

*Original study*

# The current EU rules on bovine electronic identification systems: state of the art and its further development

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## Abstract

Regulation (EC) No 1760/2000 establishes a system for the identification of bovine animals and regulates the mandatory and voluntary labelling of beef and beef products. While bovine ear tags must bear an identifying code, the current European Union (EU) rules do not regulate electronic tags for bovine animal.

Although the current system is perceived as being efficient by most of the stakeholders and is in line with current policy objectives, it could be improved in terms of accuracy and speed in order to reduce identification errors, notification and up-date times for the central database and possible delays in the management of disease outbreak crises when they occur.

In view of the direction already taken regarding the reinforced system for the identification of sheep and goats, it is highly desirable to move towards electronic identification of bovine animals bearing in mind that the implementing measures must permit a satisfactory community-wide introduction of such a system.

Recently the European Commission proposed the introduction, on a voluntary basis, of an electronic identification system for bovine animals.

This paper briefly provides a legal outline of the bovine identification and considers the benefits and/or disadvantages of the implementation of an electronic identification system.

It is emphasized that a bovine electronic identification system could bring benefits to farmers and other stakeholders as it could reduce the administrative burden through the simplification of the current administrative procedures. Furthermore, it could enhance the consumers' protection, improve disease prevention and control and crisis management, support the competitiveness of the sector and improve trade perspectives.

**Keywords:** bovine, identification, electronic system, legislation, European Union

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**Abbreviations:** BSE: bovine spongiform encephalopathy, EID: electronic identification system, RFID: radio frequency identification, EU: European Union, FAO: Food and Agriculture Organization of the United Nations, OIE: World Organization for Animal Health

## Introduction

Animal identification and registration is the foundation of any traceability system for animals and animal products.

The methods and reasons for animal identification have a long and varied history (Bowling *et al.* 2008), yet the reasons for identifying livestock remain the same: ensuring the safety of livestock products and facilitating veterinary disease surveillance and control.

In recent years, interest in animal identification, specifically the interest in a national identification system, has surged for at least two significant reasons: the need for response and follow-up to major livestock disease outbreaks (e.g. BSE, foot-and-mouth disease, blue tongue) and increased availability of technologically advanced identification systems.

Currently, many different types of animal identification technologies exist in various countries, which include mechanical (e.g. tagging, branding and tattooing), electronic (e.g. ear tags, ruminal boluses and injectable transponders) and biometric (e.g. nose prints, DNA profiling, iris scanning and retinal scanning) methods to identify and trace animals throughout their lives.

Traditional methods are still commonly and widely used in countries like Japan, South Korea, Brazil and Namibia (Bowling *et al.* 2008).

Technologically advanced systems (e.g. radiofrequency identification device tags) are in place in Australia, Uruguay and Botswana (Bowling *et al.* 2008).

Radio Frequency Identification (RFID) is a technology that uses communication via radio waves to exchange data between a reader and an electronic tag. It is based upon passive tags (without a battery), called transponders, bearing a unique identification number. One of the most interesting aspects of RFID is that it can transform physical information into electronic (digitalized) information by means of the e-reading of the electronic identifier and it can also fully use these e-data for recording and transfer.

Introduction of an electronic identification system (EID) could help to reduce typing mistakes as it allows a more accurate reading than classical ear tags. It would also make it easier to keep holding registers up to date and to secure registration of movements within the 7-day period required by the EU legislation.

Considering that the existing legislation on bovine identification does not reflect the latest technological developments, a review and amendment of the current regulation would appear necessary.

Although the current system of identification and traceability is perceived as being efficient by most of the stakeholders and is in line with current policy objectives, it could be improved in terms of accuracy and speed in order to reduce identification errors, notification and update times for the central database and possible delays in the management of disease outbreak crises when they occur.

The aim of this paper is to identify if and how an EU legal framework should be established for bovine EID by presenting the advantages and disadvantages of its implementation.

### Legislative Framework

In recognition of the need to improve the control of major animal diseases, to satisfy criteria for export trade and to provide reassurance to consumers on food quality and safety, a number of countries have implemented legislation to make livestock identification compulsory (Table 1).

Table 1  
Comparison of cattle identification systems (Bowling *et al.* 2008, modified)

Country	Individual cattle identification	Electronic cattle identification
Australia	mandatory	mandatory
Botswana	mandatory	mandatory
Brazil	mandatory	voluntary
Canada	mandatory	mandatory
European Union	mandatory	voluntary
Japan	mandatory	voluntary
Mexico	voluntary	voluntary
Namibia	mandatory	voluntary
New Zealand	voluntary	voluntary
South Korea	mandatory	voluntary
Uruguay	mandatory	mandatory
United States	voluntary	voluntary

The basis for EU law in this area is Council Directive 92/102/EEC (EEC 1992) which requires all cattle to be uniquely ear-marked and registered. Pigs and sheep have to be marked before they leave the farm of origin although the mark may be temporary and relates only to the premises of origin.

