COLLECTION **MÉTHODES & OUTILS**

Using electronic identification in the cattle sector

Final report on the pilot projects June 2010

INSTITUT DE L'ELEVAGE

IDENTIFICATION ELECTRONIQUE BOVINE

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Collection
Méthodes et Outils

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IDENTIFICATION ELECTRONIQUE DES BOVINS

Using electronic identification in the cattle sector

Final report on the pilot projects

June 2010

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FRENCH LIVESTOCK CONFEDERATION

Table of Contents

1 Presentation of the national programme 5
1.1 Background behind the initiative 5
1.2 Pilot projects for carrying out tests in real-life conditions 5
1.3 Aims and objectives 5
1.4 The projects selected and partners 6
2 The key aspects of electronic identification (RFID) 7
2.1 General principle 7
2.2 The identifier 7
2.2.1 The ear tag 7
2.2.2 The transponder (or radiofrequency label) 7
2.3 The readers 8
2.3.1 Fixed readers 8
2.3.2 Portable readers 9
2.3.3 Read distances 9
2.3.4 The importance of penning the animals 9
2.4 Technical characteristics 10
2.4.1 Low frequency radio waves, 134.2 kHz 10
2.4.2 Passive transponder 10
2.4.3 Compliance with ISO 11784/11785 standards 10
2.4.4 OTP type encryption (one-time programmable) 11
2.5 Different usage modes 11
2.5.1 Fixed reading / portable reading 11
2.5.2 Static reading / dynamic reading 11
2.5.3 Using the data in real-time / later 11
3 Applications for the sector 12
3.1 Cattle management software 13
3.2 Automatic equipment 16
3.3 Milking support 20
3.3.1 Configuration 1: Identification at the entrance to the milking parlour 20
3.3.2 Configuration 2: Identification at the milking unit 22
3.4 Milk testing 25
3.5 Automating weighing 27
3.6 Automating sorting 32
3.7 Transport: Loading/unloading cattle 35
3.8 Trade: using portable readers 37
3.9 Livestock markets 39
3.10 Abattoir 42
3.10.1 Identification checks in cowsheds 42
***3.10.2** Entering the number on the slaughter line 45*
4 General review 48

4.1 The advantages of the technology 48
4.1.1 Reliability 48
4.1.2 Safety 48
4.1.3 Comfortable working conditions 48
4.1.4 Time savings 48
4.2 Key phases involved in implementation 49
4.2.1 Determining and optimising the read mode 49
4.2.2 Validating the transfer of numbers 49
4.2.3 Using the data read 50
4.3 Integrating fixed readers 50
4.3.1 Sensitivity to environmental constraints 50
4.3.2 Recommendations 51
4.4 Reading moving animals 51
4.4.1 The importance of penning the animals 51
4.4.2 Managing read failures, insufficient information 51
4.4.3 Penning and speed of work 52
4.5 Interoperability of equipment 52
4.5.1 Technical standards and norms 52
4.5.2 Limitations of interoperability 53
4.6 Automating tasks 53
4.6.1 Electronic identification, input data for automating tasks 54
4.6.2 Combining expertise to create complete solutions 54
4.7 Equipment cost 54
4.7.1 Reading equipment 54
4.7.2 Associated costs 54
5 Conclusion and outlook 55
A tool with a greater potential for use with a range of applications 55
Different expectations depending on the stakeholders in the sector 55
Certain technical guarantees have yet to be given 55
The sector has to make a decision if the system is to be used collectively 55
An asset should the decision be made to computerise passports 55

1 PRESENTATION OF THE NATIONAL PROGRAMME

1.1 Background behind the initiative

In 2006, a number of professional organisations in the cattle sector, together with the Ministry of Agriculture, decided that an assessment was needed of how electronic identification (RFID) could be used in the cattle sector, together with a technical reference framework.

The aim was to acquire - over a period of a few years - the information needed in order to decide whether this tool could be recognised as an official means of identifying cattle and whether it could be made available to stakeholders in the sector in order for it to be used collectively.

This initiative also fell within the broader context in which a number of countries - countries outside Europe in particular which use different tracking systems to the ones used in Europe - were already beginning to use electronic identification on a large scale.

1.2 Pilot projects for carrying out tests in real-life conditions

In a bid to obtain as much technical reference material as possible, it was decided to implement a broad test programme based on a series of pilot projects.

The aim of these pilot projects was to use electronic identification in real-life conditions at all stages of the various processes at work within the sector so as to assess its real benefits. Its many applications were therefore trialled with the help of many partner organisations - on dairy and suckling farms, as well as at collection centres, animal markets and abattoirs.

In many cases, real-life conditions were achieved through using RFID on a daily basis, carrying out the necessary modifications to infrastructures, adapting IT resources accordingly and restructuring people's work around RFID.
When it was not possible to replicate real-life conditions, the experiments were structured into sequences of tasks which simulated the way in which electronic identification would be used on a routine basis.

1.3 Aims and objectives

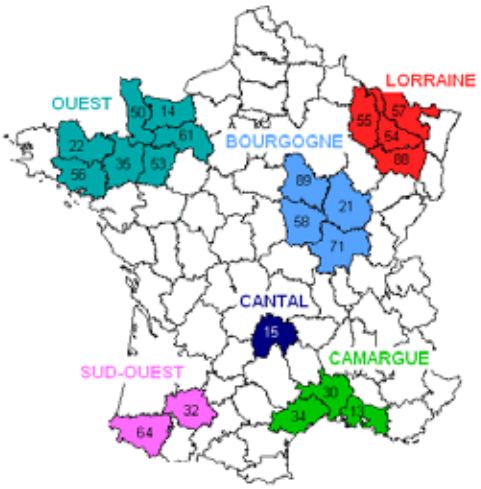
The aims and objectives that were identified when the programme was launched involved:

1. Implementing pilot initiatives at all stages of the processes throughout the sector in order to assess how electronic identification could be used in each activity sector,
2. Informing regional representatives of the sector and local bodies of the potential benefits of the tool and allowing them to get used to using it over a period of time,
3. Involving all categories of operator in assessing the electronic identification of cattle,
4. Involving as many manufacturers, installers and software publishers as possible in order to prepare equipment and software for use with electronic identification,
5. Analysing the effects that officially recognising the national cattle identification and traceability system would have.

1.4 The projects selected and partners

Following a call for applications issued in 2006, the following 6 regional projects were selected:

1. Burgundy, run by the Saône et Loire EDE (regional livestock centre)
2. Camargue, run by the Provence-Alpes-Côte d'Azur region EDE (regional livestock centre),
3. Cantal, run by the Cantal GDS (regional animal health association),
4. Lorraine, run by Lorraine Elevage, an EIG,
5. Ouest, run by the Britanny EDE (regional livestock centre),
6. Sud-Ouest, run by the *Pyrénées Atlantiques* chamber of agriculture.



THE PROJECTS - SOME FIGURES

§ 51 field applications

Made possible through the involvement of:

§ 21 *départements*, and the associated cattle identification project managers (EdE/GDS)

§ 330 breeders and 55,000 tagged animals

§ 5 test stations
Jalogny, Mauron, Pouilly en auxois, Big Denguin, Arvalis 55 station

§ 7 performance supervision bodies
Contrôle laitier 35, Bovins Croissance 21, 58, 71, 89, 54, 57

§ 6 collection centres
Gecsel, Alotis, Capvl, Vivadour, Eurofrance, Altitude

§ 2 markets
Château-Gontier, Moulin-Engilbert

§ 6 abattoirs
Socopa Mirecourt, Charal Metz, Paray le Monial, SVA Vitré, Pau Lons, Socopa Gacé

§ 6 cattle management software application publishers
Geidel, Isagri, Arsoe de Bretagne, Arsoe Nord-Est, AROSE CMRE

§ 4 farming equipment manufacturers
De laval, Packo Fullwood, Boumatic, Forster

2 THE KEY ASPECTS OF ELECTRONIC IDENTIFICATION (RFID)

2.1 General principle

Electronic identification is a remote identification technology that does not involve contact between the identifier (the animal being identified) and a reading device. The identifier contains an electronic chip. The reader uses radio waves to communicate with the identifier.

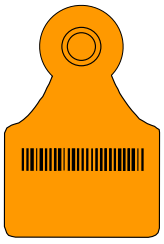
The electronic chip only contains the animal's national number:

- the country code is represented by 3 digits (250 for France - FR),
- the animal's national number is encrypted in 12 digits (to the far right of the sequence, preceded by 2 zeros for 10-digit national numbers for French cattle). This is the same number as the one marked on the tag.

2.2 The identifier

2.2.1 The ear tag

The official electronic identifier used in France for cattle is a tag, similar to conventional tags, which contain a transponder.



The electronic identifier can also take the form of a ruminal bolus. Bolus tracking is not authorised in France.

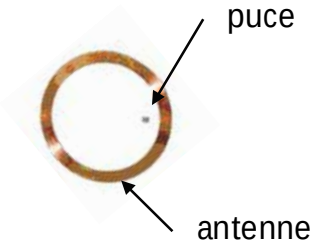
2.2.2 The transponder (or radiofrequency label)

This is the electronic component which contains information and which communicates with the reader.

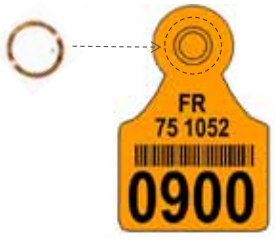
A transponder is made up of:

- an electronic chip, i.e. a silicon microcircuit with a surface area of approximately 1 mm² which contains the digital information,
- a circular antenna approximately 3 cm in diameter, made of coiled copper wire, for communicating with the reader.

<u>Transponder</u>



<u>Location in the tag</u>



The transponder is moulded into the tag

2.3 The readers

Like the identifier, the reader also integrates an antenna (made of coiled copper wire) which enables communication by radio waves with the electronic identifier.

The reader emits a magnetic field. When the identifier is located within this field, it absorbs energy through its antenna and sends information back to the reader. The reader then decodes and saves and/or transmits it.

There are two types of reader: fixed readers and portable readers.

2.3.1 Fixed readers

The tag is read when the animal comes close to the reader's antenna. Fixed readers can be installed in cattle crushes, in chutes or milking areas, or integrated into automatic equipment or slaughter lines, etc.

There are several types of fixed reader:

· Fixed panel:

The panels are installed on the walls of cattle crushes or chutes. Panels can be installed facing each other in a chute in order to strengthen the reading field.
There are different panel sizes available, ranging from approximately 30 cm x 30 cm, up to 160 cm x 60 cm.

Some panels are designed as simple frames, through which operators can pass their arms and handle the animals if necessary.

· Gateway:

With this type of reader, the animal passes through the antenna. The magnetic field emitted by the antenna extends over several dozen centimetres in front of and behind the gateway. Tags can be read anywhere within this zone.

The antennae for gateway readers can be made-to-measure and integrated into wooden structures (see photo opposite).

· Transportable panel:

Unlike fixed panels and gateways, this type of device has:

- a battery, enabling it to operate autonomously for several hours,
- an integrated memory for storing the numbers it reads for later use.

Its transportability means that it can be shared between different users, and acquire separate sets of data.

2.3.2 Portable readers

The user must move the reader close to the animal's ear tag in order to read, save and/or transfer the number.
There are different types of portable reader:

· Stick:

The functionality of stick readers is very simple. They can be used to read, save and transfer numbers.

· Box:

This type of reader comes with a keypad which can be used to add additional information to numbers as they are read.
This feature can be used to create batches when reading an animal's number.
Some models include a cane-type extension for slightly increasing the read range.

Both stick and box readers have integrated memories for transferring the numbers read so that they can be used later on. They can be transferred via a cable, or wirelessly (Bluetooth).

· All-in-one:

All-in-one readers combine the functions of a pocket computer (PDA) and an electronic reader.
The number read is transferred directly - the device can both read and process numbers (with the help of on-board software).
This type of equipment can also integrate a barcode reader. It can be used - for example - to cross-reference data read from electronic tags and passports.

2.3.3 Read distances

Portable readers have an average read distance of approximately 25 cm, while fixed readers can read tags at up to 80 or 90 cm.
This technology may not be used to read the tag on an animal that is very far away (in the middle of a field, for example). Even if readers were to become more powerful in the future, the magnetic field they emit could not be used to individually identify an animal that was very far away.

These distances - of a few dozen centimetres - are an asset in certain applications. This is because the intensity of the magnetic field emitted by a reader decreases in proportion to its distance. Also, low-frequency waves are not subject to "rebound" phenomena which increase their dispersion. These two factors together ensure that the animal whose tag is read is the one closest to the reader and not one that is further away. This is essential in order for a DAC to operate properly.

2.3.4 The importance of penning the animals

· Reading animals individually

Low-frequency ISO electronic identification cannot be used to manage anticollision (the capacity to detect two identifiers simultaneously), and so the animals have to be read one at a time. In order to electronically identify animals properly, they need to be read individually using an appropriate penning system.

- Ensuring that the animals are read properly

Penning is a means of ensuring that the animals are properly positioned in the reader's magnetic field, or cross it as they move through a chute. So, working chutes which are too wide should be avoided as this will negatively affect how effectively the animals are read.

2.4 Technical characteristics

The following technical characteristics are used for officially identifying cattle:

2.4.1 Low frequency radio waves, 134.2 kHz

These are not easily affected by the environment, and are suitable for use in a liquid environment. The presence of living organisms, mainly composed of water, does not interfere with their diffusion. Read distances, as well as data exchange speeds, are limited compared with those possible with higher frequency waves (HF, UHF). The 134.2 kHz frequency is defined by ISO norms.

2.4.2 Passive transponder

The identifier does not have its own power supply (no integrated battery). This gives it an unlimited lifespan which is suitable for repeated identification operations over a long period of time (IPG). It requires the energy generated by the reader in order to operate the chip and transmit information.
The electronic tags only emit (low frequency) waves when they are within the magnetic field of a reader and are in communication with it.

2.4.3 Compliance with ISO 11784/11785 standards

The equipment's compliance with international standards ensures its compatibility with readers and transponders across France, Europe and the rest of the world. All transponders used for official identification are compliant with ISO 11784/11785 standards.
These standards do not provide for the management of anticollision (reading several tags at once); the animals have to be read one at a time.

