The French bovine identification and traceability system, updated with the technology of RFID

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Abstract

From 1998, individual identification and traceability became essential for major cattle breeding countries.

In France starting in the 70's, all the premises and the cattle were identified as early as 1978. The national system is managed by the Ministry of Agriculture with the responsibilities of the regional farmers' organisations. There are 8 millions of births per year, 25 millions of movements and 6 millions of slaughters for 280 000 bovine farmers.

In the slaughterhouses, an own traceability system is applied, based on an order number of slaughter for each animal, carcass quarters and main cuts of meat. An accurate labelling of each piece of carcass gathers all the information, transferred electronically by the national identification system.

At first the development of software on PDA helped the record and controls of data on the field and now the RFID ear tags on the animals can still improve the quality of data at all levels of the production line : on the farm, on the market, in the slaughterhouse.

The success of such a system depends on technological aspects but also on the organisation of the national system to ensure reliability and efficiency.

Keywords: Identification, traceability, cattle, RFID.

1.0 Cattle individual identification

The traceability of beef meat began with the individual identification in many big breeding countries. It has been compulsory in all the European Union since 1998, in Australia and New Zealand one year after, then in Canada, and after Japan, Brazil, Uruguay, Mexico, Argentina, and Chile.

Traceability is a necessity for the reasons developed under.

1.1 To eradicate some animal diseases and to manage sanitary crisis

For eradication or management plans relative to designed diseases, control veterinarians from the Ministry of Agriculture have to check that all cattle get compulsory vaccinations and regularly realize blood tests.

These tests may give a positive result. In such cases, the veterinarian responsible for the test needs to find very quickly all animals which could have been in contact with the sick one. Indeed, depending on the disease (BSE for example), all these animals will have to be destroyed.

1.2 For herd management

The same official individual identification has to be used by the farmer and technicians who manage animals of the herd.

1.3 For cattle trade

When some live cattle or carcass are to be sold abroad, importer asks for identification number and data about the animal, to guaranty on the sanitary quality and to get technical data about an imal as breed, birth place and even parentage.

2.0 The French system of traceability

The traceability of beef means that all cattle get a unique official individual identification number just after the birth, and then all the movements of cattle are recorded, so that trace back is possible to find all the animals in contact anytime. And this is anywhere till the slaughterhouse or the natural death.

2.1 The French history of identification

In France the first law on breeding was in 1966. It defined rules of a permanent individual identification for volunteers' breeders who needed it for technical reasons: to select mothers and fathers for genetic improvement, private working number is no more sufficient.

After this genetic purpose, the sanitary crisis pushed the official identification complete itself after 12 years. In 1978, this permanent official identification was widespread and became compulsory for all breeders and all animals, this time on the official purpose of traceability of cattle. At this date, all farms were recorded with a unique number of premises, all births were notified very soon after born with an individual unique number and all movements between premises were also notified and recorded.

This compulsory identification was widespread to the whole European Union by the regulation of 1998 which makes compulsory the traceability of the beef meat till the pieces of meat with a system of labels for the consumers and specifies the necessity of a national database for alive cattle data.

2.2 General French organization

From the beginning of the national system, French Ministry of Agriculture delegates the daily work of identification to local breeders' organizations, named "EDE" which are responsible of defined geographical zones. There are around 70 EDE to manage with 280 000 cattle herds and 20 millions of cattle.

A national technical organization, named Institut de l 'Elevage, supports the Ministry to coordinate the implementation of the identification:

To define methods which have to be the same everywhere.

To help for the implementation at the level of farmers, EDE and national level.

To help for the implementation of electronic identification and its different using cases.

2.3 Identification from the birth till the slaughtering

2.3.1 Identification of the calves

At the beginning a technician from the EDE, applied only one ear tag to the calves, when he passed once each three months on the farm.

In 1998, the European Commission decided that the calves have to be identified before 21 days of age, so the farmers were charged to put the two ear tags themselves. On top the French responsible decided to identify in the 7 days after birth.

The farmer orders to the EDE only the number of ear tags he needs for the calving year: the uniqueness of the numbers granted is the responsibility of the EDE (and the State behind). When some ear tags are not used or damaged, the farmer has to give back to the EDE.

To trace the data of any system (genetic, herd management, trading…) the same unique official identification number has to be used by anybody for the animal.

