

## Testing of animal identification devices

Kaivo Ilves

Estonian Animal Recording Centre

Kreutzwaldi 48A, Tartu 50094

Estonia

### **Abstract**

International Committee for Animal Recording (ICAR) paid considerable attention to animal identification already in the early 80`s, and the first standards date back to this period. Number of countries using identification and registration (I&R) systems has increased rapidly during this period. Traditionally I&R systems were mostly used for pedigree and performance recording but today they are used in artificial insemination schemes and subsidy schemes, I&R is the primary requirement in traceability and disease control and to get a market access in many countries. Changes in livestock farming have created an environment for introduction of new technologies in farming that in turn requires specific area knowledge and experience and international agreements or standards.

Therefore the role of ICAR is very important by developing international guidelines and standards for identification devices in cooperation with ISO. In June, 2007 ISO appointed ICAR as Registration Authority (RA) competent to register manufacturer codes used in the radio frequency identification (RFID) of animals in accordance with ISO 11784 (Radio-frequency identification of animals – Code structure) and ISO 11785 (Radio-frequency identification of animals – Technical concept).

As ICAR Guidelines, ISO 11784 and ISO 11785 are approved and accepted by all ICAR members (representing 50 countries) and ISO standards are approved by ISO members (representing 162 countries), these documents have an international acceptance all over the world.

The aim of the ICAR approvals is:

- To have international approval acceptable in most countries all over the world.
- To protect ICAR members, authorities and farmers as end-users to help them to find a device with good quality.
- To keep costs for testing and approvals low.

### **Identification devices**

The first section of ICAR Guidelines describes general requirements for the identification system:

- The recorded animal identity must be the animal's official identity in the member country and must be unique to that animal.
- Where the identity of an individual animal is not unique, the record must so state (e.g. flock identities for goats/sheep). The identity number used for a flock or herd must be unique for that flock or herd.
- The animal's identity must be visible.
- The animal's identity should be unique and never be re-used.
- The animal's identification device/method must comply with legislative requirements.

- Animals, which lose their identity device must be re-identified and, wherever possible, with their original number, provided that there is evidence that the animal is being correctly identified (where this is not possible, a cross reference to the original number must be maintained).

ICAR has defined requirements for testing and approval of identification devices in the ICAR Guidelines in Section 10.

Permanent identification devices can be divided into two categories:

- Simple identification devices such as conventional plastic or metallic eartags, which may have both visual and machine readable symbology (e.g. numerals and barcodes).
- Electronic identification devices like RFID transponders and the corresponding transceivers. RFID transponders used in animal identification are:
  - insectable transponders,
  - electronic (ear) tag transponders,
  - electronic ruminal bolus transponders,
  - tag attachments.

### **Testing and approval of the conventional tag**

In cooperation with French specialists ICAR has developed test protocols in such level that the ICAR approval should meet the demands of animal industry and authorities worldwide. Testing and approval of conventional tags is described in the ICAR Guidelines in Section 10.7. The ICAR procedure for testing considers the following issues:

- Ease of application and use.
- Efficiency of animal recognition.
- Durability and tamperproof quality.
- Animal welfare.

Testing of the ear tag is always coordinated by ICAR and the test consists of two phases - preliminary test and laboratory test. Both tests must be done by ICAR approved test laboratories.

Preliminary tests include:

- Test on machine readable printing if it is requested by the manufacturer.
- Locking mechanism checks. The primary purpose of these tests is to verify that the male to female locking mechanism, once correctly applied using the compatible pliers, cannot be subsequently dismantled in such a way that would allow the tag to be re-used in a different animal, i.e. that tampering with the locked tag in a potentially fraudulent way, renders the tag unusable.

The aim of the preliminary test is to assess conformance of the eartags with the information given in the application form and to detect any major failure (damage of the tag at application, possible unlocking without deformation, inappropriate design considering welfare requirements).

Laboratory tests include:

- Assessment of descriptive parameters (weight and dimensions; composition)
- Performance assessment after various treatments.

After successful laboratory test the ICAR approval is granted and the product is listed on ICAR homepage. If there is a request for the field test it might be organized by ICAR Guidelines by ICAR.

### **Testing and approval of radio frequency identification devices**

Testing and approval of radio frequency identification devices (transponders and transceivers) are standardized in cooperation of ICAR and ISO. Testing of RFID can be subdivided into two main categories:

- Conformance test
- Performance test

Conformity testing is required if the use of particular identification devices is specified in any kind of official regulation or scheme. In general, the submission of identification devices to conformity testing is obligatory before they can be used in the official identification of animals.

Conformance test is described in standards:

- ISO 24631-1: Radio frequency identification of animals – test procedures – part 1, Evaluation of conformance of RFID transponders with ISO 11784 and ISO 11785 (including granting and use of a manufacturer code).
- ISO 24631-2: Radio frequency identification of animals – test procedures – part 2, Evaluation of conformance of RFID transceivers with ISO 11784 and ISO 11785.