The transponders can either use HDX (Half-Duplex) or FDX-B (Full-Duplex) technology. Both are recognised by the ISO standards mentioned above:

HDX

According to this standard, data is exchanged between the reader and the tag asynchronously:
while the reader is activated, the transponder stores enough energy so that it can power the chip. Once the reader ends its activation, the transponder sends its response (the identification number).

FDX

According to this standard, data is exchanged between the reader and the tag synchronously:
both the reader and the transponder operate at the same time. The reader activates the chip and the transponder responds continuously as long as the field is maintained.

Readers that are compliant with the ISO 11785 standard can read both HDX and FDX standard transponders. The technology used in the transporter is completely transparent for the user.

2.4.4 OTP type encryption (one-time programmable)

OTB encryption is a technology that allows the tag manufacturer to encode and lock the electronic chip. Once the chip has been encoded, a fuse system is used to lock the chip into read-only mode so that it cannot be rewritten to.

The number which can be seen marked on the plastic and the electronic number that is encoded into the chip are identical.

2.5 Different usage modes

Electronic identification can be used in a number of different ways with a range of very varied applications. Some usage modes are more appropriate than others, depending on the place where the animals are kept, the business sector, how the work is structured and configured or the operator's preference.

2.5.1 Fixed reading / portable reading

When a portable reader is used, the animal is stationary (or roaming in a semi-extensive grazing system), and it is the operator who moves.

When a fixed reader is used, the operator remains at his workstation, and the animal is either stationary, or free to move around.

2.5.2 Static reading / dynamic reading

In some situations, operators are required to read the tag of a stationary animal; other situations are better suited to managing animals as they move.

They can be read statically. The animal is stationary. It can be read using either a fixed or a portable reader.

They can be read dynamically, meaning while the animals are moving. In this situation, they can only be read using a fixed reader.

2.5.3 Using the data in real-time / later

In most cases, electronically reading a tag is a precursor to data being entered into an IT system, or saved, or displayed on a screen... or it activates a piece of automated equipment, etc. In such cases, the data that has been gleaned from the electronic identification process is used instantaneously; the operation is carried out in real-time.

Electronic identification can also be used simply as a means of collecting numbers so that they can be used later on. The reader stores the numbers it reads in its internal memory so that they can be transferred subsequently. The data is then used later on.

3 APPLICATIONS FOR THE SECTOR

· Working method

When the projects were launched, all those involved shared their expectations or gave feedback on proposals designed to integrate the use of electronic identification into their day-to-day activities.

In each case, the projects were carried out in 3 stages: Analysis / Implementation / Evaluation.

Unless organisational constraints were an obstacle, the analysis and implementation phases took place in 2008, with all of 2009 being set aside for the evaluation.

Implementing the pilot initiatives involved:

- electronically tagging an appropriate number of cattle (sometimes up to several thousand),
- deciding what types of reader should be used and installing them,
- modifying infrastructures, if necessary,
- modifying the way in which work was structured,
- modifying the software or automatic equipment that makes use of the data gleaned from the electronic identification so as to make it compatible.

· A non-exhaustive set of uses

The uses of electronic identification described in this document are not an exhaustive list of all possible uses in the sector.
They are a reflection of the types of use that the various stakeholders involved were interested in seeing when the projects were launched. It is these uses which were effectively implemented over the course of 2 years of experimentation.

Electronic identification has enough potential for other types of application to be considered.

· No obvious applications for artificial insemination and carcass disposal

For artificial insemination and carcass disposal, the pilot projects did not get beyond the analysis phase. After an initial stage which involved holding discussions with the various bodies concerned, it was decided that electronic identification did not bring with it any dramatic advantages.

Basically, the day-to-day tasks carried out by inseminators or collection agents working for carcass disposal companies could not be made easier by the integration of equipment currently used for electronic identification (fixed or portable).

In view of the fact that conditions were not yet suitable for further experimenting with electronic identification in either of these two sectors, no application was implemented. But this situation is not necessarily final, and there is nothing to suggest that solutions might not be possible at some point in the future for these two sectors.

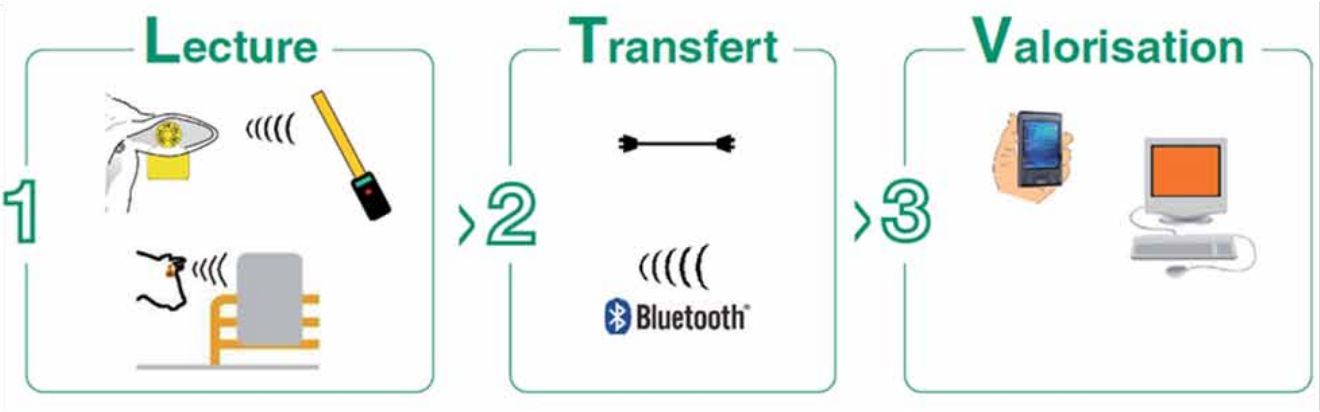
The rest of the 3rd section of this document is a series of information sheets.

Cattle management software

Facilitating the collection of numbers for batch management

Users concerned: breeders who use cattle management software

Operation and implementation



1. The number can be read automatically using a portable or fixed reader
2. The number is then transmitted in real time (PDA/Smartphone) or later on (PC)
3. The data acquired is used by the cattle management software for various event types (notifications, health events, etc.).

Four types of use have been tested:

	Equipment	Penning system used	Use
1	PORTABLE reader + PDA	Tethered animal	REAL time
2	All-in-one PDA	Tethered animal	REAL time
3	FIXED reader + PDA	Moving animal	REAL time
4	PORTABLE reader + Desktop PC	Tethered animal	DEFERRED

See assessments on the following pages

Conditions of use

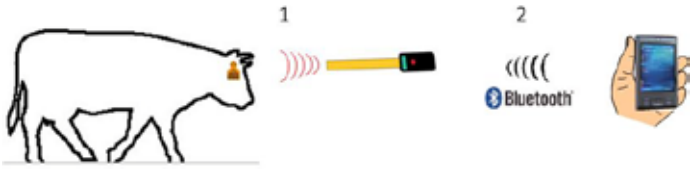
The animals must be PENNED order to read their tags:

- Mobile reading: large cattle must either be tethered or stationary in a chute, calves may be free to roam semi-extensively, with no more than 10 or so per space,
- Fixed reading: the animal tags must be read in a working chute (calves and large cattle).

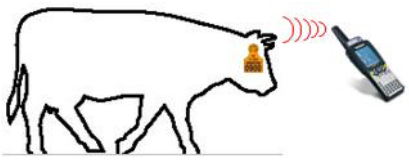
Conditions of deployment

Breeders or Fatstock farmers: Voluntary RFID

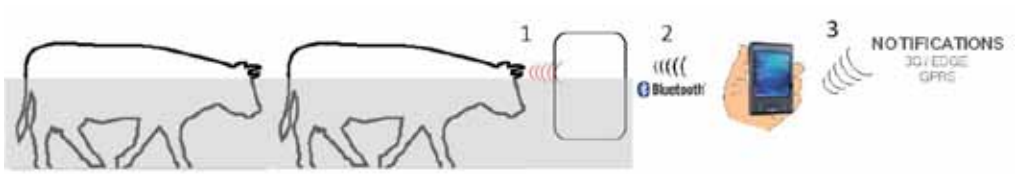
Specialist fatstock farmers: Wide spread use of RFID tags, because for the entry of animals to be managed automatically by electronically reading them, the animals have to have been electronically tagged before they arrive at the farm.

1 - PORTABLE reader + PDA	Stationary animal Use in REAL TIME	
Operation and implementation	 the portable reader is connected (wirelessly) to the pocket computer (PDA) on which the cattle management software is installed. **1.** The numbers are read by the portable reader, **2.** And then transmitted in real time to the software which stores and processes them.	
Equipment	Portable reader (€600 to €1000), PDA (€200 to €400)	
ADVANTAGES	J RELIABLE reading, no data entry errors	
DISADVANTAGES and limitations	L HAVING TO SET UP THE BLUETOOTH® CONNECTION AND ITS STABILITY THEREAFTER: before using the portable reader for the first time, the connection between the reader and the PDA has to be set up. Bluetooth® connections are not always stable, and if they drop, the work is interrupted and so the operator needs to know how to re-establish them. L BULK: both the operator's hands are full with the portable reader and the pocket computer (PDA). (It should be noted that solutions currently exist which involve mounting the PDA onto the reader so as to free up one hand). L This application is not very useful for managing individual events.	
General advantages	★ ☆ ☆ ☆ ☆	*Not a widely used solution because of its bulkiness, and the difficulties associated with the instability of the Bluetooth® connection work against it.*

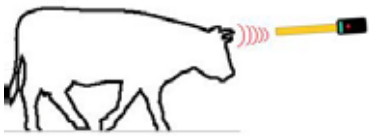
This configuration was tested on 9 farms as part of the Cantal, Lorraine, Burgundy and Southwest projects, using the Bovitel, Est-Elevage, Geidel and Selso software applications and the Allflex, Agrident and Réseaumatique portable readers.

2 - All-in-one PDA	Stationary animal Use in REAL TIME	
Operation and implementation		The reader and pocket computer (PDA) are integrated into a single device. The numbers read are immediately sent to the software application which stores and uses them. A cane may be used (an antenna extension) for reading electronic tags without having to get too close to the animals.
Equipment	All-in-one PDA (€1200)	
ADVANTAGES	J RELIABLE reading, no data entry errors J TRANSFER, given that the reader is integrated into the PDA, there is no uncertainty over whether or not the data read is transferred to the software application (no Bluetooth connection problems). J INDIVIDUAL EVENT management. Unlike the other configurations, the all-in-one PDA can easily be used to save individual events. J OPTIONAL BARCODE READER: Some all-in-one PDA models can also integrate a barcode reader.	
DISADVANTAGES and limitations	L BULKY: because of the device's size, it is difficult to carry it around all the time	
General advantages	★ ★ ★ ★ ☆	*This solution is very easy to use, and so has great appeal. The downside is still its bulk*

This configuration was tested on 2 farms as part of the Lorraine and Southwest projects, using the Geidel and Est-Elevage software applications
and the PSION all-in-one PDA.

3 - FIXED reader + PDA	Moving animal Use in REAL TIME	
Operation and implementation	 The fixed reader is installed on the wall of a chute or cattle crush (left open) and connected (wirelessly) to the PDA on which the cattle management software is installed: **1.** The numbers are read by the fixed reader as the animals pass by and **2.** Are then transmitted in real time to the software on the PDA, **3.** If the PDA is 3G/EDGE/GPRS enabled, an entry notification can be generated and sent as soon as the animals have passed by in the chute,	
Equipment	Fixed reader (€2500 to €3000), PDA (€200 to €400), chute or cattle crush	
ADVANTAGES	J RELIABLE reading, no data entry errors J SECURITY: the farmer does not need to approach the animals, it is not necessary to stop them and catch hold of their ears in order to read the national numbers in their entirety J REDUCED BULK, the operator only needs to have the PDA in his hand	
DISADVANTAGES and limitations	L HAVING TO SET UP THE BLUETOOTH® CONNECTION AND ITS STABILITY THEREAFTER: Bluetooth® connections are not always stable, and if they drop, the work is interrupted and so the operator needs to know how to re-establish them.	
General advantages	★★★★☆	*This application is very appealing for farms which can easily use their working chutes.*

This configuration was tested at the Mauron experimental station with the AGRAEL software application and an Agrident fixed reader installed in a refitted Maréchal working chute.

4 - Portable Reader + Desktop PC	Stationary animal DEFERRED use	
Operation and implementation	**1 – In the cowshed**  **1.** In the cowshed, the animals' electronic tags are read and their numbers stored in the portable reader. **2 – At the office**  **2.** The numbers stored in the reader are transferred to the cattle management application and the breeder logs the appropriate event (exit, vaccination, etc.).	
Equipment	Portable reader (€600 to €1000)	
ADVANTAGES	J RELIABLE reading, no data entry errors J STRAIGHTFORWARD TO USE, connecting the portable reader to the computer directly displays the list of animals whose tags have been read in the application and makes it easy to send notifications, log health-related events, create batches, etc.	
DISADVANTAGES and limitations	L CAN ONLY BE USED for noting down the numbers prior to entering them into the computer later on at the office.	
General advantages	★★★★★	*This solution is very easy to use, and so has great appeal, in spite of the limitations in how it can be used.*

This configuration was tested on 3 farms as part of the Lorraine project with the Est-Elevage software application and the Agrident, Allflex and Gallagher stick readers.

