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
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 it's 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.
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 13dBi 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