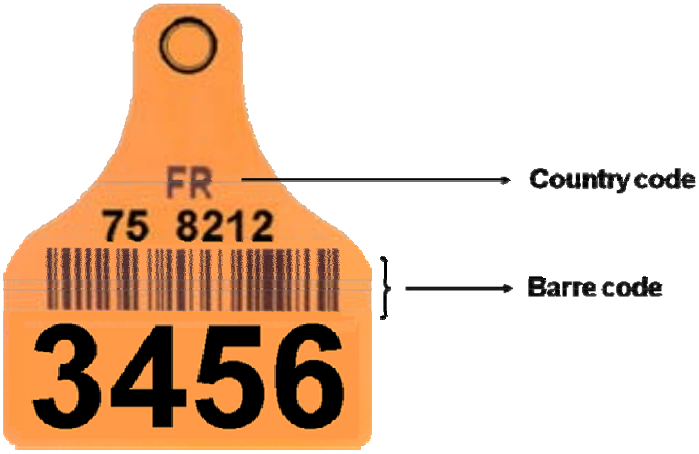

Figure 1. An official French conventional ear tag

Some electronic (Radio Frequency ID) official ear tags can be used since 2008 in France, with the previous identification system just adapted to the new electronic number: the advantage of RFID is an automatic reading with a receiver of the identification number of the animal, which is encoded in the chip of the ear tag.

This avoids involuntary human mistakes (on reading, on writing and on recording) on the identification of the animal concerned, so improve the reliability of the data recorded

2.3.2 The notification of all events on the farm

The farmer has to declare all events in the herd:

The birth with a new identification number, birth date, sex…

The entries on the farm, individual identification number of new animals.

The exits from the farm with the date of departure to slaughterhouse, other farms or death.

2.3.3 Record of data and controls

The record of all information sent by the farmer is done by the EDE or directly by the farmer with specific software and sent by an electronic net, after some controls on the data in the local database.

2.3.4 The French cattle passport

After recording a birth, the data are sent to the national database to check them at this level, and errors or OK are coming down to the EDE before to print the passport. The passport has to follow the animal all his life, till the slaughterhouse and after they are recovered to be destroyed.

2.3.5 Controls before slaughtering the animal

Before the animal is slaughtered, the identification number between his passport and his ear tags are checked: if there is not the right passport, the animal is not slaughtered.

If the passport corresponds to the animal at the entry of the slaughterhouse, a unique slaughtering number is associated to the identification number: a number with slaughtering date and an order number on the chain.

This short number is easier to use for the work on the chain, but one ear tag stays on the carcass till the cold chamber, in case of any doubt on the identification number.

2.3.6 Controls on the carcasses and pieces of meat

A label is printed and also barcodes to stick on each piece of carcass. On the label you find with the official identification number, all the data from the passport (birth farm, birth date, breed, sex, type of animal) and the slaughtering data (slaughter date, place, and weight).

The European regulations and French specifications ask for 3 types of checking:

Controls from the slaughter.

Controls from private firms agreed for that (EN 45011).

Controls from veterinaries of the Ministry of Agriculture.

Figure 2. The label on the carcass.

2.4 The roles of the Ministry of Agriculture

All the technical work is supported by the Institut de l'Elevage and validated by the Ministry.

That means the Ministry has the responsibility of the EDE and agrees them, the EDE have to help and check the operations of the farmers and other stakeholders. The Ministry agrees the official ear tags on the results of laboratory and field tests and the official documents for them.

The Ministry validates the procedures on the proposal of the Institute, for the data exchanges between agreed computer centers.

The Ministry manages the national database of identification himself.

Identification and genetic data are managed in the same information system.

2.5 Adaptation to the electronic identification

The actual system described over has to adapt to the RFID and his different using cases.

2.5.1 Use of RFID on farm

From private use to official use of the RFID tag

For the farmers, who already used herd management software and automatic scales or feeding equipments, the specific interests to use RFID are proportional with the number of animals in the herd.

RFID ear tags are not a new way (from more than 10 years in some experimental genetic stations) to benefit of the advantages of the automatic recording of data collected on the farm, like the weights or milk recording.

RFID support was adapted to each situation (necklace for feeding automate, pastern tag for milk goats, ear tag for head lockers…).

The cost of RFID was not so high, because the same RFID part of the ear tags can be used on more than one animal, changing the corresponding with the national animal identification each year.

Herd software assures the correspondingbetween a private RFID number and the national identification of the animal: identity, parents, treatments…

When RFID becomes an official way for identification, it must respect some new characteristics.

The type of support is not completely free for the European countries: only ear tags, bolus and pastern tag for goats are possible (no injected glasses for cattle and small ruminants).

