

RAINing Cattle

Using RAIN RFID to read
high volume and fast
paced assets in a
challenging environment

Robby Lopez - Times-7 Research Limited

Topics for today

- ▶ Traceability in New Zealand agriculture
- ▶ ANZCO Deployment
- ▶ Future Opportunities

Times-7 Research Limited



- ▶ We are a specialist manufacturer of RAIN RFID antennas.
- ▶ Exporting to 50+ different countries.
- ▶ Large portfolio of products.
- ▶ Member of RAIN Alliance for 2 years.

NZ Agriculture

- ▶ In a country with a population of 4.8 million people, around 10 million cattle (dairy and beef) and 27 million sheep.
- ▶ Agriculture makes up the bulk of exports in New Zealand.
- ▶ Dairy, Meat, Eggs and Honey combined contributed to 40% of all exports, with a combined value of around \$15B.



Agriculture in NZ

- NAIT System

- ▶ National Animal Identification and Tracing system used to trace animals from birth to slaughter or live export.
- ▶ RFID Tag using LF Standard (134KHz).
- ▶ Challenges for farmers to comply.
- ▶ In general does not add any value to farm operations, simply mandatory compliance.



ANZCO Foods and Five Star Beef

- ▶ Largest and one of few beef feedlots in NZ.
- ▶ Cattle are first grass fed, before coming, and typically kept for 100-150 days.
- ▶ Up to 25,000 cattle at one time.
- ▶ Around 250 animals leaving each day.
- ▶ ANZCO first contacted Times-7 in regards to tag testing.



Ear tag requirements

- ▶ Longevity - some tags are required to last up to 10 years.
- ▶ Animals have a tendency to rip the tags out.
- ▶ Animals can very easily damage the tags.
- ▶ Cost .
- ▶ RF performance.

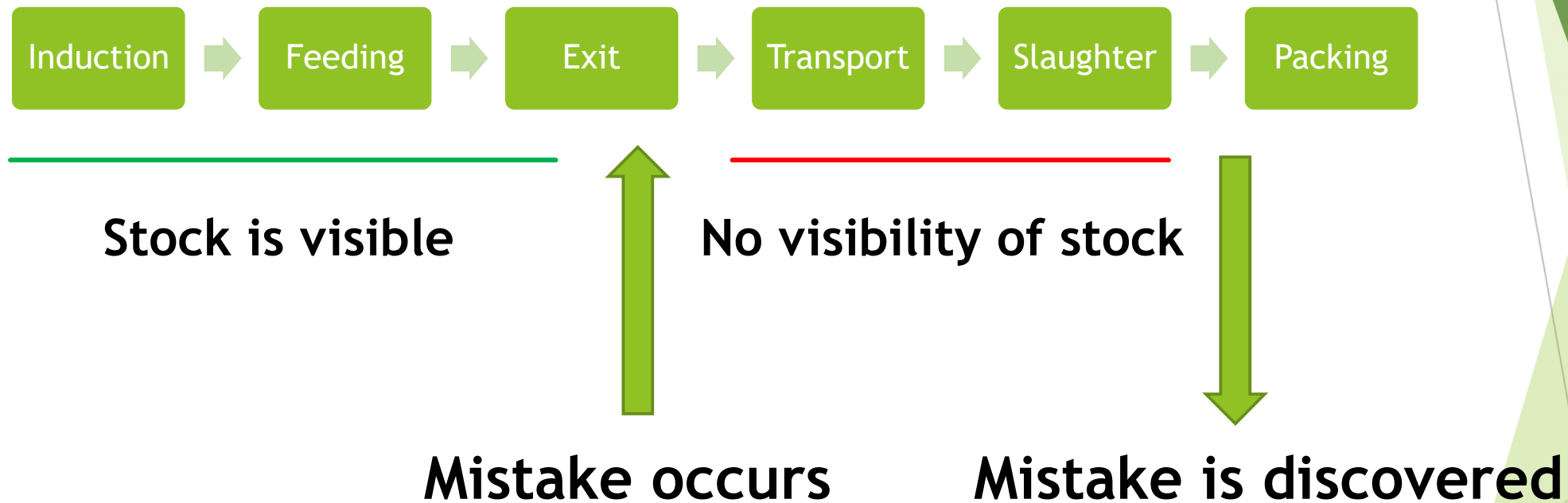


UHF Ear tags

- ▶ Not all ear tags created the same - significant variations in read performance between different UHF RFID cattle tags



