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REPORT FROM THE COMMISSION TO THE COUNCIL
on the implementation of electronic identification in sheep and goats

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1. INTRODUCTION

Community rules on identification and registration of livestock, including sheep and goats, were laid down in Council Directive 92/102/EEC on the identification and registration of animals¹. However experience with certain diseases showed that the implementation of Directive 92/102/EEC had not been entirely satisfactory and needed further improvement. In the bovine sector it was necessary to establish the concept of individual traceability in the context of the protection of consumers from Transmissible Spongiform Encephalopathy (TSE). Hence Council Regulation (EC) No 820/97 of 21 April 1997 establishing a system for the identification and registration of bovine animals and regarding the labelling of beef and beef products² was adopted and its requirements are upheld in the current Regulation (EC) No 1760/2000³.

Experience gained during the foot-and-mouth disease epidemic in 2001 highlighted the need to establish traceability systems for sheep meeting the specific requirements of this sector. Sheep and goats are now identified according to Council Regulation (EC) No 21/2004 of 17 December 2003 establishing a system for the identification and registration of ovine and caprine animals⁴. This system includes four main elements: “identifiers”, a “holding register”, a “movement document” and a “computerised database”.

Taking into account the well known limitations, in the management of small ruminants, to read individual animal codes from ear tags or tattoos of large numbers of animals in short time, the introduction of electronic transponders is foreseen to automate reading of individual animal codes directly into data processing systems. The obligatory introduction of electronic identification is scheduled for 1 January 2008.

According to Article 9(4) of the Regulation, the Commission is required to report to the Council on the implementation of the electronic identification system, accompanied by appropriate proposals confirming or amending the date of obligatory introduction of electronic identification.

¹ OJ L 355, 5.12.1992, p. 32, as last amended by Regulation (EC) 21/2004 (OJ L 5, 9.1.2004, p. 8).

² OJ L 117, 7.5.1997, p. 1.

³ OJ L 204, 11.8.2000, p. 1.

⁴ OJ L 5, 9.1.2004, p. 8.

Based on the assessment of the contributions from the Member States, this report describes the current situation and draws conclusions on the feasibility and appropriateness of obligatory introduction of electronic identification for sheep and goats in the European Union, as from 1 January 2008 and for updating technical aspects of the Regulation. It is accompanied by an appropriate proposal.

1.1. EC legislation in relation to electronic identification of sheep and goats

Community rules on the identification and registration of sheep and goats were reinforced by Council Regulation (EC) No 21/2004 in order to permit **individual traceability** of sheep and goats throughout their lifetime. The implementation of that Regulation is scheduled in two steps.

In a **first step**, all animals born after 9 July 2005 had to be identified individually with a visible eartag in combination with a second identifier bearing the same code. The second identifier could be a second eartag, an electronic identifier and under certain conditions, also a tattoo or a mark on the pastern.

In a **second step**, the Regulation foresees the linking of the individual animal codes with movement information. The provision that the movement document and the holding register shall contain the individual codes of the animals is linked with the date of introduction of electronic identification (point B.2 and C.2 of the Annex to Regulation (EC) No 21/2004). Until this date only the number of animals and not their individual animal codes are recorded on movement documents and in holding registers.

For the implementation of electronic identification, the Commission adopted Decision 2006/968/EC implementing Council Regulation (EC) No 21/2004 as regards guidelines and procedures for the electronic identification of ovine and caprine animals⁵. These guidelines are the technical basis for interoperability between devices from different manufacturers as well as for the approval of electronic identifiers.

Regulation (EC) No 21/2004 provides for the following derogations.

- Member States in which the total number of sheep and goats is less than 600 000 may make electronic identification optional for animals not involved in intra-Community trade.
- Member States may authorise a facilitated batch identification system for animals intended for slaughter before the age of 12 months and not intended either for intra-Community trade or for export to third countries. This derogation is currently applied in 10 Member States.

⁵ OJ L 401, 30.12.2006, p. 41.

1.2. Scope of the report

In order to prepare this report, the Commission invited Member States to provide information on their experience with the implementation, on a voluntary basis or on pilot projects, of electronic identification. The Commission received information from Cyprus, France, Germany, Italy, The Netherlands, Portugal, Spain and the United Kingdom. The present report is therefore mainly based on the contributions from those Member States that have acquired experience with the implementation of electronic identification.

In addition to the up-to-date information from the Member States, the Commission also considered results from its own large scale project on livestock electronic identification (IDEA – Identification Electronique des Animaux), which was carried out in 1998-2001. The studies and pilot projects in the Member States had different scientific goals and the fields of study ranged from scientific laboratory experiments to field tests. The specific results can therefore not always be compared. This report summarises the results in general terms.