Portable reader + PDA

Portable reader + PDA

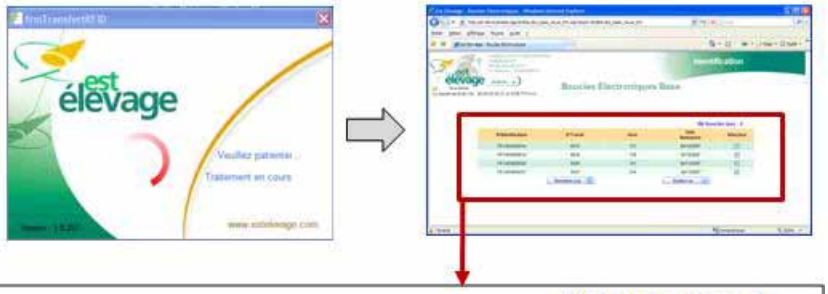
Synchronising data

All-in-one PDA

Portable reader + Desktop PC: Transferring data

1 - Connexion du lecteur à l'ordinateur

2 – importation automatique des n° vers le logiciel



Nb boucles lues : 4

N°Identification	N°Travail	Nom	Date Naissance	Sélection
FR 5454826914	6914	733	09/10/2007	☑
FR 5454826918	6918	738	16/10/2007	☑
FR 5454826920	6920	741	04/11/2007	☑
FR 5454840437	0437	744	16/11/2007	☑

Sanitaire Lot Sortie Lot

Sheet 2

Automatic equipment

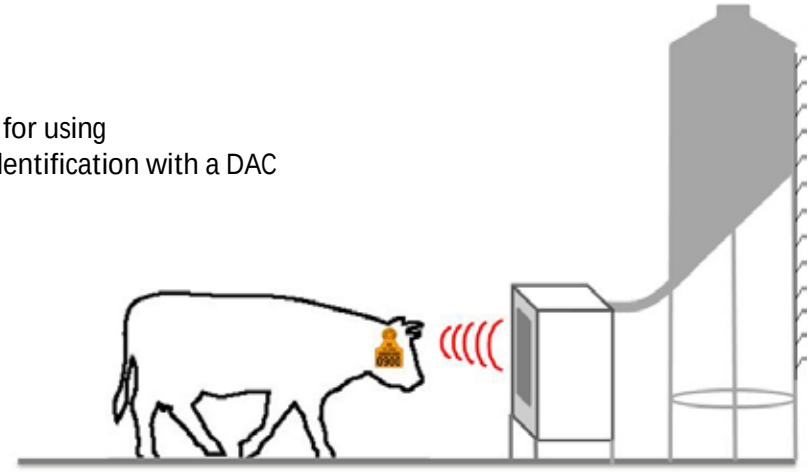
Adapting automatic farming equipment so that it can be used with official electronic tags by replacing identifiers supplied by “manufacturers" (collars, tags, rings)

Users concerned: breeders who use DAL, DAC, automated milking systems, farm milk counters with identification systems or sorting systems at milking parlour exits

Operation and implementation

- BEFOREHAND: A automated equipment compatibility assessment is carried out with the installer,
- For new generation automatic equipment, implementation involves simply using an official electronic ear tag instead of the automatic equipment’s identifier (collar, tag, ring).
- For legacy automatic equipment, and depending on the results of the compatibility assessment, it is sometimes essential to carry out additional modifications (see below, § conditions of use).

Schematic diagram for using
official electronic identification with a DAC



Conditions of use

- The automatic equipment must be compatible with the international norms used in animal identification (ISO 11784 and 11785). It must operate equally well with both the tag standards (FDX and HDX) recognised by these norms. Otherwise:
  - if it is only partly compatible, the tag type with which it works must be determined (HDX or FDX),
  - if it is incompatible with both tag types, then the reading system - at the very least - needs to be changed. On old equipment, simply changing the reading system may not be enough. This should be confirmed on a case-by-case basis with the installer.
- The automatic equipment must have a reading system which can be used to read ear tags on animals' left ears. Otherwise, the reader(s) must be moved so that they can read tags on the animals' left ears.
- Electronically tagging animals that have been bought: Until such time as electronic tagging becomes standard practice, animals brought onto farms which do not have electronic tags (or which have tags that are incompatible with the automatic equipment - FDX instead of HDX, or the other way around) will need to be tagged.
- Milking parlour: at the entry to the platform, an appropriate pen is required in order to ensure that animals are read at the right rate.

Assessment

Advantages:

- J Avoids the redundancy of animals being identified using several systems,
- J Avoids having to manage correspondence between "manufacturer" identifiers and the animal's official number
- J Low cost of official electronic tags compared with collars and other "manufacturers" identifiers
- J Official tags can work with different types of automatic equipment throughout an animal's life

Disadvantages and limitations:

- L Legacy automatic equipment: not all devices are compatible, a preliminary technical assessment needs to be carried out before implementing an electronic identification system on a farm

General advantage: ★★★★☆

This application goes a long way to meeting farmers' requirements in view of how easy it is to use in conjunction with compatible automatic equipment. However, the number of compatible automatic devices on the market is currently very low. Manufacturers will need to increase their efforts over the next few months in order to be able to provide farmers with ranges of compatible equipment.

Conditions of deployment: Voluntary RFID

Average investment cost

- Automatic equipment that is completely compatible: price of the electronic tags
- Automatic equipment that is partly compatible: price of the tags, changes made to how the reader is positioned
- Automatic equipment that is incompatible: changes made to the reading system used, and any other changes that are required

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Configurations that have been tested

Automatic equipment	Manufacturer	No. of animals tagged		No. of farms	Project
		HDX	FDX-B		
DAL	Forster	335	331	3	Ouest, Lorraine
DAC	Boumatic	142		1	Lorraine
DAC	Delaval	75	70	1	Ouest
Robotic milking system	Packo Fullwood		90	1	Lorraine
Milking Parlour (EFM*)	Delaval	70		1	Ouest
Milking Parlour (EFM*)	Boumatic	60	30	1	Ouest
Sorting system	Packo Fullwood		90	1	Lorraine

* EFM: electronic farm meter

For detailed information, see the Ouest and Lorraine project reports

Equipment tested during the pilot projects

in collaboration with the manufacturers

DAL Forster

Delaval Milking Parlour with milk meters

Electronic tag reader at the milking parlour entrance

DAC Boumatic

Packo Fullwood Automated Milking Systems

reader antenna

Milking support

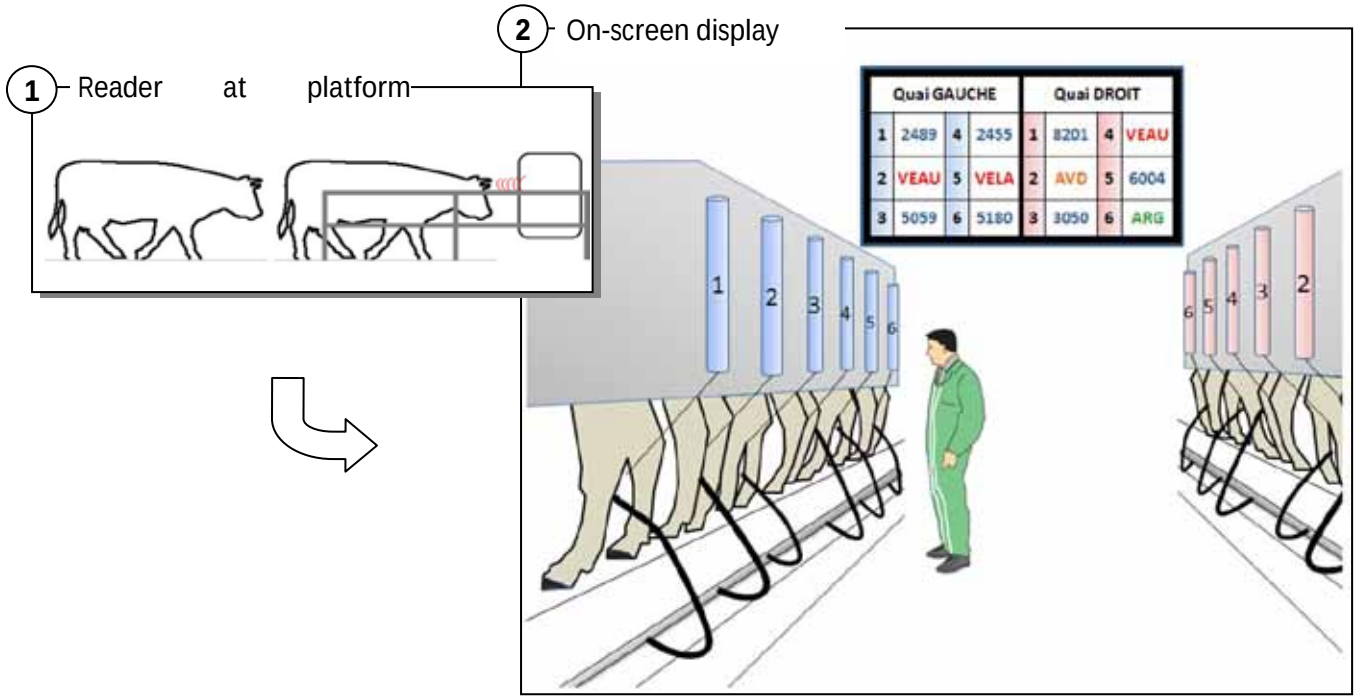
Configuration 1: Identification at the entrance to the milking parlour

Displaying the number of each cow, displaying and filling in alerts

Users concerned: all dairy farmers who do not have electronic milk metres or identification systems in their milking parlours who have at least 60 dairy cows.

Operation and implementation

1. Reading: the cows' electronic tags are read as they enter the platform
2. Displaying the numbers: The numbers are displayed one after the other on the screen, in the box for the cow's milking station. At the end of the milking session, opening the barrier resets the screen so that data for a new series of cows to be milked can be displayed.



3. Alert management: known alerts are displayed, flashing alternately between the animal's number and an alert code. A colour code (red/orange/green) gives an indication of the level of alert (high/medium/low). The alerts can be entered by the farmer via a display system (using a long-range mouse) and/or come from a cattle management application connected to the system.

Equipment: a fixed reader at each platform entrance + 1 screen (connected to a PC)
a connection to a cattle management application (optional)

Conditions of use

- This system is compatible with herringbone and side-by-side milking parlours,
- PENNING: The milking platform entrance often has to be adapted in order for tags to be read electronically. Marking the platform entrance by a small chute is recommended (at least 80 cm wide and 1.5 m long). This prevents numbers from being swapped around by cows from arriving at the platform entrance and then not moving into the first position when the barrier opens.
- At the entry to the milking parlour: an appropriate pen is required in order to ensure that animals are read at the right rate.

Assessment

Advantages:

- J RELIABILITY
- J COMFORTABLE WORKING CONDITIONS, no need to climb up onto the platform to read the cow's number
- J IMMEDIATE ENTRY of alerts
- J EASIER INFORMATION EXCHANGE between the various people involved in milking
- J System can be used by the MILK INSPECTION SERVICE with the aid of a portable electronic milk meter
- J PRICES, current solutions available on the market that enable alerts to be displayed require the installation of milk meters (system approximately 3 times more costly)
- J Solutions compatible with all types of milking parlour

Disadvantages and limitations:

- L Not suitable if the platform entrance cannot be adapted (waiting area too small, for example)

General advantage: ☆ ☆ ☆ ☆ ☆

This new system completely meets the requirements of all farmers involved in projects.

Conditions of deployment: Voluntary RFID

Average investment cost (not including cattle management software): **approximately €9000**

- *Readers (1 per platform, 2 x €2500):* *€5000*
- *Screen:* *€1500*
- *Adapting platforms and assembly:* ..... *€1000-€2500*

Note:

The use of the long-range mouse is one aspect of the application that could be improved. Although it is functional, it is not as ergonomically designed as it could be and can only be used to enter simple information. An alternative that is currently being looked into would involve using a touch screen. This would make entering information easier, and would make for a higher level of interactivity with the cattle management software - details of events noted during milking could be entered immediately.

Configurations that have been tested

Reader	Software	No. of animals tagged		No. of farms	Project
		HDX	FDX-B		
Nedap / Agid	Agrael	150	150	2	Ouest
Agrident / Itw reyflex	Agrael	50	50	1	Ouest

For detailed information, see the Ouest project report

Milking support

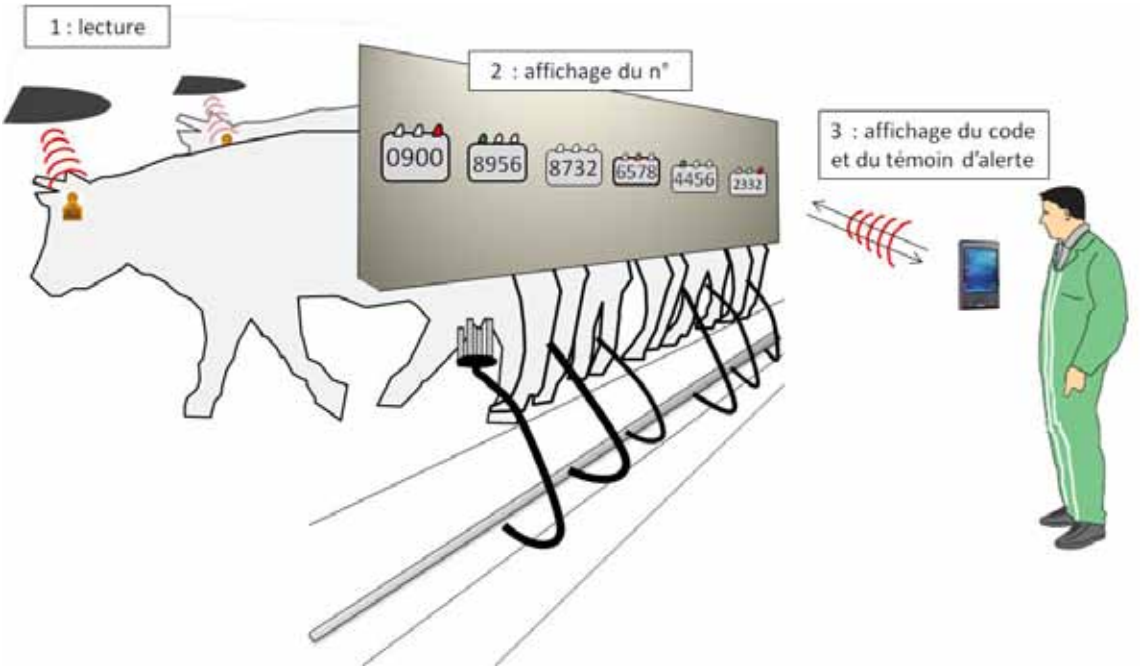
Configuration 2: Identification at the milking unit

Displaying the number of each cow and displaying alerts

Users concerned: all dairy farmers who do not have electronic milk meters or identification systems in their milking parlours and who have at least 60 dairy cows.