Considering that the implementation of this Directive was not entirely satisfactory and needed further improvement, a specific regulation for bovine animals was adopted (EC 1997). According to this Regulation, bovine animals must be identified by an ear tag applied to each ear and accompanied by a passport throughout any movement. These requirements are maintained later in the current Regulation (EC) No. 1760/2000, which established a system for the identification and registration of bovine animals at the production stage and created a beef labelling system (EC 2000).

The legislation requires bovine meat to be labelled in such a way as to provide information concerning the identification of the animal, the slaughterhouse and cutting facility. Compulsory labelling is intended to ensure a link between the identification of the carcass, quarter or pieces of meat and the identification of the individual animal from which the beef was derived or the identification number relating to a group of animals.

It is interesting to underline that the provisions on beef labelling in Regulation (EC) No 1760/2000 were introduced in the wake of instability in the beef market caused by the BSE («mad cow disease») crisis. The origin of beef as well as the conditions in which it was produced became important quality criteria and transparency increasingly became a fundamental decision criterion for consumers. In order to maintain and strengthen the consumers' confidence in beef, to stabilize the beef market and to avoid consumers being misled, the EU enacted labelling rules which indicate the framework within which the information is made available to consumers by sufficient and clear labelling of the product (recital 4).

European Union legislation has focused on cattle, but other sectors have been given more attention to. Reinforcement of EU requirements on identification and registration in the sheep and goat sector has been considered. For example, the Scientific Steering Committee of the EU attaches importance to the identification of small ruminants and, in its opinion on transmissible spongiform encephalopathies in small ruminants in October 2001, it underlined the need for flock certification programmes to go along with implementation of better identification and tracing of individual small ruminants.

In 2004 Regulation (EC) No. 911/2004 (EC 2004a) addressed implementation with regard to ear tags, passport and holding registers.

There are several multinational and supranational organisations that have published guidelines or regulations relating to the identification and tracing of livestock (World Trade Organisation, OIE, Codex Alimentarius Commission for Food Safety, FAO). The most prominent of these is the OIE. A resolution was passed confirming the importance of animal identification and traceability for trade and animal and public health in 2004 (OIE 2004). It was agreed that the OIE should be active in this area and that a common definition of terms and some guidelines for the development of identification and tracing systems should be prepared. This was subsequently achieved and in 2007 the OIE Terrestrial Animal Health Standards Commission accepted the first series of guidelines on identification and tracing as official OIE standards. In addition, the OIE's Terrestrial Animal Health Code has recently been revised to include guidelines for zoning and compartmentalization (Chapter 4.3, Article 4.3.3) (OIE 2011). The guidelines also stipulate that »the existence of a valid animal identification system is a prerequisite to assess the integrity of the zone or compartment« and therefore, regionalization and the benefits that it can entail may only be implemented if supported by these systems. The OIE guidelines concerning animal identification and tracing are not prescriptive, but do suggest that the requirements of systems should be commensurate with the risks that are being managed and that linkages need to be established throughout the food chain. This »farm to fork« aspect of animal identification and tracing was reinforced in a statement by the President of the OIE, Bernard Vallat, in 2008 which called for progressive implementation of animal identification and tracing systems worldwide (OIE 2008).

The FAO Manual »Good Practices for the Meat Industry« (FAO 2004) contains separate sections pertaining to animal identification and traceability that are, in the main, not prescriptive, but provide more details and specifics on best practice than the guidelines released by the OIE.

In step with the OIE guidelines, the FAO manual specifies the need for animal identification and traceability systems to be under state supervision and administered within the context of defined standards and specifications. In addition to standards and specification for data systems and animal identifiers, the manual suggests the need for accreditation standards and registers of approved organizations for livestock transporters, livestock marketing agents or traders and abattoirs.

The FAO manual then describes the range of enabling technologies that can be used for individual animal identification (boluses, tattoos, ear tags etc.) and concludes that under most circumstances, ear tags are most suitable owing to problems associated with the other recognized alternatives. Considerations of appropriateness notwithstanding, the manual recommends RFID tags as the most desirable option where economically viable and where a supporting infrastructure exists.

The OIE and FAO guidelines indicate that a »one-size fits all approach« to animal identification and tracing is not necessary or appropriate. Instead, they recommend that the level of animal identification for any given species should be determined by the need to meet the desired outcomes through consultation with parties including industry.