2. EXPERIENCE ON IMPLEMENTATION OF ELECTRONIC IDENTIFICATION

2.1. Elements of electronic identification

Electronic animal identification is based on the use of **radio frequency identification** (RFID), a technique operating at low frequencies and very short distances. The **electronic identifier** is called a transponder and is a passive, read-only device which contains no internal source of electrical power. The identification code can only be read when the transponder is energised by the signal transmitted by a **reader**. The transponder reacts to this signal by emitting an information telegram, which includes the animal identification code. Communication between transponders and readers are effected by two, alternative, data transmission protocols (half-duplex, HDX; and full-duplex, FDX-B). After transmission of the information telegram, the transponder reverts to a completely passive state until the next activation.

In order to ensure proper communication between transponders and readers from different manufacturers, the ISO standards 11784 and 11785 have been developed and were published in 1996. The ISO standards are accepted and used internationally and therefore Regulation (EC) No 21/2004 makes reference to them.

The International Committee on Animal Recording (ICAR) has described test procedures aimed at verifying the compliance of transponders and readers with the existing ISO standards. Those procedures have been published in the International Agreement on Recording Practices⁶ and Decision 2006/968/EC makes reference to it.

Electronic identification has the advantage of allowing the transmission of electronically read individual animal codes directly into **data processing systems**. It is therefore an efficient solution to link individual animal codes of sheep and goats to movement information because those species are normally moved in big groups and frequently undergo several assembly operations at markets and assembly centres.

2.2. Performance of electronic identification systems for sheep and goats

2.2.1 Identifiers

Regulation (EC) No 21/2004 refers explicitly to the use of electronic eartags and ruminal boluses. The two types can be defined as follows:

- **electronic eartag**: a transponder embedded in a package designed to be permanently fixed to the animal's ear ;
- **ruminal bolus**: a transponder housed in a specific gravity container (e.g. ceramic) which is orally administered to a ruminant and that remains (due to its weight, shape and size) permanently in the reticulo-rumen (forestomach);

Electronic eartags

Electronic eartags can be applied early in the life of an animal (principally to newborn lambs). Only limited technical knowledge is required to correctly place the identifier. The occurrence of inflammations of the ear cannot be excluded; in fact, the type of eartag, as well as age, species, breed of the tagged animals and the tagging season has been reported to have an effect on the occurrence of inflammations/infections. The loss rate for eartags (both electronic and conventional) is generally higher than for boluses. Loss rates of about 5% occur under practical conditions and figures up to 14% have been reported under extreme scrubland grazing conditions. The presence of the eartag can be verified visually and in case of reading difficulties, a handheld reader can be brought close to the identifier. Fraudulent manipulations (unauthorized replacement) of the ear tags are still possible. Recovery at slaughter does not cause any problems.

⁶ The International Organization for Standardization (ISO) has published standards dealing with aspects of radio frequency identification (RFID) of animals. In addition, the International Committee on Animal Recording (ICAR) has developed procedures aimed to verify the compliance of certain RFID devices with ISO standards. Those procedures have been published in the International Agreement on Recording Practices in the version as approved by the ICAR General Assembly, June 2004.

Ruminal bolus

The bolus is deposited in the reticulum which develops as part of the forestomach after birth. Therefore there is some limitation to the minimum age at which a bolus can be introduced. Specific mini-boluses are on the market and low loss rates are reported when applied to animals aged 3 weeks and older. Recent publications and experience from the Member States showed that loss rates less than 0.1% can be achieved as long as the correct bolus type (size, weight) is applied in relation to the age and the weight of the animal. In particular under management conditions, which are susceptible to higher losses of eartags (e.g. scrubland grazing) the bolus has clear advantages. The application of boluses requires appropriate training. The presence of a bolus cannot be checked externally without a RFID reader. In the case of non-reading of an animal, which was previously identified by a bolus, it would not be possible to determine whether the bolus was lost or stopped functioning. Fraudulent manipulations of the identity of the animal are almost impossible, and in any case are not worthwhile if compared with the value of the animal and the cost of the intervention. Manual recovery is a practice which can be easily implemented in the slaughterhouse, on the condition of an appropriate training of the relevant staff. Technical solutions for the automatic recovery at slaughter are under development.

Other types of identifiers are currently not accepted as official means of identification for sheep and goats in Regulation 21/2004. However, some Member States reported some experience with those types of identification:

- **injectable transponder:** a small size transponder capable of being implanted into an animal's body by injection, and encapsulated in a biocompatible and non-porous material, such as glass;
- **electronic mark on the pastern:** a plastic-encapsulated transponder designed to be fixed to the animal's pastern.

Injectable transponder

Even if an injectable transponder has the advantage that it can be applied to very young animals, there is still uncertainty about its optimum position (e.g. abdomen, caudal fold, cleft between the claws, metacarpal area). The injection is a more complex process requiring specific training, which also influences the retention of the transponder. Sophisticated coating substances on the surface of some transponders ensure a fast encapsulation and prevent migration of the transponders. The injectable transponder is not visible from outside. In the case of non-reading of an animal with an injectable transponder it would not be possible to determine whether the transponder was lost or stopped functioning. The removal of an injectable transponder from a live animal is not worthwhile if compared with the value of the animal and the cost of the intervention. The recovery rate of the injectable transponder at slaughter is low in comparison with the other identifiers and automatic methods have not been developed. Therefore, depending on the injection site, the risk that injectable transponders enter the food/feed chain is higher than for other electronic identifiers. Injectable transponders are widely used in pets and horses.

