IMA-Wageningen

New developments in test procedures for animal RFID based on ISO11784 and ISO11785

Kees van 't Klooster and Pieter Hogewerf

Innovative Modern Agriculture -Wageningen

What is ISO

- World's leading developer of standards
- NON governmental organization
- Federation of 157 national standardization organizations (including ANSI)
- Technical working groups developing standards: 3,000
- Number of experts contributing in those groups: 50,000
- www.iso.org

ISO International Organization for Standardization

What is ISO

– ISO/TC23/SC19/WG3 Animal identification:

Member country representatives

TWG

international user representatives

Including ICAR

International Organization for Standardization

Available transponder types

Injectable:

Under skin:

Companion animals, horses, CITES, (pigs)

- Bolus:

  Bovine, ovine, caprine

- Ear tag:

  Bovine, ovine, caprine, pigs

International Organization for Standardization

Necessity and usefulness of RFID

Necessity and usefulness of RFID tags:

- Tracking and Tracing of lost pets and animals for food production
- Reduce the costs of outbreak of diseases
- Fraud control
- Management by farmers, veterinarians

International Organization for Standardization

ISO standards

International ISO standards:

- Code structure (ISO 11784):
  Representation of the identification code
- Technical concept (ISO 11785):
  Transfer of the identification code

Under development:

- Advanced transponders (ISO14223) (sensors, data storage, encryption)
- Test protocols (ISO24631) (conformance and performance)

International Organization for Standardization

International Organization for Standardization

ISO 11784

Bit no	Information
1	Animal bit
2-4	Retag counter
5-9	User information
10-15	Reserved field (for future use)
16	Data block flag
17-26	Manufacturer/Country code
27-64	Identification code

Standard provides a means to enable unique ID codes

Standard allows for country ID code schemes as well as for manufacturer ID code schemes

International Organization for Standardization

ISO 11784 Retagging

- In case when retagging is needed and when a country wants to use the same ID code
- Can not be used in combination with manufacturer code
- National authority must maintain database(s)
- Secure production of retags
- Production of reader that reads retag counter

International Organization for Standardization

ISO 11785 Communication

Activation frequency 134.2 kHz

(signal transmitted in noisy environment and through live animals)

Two protocols are accepted:

Full duplex: FDX-B

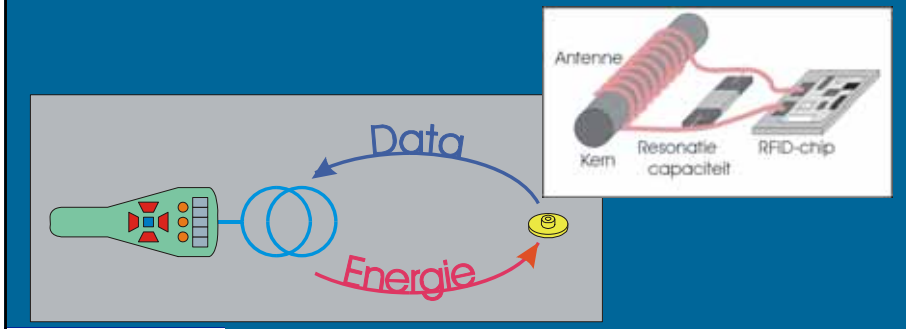
Half duplex: HDX

International Organization for Standardization

ISO 11785 Communication

Radio frequency identification (RFID)

- Transponder passive component => no battery



International Organization for Standardization

ISO11785

What is said in Annex A of the standard about FDX-A:

Until 1998 the following technologies are allowed:

125kHz Destron

125kHz Datamars

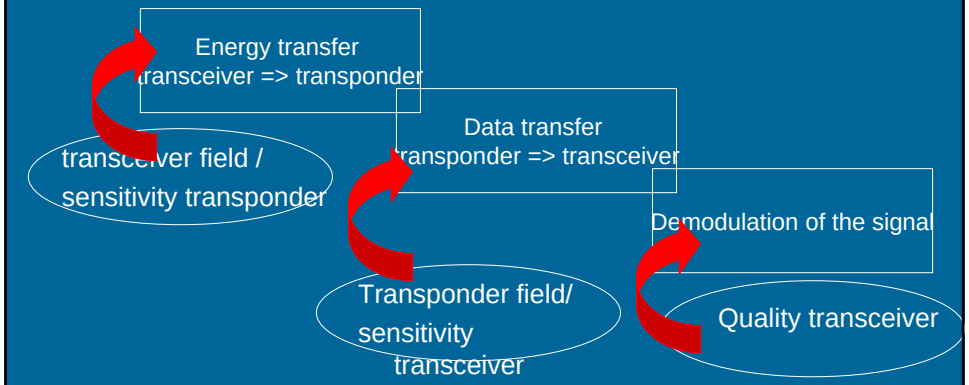
128kHz Trovan

Backwards compatibility of ISO readers for a period of 30 years as described in Annex A in ISO11785 is an essential option to be provided by manufacturers of FDX-A technology

International Organization for Standardization

Principle reading process

Schematic presentation reading process:



Readability influenced by transponder & transceiver

International Organization for Standardization

ICAR test procedures

Conformance test of transceivers and transponders:

- Guaranteeing worldwide readability

Performance test of transceivers and transponders

- Making a founded selection of the available products

International Organization for Standardization

ISO and ICAR agreement on testing

ISO can assign a Registration Autority (RA) that for testing products on meeting certain requirements

Animal Identification: ICAR is RA

ICAR approves test laboratories

Upon passing conformance criteria a manufacturer code is given by ICAR to manufacturer

International Organization for Standardization

ISO24631 part 1conformance transponders (1)

Checks conformance test transponders:

- Read by reference reader
- Resonance frequencies
- Modulation side bands
- Telegram structure
- Identification code
- CRC calculation (cycle redundancy check)

Granting of a manufacturer code

Manufacturer has signed code of conduct

International Organization for Standardization

ISO24631 part1 conformance transponders (2)

Approved transponders:

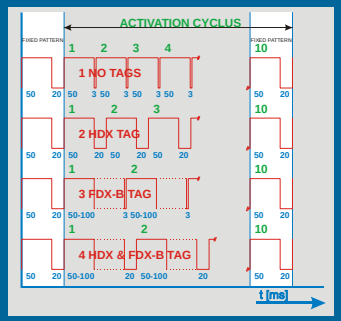
- Perform conform ISO 11784/11785
- Worldwide readable with ICAR approved reading equipment
- Responsibility has been taken for guaranteeing uniqueness ID
- Tracibility up to certain level guaranteed
- Manufacturer is motivated to follow ICAR rules
  (manufacturer code can be withdrawn)

International Organization for Standardization

ISO24631 part 2 conformance transceivers (1)

Checks conformance test transceivers:

- Frequency activation field
- Read HDX and FDX-B tags
- Reaction faulty transponders:
  - Animal bit = ‘0’
  - Trailer bits <> ‘0’
  - Reserved bits <> ‘0’
  - CRC incorrect
- Timing of transceiver



International Organization for Standardization

ISO24631 part 2 conformance transceivers (2)

Approved transceiver:

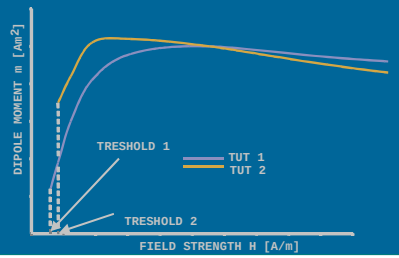
- Is able to read ISO 11784/11785 transponders
- Field balanced for the two transponder technologies
- Reader can display country (manufacturer) code + ID code

International Organization for Standardization

ISO24631 part 3 Performance transponders (1)

Checks performance test transponders:

- Transponder minimum activating field strength
- Transponder dipole moment
- FDX-B bit length stability
- HDX frequency stability



International Organization for Standardization

ISO24631part 3 performance transponders (2)

Performance test transponders informs about:

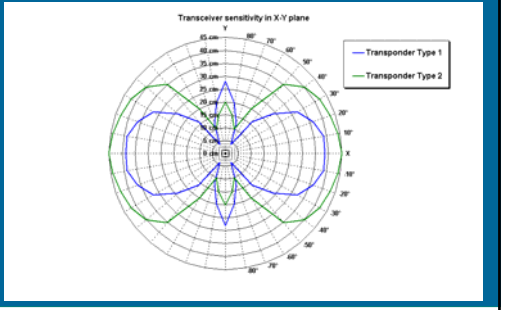
- Transponder = f (field strength conditions)
  - Estimation of the readability range of the transponder
- Transponder dipole moment
  - Estimation of the impact of electromagnetic disturbances on readability
- FDX-B bit length stability / HDX frequency stability
  - Estimation of the readability of the transponder

International Organization for Standardization

ISO 24631 part 4 performance transceivers (1)

Checks performance test transceivers:

- Antenna pattern
- Identification speed
- Conformance field strength demands (ETSI EN 300 330)



International Organization for Standardization

ISO 24631 part 4 Performance transceivers (2)

Performance test transceivers informs about:

- Antenna pattern => suits to application
- Recognition time => reader capacity

International Organization for Standardization

Synchronisation of transceivers

In locations with multiple transceivers
the synchronisation of transceivers is important
(e.g. slaughterhouses, saleyards)

ISO specifications synchronized transceivers have been drafted and tested based on needs in Europe

International Organization for Standardization

Information retrieved from transceivers

Numeric display and communication of transceivers is not part of standards yet.

Users working with several transceivers of different brands may benefit from uniform display and communication.

ISO/TC23/SC19/WG3 is studying the possibilities to harmonize display and communication of transceivers

International Organization for Standardization

Conclusions

Worldwide approved ISO standards for animal RFID

- Companion animals, wildlife animals, zoo animals, livestock and fish

ICAR is Registered Authority for Testing resulting in

- Worldwide readability
- Informs about basic electronic performance

Additional (local) tests might be necessary to test:

- Shock resistance
- Climatic impact
- Durability
- Animal welfare aspects

International Organization for Standardization

Conclusions

User needs provide input for further development of standards for animal RFID

International respected standards and test procedures serve the free exchange of animals in order to minimize barriers and costs for (international) trade.

International Organization for Standardization

Thank you and any questions?

International Organization for Standardization