### *Observations*

Regulation (EC) No 1760/2000 was listed as »information obligations with special importance in terms of the burdens they impose on businesses« under the Communication from the Commission to the Council and the European Parliament (EC 2009a).

The action Plan of the new EU Animal Health Strategy (2007-2013), where »Prevention is better than cure« (EC 2007), foresees a commission to simplify information obligations such as holding registers and passports in the course of introduction of bovine EID.

However, when the current rules for bovine identification were adopted in 1997, EID was not sufficiently technically developed to be introduced for cattle at that time. The Electronic identification system based on RFID has evolved considerably over the last 10 years and permits a faster and more accurate reading of individual animal codes directly into data processing systems. Thus saving labour costs for manual reading but at the same time getting increasing equipment costs. So the existing legislation on bovine identification does not reflect the latest technological developments.

A comparison of the speed and efficacy of methods for cattle identification is presented in Table 2.

The use of electronic identifiers could help to reduce the administrative burden and paperwork, for instance when the holding register is kept in a computerized form (which is the case for a growing percentage of farms), by using automatic reading and automatic entry into the register, with obvious benefits for problems of human error and even fraud. In addition, a faster and more reliable system will allow, among other things, a faster reading and greater accuracy than classical ear tags, easing the procedure to report animal movements to the central data base, thus providing for better and faster traceability of infected animals and/or infected food.

Numerous further research projects, including the European Commission's large scale Identification électronique des animaux (IDEA) project, have demonstrated that, in principle, the use of electronic identifiers can deliver a substantial improvement in animal identification systems (Report to the Council and the European Parliament on the possibility of introduction of electronic identification for bovine animals [EC 2005]).

Given the current technological advances in EID, several EU member states (MS; e.g. Denmark, Germany, Italy, Cyprus and Spain) have decided to start implementing bovine EID on a voluntary basis. Experience outside the EU (Canada, the United States of America, some South American countries etc.) also shows a growing use of bovine EID. In addition, EID has been already introduced in the EU for several animal species (most of them as mandatory) (EC 2004b, EC 2008).

The current legal framework does not prohibit member states from using electronic identifiers on a voluntary basis, but this must be done in addition to the official conventional visible ear tags. As no harmonized technical EU standards have been established, different

Table 2  
Comparison of identification methods for cattle (Stanford *et al.* 2001)

Method	Ease of application	Ease of reading <sup>a</sup>	Success of reading	Affordability	Data transfer speed	Protection from fraud	Protection from entry to food chain	Lack of pain/stress to animal
Ear tags								
Plastic dangle	+++	+++	++	+++	+	+	+++	+++
Plastic bar code	+++	+	++	+++	++ <sup>b</sup>	+	+++	+++
Metal ear clip	+++	++	+++	+++	+	+	+++	+++
Electronic RFID	+++	+++	+++	++	+++	+	+++	+++
Injectable transponder								
Base of ear	++	+++	+++	++	+++	+++	++	+++
Axilla	++	+++	+++	++	+++	+++	+	+++
Other methods								
Rumen bolus	++	+++	+++	++	+++	+++	++	+++
Ear notch	++	+++	+++	+++	+	+++	na	++
Retinal scanning	++	+++	+++	+	+++	+++	na	+++
DNA fingerprinting	+++	+	+++	+	+	+++	na	+++

<sup>a</sup>Failure to read would be due to loss or breakage. <sup>b</sup>reduced speed due to the requirements for cleaning prior to reading, Number of the sign + indicates the superiority of method for that trait: ++++ high, +++ intermediate, ++ moderate, + low, na: not applicable.

types of electronic identifiers and readers with different RFID frequencies could be used in different places. If each member state selected different standards, this would likely lead to a lack of harmonization, thus jeopardizing electronic exchange of data and the benefits of having EID systems. In relation to voluntary beef labelling, there is a need to reduce the excessive administrative burden in the voluntary system which is currently in place. Regulation (EC) No 820/97 established a system for the identification and registration of bovine animals and labelling of beef and beef products, which was further strengthened by Regulation (EC) No 1760/2000. The latter concerns the compulsory indication of the origin of the cattle (born/fattened/slaughtered) from which the beef originated, compulsory references to the identification code number of the slaughtered animal and the establishments where the meat has been processed (slaughterhouse and meat cutting plant) as well as a formal Commission approval procedure including a notification requirement for any additional labelling information other than compulsory ones. As long ago as 2004 the Commission submitted a report to the Council and the European Parliament on the beef labelling part of Regulation (EC) No 1760/2000 which pointed out deficiencies in the voluntary beef labelling scheme (EC 2004c). These were that the system is not applied in a uniform way in all member states (e.g. the administrative practice differs considerably between the member states) and that all indications included in the label (including those that are not related to origin, traceability or quality characteristics of the meat) should be subject of a formal approval procedure by the competent authority. The Commission Staff Working Document on Simplification of the CAP pointed out the suggestion put forward by the »High Level Group of Independent Stakeholders on Administrative Burdens« (Stoiber Group) (EC 2009b). The Stoiber Group suggested repealing the notification requirement with regard to the use of additional voluntary labelling indications other than those which are compulsory for beef.