To be read by anybody with a reader, some technical RFID specifications as transfer protocol, defined frequency and data structure have to be taken in account from two ISO standards 11784 and 11785.

The RFID tag must be applied only once on ONE animal (no recovery after the death to apply again).

These constraints may result in cost increase (even then the necklace with active chip for cows is much more expensive than ear tag transponder) but give new opportunities even on the farm.

The RFID number is unique (in France, the national number is directly coded in the transponder), so that no more correspondence is necessary to link official data to electronic data.

The breeders can change the brand of equipments (readers and automate with readers) or software, which are able to read all the same RFID official tags.

For the performances' recording

From very long time some private RFID systems have brought the possibility of automatisation of performances recording, in the selection premises or expert farmers.

The easiest automatic recordings are for body weighing, milk recording and individual feeders for calves or cows.

So there is also a transition from private systems to the official RFID system.

To benefit from official RFID interests, farmers need at least minimal of equipment.

What about farmers without any reader and unable to use such equipment surely and well. What about farms without any corridor or handling pen to maintain small groups of animals

Farms with private systems must be adapted.

Animal tags must be replaced by official ones.

Readers must be in compliance with ISO standards 11784 – 11785: you can see the results of tests of devices on the website *www.icar.org*

Technicians' and farmers' software have to be adapted to National RFID number automatically recorded, instead of system with private number, herd number and control

The type of the transponders has to be adapted to the operation concerned: in the milking parlor the best is to read the identification number from down and not at the head with an ear tag. But the pastern tags used on goats for a long time (without RFID) are not adapted for cows and not allowed by the European regulation.

For the feeding automates, the ear tags on the head are well adapted.

2.5.2 RFID for sanitary security

The aim of the traceability is to trace back contagious animals and all the animals in contact:

Individual traceability allows reducing the number of animals killed in case of problem on one premises, in comparison of group traceability. The system of individual traceability was also possible without RFID for cattle, because of number of movements of animals to follow (it is not the same with other species like ovine).

Obviously, it must be an official RFID

RFID allows general individual identification, but for trade and traceability, 100 % of animals have to be identified and it is a strong constraint to benefit from RFID interest:

To automate entries and exits recording with RFID 100% animals must be identified by RFID.

Reading ratio, will never be 100 %.

If the cattle is weighed while RFID tag is read, like usually, the door of the pen doesn't open before the official identification number and weight are recorded.

2.5.3 RFID for trade

For trade, RFID official numbers will be used by different operators (seller, market, buyer, slaughterhouse…), so it has to respect common characteristics to be read by every reader with fixed antenna or handheld.

The main interests are the better liability of animal numbers recorded and increase of speed of trading operations, only in the case where all animals are RFID tagged.

RFID reading of the tags in a big group of animals is rapid and liable: the main interest of this way to read all of one group is to collect and record common data for all the animals of whole group. The best example is for animals ready to be sold together (or a group of animals which receive a same treatment...).

No RFID reading is possible in a group of animals without a handling pen or a corridor.

2.5.4 RFID in slaughterhouse

Individual official identification is already compulsory for the slaughterhouses. The interest of RFID is the automation of arrival recording, on live animals and after on carcasses: the constraint of 100% reading is also extremely strong at the arrival

No organisation was found to benefit from RFID when animals with and without RFID arrives at the entry.

Presently, carcasses are identified with a specific number, different from live animal number: software must be adapted to link RFID official identifier from arrival till the end of the slaughtering chain, and in some cases till the packed meat ready for the supermarkets.

3.0 Conclusions

An identification and traceability system like the French one needs many conditions to be reliable.

The main question is to collect the real data on the field and record them under the right identification number for every actor of the chain line from farmer to slaughterhouse.

RFID on farm has existed for a long time with private systems used by few farmers interested in technology. Such private systems present no interest for other actors of animal industry.

Only an official RFID presents a common interest and it supposes a wide use of the RFID by a big majority of farmers.

The challenge is to help non technology farmers to use RFID and also small herds to survive even they don't get any direct benefit from this technology.

4.0 References

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Council Directive 97/12/EC of 17 March 1997 amending and updating Directive 64/432/EEC on health problems affecting intra-Community trade in bovine animals and swine.

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French decree No 2006-376 of 23 March 2006 on identification of bovine animals and modifying rural code.

French departmental order of 9 May 2006 on identification of bovine animals modalities.

Norm ISO 11784: 1996 Radio frequency identification of animals -- Code structure.

Norm ISO 11785: 1996 Radio frequency identification of animals – Technical concept.