that supplementary
devices, which may have a short life span, are required. However, it will be necessary for the interrogator to be able to focus directly on the animal being identified.

**Sites for attachment**

It is unclear which is the most suitable site for attaching transponders to beef cattle. The site must allow for ease of implanting, ease of reading both in the live animal and the carcass, protection from damage, and provide long term security. In addition, guaranteed easy recovery after slaughter is essential to ensure the transponder or its parts do not enter the food chain. Transponders mounted externally on animals (for example, on cartilage) are easily interrogated but are prone to damage and loss. Implantable transponders have the potential to provide reliable long term identification. We are presently investigating the lodging of transponders in the rumen, anal region and in the ear of cattle. Bloat capsules containing transponders placed in the rumen have so far been successfully interrogated over a 3 month period. The anal region is very satisfactory for ease of implanting and reading, and protection of the transponder, but difficulty with recovery precludes its commercial use at present (Hasker et al. unpublished data). Because of this difficulty this site should only be used for research purposes until reliable recovery procedures are developed.

We investigated 3 ear sites for implanting; under the skin at the base of the back of the ear; under the skin at the middle of the back of the ear; under the cartilage (Cartilagophyllum scrutiformis) at the base of the ear. Under the cartilage offered best protection, ease of implanting, retention of transponder, and equal ease of recovery. Our results so far indicate the importance of good implanting procedures. Only 1 transponder of 168 implanted into open range weaner heifers has failed to read over a 6-month period. In addition to the heifers, about 5000 head of feedlot cattle have been implanted. Initially, at the feedlots, 28% of transponders in identified animals could not be interrogated at slaughter. These failures post stunning, comprised about 8% due to breakdown of the transponders and the remainder to losses of the implant from the ear. Subsequently, greater care with the implanting procedure has reduced losses to zero while failure due to damage has remained at about 8%. The higher rate of damage in feedlots compared to the open range heifers may be due to the close confinement of cattle. Because of the reliability of recovery we currently recommend that the Cartilagophyllum scrutiformis site be used for commercial purposes.

**DATA CAPTURE, TRANSFER, STORAGE**

Using EID requires the adoption of electronic technology. Identity and weight can be collected automatically and other information collected semi-automatically by keying it into a data capture device such as a handheld, laptop, or desk top computer. Data capture is implemented by interfacing a data capture device to the EID reader and weighbridge. Some weighbridges can interface with EID readers and provide for keying in of other information in coded form. This information may be transferred to an office computer for long term storage and processing using a cable and transfer program. Alternatively, the data capture device can have 2 way communication by radio with the office computer. The data capture device does not have to store all the information held on a herd. The stored information relevant to a group of animals to be handled/treated may be selected and transferred from the data base on the office computer to a data capture device and, after updating, transferred back. Because handheld devices are extremely portable the authors are assessing the practicability of a touch-screen handheld computer for data capture. This is easy to use, as screen displays are limited to prompts and outlines of relevant keys. Advantages are portability, the user has no need to be familiar with a keyboard and the areas representing keys can be larger than the size of conventional keys.

EID used in conjunction with a system of controlled watering points and spear traps (Cheffins et al. 1990) and walkover scales allows the automatic capture in the paddock of information on individually identified animals. This information can be transferred periodically either to a computer taken to the recording point or by radio communication with an office based computer. Such monitoring would provide early indications of changes in growth patterns and the sudden loss of weight of a pregnant cow would signify the birth or miscarriage of a calf.

**POTENTIAL BENEFITS**

EID provides the first practical means for gathering data in extensive situations and makes possible the use of management practices which will increase productivity. A study by Round (1987) in a north Queensland cattle herd shows that using management practices based on data collected manually from individually identified cattle increased pregnancy rates from 77 to 92% over 8 years. From a study of the performance of breeders in the Darwin pastoral district O’Rourke et al. (1991) developed a model to predict conception rates, which required the identification of individual animals. The genetic improvement of the Queensland herd stands to benefit greatly from technology which facilitates using
records. A survey of the Queensland beef industry indicates that over one third of replacement bulls in Queensland come from commercial herds and that records are kept in less than half of these herds (Daly and Hasker 1986).

EID makes possible the collection of lifetime and carcass information on individually identified animals and thus the development of comprehensive management information systems based on individual animal data. An example of this is that by the addition of individual identity to Ausmeat feedback sheets correlated with property generated data, producers can determine whether animals showing non acceptable fat coverage or inappropriate carcass weight were treated differently from their compatriots. This provides a basis to make management changes to improve productivity. Producers who calculate average daily gain and collect individually identified carcass information can determine those strains which perform best, purchase from a particular source or decide whether paying a premium is worthwhile.

**COMMERCIAL APPLICATION**

EID offers an alternative to traditional means of identification. However, the price of transponders (currently $A5 - $12 each) will limit its adoption for purely identification purposes. Its adoption to gain the broader advantages mentioned earlier is also restricted by the lack of compatibility among the different makes of hardware (5 currently in Australia) and availability of suitable software.

An example of a problem caused by incompatible makes of hardware is the impracticality of installing different makes of readers at any 1 abattoir. Thus it seems highly desirable that only a few makes be available and that their readers be capable of interrogating more than 1 type of transponder.

Software to implement a comprehensive information system would include a database and flexible processing which would probably incorporate a spreadsheet capability. A problem that will be encountered is that data formats from potential non property sources (AUS-MEAT, BREEDPLAN) will differ. This highlights the desirability for uniformity of data formats within the industry.

So far we have shown under commercial conditions the successful implanting and reading of EID devices and automatic capture and correlation of liveweight data in live animals, and in an abattoir the interrogation of individually identified bodies and automatic transfer of this identity to Ausmeat feedback sheets. For the commercial benefits of EID to be fully realised, research workers, the beef industry, authorities, EID manufacturers and software suppliers must consider the following:

(i) establishing the most suitable site for implanting transponders, their interrogation and recovery;
(ii) installation of EID interrogating capability in abattoirs; (iii) further development of the capability to transfer information electronically from abattoir to producers and for more abattoirs to install this capability; (iv) developing procedures in abattoirs to ensure rapid low cost reliable recovery of transponders; (v) development of suitable software; (vi) standardising of data structures and codes used within the industry; (vii) development of transponders and interrogators capable of long range interrogation; (viii) communicating to overcome problems inherent in having a number of different types of transponder requiring specific interrogators.

**EID numbering**

A proposed format in the AMLRDC Report 90/02 incorporates individual property identification for tracing animals to their most recent owner. While a uniform national numbering system for the livestock industries is a desirable objective, this will fail to achieve its traceback purpose because cattle in northern Australia are extensively traded. It will also inhibit the adoption of EID technology by complicating the manufacture and supply of transponders and increasing costs. The use of EID in traceback (which is essentially short term or transactional) should be considered separately to the uses outlined in this paper and which are more of a long term nature. The transactional use can only be best served by implementing a cheap means of EID incorporating a property number. A coding system printed on a sticker which could be applied to a tailtag or the hide of the live animal would be such an example. A possible contender is the Cyclops system being developed by the Centre for Electronics in Agriculture, Armidale, New South Wales. A simple number would suffice for long term use. However it is essential that no transponders marketed in Australia have duplicated numbers.

**REFERENCES**