Operation and implementation

1. Reading: the cows' electronic tags are read once they have arrived at the milking unit via a reader located just above their heads
2. Displaying the numbers. The number is displayed on an individual screen located in the pit, near the milking unit.
3. Alert management: known alerts are shown on screens via the farmer's PDA. The PDA is synchronised with the cattle management software before milking. Information is exchanged wirelessly between the PDA and the display screens. The alert level is shown using a system of different coloured LEDs (green, orange, red). The alert type is indicated by an alert code shown on the individual display.



Unlike the system centralised information is displayed on a screen, this system does not allow information to be entered and transmitted. If required, this can be done directly on the farmer's PDA.

Equipment: a fixed reader for every milking unit,
one display per milking unit,
cattle management software installed on a 3G/EDGE/GPRS-enabled PDA

The quality of the information read varies depending on:

1. the behaviour of the cows: cows in some herds have a tendency to lower their heads. When this happens, the time it takes for the tags to be read can increase significantly.
2. the readers' power supply:
   - battery-powered: average read-rate of 80%
   - mains/transformer-powered: currently being tested.

Conditions of use

It is only possible to position the readers above the animals' heads in herringbone (or tandem) milking parlours.

Assessment

Advantages:

- J RELIABILITY
- J COMFORTABLE WORKING CONDITIONS, no need to climb up onto the platform to read the cow's number
- J Alternative solution that works particularly well when the waiting area is too small for the tags to be read to be carried out at the platform entrance

Disadvantages and limitations:

- L Not appropriate for side-by-side milking parlours because the handrail systems would prevent readers from being installed above the animals' heads.
- L Wireless connection between the 3G/EDGE/GPRS-enabled PDA and the displays is too unstable

General advantages: ★★★☆☆

Certain technical aspects of this application - which is still being developed - still need to be checked.

Conditions of deployment: Voluntary RFID

Average investment cost (not including cattle management software): Not given

Note:

This system is a prototype and is still in the process of being developed. The tests which have so far been carried out have confirmed the technical feasibility of such a system.

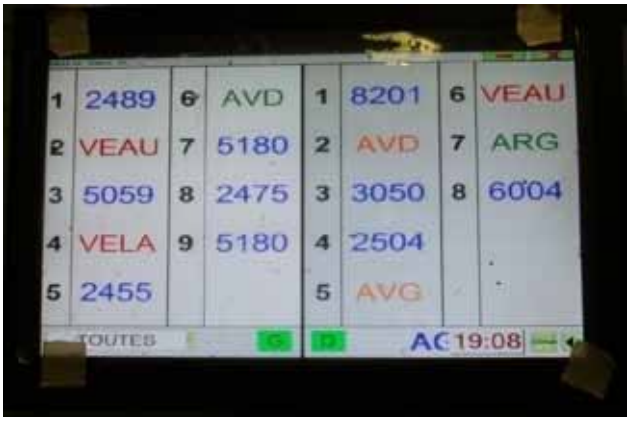
Configuration that has been tested

Reader	Software	No. of animals with electronic tags		No. of farms	Project
		HDX	FDX-B		
Allflex	Agrael	250	75	4	Ouest

For detailed information, see the Ouest project reports

Configuration 1: Reading performed at platform entrance

No. and alert displayed



Centralised display on a screen

Registering an alert
(with the long-range mouse)

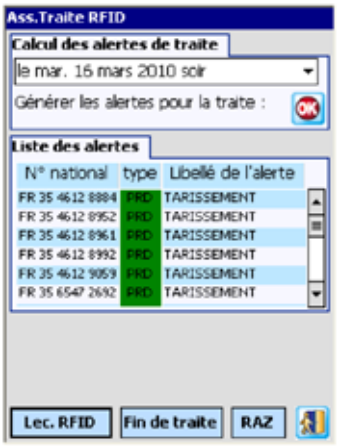
e.g.: alert on cow no. 5172

Configuration 2: Reading performed at the milking unit

No. and alert displayed

Schematic diagram for the individual display (prototype)

Updating the alerts on the farmer's PDA in order to exchange information with individual screens



To simplify the update procedure, it is done over the 3G network with the farmer's portal. This avoids having to synchronise in the office (via a PC) which is more restrictive.

Milk testing

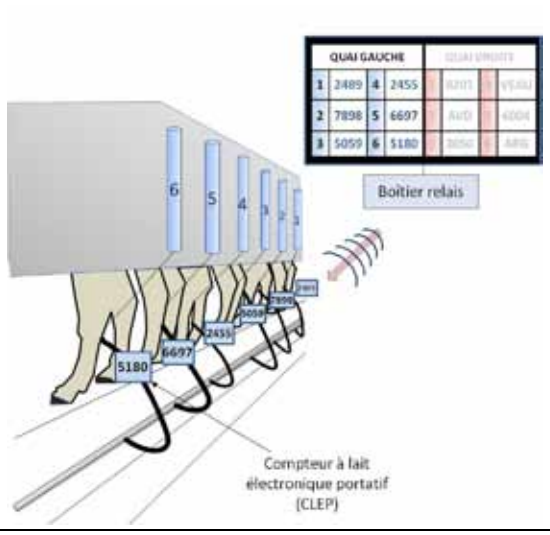
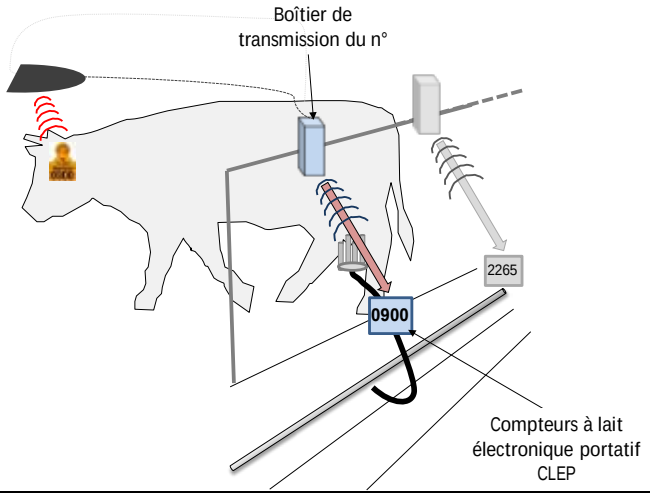
Automatically sending the animal's number to the electronic milk meter

Use in addition to milking support (cf. 3.1)

Users concerned: milk testing bodies

Operation and implementation

This application involves retrieving the animal's number when it is read by the milking support system and automatically sending it to the portable electronic milk meter.
If the numbers are read at the entrance to the platform, they are first centralised and then sent, one at a time, to each milk meter (figure 1).
If the numbers are read at the milking unit, they are sent directly to the milk meter via a wireless transmission box (figure 2).

figure 1: Reading performed at platform entrance	figure 2: Reading performed at the milking unit
	
1 - The display system sends the cows' numbers to the relay box *2 – The relay box sends the numbers to each milk meter by radio*	*1 – The milk meter activates the reading via the transmission box* *3 - The transmission box sends the number to the meter which is associated with it by radio.*

Conditions of use: This application is only possible if there is a milking support system at the farm.

Assessment

Advantages:

- J Numbers are RELIABLY sent, no data entry errors at the milk meter
- J COMFORTABLE WORKING CONDITIONS, no need to climb up onto the platform to read the cow's number
- J Application can be used within the context of the milk testing B protocol

Disadvantages and limitations:

- L This application can only be deployed on a large scale in order to meet the requirements specific to milk testing. This is because its implementation is contingent on the farm having a milking support system.

General advantage: ★ ★ ★ ★ ☆

The application is operational for use at platform entrances, but it is still in the process of being developed for unit to unit use.

Conditions of deployment: Voluntary RFID

Configurations that have been tested

Configuration	Reader	Milk meters	No. of animals tagged		No. of farms	Project
			HDX	FDX-B		
Reading performed at platform entrance	Nedap (agid)	Lactocorder	150	150	2	Ouest
Reading performed at the milking unit	Allflex	EMM – TruTest	250	75	4	Ouest

For detailed information, see the Ouest project report.

Configuration 1: Reading performed at platform entrance

Reader located in front of the barrier

Relay box

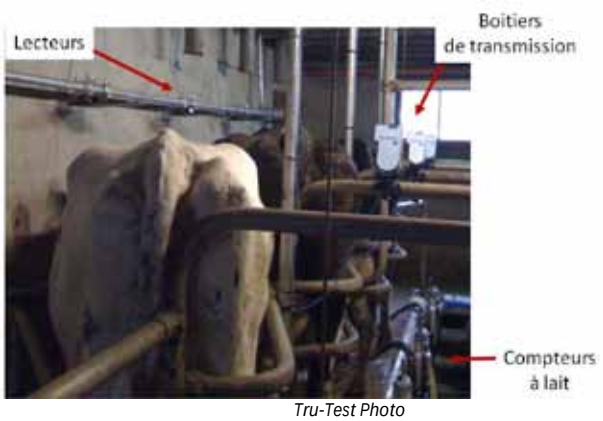
Milk meter

Configuration 2: Reading performed at the milking unit

Reader located above the animal's head

transmission box

milk meter



Tru-Test Photo

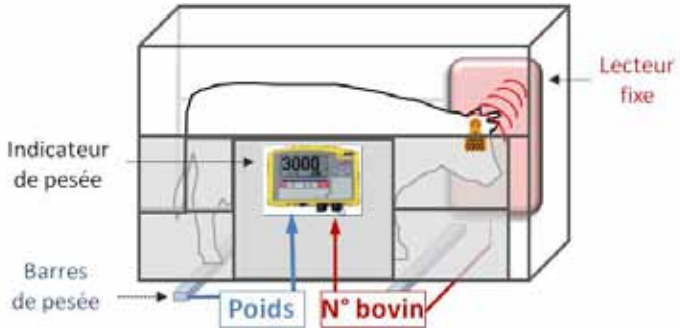
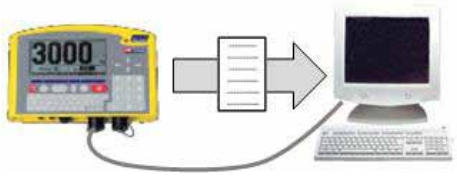
Automating weighing

Ensuring the automatic association of an animal's weight with its identification number

Target users: farmers, BC technicians, sales operators (collection centre, etc.)

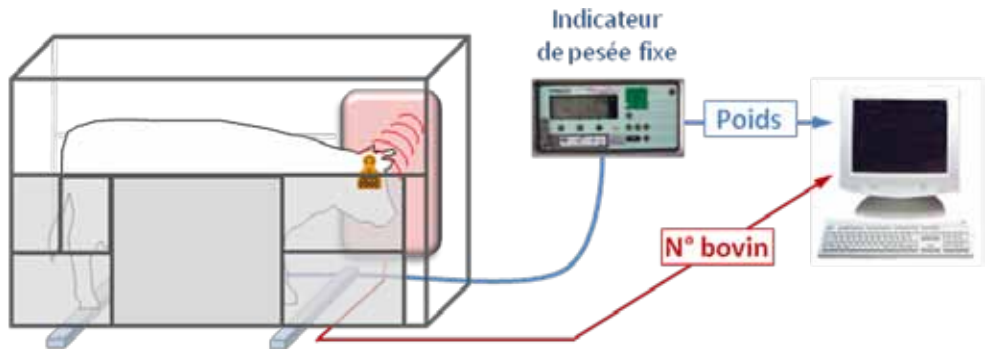
Operation and implementation

- AT FARMS - structured into two phases

1 - Weighing and saving of data	2 - Transfer and use
 *The fixed reader is connected to the weight indicator. The weight indicator ensures that cattle number and weight data are probably associated for each animal and then saves all weighing data.*	At the office  *The weight indicator is installed at a remote location and is connected to a computer. All recorded data is transferred to a software application (farmer/BC technician) which then makes use of the weighing data.*

A portable reader can be used instead of a fixed reader.

- AT A COLLECTION CENTRE - use in real time



The fixed reader and the weight indicator are directly connected to the computer. The weight and the number of the animal are transmitted to the computer as the data is read in, and are used in real-time.

Equipment: cattle crush / weight indicator / fixed reader

Conditions of use

- The cattle crush needs to be adapted for fixed reading (reader on the left). The metal structures of the cattle crushes might interfere with the electronic reading if they are too close to the readers' antennae. If this is the case, the cattle crushes often need to be adapted in order to make reading possible (by replacing one of the metal walls by a wooden plate, for example).
- A weight indicator that is compatible with the electronic reader is required - i.e., one that has the right type of connector and which recognises the format of the data transmitted by the ISO readers.

- The software which makes use of the data must be able to retrieve the data from the weight indicator. Otherwise, the necessary IT development work must be carried out in order to adapt the software.

Assessment

Advantages

- J SECURITY AND COMFORTABLE WORKING CONDITIONS: farmers are not required to put their arms in the cattle crush and grab hold of the animal's ears in order to read the tags. The operator's work essentially involves managing the flow of animals into and out of the crush, and making sure that the data has been properly saved.
- J RELIABILITY: Data no longer needs to be entered manually. This prevents errors from being made when entering weights and number data. The weight recorded is certain to be that of the animal in the cattle crush.
- J TIME-SAVINGS: With this system, data does not need to be entered twice (first on paper, then on the PC).
- J OPTIMISATION OF WORK: automatically entering the animal's weight and identification number means - particularly in collection centres - that more time can be spent on other tasks (observation, classifying the animals, etc.) without slowing down the rate of work.
- J The system can still be USED even if not all animals have electronic tags - numbers can still be entered manually on the weight indicator.
- J SHARING (among farmers), when weighing operations are not carried out on a frequent basis, sharing them among several farmers is an option (CUMA type). Each farmer only needs their own weighing bars. The transportable reading system and weight indicator are shared.
- J IMMEDIATE USE for advice (TECHNICIANS): the data can be used immediately; average daily weight gains are calculated instantaneously. Performance can be assessed and advice can be given as soon as the weighing operation is finished.
- J identification checks are carried out AUTOMATICALLY (SALES OPERATORS): If the passports can be scanned before the weighing operation, the direct connection between the weighing machine and the IT system means that automatic consistency checks can be carried out between the tags and the passports.