The aim of the tests and registration is to have only approved and registered products without any modification on the market. For this reason there are three types of tests for RFID transponders:

A full test is mandatory in the following cases:

- When a manufacturer not registered by ICAR applies for a test.
- When an ICAR registered manufacturer uses a new silicon (Integrated Circuit) or a new technology (HDX or FDX-B) in the transponder.
- When an ICAR registered manufacturer changes the coil technology (ferrite coils vs. air coils).

A limited test is applicable in the following cases:

- When an ICAR registered manufacturer inserts previously ICAR certified transponder hardware (silicon + coil) into a different primary transponder packaging material.
- When an ICAR registered manufacturer uses the silicon of an ICAR certified transponder with different coil dimensions.
- When an ICAR registered manufacturer inserts an ICAR certified transponder with its original primary packaging in a different secondary packaging (examples: glass transponder in a bolus, a glass transponder into an ear tag).

A listing update is applicable when an ICAR registered manufacturer intends to use an ICAR certified transponder without any modification. In this case the applicant has to deliver a copy of the original test report and a written confirmation from the ICAR registered manufacturer who originally submitted the transponder under question for certification by ICAR.

Successful conformance test confirms the compliance of the transponder with the code structure and the technical concepts given in ISO 11784 and ISO 11785.

There are two kind of code structures available according to ISO 11784:

- Country code transponders

- Manufacturer code transponders

Country code used in transponders is ISO 3166 numeric-3 country code and according to the ISO 24631-1 Annex E (Conditions of use of manufacturer codes) 'A manufacturer is not permitted to use a country code unless he is authorized by the specific official competent authority in this country'.

Manufacturer code used in transponders is a code granted by ICAR if manufacturer has already participated successfully to a full test. The manufacturer code might be shared manufacturer code or unshared manufacturer code. The shared manufacturer code is '900' for all manufacturers having shared manufacturer code but ICAR has allocated a restricted set of identification codes for exclusive use together with the shared manufacturer code. Unshared manufacturer codes are from 901 to 998 and the unique code might be used only by specific manufacturer.

ICAR has approved 346 products from 114 manufacturers. All registered manufacturers and the manufacturers codes granted by ICAR are published on ICAR homepage ([www.service-icar.com/manufacturer\\_codes/Manufacturers\\_DB/manufacturer\\_codes\\_main.asp](http://www.service-icar.com/manufacturer_codes/Manufacturers_DB/manufacturer_codes_main.asp)).

Performance testing is an option for determining the operation of identification devices in practical applications. The objective of this kind of testing is to provide widespread information concerning the special characteristics of identification devices to the end-user.

Performance test is described in standards:

- ISO 24631-3: Radio frequency identification of animals – test procedures – part 3, Evaluation of performance of RFID of ISO 11784 and ISO 11785 transponders.
- ISO 24631-4: Radio frequency identification of animals – test procedures – part 4, Evaluation of performance of RFID of ISO 11784 and ISO 11785 transceivers.

The objective of the performance test is to furnish qualitative and quantitative data for the comparison of the FDX and HDX transponders conforming to the technologies described in the standards ISO 11784 and ISO 11785 in order to contribute to market transparency. The test includes the following parameters:

- Transponder minimal activating magnetic field strength

The measurement will define the minimal value of the magnetic field strength to get in the full activity stage of the transponder. This value will be comparable for all transponders of the market, and in addition the obtained value can be used for the system analyses for comparison of transceivers-transponder performance matching.

- Transponder dipole moment

The transponder dipole moment is the ability of the transponder to send the information to the transceiver station. This value can be used for the system analyses when comparing the transceivers-transponder matching.

- Stability

The stability of the return signal is especially important when reading in difficult environments. The obtained value can be used for the transceivers-transponder performance analysis.

ICAR is not publishing results of the performance tests but if the product is tested the date is published and manufacturer can provide the test report if requested.

## **Conclusion**

As a result of international cooperation we have standards for identification of animals and testing of identification devices that are accessible for all interested. Besides standards, there is information regarding products approved by the ICAR on ICAR homepage.

Table 1: ICAR approved products (20.11.2011)

<b>Conventional tags</b>			
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<b>Conformance tested</b>	<b>Total</b>	<b>FDX</b>	<b>HDX</b>
Bolus	62	43	19
Eartag	176	123	53
Injectable	93	84	9
Leg tag	4	4	0
Tag attachment	11	10	1
<b>Total</b>	<b>346</b>	<b>264</b>	<b>82</b>
<b>Performance tested</b>			
Bolus	27	23	4
Eartag	48	38	10
Injectable	3	3	
<b>Total</b>	<b>78</b>	<b>64</b>	<b>14</b>

To have products with good quality on the market we need to have a good cooperation between ICAR and national competent authorities by exchanging information and finding products not compliant with international standards.

## References

- ICAR 2010, A Synthesis of ICAR Guidelines on Animal Identification.  
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