The issue - Traceability at the exit race



Mistakes could only be discovered after an animal had been sent to be slaughtered

The issue - Traceability at the exit race

- ▶ Exit race is large, animals pass through in a mob of typically 30-50 animals, and onto weigh scale, before being loaded onto a truck.
- ▶ Behavior of the mob is highly erratic and unpredictable.
- ▶ Highly impractical to scan animal ear tags one by one using LF tags/handheld scanner.





Exit Race Installation - Technical Challenges

- ▶ Height - 4m / 13ft. This height was necessary as they need to be able to drive a large front loader under the gantry.
- ▶ Width - around 3m/10ft. Because of the width, cattle could bunch up on either side of the race.
- ▶ Speed of asset - cattle had a tendency to bolt through the race at high speed.

Exit race installation - First trial

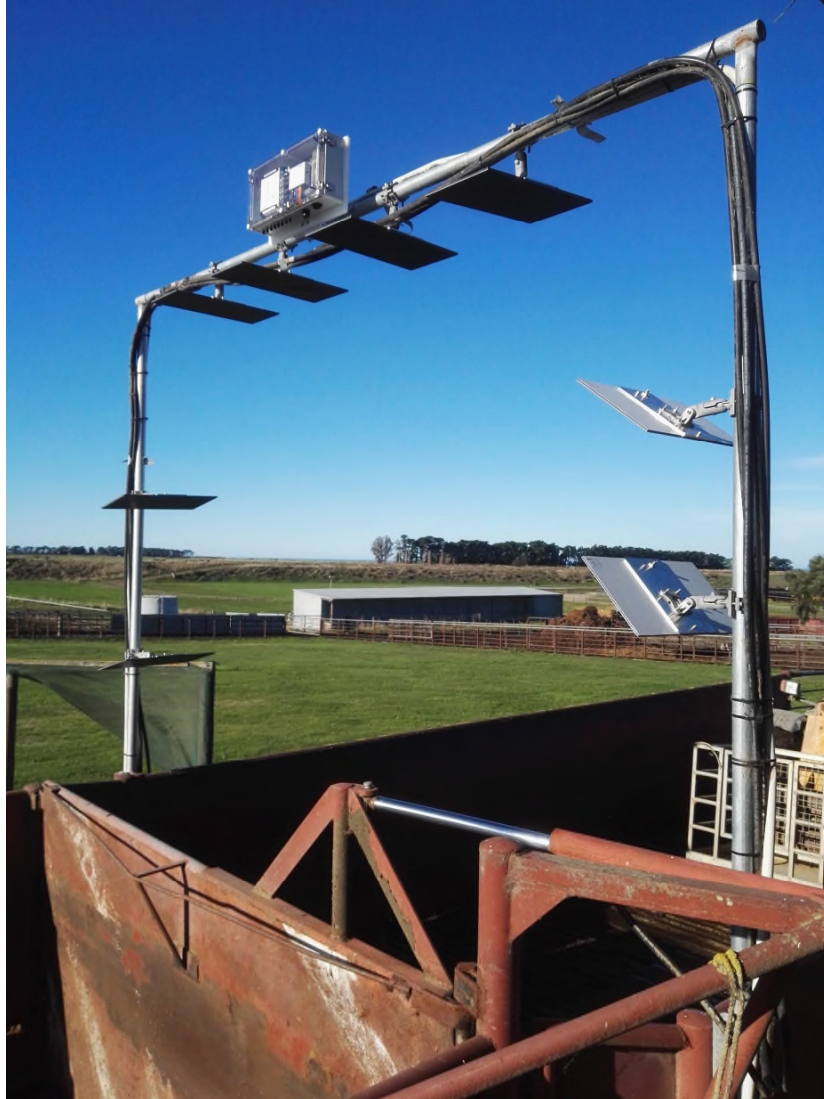
- ▶ Relatively standard setup.
- ▶ 1x Impinj Speedway R420 4 port reader - powered via PoE.
- ▶ 4 x Times-7 A5010 antennas.
- ▶ 8m LMR-195 type cables Used.
- ▶ Resulting read accuracy quite low - 60-70%.



