On field assessment of UHF technology for sheep electronic identification

Duroy, S., Gautier, D., Grisot, P.G., Demarquet, F., Hardy, A., Przewozny, J.L.

ICAR Conference - Animal Identification Services Session

Prague - June 20, 2019

Context

- Low-Frequency (LF) RFID is mandatory in EU for small ruminants identification since 2010
- Only 38 % of European sheep farmers use electronic identification (2018, *SheepNet network*)
- Still not easy to collect identification numbers of moving animals and to get a complete traceability…

Context

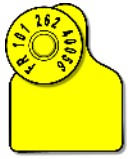
Reading batches of moving animals with LF tags :

- One-by-one reading
  - ➔ Make animals move on through individual corridors
- Animals flow slows down
- People need to push animals
  - ➔ Waste of time

Can UHF be a solution ?

LF vs UHF

Main specifications



	Low-Frequency (BF)	Ultra-High Frequency (UHF)
Water effect	NO	YES
Read range	Up to 80 cm	Several meters
Multiple readings	NO	YES

Get a user experience

- Make reading tests in real conditions
- Use readers and antennas not made for livestock use

Step 1
Experimental farms

Step 2
Trader's collection centers

UHF Eartag

Reader

Antennas — **Reader** — **App**

Bluetooth Module

Reader
(19 x 17,5 x 3 cm)

Step 1 : Reading in a large corridor (farms)

Trial conditions in farms

- Width of corridor : 2 m to 2,5 m
- Nb of antennas : 4
- Height of antennas : 1,2 m
- Batch sizes : 50 to 130 Animals
- Speed : walk, run
- Fences : wood / metal

Step 1 : Reading in a large corridor (farms)

Trial conditions

Wood fences

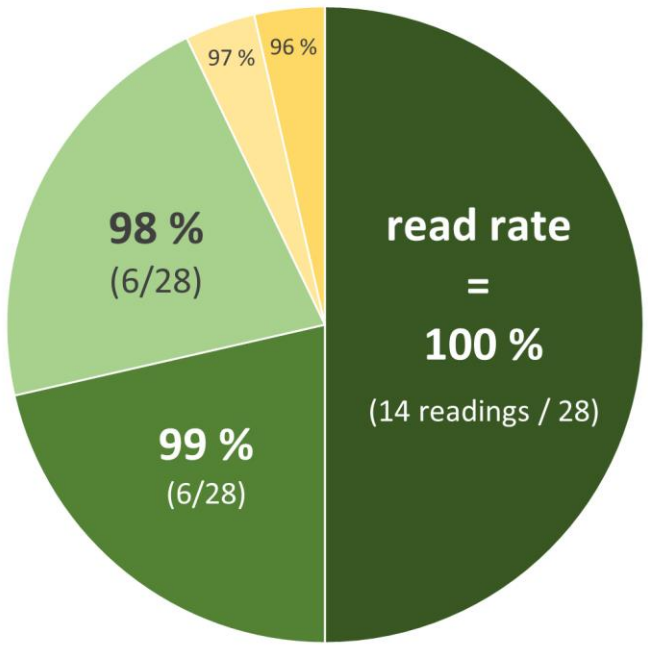
Metal fences

Step 1 : Reading in a large corridor (farms)

Read rate - Results

Wood Fences

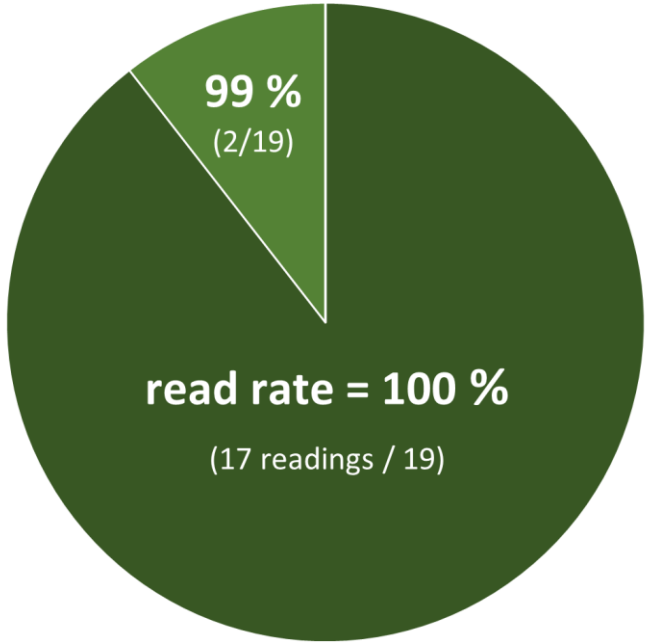
Le CIIRPO



28 single pass readings
(Batches of 50, 70 and 110 ewes)