Disadvantages and limitations:

- L DATA TRANSFER. For use on a farm, the "indicator to weight-software" is very rarely optimised for simple transfer. Doing this needs to be made simpler. As a general rule, an interface application supplied by the manufacturer of the weight indicator has to be used in order to retrieve the data. The data then has to be imported from the "farmer" or "technician" application which then uses it. Direct links between the indicators and the "farmer" software have to be made possible.
- L Not all weight indicators are intuitive. The interfaces have to be made more straightforward and user-friendly.

General advantages: ☆ ☆ ☆ ☆ ☆

Conditions of deployment

At farms: Voluntary RFID
Sales operators: Widespread use of RFID

Average investment cost

Fixed reader (€2500 to €3000) + weight indicator (€500 to €1100) + weighing bars (€800 to €1400) + cattle crush (€2500) + IT gateway

Note

- Automatic sorting can be used with this system (see sheet 5)
- Fixed readers can be installed inside on-board lorry pens (cf. Burgundy Project Bovins Croissance initiative).

TEST CURRENTLY UNDERWAY: Weighing calves at feeders

A trial is currently underway in Brittany which involves investigating the possibility of automatically weighing calves as they pass through the feeder. This application is designed to track the growth of calves without having to carry out specific weighing operations. With this kind of setup, the only remaining task is to transfer the weights from the weight indicator to a computer.
As part of the initial tests currently being carried out, the following are being calibrated:

- the size that the stalls have to be so that calves can only enter them one at a time, and the weight recorded is indeed the weight for the animal being read,
- the width of the read field so that only the weight of the animal in the stall is read and not that of another animal close by.

The practical and economic benefits will be assessed as soon as the system is operational.

Configurations that have been tested

Site - Partner	Reader	Scales	No. of animals read		Project
			HDX	FDX	
Alotis	Agrident		143	674	Lorraine
CAPVL	Destron		110	27	Lorraine
Station ARVALIS	Gallagher	Gallagher	-	344	Lorraine
Vivadour	Nedap	Precia Molen	87	-	Sud-Ouest
Elevages du Cantal	Gallagher	Gallagher			Cantal
Mauron - 1 Station	Nedap	Balea	700	700	Ouest
Mauron - 2 Station	Agrident	Balea	600	600	Ouest
Gecsel	Agrident				Burgundy
Bovins Croissance (71)	Gallagher	Gallagher	6739	7284	Burgundy
Bovins Croissance (58)	Allflex	Tru-Test	366	-	Burgundy
Bovins Croissance (58)	Agrident	Tru-Test			Burgundy
Bovin Croissance (21)	Allflex - portable		673		Burgundy
Bovin Croissance (89)	Allflex	Tru-Test			Burgundy

For detailed information, see the Ouest, Burgundy, Cantal, Lorraine and Sud-Ouest project reports.

Weighing on farms

Examples of cattle crushes that have been adapted for electronic reading

Insertion of a wooden panel (Mauron)

Insertion of a composite panel (Jalogny)

Weight indicators

can be used with a portable reading system (see below)

When weighing is finished, these indicators are moved to an office and connected up to a computer so that the data can be transferred

Portable reading equipment

This portable fixed reader has an autonomous battery power supply and a memory so that the data read can be stored. A number of farms can group together and share the cost of this equipment - and then enjoy shared ownership of it.

On-board installation (Bovins de croissance lorries)

The weighing technician moves in from the left of the animal, so the reader is positioned to the right

The weighing data is imported via the technician's software (logibc) once the weighing is finished

Weighing in a collection centre

Specially adapted cattle crush

Weight indicator, fixed

international metrology organisation certified equipment

Weight station

The weighing system and the electronic tag reader are connected up to a computer. The reader makes a sound once it has detected an electronic tag on an animal. The animal's weight and number are entered automatically.

Automating sorting

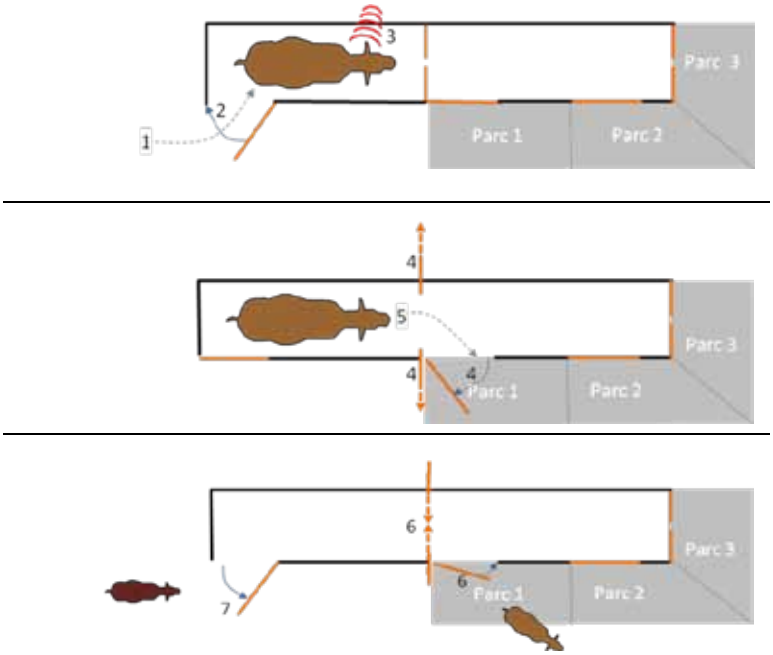
Target users: suckling farmers (with more than 60 cows), sales operators (collection centre, etc.)

Operation and implementation

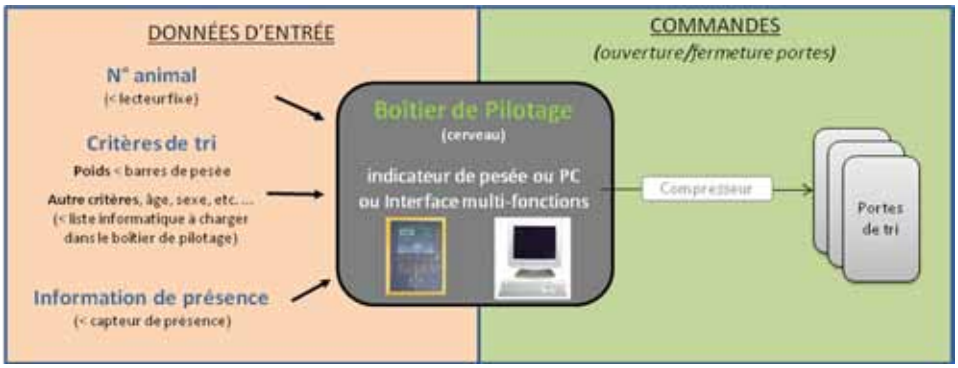
Automating sorting involves automating all or some of the operations in the following cycle:

1. The animal's entry
2. The closure of the cattle crush's rear door
3. The reading of the electronic tag (and weighing, if the animals are being sorted according to weight)
4. The opening of the cattle crush's front door and of the sorting area's door
5. The animal's exit
6. The closure of the cattle crush's front door and the closure of the relevant sorting area's door
7. The opening of the cattle crush's rear door

... then the entry of a new animal



Automatically sorting animals involves individually isolating each one for a very short period of time.
Each animal's number is read by a fixed reader.
The doors are only opened once the animal's number has been read beforehand.
The opening and closure of the doors is managed by a weight indicator, a computer or another specifically dedicated device (multifunction interface).



Sorting criteria

Animals can be sorted by weight by connecting a weighing system to the management box.
All the other sorting criteria (which cannot be detected by the sorting system) require a list to be loaded into the management box. The sorting operation is first carried out on a computer, and then the resulting list of animals is loaded into the management box. The box then makes sure that the animals are sorted according to the list.
Completely automated sorting systems use presence detectors and can operate completely autonomously.
Semi-automated systems that do not use presence detectors require somebody to be present on a permanent basis - in order to reset the cycle, for example. The result is a slightly lower sorting rate.

Equipment: cattle crush (or suitably equipped working chute) / fixed reader / compressor / management box / jacks

Conditions of use

- For all systems, whether they be automated all semi-automated, the flow of animals arriving into the system still has to be managed.
- Installing this type of sorting system involves changing the layout of the buildings and the cattle crush (arrival chute, sorting area).

Assessment

Advantages:

- J SECURITY: farmers are not required to put their arms in the cattle crush and grab hold of the animal's ears in order to read the tags.
- J COMFORTABLE WORKING CONDITIONS: The cattle crush and sorting area doors don't have to be operated manually.
- J TIME SAVINGS: all the operator has to do is manage the flow of animals arriving into the sorting system. So in a completely operational system, a single person can manage the whole sorting operation. For example, at the Mauron station, automated sorting is approximately 3 times faster than with an operation which is managed manually

Disadvantages and limitations: -

General advantages: ☆ ☆ ☆ ☆ ☆

Conditions of deployment

At farms: Voluntary RFID
Sales operators : Widespread use of RFID

Average investment cost

The sorting systems used are prototypes that were specially built for the pilot projects' requirements. For example, the prototype used in Brittany cost nearly €14,000 (including the cattle crush). Market prices should be considerably lower than the prices at this experimental investment stage.

Note:

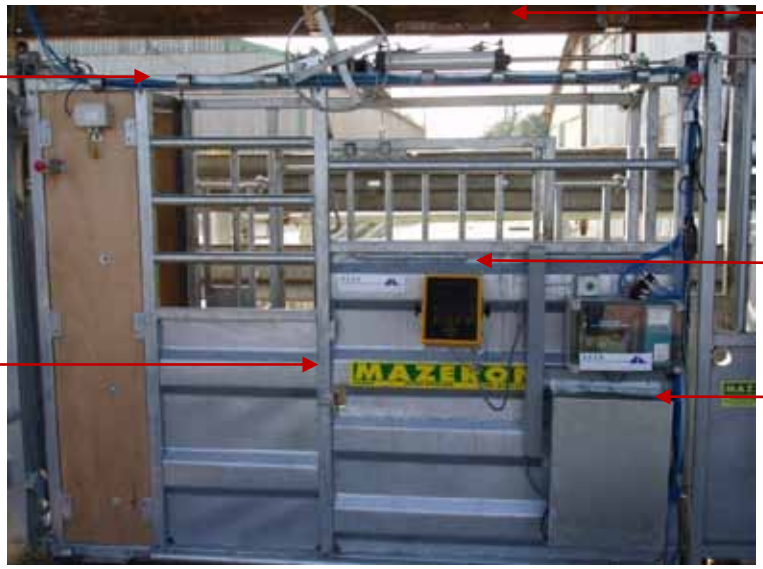
This type of installation can involve building layouts needing to be significantly changed.

Configurations that have been tested

Site	Cattle crush	Weight indicator	Fixed reader	No. of animals tagged		Project
				HDX	FDX	
Mauron (56)	Mazeron pen	Balea	Agid / nedap	200	200	Ouest
Elevage Y (72)	Satene chute	Iconix	Edit ID			Outside pilot project

For detailed information, see the Ouest project report.

Pen specially equipped for automatic sorting



Door activated by jack

Weighing and sorting management box

Operates the doors once the number of the animal sent by the reader has been checked

Exit to the right towards sorting area 1

Exit to the left towards sorting area 2

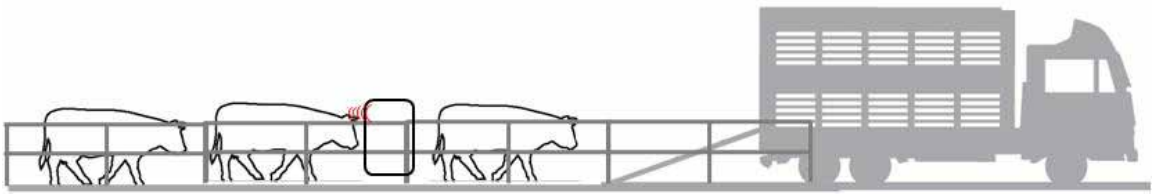
Transport: Loading/unloading cattle

Automating the noting of numbers

Users concerned: sales operators

Operation and implementation

The identification numbers of the cattle are automatically noted when they pass through a working chute fitted with a fixed reader.
The aim is to automate passport-tag consistency checks to ensure that the numbers of the animals and their passports tally (particularly before any are exported.



Equipment : 1 fixed reader in a chute for reading animals' tags when they arrive or when they leave,
It is vital to protect readers in collection centres through which thousands of animals pass per year. A poorly-protected reader can very quickly sustain damage (the reader's box should be installed away from the chute, and its antenna should be protected by wooden or stiff plastic panels, etc.)

Conditions of use

- fixed reader for moving animals: gateway or panel reader
- adapted chute (line, or U-shaped). For U-shaped (or angled) chutes, positioning the reader on a bend (where the animals have to slow down) can ensure that data is read more reliably.

Assessment

Advantages:

- J TIME-SAVINGS: on the Cantal project, it is estimated that more than 20 minutes has been saved on recording the numbers for a batch of 60 grass-fed calves (24 minutes manually as opposed to 2 minutes using 100% reliable electronic identification)
- J SAFETY: farmers no longer have to catch the animal's ear in order to read the 10 digit number in its entirety
- J RELIABLE reading, no data entry errors

Disadvantages and limitations:

- L READING RATES: although the reading rates are very good, using fixed readers to read the numbers of moving animals does not yet guarantee a 100% read rate.
- L For counting animals, read failures still need to be managed.

General advantage: ☆ ☆ ☆ ☆ ☆
The time-savings and the added security that this application provides go a very long way to meeting operators' requirements.

Conditions of deployment: Widespread use of RFID

Average investment cost: fixed reader (€2500) + adapting the chute

Gateway reader - U-shaped chute

Reading moving grass-fed calves

e.g.: 25 seconds to read and retrieve all the numbers for a batch of 9 grass-fed calves

TEST CURRENTLY UNDERWAY: Dynamic reading in a wide chute

Trials to read numbers as animals are being loaded/unloaded are currently underway in Brittany.
This involves experimenting with fixed readers mounted in parallel in wide chutes so that several animals walking abreast can be read at the same time. This system is designed to avoid all the animals having to travel systematically through one single chute - which can create a bottle-necks and so slow down the unloading.

The system is currently being tested on an exit at a dairy farm's animal housing unit (selected because of the frequent and repeated movements of dairy cows).