Exit race installation - Second Trial

- ▶ Overall theme - every dB counts!
- ▶ Changed to much shorter LMR-400 type cables.
- ▶ Used higher gain A5060 antennas.
- ▶ Reader powered via DC to enable higher output power.
- ▶ Consistently achieved 90-95% read rate with this setup - 4 antennas.





Exit race installation - Third Trial

- ▶ 95% was good, but still not ideal.
- ▶ Decision to add another reader + 4 antennas, bringing total to 8 antennas.
- ▶ Great performance!
- ▶ 1 tag missed out of 450 cattle through the race - approx. 99.8% accuracy.

Exit race installation - Learnings

- ▶ All 8 of the antennas were doing useful work - no single antenna was significantly over or under performing.
- ▶ Some tags only just being read - so its important to have as much antenna coverage as possible.
- ▶ Again - every dB counts.



When traceability fails...



- ▶ 2017 outbreak of Mycoplasma Bovis
- ▶ Up until then, NZ and Norway were the only countries in the OECD free from the disease.
- ▶ Investigations estimated that up to 70% of farmers not fully complying with all requirements to track cattle.

Alternative technologies

- ▶ Recent trends towards smarter devices.
- ▶ ‘fitbit for cattle approach’
- ▶ Alternative wireless standards - Bluetooth, LoRa, mesh networks etc.
- ▶ Complementary technologies.



UHF RFID in NZ - Pathfinder

2013

The Use of EPC RFID Standards for
Livestock and Meat Traceability

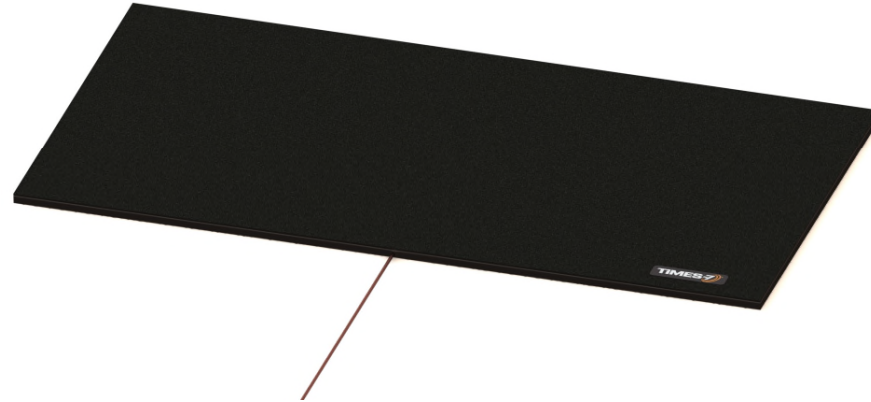


Gary Hartley
New Zealand RFID Pathfinder Group
January 2013

- ▶ Lobby group set up in New Zealand to promote the use of UHF RFID.
- ▶ Times-7 a founding member.
- ▶ Produced a number of case studies around UHF RFID use in agriculture.

Antenna Considerations

- ▶ Highest gain very useful for many applications.
- ▶ Working on 13dBic antenna for such applications.
- ▶ Understanding beam shape also important.



Other applications

- ▶ Ceiling tile antenna
 - ▶ Hospital use case
- ▶ Manufacturing warehouses
 - ▶ Ceiling to floor reading
- ▶ 8-64 patch solutions
- ▶ Beam shape from 20-60 degrees

Questions?

Feel free to contact me

Robby.lopez@times-7.com