Introducing bovine EID on a voluntary basis as a tool for official identification would allow actors to have time to familiarize themselves with the EID system and to discover the added value it would bring in particular circumstances. This approach is preferable as it leaves space for EU member states and all the private actors involved organizing themselves, so they can evaluate the benefits in the light of regional differences and different types of production. Moreover, it is flexible enough to receive support from authorities and stakeholders and this will benefit enforcement of the rules. The voluntary introduction of EID implies that it would be chosen by those who are likely to gain immediate benefits for farm management. It would be an individual decision taken for economic reasons (market driven) by each operator. Under the voluntary regime, bovine animals could be identified by two conventional ear tags (current system) or by one conventional visible ear tag and one electronic identifier (i.e. an electronic ear tag or a bolus) conforming to officially approved EU-harmonized standards. The introduction of electronic identification on a voluntary basis also provides the opportunity for EU member states to opt for a mandatory regime in their national territory. In the case of a member state opting for the mandatory regime, each bovine animal would be identified by one conventional visible ear tag and one electronic identifier. An EU mandatory regime may not be the best approach at the moment as some stakeholders (e.g. small farmers) would be disadvantaged economically. However, leaving aside cost considerations, it would ideally be the most efficient option in terms of the consumer' protection (traceability), reduction of administrative burden and avoidance of risks related to the co-existence of two systems of

identification. This choice would be also partially justifiable in terms of greater consistency with EU policies on EID in other animal species (e.g. small ruminants).

### *Moving into a new system*

Experience in Canada, Australia and the United States of America has indicated that RFID technology ear tags can be used successfully in the field and that the benefits associated with RFID tags vs. solely visual or bar-coded alternatives considerably outweigh the marginal extra costs of the devices.

For these reasons, the EU is actively considering introducing RFID identification of cattle and has already made it compulsory for other livestock species.

In any case, the introduction of electronic identification should be considered in the light of its technical feasibility and its ability to improve the existing system of bovine identification.

To decide on the possibility of introducing EIDs on a community-wide basis, the following general conditions for the identification and registration of bovine animals would have to be considered: 1) organizational structures and data management systems have to be well established; 2) animals would have to be identified at any time by (at least) two identifiers, where one must be a »visual« ear tag and the second can be an electronic identifier; 3) on the basis of present knowledge, the requirement for tagging no later than 20 days after birth limits the use of the bolus.

Since a mandatory implementation of EID might have a non-advantageous economic impact on some operators, the preferred option for introduction of EID is a voluntary regime, where EID is considered an acceptable and suitable legal means of identification of bovine animals with the possibility for MS to introduce a mandatory regime at national level.

European Union member states have very different farming practices and sector organizations and for these reasons it would be advisable to recommend that each member state should work collaboratively with all chain actors to identify the added value of EID and to secure its acceptance, so that EID can be made compulsory at the right moment. Each member state could decide to introduce EID by law at a convenient time and not under a push scenario.

Further advantages of EID which should be mentioned are: i) unambiguous identification of animals, leading to greater data accuracy; ii) ease of reading and fewer errors in notification could lead to reduced notification time and bring the national database closer to »real-time«; iii) tracing back and forward can be done in hours rather than days, leading to improved management in case of disease outbreak; iv) improved traceability for consumers; v) cost savings in other farm management areas linked to multi-purpose use of the system; vi) security of operators; vii) reduction of data transfer costs leading to less paper work for operators; viii) competitive trade advantage for those who are not able to provide top level traceability assurances to customers and - as aforesaid - in managing and responding to animal disease or related outbreaks; ix) electronic identification system provides incentives to share production and marketing information with upstream and downstream actors in the value chain, leading to improved transfer of product liability.

In conclusion, improving the existing legal text would probably contribute to better enforcement. For this reason, the Commission is considering repealing all current provisions in order to propose a consolidated text.



The future proposal of the Commission will aim at considering new scientific data, improving welfare standards (for example EID can be used for the monitoring of animal transport condition and any other event based on obligations of Council Regulation No. 1/2005/EC) and ensuring better enforcement.

Bovine EID is expected to contribute to some key objectives contained in the Europe 2020 strategy. It will re-enforce EU policies supporting small and medium enterprises and will be in line with other major EU policies such as the external dimension of Global Europe and the EU Market Access Strategy.

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