Metal Fences

Carmejane
FERME Expérimentale



19 single pass readings
(Batches of 50, 90 and 130 ewes)

Step 1 : Reading in a large corridor (farms)

First conclusions

- Easy to set up
- High read rates
- Water effect ?
- Metal effect

Trials to be continued for the rest of the sheep industry
(traders, collection centers, slaughter houses)

Step 2 : Reading in a collection center

Trial conditions

- Width of corridor : 1,6 m
- Nb Antennas : 2
- Height of antennas : 1,9 m
- Batch sizes : 52 Lambs
  : 22 Ewes
- Speed : walk, run
- Fences : Full metal

21 single pass readings

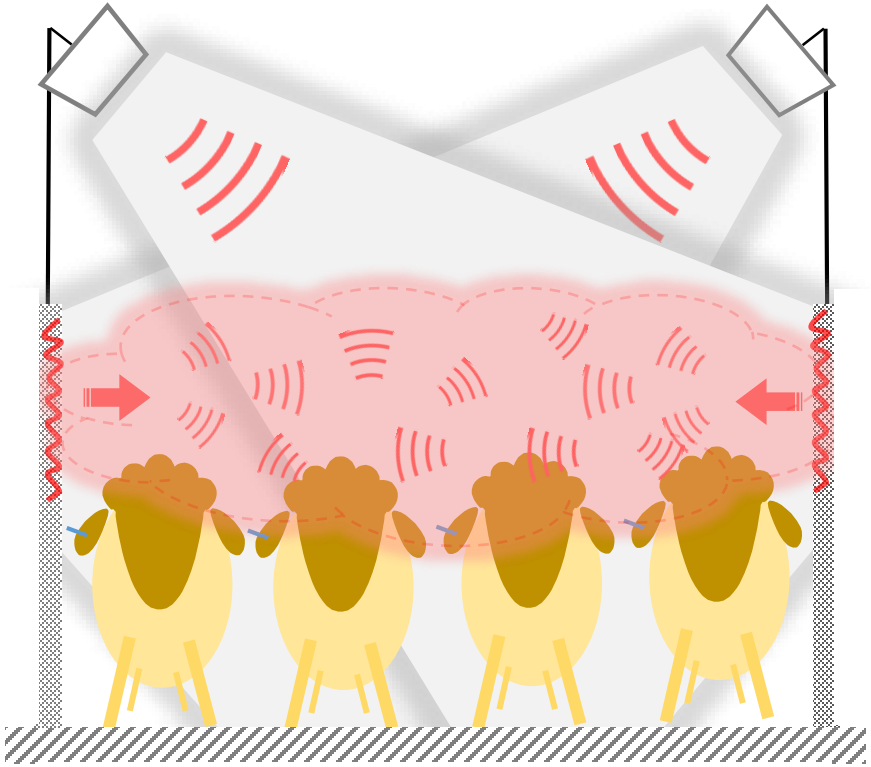
Read rate = 100 %

Step 2 : Reading in a collection center

- UHF waves reflect on metallic surfaces
- « Tunnel effect » of metal fences

Tunnel reader (logistics)

Photo : Fraunhofer IFF



Step 2 : Collection center

Non-expected readings

False positive readings

- Clothes Labels
  not a problem, easy to sort by software
- No spontaneous « hot spots »
- Necessity to “protect” areas very close to antennas

Step 2 : Collection center

Loading / Offloading

- **Embedded fixed antenna** :
  Too much powerful electromagnetic field
  > too many reflections

- **Handheld reader :**
  better, but not powerful enough

UHF Handeld Reading

- Functional, similar as LF
- Read range, slightly longer than LF
- User gesture less directed, sweeping
- Possibility to **adjust the read range by power modulation**

Conclusions & applications for future

- UHF, promising technology for multiple readings
  reliable, easy to set up, no needs to modify animals circulation
- Keep on testing within different environments
  Slaughtering chain…
- Optimum “tags/antennas/power of the reader” can be improved
- ISO standards in progress
  Numbering schemes, data construct, quality and performances of tags
- UHF, a potential tool for precision livestock farming
  a possibility to monitor animal behavior with a cheap device

Thank you for your attention

Partnership

Financial support
Ministry of agriculture

www.idele.fr