Fixed readers in parallel

Configurations that have been tested

Site	Reader	Cattle crush	No. of readings		Project
			HDX	FDX-B	
Altitude group	Allflex panels	Line chute	1700	500	Cantal
Eurofrance / Foyen	Nedap / Agid gateway	U-shaped chute			Cantal
A farm in the Ille et Vilaine region	Destron / Néodis panels	Wide chute	800	800	Ouest

For detailed information, see the Cantal and Ouest project reports.

Trade: using portable readers

Facilitating individual registrations and the batching of tethered animals

Users concerned: sales operators

1 - Registering purchases and checking traceability

Operation and implementation

Reading tags electronically can easily replace reading the barcodes on tags - which is what wholesalers frequently do (with calves) to register purchases and print out removal orders.

Equipment: the tags are read by an all-in-one PDA - a professional device fitted with an electronic reading module. This type of PDA can also be fitted with a cane to make it easier to read the tags of calves in pens or even large tethered cattle.

Conditions of use: 8-day-old calves or tethered cattle.

Assessment

Advantages:

- J Reading electronic tags is EASIER than reading barcodes (no contact, no need to immobilise the calves and carefully find the right location on their ears, the tags can be read even if they are dirty)
- J THE TAGS OF LARGE CATTLE CAN BE READ, whereas reading barcodes can be constraining and unsafe when large tethered cattle are involved,
- J ELECTRONIC TAG AND BARCODE READING via the same PDA: These all-in-one PDAs can be fitted with an electronic tag reading module alongside the barcode reader for cross-referencing and checking tags/passports.

Disadvantages and limitations: -

General advantage: ☆ ☆ ☆ ☆ ☆

Application that is easy to set up and which is comfortable to work with, improving the way in which existing equipment is used, without the need to change current working methods.

Conditions of deployment: Widespread use of RFID

Average investment cost

- All-in-one PDA (PDA fitted with a reader module): €1200, €1500 with optional barcode reader
- software update

2 - Batching large tethered cattle

Operation and implementation

Some types of reader can be used to add additional information to numbers as they are read (for example, batch number). This option has been implemented at a collection centre which batches culled cows. Associating the destination client code with an animal's number makes it easy to put batches together.

Collection centre - animals in cubicles	Registering batches using a portable reader
	

Conditions of use: Animals tethered and option to move around in front of them

Assessment

Advantages:

- J RELIABLE reading, no data entry errors
- J TIME-SAVINGS compared with manually taking down numbers
- J Using an all-in-one PDA means that detailed information can be loaded about the cattle (where they come from, whether or not they are eligible for a quality initiative) before the batching operation. This data is then available as soon as it has been read, making it easier to allocate the cattle to their relevant recipients.

Disadvantages and limitations: -

General advantage: ☆ ☆ ☆ ☆ ☆

Application that is easy to implement and which meets the requirements of the various operators involved in the projects

Average investment cost: the same as for application 1

Configurations that have been tested

Site	Reader	Software	No. of readings		Project
			HDX	FDX-B	
Altitude group	APR agrident + cane	-	~100		Cantal
Wholesaler (Château-Gontier)	Workabout pro G2 - PSION	Gandon informatique	~30	~30	Ouest

For detailed information, see the Cantal and Ouest project reports.

Livestock markets

Automating the registration of entries onto an unofficial market
Boosting internal traceability at a veiling

INTRODUCTION: Of all the applications that were studied as part of the pilot projects, applications for markets were the most complicated to implement. The main constraint was the lack of knowledge about the places the animals have come from, making tagging at farms very constraining. Two different ways of doing things were chosen:

1 - Using non-official electronic tags on limited numbers, in order to enable the wholesaler to control the number of animals at each reading and tagging operation the day before the market (the case of Château-Gontier),

2 - Using official electronic tags across a wide area of contributor farms in order to obtain frequent but uncontrolled movements of tagged animals at the market (the case of Moulin-Engilbert),

The trials implemented at the markets are therefore more feasibility studies than actual experiments in real-life conditions based on tags being read frequently and regularly.

1 - Management of entries onto the Château-Gontier 8-day-old calf market

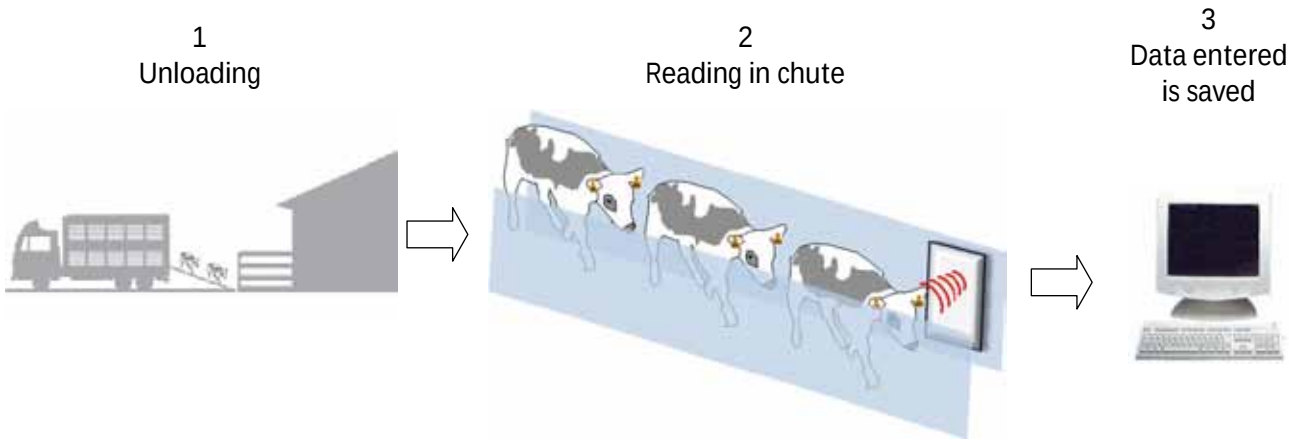
Operation and implementation

Electronic identification can be used to log all animals that physically enter into the market area. This way, it can be used as a replacement for the imperfect system which involves scanning the barcodes of the passports that the cattle traders present as they arrive.

The tags can be read in two ways:

- using working chutes fitted with fixed readers leading into the hall's main entrances,
- using portable readers operated by market operatives for the animals who have not used the special fitted chutes. Because of the limited numbers of tagged animals, this method was not tested.

Schematic diagram



Equipment: at each platform (or unloading door): fixed reader and suitable pen / software development.

N.B.: On several occasions, reading several batches of several dozens of calves was 100% successful, without any read failures. However, the data save rate was less than optimal (measured at between 77% and 94%). This problem has to do with the IT equipment connected to the reader.

Conditions of use: appropriate chutes adapted for the size of the calves

Assessment

Advantages:

J QUALITY of READING: The operations showed that dynamic reading was possible for young calves.

Disadvantages and limitations:

L MOVEMENT OF CALVES IN THE CHUTE: A significant proportion of the dairy calves do not move spontaneously through the chutes. They often need to be pushed. This is a major disadvantage - it dramatically slows down the speed at which the calves move through the chutes. This is less of a problem with crossbreed calves. Another type of penning system (short funnel type + gateways side-by-side) needs to be looked into.

General advantages: ★ ★ ★ ☆ ☆

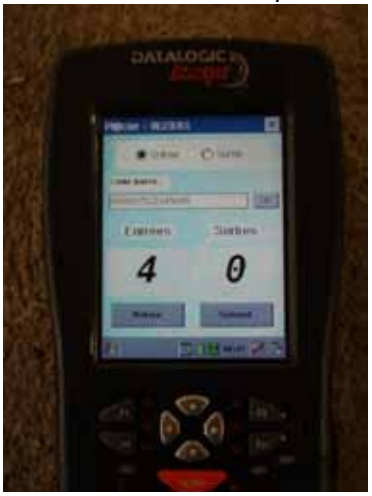
Strong interest on the part of market managers for a system which enables entries to be managed individually, but a penning solution still has to be found.

Conditions of deployment: Widespread use of RFID

Chute + fixed reader

Calf passing in front of the reader

PDA that has simulated data being retrieved from the read operations



2 - Boosting internal traceability at the Moulin-Engilbert veiling

Operation and implementation

Electronic identification can be used to boost the market's internal traceability by automating cross checks between the ear tags and the passports of the animals presented at the sale.
When they arrive at the market, the farmers bringing the animals register them by scanning their passports. The animals are then put into batches in preparation for sale. Then, just before the sale, the animals are read individually by a fixed reader located at the entrance to the ring. The market's software performs an automatic check to make sure that each batch contains the right number of animals and that their passports and numbers match.

Equipment: fixed reader / software development

Conditions of use: Using fixed readers to read the animals' tags requires a pen that is suitable for reading animals individually.

Assessment

Advantages:

- The passport/tag consistency checks are RELIABLE, ensuring the traceability of the batches at the sale

Disadvantages and limitations: -

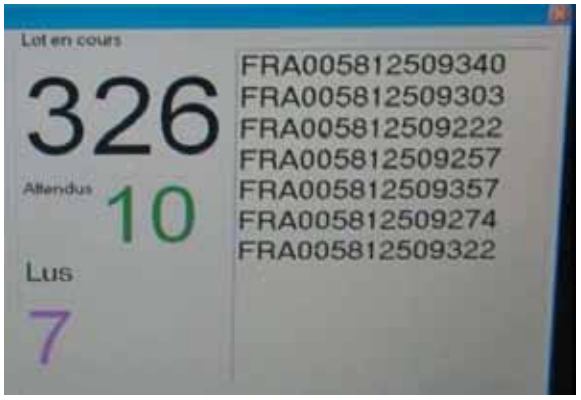
General advantages: ★★★☆☆

Strong interest on the part of market managers. Incomplete interfacing with the market's information system, together with the lack of data, means that it has not been possible to assess the general advantages of this application.

Conditions of deployment: Widespread use of RFID

Fixed reader in front of the entrance to the ring

Monitoring screen



Configurations that have been tested

Site	Readers	Cattle crush	No. of animals read		*Project*
			HDX	FDX	
Château-Gontier	Fixed: Nedap and Allflex	chute	700	*1,200*	*Ouest*
Moulin-Engilbert	Fixed - Allflex	chute		*27*	*Burgundy*

For detailed information, see the Ouest and Burgundy project reports.

Abattoir: Identification checks in cowsheds

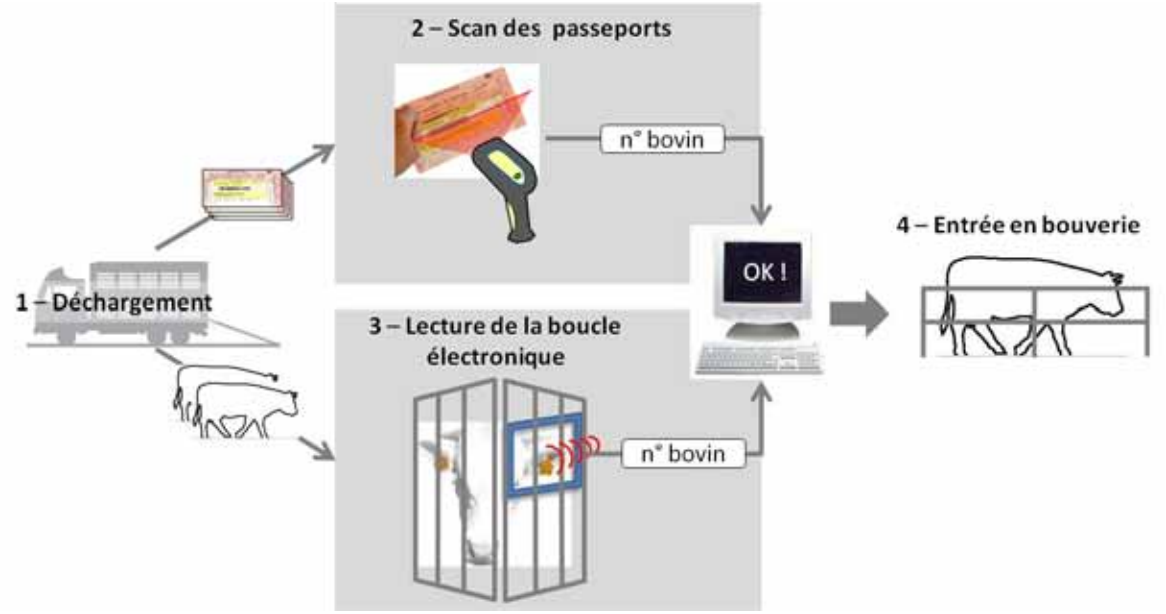
Automating consistency checks between passports and tags using a fixed reader

Users concerned: all abattoirs

Operation and implementation

1. Unloading,
2. Passport barcodes are scanned in an office,
3. Electronic tags are read as the animals pass through the identification pit,
4. Checks are validated: if the check is OK à the animal is directed to the abattoir,
   if the check is NOT OK à the situation is resolved in the cowshed.

Once the electronic tag has been read, the software can, if necessary, generate an alert triggered on the basis of the animal's age (to indicate, for example, whether or not the animal should undergo a BSE test).



Equipment: a fixed reader in the identification pit (on the left side, preferably),
software update for the abattoir

Provided the antenna is properly set, reading rates are generally very good, because the animals are stationary within the reading field. On the basis of the experience acquired over the course of these projects, the abattoirs involved believe they have completely validated the use of this technology.

Conditions of use

For organisational reasons, it is better for the animals' tags to be read while they are in the cattle crush. However, the reading of the tags can be negatively affected by the metallic structures that make up the identification pit. In some situations, it may be necessary to adapt the cattle crush or build a customised antenna.

The following will need to be protected:

- the antenna from any damage that may be caused by the animals as they pass by,
- the reading box against any humidity

Assessment

Advantages:

- J SAFETY: the operator is not right next to the animal's head, and no longer has to grab hold of the tag in order to read the number.
- J COMFORTABLE WORKING CONDITIONS: consistency checks and alert management are automated è it is no longer necessary to look for a number in a list on a form or in a bundle of passport photocopies.
- J RELIABILITY: no more data entry errors, and no risk of misinterpreting dates of birth (example: for BSE checks)

Disadvantages and limitations:

- L The METALLIC ENVIRONMENT can sometimes make installing the antenna complicated.
- L If the checking station has been designed to enable operators to approach the animals from the left, particular attention has to be paid to installing the reader (the range of suitable readers is more limited, a frame antenna has to be used through which operators can pass their arms in order to intervene).

