Abattoir sheep carcase tracking system
at Hillside Meats

Key points

Producer feedback on individual animals instead of lot is a seen as a critical component for on going efficiency and genetic improvements.

This project demonstrated the ability to automatically link individual live sheep RFID eartags to carcase gambrel RFIDs through the slaughter process.

The benefits to producers include:

- Individual animal feedback is given to the producer when lambs are supplied with RFID ear tags
- Comparing different production management regimes for individual animals
- The identification of superior sires for growth and leanness which can significantly increase gross margin and decrease turn-off time

The benefits to processors include:

- More effectively monitoring the performance of lambs consigned by individual producers
- Developing preferred supplier networks in addition to the supply chain working together to more effectively meet end user requirements
- Increased traceability

The principals of the tracking system can be adapted to most small animal abattoirs.

There is also potential for RFID to extend traceability into the boning room to allow measurement and prediction of carcase yield and the relative profitability between carcases and between cuts on carcases.

Case study

The aim of this project was to demonstrate a system linking live sheep carcase data via Radio Frequency Identification (RFID) on a traditional (non-inverted) abattoir chain.

Hillside Meats owner Peter Trefort said "I wanted to be able to monitor the performance of individual lambs supplied to us by the producer members of the 'Q Lamb' alliance. This was so that we could provide them with better feedback on carcase performance."

"The Q lamb alliance and Hillside Meats have a very innovative partnership however feedback to suppliers was limited to carcase information by lines of sheep only. Information could not be related to the individual live animal." Mr Trefort said.

Project Development

An automatic sheep carcase tracking system was designed to enable individual live sheep fitted with Electronic Identification (EID) ear tags to be tracked throughout the abattoir and linked to their individual carcase data. The development and demonstration of the Carcase Tracking System (CTS) was supported by the Sheep Cooperative Research Centre (Sheep CRC), Meat & Livestock Australia (MLA) and Hillside Meats.

The system allows lambs tagged with EID ear tags to be successfully assigned to a high frequency (HF) RFID transponder embedded gambrel which provides the traceability link from individual live animal to its carcase. The carcase weight, fat depth and classification are captured at the carcase weighing station and linked back to the live EID eartag. Feedback can then be

provided to the producer on an individual animal basis. The RFID system demonstrated at Hillside has the ability to relate the PIC(s) for the mob of lambs or sheep to the individual gambrel RFIDs.

There were a number of challenges faced in this project:

- Consistently reading electronic eartags at commercial speeds (200 – 600 carcases/hr)

- Relating the animal eartag EID to the RFID inserted into the gambrel

- Reading the gambrel RFID at crucial traceability and information collection points on the chain, for example the retain rail where the sequential order of carcases may change.

- Reading the gambrel RFID at the weighing scales and relating carcase weight and fat measurement back to the original live animal

- Transferring the carcase information to the office computer and ultimately to the grower

- Sourcing of equipment that operates consistently in the abattoir environment

Project Results

The carcase tracking system is designed to be used in conjunction with both full duplex (FDX) and half duplex (HDX) industry standard 134.2 kHz low frequency (LF) animal electronic identification (EID) ear tags.

Gambrel Transponders

The existing plastic abattoir gambrels were injection moulded with high frequency (HF) RFID transponders. The 13.56 MHz HF transponder was chosen for the gambrels as it is not adversely affected by background radio frequency (RF) noise created in the abattoir by vari-speed motors, fluorescent lights and carcase stimulation. The HF tracking system also does not conflict with the LF EID ear tags used in the animals.

Sheep EID Ear Tag reader

The sheep on the abattoir chain are approximately 900mm apart, and can be closer if they are swinging. This causes possible misreading of sheep EID ear tags.

To overcome this, a preread/ post-read EID blocker was developed in conjunction with a white nitrile 'contact' flexi-antenna and panel controller.

The flexi-reader panels are placed at 45º to each other to de-tune and reduce the read range. As a carcase pushes between the flexi-panels they re-tune, and proximity sensors allow the eartag EID to be read by the pre/post EID blocker. The pre/post EID blocker then checks the EID with a list of previous EID's recorded and only sends the ID if it is a new one.

Assigning sheep eartag EID to gambrel RFID

The kill floor gambrel HF RFID reader and the animal LF EID eartag reader are located in close proximity. A carcase detector senses the presence of a carcase and initiates the record.

The gambrel RFID is then recorded. If there is an animal EID eartag present, this identity number is added to the record.

Retained Sheep

Occasionally carcases may need to be redirected on to a retain rail. The retain reason needs to be recorded to address and rectify areas of inefficiency in the supply chain. As all retained carcases are trimmed to rectify the issue, there is a direct loss of saleable product. By accurately identifying the reason for retain and providing detailed feedback, it's possible to reduce this cost to the supply chain.


Any carcase entering the retain rail is recorded on the system by a HF gambrel reader at the entry to the retain rail. The system was designed to have a touch screen at the end of the retain rail to record the retained reason, but at this stage it has not been installed. The inspector would only have to tap the screen to record a comment against a carcase. Until the screen is installed, the comments are manually entered at the weigh station. Only obvious retain reasons can be recorded using the manual method.

Weight & Grade Station

At the weigh-scales a tripper detects the arrival of a new carcase, finalising the previous record and initiating the new record.
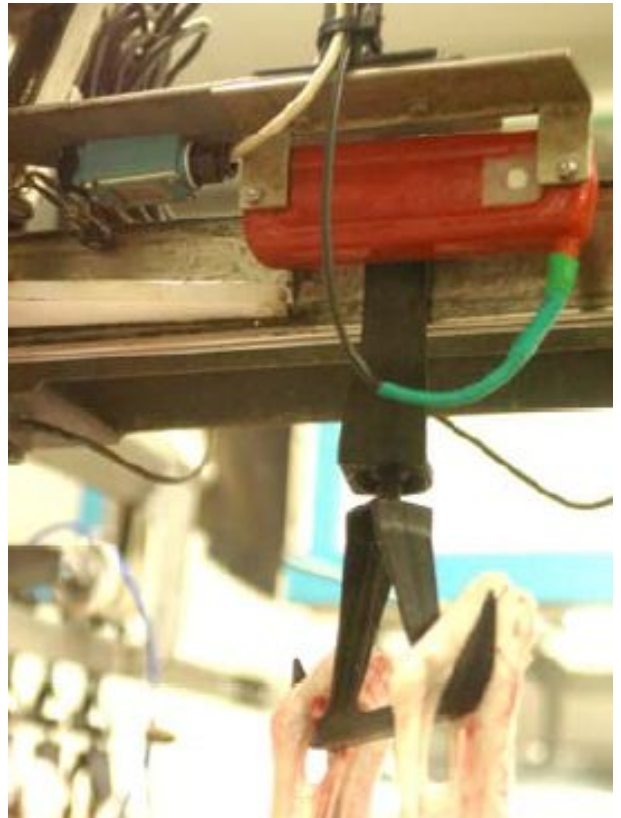
The HF transponder in the gambrel is read by an elongated SCL HF antenna connected to a HF reader.

The carcase weight and fat depth measurements and grades are captured by the existing computer system. When the carcase label is printed, data is transferred between the tracking system and the host system. The animal eartag EID is then associated to its kill data and made available to the grower.

Summary

This technology will need to be tested in an inverted chain abattoir and those that run at faster chain speeds (up to 10 carcases per minute). There is also potential for RFID to extend traceability into the boning room to allow measurement and prediction of carcase yield and the relative profitability between carcases and between cuts on carcases.

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