General advantages: ☆ ☆ ☆ ☆ ☆

This application fully met the requirements of the abattoirs involved.

Conditions of deployment: Widespread use of RFID

Average investment cost

Fixed reader (approximately €2000-€2500, including installation)

Note:

In order to minimise the animals' stress and avoid queues during unloading, some abattoirs do not confine the animals to the identification pit, preferring to carry out identification checks in the stalls. In such circumstances, the identification checks are carried out by a technician with a PDA who moves from stall to stall. For abattoirs that are organised in this way, portable readers or all-in-one devices also provide a number of advantages in terms of safety and reliability.

Configurations that have been tested

Abattoir	Reader	Cattle crush	No. of animals read		Project
			HDX	FDX-B	
Paray le Monial (71)	Allflex	Identification pit			Burgundy
Socopa Gacé (61)	Agrident / ITW reyflex	Chute	*266**	*947**	Ouest
Socopa Gacé (61)	Agrident / ITW reyflex	Identification pit			Ouest
SVA (35)	Allflex	Chute	1950	350	Ouest
Charal Metz (57)	Nedap / Agid	Chute	-	-	Lorraine
Socopa Mirecourt (88)	Agrident Reyflex	Identification pit	143	498	Lorraine

For detailed information, see the Burgundy, Ouest and Lorraine project reports.

**No. of tagged animals of which the exact proportion of animals read was not checked*

1 - Unloading

2 - Passport scanning

3 - Identification check WITHOUT RFID

Visual reading of the number

or

Barcode reading

3 - Identification check WITH RFID

Automatic reading of the electronic tag

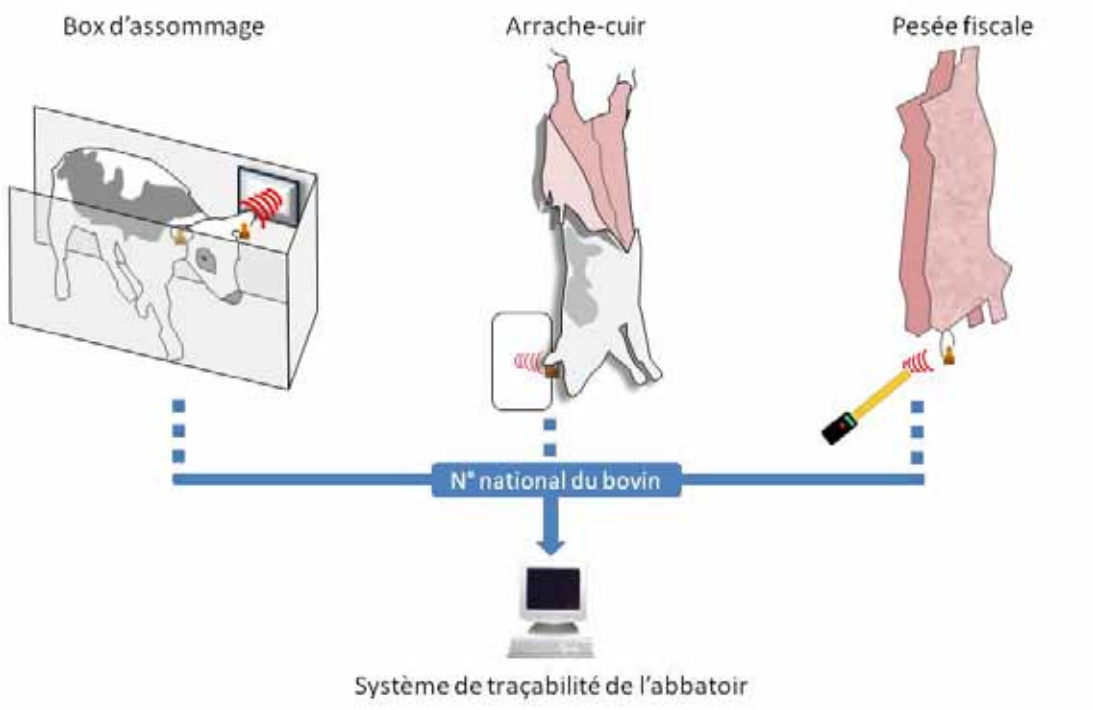
Abattoir: entering the number on the slaughter line

Replacing data entry via keypads and barcodes by electronic reading

Users concerned: all abattoirs

Operation and implementation

Electronic identification is used as a means of facilitating or automating entry of the animal's number. This operation may need to be carried out several times, until the animal's ear is cut off.



The reader, fixed or portable, is powered on a continual basis and can be connected, like a telescopic barcode reading head, to various stations along the length of the slaughter line. Different stations along the slaughter line were tested as part of the pilot projects: the stun box, the leather removal machine and the fiscal weighing scales.

The carcasses are separated from one another, and so there is no risk of collision (several tags entering the reading field).

A very minor modification needs to be made to the abattoir management software in order to retrieve the number as it is read by the reader.

Equipment: PC equipped with the abattoir's software to retrieve the data / portable or fixed reader

Conditions of use

- The tag can be read at all stations along the length of the slaughter line (up until the ear to which the tag is attached has been removed from the carcass),
- The reader is connected to the abattoir's IT system (an IT gateway needs to be developed).
- Specially adapted (or protected) readers must be used in order to withstand the humidity.

Assessment

Advantages:

- J RELIABILITY: with this system, entry of identification numbers is automated, and data entry errors are avoided, as is the need to read the animal's number with a barcode reader.
- J COMFORTABLE WORKING CONDITIONS: Automating the tag reading reduces the number of tasks that the operator has to carry out (data entry via a keypad or using a barcode reader), and they no longer have to bend down in order to read the tag.

Disadvantages and limitations:

- L Portable readers are not able to withstand washing at high pressure, and so need to be protected appropriately.

General advantages: ☆ ☆ ☆ ☆ ☆

Conditions of deployment: Widespread use of RFID

In order to make full use of the tag reading system and completely capitalise on all the advantages of RFID, all cattle need to be electronically identified.

Average investment cost

- portable reader €700 or fixed reader €2500-€3000
- software modification (development of IT gateway)

Note

Portable readers: Reading tags at fixed stations along the length of chain means that permanent cabled connections can be used, as well as the mains power supply. This type of configuration avoids problems associated with having to charge batteries.
Given its sturdy construction, an RS232 serial connection should be used instead of a USB connection.

Configurations that have been tested

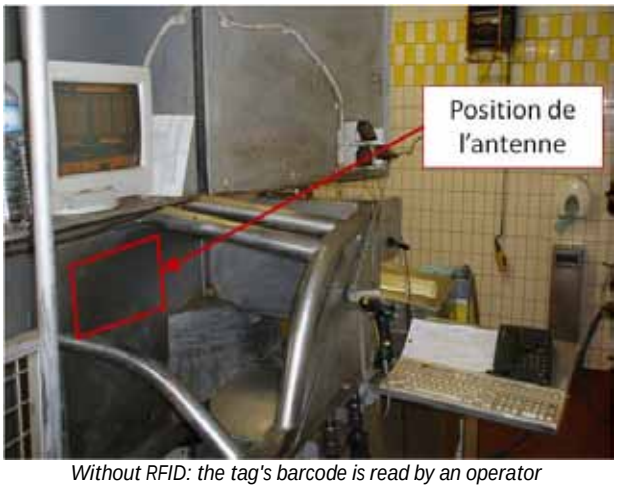
Site	Location of the reader	Reader	No. of animals read		Project
			HDX	FDX	
Gacé (61)	Leather remover	Fixed - Agrident	*260**	*947**	Ouest
Pau-Lons (64)	Fiscal weighing	Portable - Agrident	340	605	Sud-Ouest
Paray Le Monial (71)	Fiscal weighing	Portable - Allflex	92		Burgundy
SVA (35)	Stun box	Fixed - Allflex	5474	1510	Ouest

For detailed information, see the Ouest, Burgundy and Sud-Ouest project reports.

**No. of tagged animals of which the exact proportion of animals read was not checked*

In the stun box

Calf stun box



Without RFID: the tag's barcode is read by an operator
With RFID: automatic reading

Slaughter chute

At the leather remover

Without RFID

The tag's barcode is read by an operator

With RFID

Automatic reading

At the fiscal weighing machine

The electronic tag is read using a cane

Monitoring screen (fiscal weighing)

4 General review

4.1 The advantages of the technology

The various experiments that have been carried out within the context of the pilot projects have demonstrated the technology's advantages in real-life conditions. RFID technology has advantages in terms of:

4.1.1 Reliability

- **The ease with which tags can be read**

Of the 55,000 tagged animals, 99.99% of the tags worked perfectly during the course of the tests. A 3 year test period is not enough in order to be able to say for sure whether or not it will be possible to read the tags throughout the animal's life-time. However, these results and a number of known references about the technology are enough to confirm that it could be used on farms and in the sector.

NB: Only 80 tags (all from the same production series) were found to be faulty. The amount of work involved in replacing the tags (detagging/retagging) has demonstrated how absolutely necessary it is for manufacturers to have total control over the quality of the tags they produce. Significant numbers of brand-new tags that could not be read could lead to major questions being asked about the viability of electronic identification. Detagging and retagging large numbers of animals is not an option.

- **The stability of reading the tags**

Beyond the configuration problems which are inherent in installing readers, they are functional and stable over time. The readers work consistently.

- **The integrity of the numbers that are read, transmitted and stored**

The number that is encrypted into the chip always corresponds with the number marked on the tag. This is one aspect of the technology which the manufacturers have perfected.
What's more, the technology ensures the integrity of the numbers read: in the event of a problem reading the tag, the reader displays nothing.

4.1.2 Safety

Unlike manually taking down a number or even scanning the tag with a barcode reader, both of which involve grabbing hold of the animal's ear, electronic reading at a distance significantly enhances operator safety.

This is particularly the case in collection centres, abattoirs and with the herds involved in the Camargue project (see photo above).

4.1.3 Comfortable working conditions

Automatic reading means that operators no longer have to note down numbers manually and then enter them into a computer via a keypad. Mobile readers make their work easier, and fixed readers do away with the task altogether.

4.1.4 Time savings

Often, the way in which work is scheduled is affected by tasks other than taking down and entering numbers - which are more constraining in terms of the speed at which work is carried out. So electronic identification improves the comfort of working conditions, rather than bringing about a genuine increase in productivity.

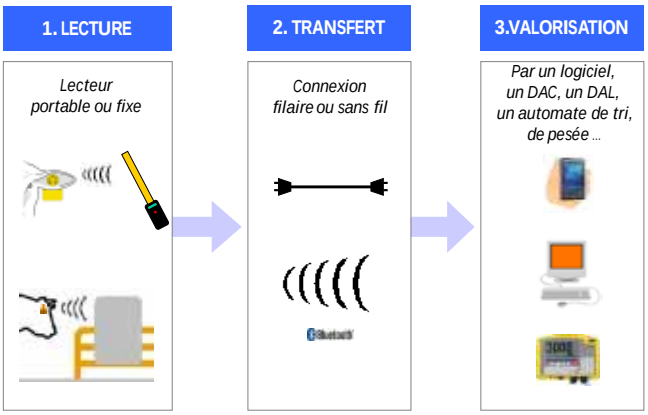
However, when dealing with very large batches, using electronic identification instead of manual noting and keyboard entry can bring about significant time savings for registering numbers.

4.2 Key phases involved in implementation

The pilot projects have demonstrated that implementing an application using electronic identification does not only involve communication between the electronic tag and the reader.

In order to take full advantage of electronic identification, the following have to be managed:

1. The actual reading, i.e., communication between the tag and the reader,
2. The transfer of numbers (either via a cable connection or wirelessly) from the reader to the device which uses them,
3. End use, i.e. the IT processing or interfacing with automatic equipment.



Depending on the application, the site, the activity, the type of operator, etc., each of these three points can be a technical issue in its own right which needs to be completely addressed and resolved.
A single problem in just one of these 3 areas can compromise any added value which electronic identification might generate.

4.2.1 Determining and optimising the read mode

Validating the read mode is an essential prerequisite before any use can be made of the data. It has to be possible to electronically read tags in all the conditions in which the farmer or operator may be required to work.
A number of factors have to be taken into consideration when deciding on the right kind of reader:

- for portable readers, battery life, ergonomic design, portability, connections to peripheral devices, etc.
- for fixed readers, environmental constraints, the ease with which the reader can be integrated into existing structures, any changes that might need to be made to how the animals move around inside a particular building, etc.

NB: The pilot projects demonstrated that applications which involve fixed readers are more common in the cattle sector.

4.2.2 Validating the transfer of numbers

The way in which data is transferred between a reader and the peripheral device which makes use of it (PDA, Smartphone, PC) is a fundamental aspect of how electronic identification operates.

- **Cable connection**

Cable connections are for portable readers which collect data for deferred use and fixed readers. In both cases, cable connections have been tried and tested, and are considered functional. With fixed readers, RS232 serial connections are mainly used because of their sturdy construction. With portable readers, USB connections are mainly used.

- **Wireless Bluetooth connection**

Bluetooth technology can be used to connect two devices wirelessly. Its range is only a few dozen metres.
The wireless Bluetooth data transmission protocol is mainly used to transmit data acquired by a reader (fixed or portable) to a PDA, smartphone or computer in real time.
Various different tests have shown that configuring and using a Bluetooth connection is too complicated for an inexperienced user. As things stand, it cannot be deployed on a wide scale.
Reader manufacturers must offer simple solutions that everyone can use.

NB: GPRS, EDGE and 3G/3G+ are all mobile phone technologies which can be used to transfer data to remote databases. Their range can be from 10 to 30 km from a relay antenna. Their usage is contingent on network coverage.

Like smartphones, all-in-one readers can integrate GPRS, EDGE or 3G/3G+ connectivity so they can communicate with centralised databases, without the need for intermediary synchronisation with a desktop PC.

4.2.3 Using the data read

The end use mainly involves having the numbers which have been automatically read processed by a "business" application (technical cattle monitoring application, management system, etc.) or triggering an automatic device.

In both cases, IT service providers are required in order to adapt the software.
If the data read is used to trigger an automatic device, specific expertise in mechanics and electronics is needed. The involvement of specialist installers is therefore required.

4.3 Integrating fixed readers

The projects have demonstrated that the majority of uses of electronic identification throughout the sector involve fixed readers. How fixed readers are installed is fundamental in determining whether or not an RFID application is successful. It's important to ensure that they are integrated as well as possible into existing structures to ensure that data is read properly.

4.3.1 Sensitivity to environmental constraints

Fixed readers are extremely susceptible to interference from metallic and electrical environments. This should be taken into account when installing them to ensure that they operate properly.
As such, cattle crush and chutes often have to be specially adapted. This usually involves replacing a metallic structure by a wooden or plastic wall to avoid interference with the readers.

Modifying a cattle crush	Modifying a chute
	

- **Should the constraints be managed or should the reader be moved?**

  At certain sites where the environmental constraints were considerable, it was decided to install the readers in better locations in order to avoid having to carry out major modifications to existing structures (cattle crush or chutes). The readers were therefore positioned upstream on the routes through which the animals passed. This resulted in a system in which the cattle had to queue:
  - in which several animals were positioned between the reader and the operator,
  - which led to a longer period of time between the numbers being read and the point at which they could be used.

  Each time, moving the reader further away proved to be the wrong decision, as it interfered with the flow of animals and the way in which the operator's tasks were structured. Furthermore, the order of the animals could change during the period between the reading of the numbers and their being used (for example, a calf might lie down and the one behind it will pass over it). This completely calls into question the benefits of automatic registration.

4.3.2 Recommendations

The period between a number being read and its being used therefore needs to be as short as possible (for weighing, slaughtering, registering, etc.). There are two possible options:

1. Modifying the existing structures (significantly, if required),
2. Moving both the reader and the operator to a place where there are fewer electronic and metallic constraints and then reviewing the way in which the work is structured accordingly.

The second option is often impossible at sites (abattoirs, collection centres) where workstations are completely integrated into their surrounding environments. In these circumstances, modifying the cattle crush is highly recommended.

However, in new buildings, this installation constraint can be taken into account so as to optimise the way in which work is structured and so take advantage of electronic identification.

It would be useful if, in the future, cattle crush manufacturers could offer specially adapted products for the installation of fixed readers.

4.4 Reading moving animals

Because current technology does not allow several animals to be read at the same time, it is vital that they be read individually. For moving animals, they need to be made to move through a chute.
For the pilot projects, tests on moving animals involved:

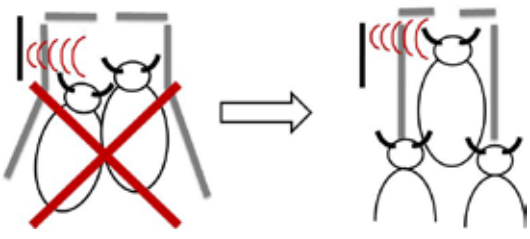
- grass-fed calves at collection centres,
- 8-day-old calves at the Château-Gontier market,
- dairy cows at the entrance to the milking parlour.

It was not possible to acquire enough data about reading the tags of large moving cattle during the pilot projects.

4.4.1 The importance of penning the animals

In order to optimise the quality of the reading and achieve a maximum read rate, the quality of the cattle crush is a determining factor:

- the width of the chute should be as close as possible to that of the animals,
- for short chutes, the reader should be at least 1.5 m from the chute entrance.



4.4.2 Managing read failures, insufficient information

Although the read rates measured were very high (often above 99%) and very encouraging, they still do not make it possible to:

- guarantee a 100% read rate in all conditions,
- and so completely eliminate read failure problems (even though they are very rare), the management of which can, in some cases, prove very problematic

At milking parlour entrances, for example, read rates are sufficiently high for the use of RFID to be completely validated. And read failures are not an insuperable problem - because the animal is immobilised throughout the milking procedure, the number on its tag remains visible and can be taken down manually if necessary.
But when loading animals into a lorry, on the other hand, a single unmanaged read failure can completely compromise traceability, and so calls into question the advantages of the technology. Managing read failures is therefore critical.

Tests carried out during the pilot projects did not yield enough information for this issue to be properly addressed.

4.4.3 Penning and speed of work

- **The limitations of reading tags in chutes**

The various projects demonstrated, for example, that the way in which the animals are guided through the chutes is not always the most suitable. Young dairy calves, for example, do not always move spontaneously through the chute, and so reading the tags can be time-consuming.
Tests currently being carried out on large cattle in Brittany have not yet produced satisfactory results.

And reading animals' tags in chutes can sometimes be complicated to set up with existing structures. When a batch is being unloaded, reading tags in chutes can slow down the flow of the animals and lead to a bottleneck. For example, some abattoirs are not considering switching over to individual chutes, preferring to guide the animals directly into stalls in order to minimise the stress associated with unloading.

- **Alternative solution, a possibility to be investigated**

An alternative solution would involve using multiple readers, similar to those used at markets in Australia (see photo below). With these systems, animals' tags could be read in very wide chutes (compatible, for example, with the transfer bridges of lorries), without slowing down the unloading operation by avoiding bottlenecks.



Photos ALEIS

This type of system was not tested during the pilot projects. It would be useful to gather information on how this equipment is used and assess how it deals with the constraints associated with reading the tags of more than one moving animal, particularly for operators working downstream.

But it should be remembered that this type of system has no solution for dealing with read failures. So it can only really be of benefit if all the animals moving through it have fully functional electronic tags. If one single animal does not have an electronic tag or has a tag which is not working properly, the benefits of reading the whole batch electronically are compromised.

4.5 Interoperability of equipment

In order for the system to be used throughout the sector, equipment needs to be interoperable:
All readers need to be able to read, display and send the numbers of all electronic tag types.
Conversely, all electronic tag types need to be readable by all types of reader. The animals' tags and operators' readers need to be able to communicate throughout the animals' lifespan.
In order for this to be possible, technical standards have to be agreed on. For some devices, norms have already been developed; others are in the process of being standardised.

4.5.1 Technical standards and norms

- **Tags and readers**

The tags and readers must be compliant with the ISO 11784 and 11785 norms. Essentially, all readers must be able to read ISO compliant tags, i.e., tags with low-frequency (134.2 kHz) HDX or FDX ISO transponders.

HDX or FDX?
These are both ISO-approved electronic chip standards used in animal identification. They both have their own distinctive characteristics, as well as their own advantages and disadvantages. FDX is more sensitive to mechanical vibrations, whereas HDX is more sensitive to electrical interference. HDX has better read distances than FDX (approximately 15%), but is more expensive (approximately 15%).

Both were tested in large numbers as part of the pilot projects - 30,000 HDX tags and 25,000 FDX tags. The differences mentioned above did not prove restrictive from an operational perspective. All applications worked with both HDX and FDX tags.

At this stage, no information suggests that one particular standard should be favoured over the other. If a choice has to be made, it will be the market that decides.

- **Display and transmission of numbers read by the readers**

Whatever its brand or model, the reader must be able to supply numbers in the same mode (number of digits, associated information, etc.) to the software or automatic equipment that makes use of them. Otherwise, the farmers or operators would not be able to change readers without having to modify the software or automatic equipment which processes the data.

A standard for displaying and transmitting data is in the process of being validated by the ISO. This will be the 24631-6 norm, the publication of which is eagerly awaited: it will require manufacturers to agree on and standardise this particular feature on all readers.

4.5.2 Limitations of interoperability

In an entirely interoperable technical environment, a user should be able to change reader whenever they want without it affecting the software used to process the data - just as in an office environment, a printer can be changed without it affecting the word-processing software being used.

Unfortunately, however the technical constraints associated with the way in which the readers work does not always allow this. Currently, software is still very specifically designed to work with a particular reader.
Any change in reader therefore has to be validated beforehand by the designer of the software used to process the data.

- **Impact on the distribution of readers**
  In the absence of greater standardisation for readers, it is only possible to guarantee that a particular model will be compatible with a given software application once it has been validated by the software designer.
  This means that software designers (of cattle management programmes in particular) have to provide their clients with a list of the readers that are compatible with their applications and keep updating this list on a constant basis. Software designers could recommend - and even distribute and configure - readers for their clients (as they do with PDA solutions).

  The market has yet to settle, and so the roles of reader manufacturers and software developers have not yet been clearly defined as far as configuring the readers and providing technical support is concerned.
  Whatever happens, it is important that users only have to deal with one person.

  Getting reader distributors and software designers to work closer together and/or having all of these tasks taken care of by specialist installers is what is required if electronic identification applications and user services are to be properly deployed.

4.6 Automating tasks

The main function of RFID is to simplify the noting, entry and storing of a number using a reader.

It is currently only used for this purpose and has numerous applications throughout the sector. Studies carried out into its various applications have demonstrated this (see section 3). But electronic identification is also a technique that will facilitate the emergence of automated solutions.

4.6.1 Electronic identification, input data for automating tasks

In addition to simply entering data, when used with intelligent devices, electronic identification can be used to automate tasks and simplify work. For example, it is possible to automate the counting of animals, the display of numbers on the screen, weighing, sorting, etc.
So electronic identification becomes a means of supplying input data to an “intelligent entity” which interprets information and operates peripheral devices. Depending on the application, this "intelligent entity" can be an automated device, a computer, a weighing box, a multifunction interface etc.

4.6.2 Combining expertise to create complete solutions

Implementing automated solutions requires a combination of skills, and so involves various different businesses - such as those involved in identification, designing pens, automation and IT - all working closely together.
These close working relationships have not yet been formalised on the market, but are just beginning to be created. They are what are needed if users are ever to be able to enjoy complete solutions as far as automating tasks is concerned.

For example,

- IT service providers and weight indicator manufacturers will have to work together in order to simplify the way in which weight data is transferred to cattle management applications,
- similarly, reader manufacturers, pen manufacturers and automated equipment installers will all have to work closely together in order to provide complete automated sorting solutions,
- etc.

4.7 Equipment cost

4.7.1 Reading equipment

The prices given below are a reflection of the average prices that were quoted within the context of the experiments. As the markets that use electronic identification grow, the prices of equipment should start to fall considerably over the next few years - or even over the next few months.

- Electronic tag: €1 more than a conventional tag,
- Portable reader: €700 for a simple reader (stick or box),
  €1200 for an all-in-one reader (integrated PDA),
- Fixed reader: €2500-€3500 (including installation. The size of the antenna, how the reader is protected, and the way in which the power supply is integrated can all affect the overall price of the installation.

4.7.2 Associated costs

- Modification of the penning system (changes to the chutes or pens),
- IT development work to adapt software,
- Modifications to automatic equipment (repositioning readers, changing readers),
- etc.

For the purposes of weighing cattle at farms, a number of farmers can club together and purchase a reader and weight indicator (see weight sheet).

5 CONCLUSION AND OUTLOOK

A tool with a greater potential for use with a range of applications

The various experiments carried out in real-life conditions across the sector have demonstrated that electronically identifying cattle can simplify work, improve traceability, automate tasks and result in more reliable information.
On farms, electronic identification can be used as part of the milking process, during weighing, for sorting or by automated equipment and cattle management software.
For operators downstream who have to manage a great deal of information over very short brings a time, electronic identification can bring about obvious time savings in terms of reliability, safety and productivity.

Different expectations depending on the stakeholders in the sector

Although electronic identification provides solutions which can be used on all types of farm, some applications are more directly suited for dealing with large numbers of cattle or for automated management. In this respect, electronic identification should first start to gain in popularity on farms with large numbers of cattle.
Stakeholders involved downstream in the projects all expressed a keen interest in the use of electronic identification. But from their perspective, electronic identification can only be used if electronic tags are widely adopted. As far as they are concerned, a system in which animals that have been tagged electronically coexist with animals wearing traditional tags is of no benefit.

Certain technical guarantees have yet to be given

From a technical perspective, electronic identification has proven its utility for all applications which involve stationary animals; example, animals in cattle crushes, feeding racks, automatic stalls, etc.
However, as far as moving animals are concerned, the pilot projects did not provide answers to all the questions: although read rates were very good, will it ever be possible to achieve systematically perfect read rates with moving animals? Otherwise, how can read failures be managed which, in certain cases (loading into/unloading from lorries, example), is absolutely critical? Is reading tags in working chutes always compatible with the speed at which operators work? Are there alternative solutions - either in terms of creating new installations or adapting existing infrastructure?

The sector has to make a decision if the system is to be used collectively

Electronic identification is a tool which can provide a number of services when dealing with large herds. For smaller farms, it brings real benefits, but less systematically.
As such, all the individual initiatives of farmers who will be introducing identification will not be enough for it to be deployed sufficiently widely - either in the short or long term - and so be collectively used. Only if the sector decides to proceed with the wide-scale adoption of RFID can operators working downstream use it.

An asset should the decision be made to computerise passports

Electronically identifying cattle would bring benefits should the decision be taken to computerise the various documents that accompany cattle (passports and health certificates).
These documents are currently widely used by everybody involved in the sector as a means of sharing the information (age, race, originating farm, etc.) that is indispensable from a technical perspective and vital for any commercial activities. These documents are barcoded and so the data they contain can be entered automatically.
If ever they were computerised, there would still be a need for the information contained in the passports. This information would therefore be accessed via databases. And thanks to the ability to automate the taking down of numbers, RFID will simplify the way in which these databases are queried and will ultimately provide operators with access to information that is currently contained in the accompanying documents.

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Using electronic identification in the cattle sector

Final report on the pilot projects June 2010

In 2006, a number of professional organisations in the cattle sector, together with the Ministry of Agriculture, decided that an assessment was needed of how electronic identification (RFID) could be used in the cattle sector, together with a technical reference framework.
The tested applications on farm-sites related to the link with cattle management software, milking support, automatic equipment, milk testing, automatic weighing and automatic sorting.
For the downstream operators of the cattle sector, the tested applications focused on loading / unloading cattle at a collection centre, the use of portable readers by sales operators, boosting internal traceability at market places and slaughter-houses, identification checks in cowsheds, and entering the animal's number on the slaughter line.

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