Electronic mark on the pastern

More recently, an alternative EID tag under development is a transponder included in a mark on the pastern (also called "leg band"). Only a few practical experiences exist with this type of identifier. In principle, the identifier can only be applied to adult animals, whose pastern has reached its maximum diameter. This limits the possibilities of an early identification of lambs within six months as laid down in Article 4(1) of Regulation (EC) No 21/2004. The application is easy and no animal health problems have been reported. The external mark is clearly visible, but on the other hand, more susceptible to fraudulent manipulation and rough environment conditions. This type of identification has specific management benefits for holdings where individual animal codes need to be recorded in the milking parlour.

2.2.2 *Readers*

The reading efficiency is influenced by the performance of the readers and identifiers and by the capability of the relevant staff to ensure an appropriate installation of the reading system (antenna positioning, raceway width, setup of the firmware) in order to prevent interferences from the environment and to ensure the best possible performance of the equipments..

Several field tests in the Member States achieved 100% readability. On the other hand, figures as low as 50% were also reported. If mixed groups of animals with electronic and non-electronic identifiers are handled together a general logistic problem may occur.

Two general types of reading situations are assessed.

Static reading

Static reading is carried out on single **restrained** (static) animals (in for e.g. a feeding grill, or corridor) with a **handheld reader** (also called "portable" or "mobile" reader), thus eliminating transcription errors. Present models of handheld readers work with farming management features (e.g. weight crates) to enable a regular control of the animals' performances. The reading efficiency is influenced by the physical characteristics (e.g. size and shape) of the antenna and the level of charge of the battery supply (some readers decrease the reading distance at low battery levels). However, a minimum quality of the marketed devices can be guaranteed by the approval procedure established by Decision 2006/968/EC. The animals are read one by one, which clearly limits the reading speed. Therefore, a handheld reader is mainly used for smaller groups of animals. Also, non-reading animals can be easily detected and individually managed. Handheld readers are generally easy to use and do not require high technical skills. Handheld readers are comparatively cheaper than fixed readers. However, more sophisticated functions are present in more expensive models only.

Dynamic reading

In dynamic reading systems, the **moving animals** pass through a corridor where an antenna of a **fixed** (static) **reader** has been placed. The reading speed and distance are considerably higher (in real life conditions, one animal/second) than with a handheld reader. Fixed readers are usually combined with the automation of the IT management system. Detecting and separating non-reading animals can require appropriate structural facilities (e.g. automatic gates). Dynamic reading systems need time for installation. The antenna of a fixed reader needs to be tuned to allow an optimal reading of the identifiers; however, more recent readers come with an automatic tuning option. For the new generation mixed reading conditions (different types of identifiers) do not influence the reading efficiency. Technical solutions exist, where fixed readers can be easily transported and installed at different places without requiring too much effort.

Fixed readers can easily be connected with weight crates or installations (gates) to segregate read and non-read animals. They provide a practical solution for managing large numbers of animals within a short period of time. Due to their technical complexity, the different functions they can provide and the higher performance, fixed readers are more expensive than handheld ones. The RFID market provides at the moment static readers which, despite their sophistication, are user friendly (plug and play).

2.2.3 Data transfer from readers to data processing solutions

The important benefit of electronic identification of animals is the ability to read the identification codes of the animals directly into a data processing system (e.g. animal movement report, or herd management). Therefore, several projects also included the connection between the reader and PC/PDA and the data transfer into management software or even a central database.

Programmable readers are equipped with a memory capacity to store the animal codes read. Using this memory, the individual animal data can then at a later stage be transmitted to a PC. In case of dynamic readings, simultaneous data transmission from the reader to the PC requires a permanent connection. Positive results with Bluetooth and Wi-Fi have been reported for distances, depending on wireless protocol and environment in case wired solutions are not practical.

The interfacing between the software on the programmable readers and the software for further data processing was reported as an issue which needs further consideration. Programming work was necessary to adapt the available farm management software in order to communicate with the readers as well as with central databases. This problem is frequently due to the fact that the farm management software is proprietary and therefore any adaptation to incorporate the additional information requires additional programming work. At present, no international or EU-standard exists for the reader output data format. Technical discussions are currently being held at ISO level.

2.2.4 *The end-user perspective*

Farm

With appropriate training, the application of electronic and conventional identifiers is comparable. Readers have shown their practicability and it is merely a question of price to equip farms with readers of high quality. Farmers are more motivated to use the technology, when the RFID system is user friendly and when direct management benefits are obtained (cost reductions, time savings, elimination of errors). This is more likely on farms with intensive management systems (e.g. dairy goats, pedigree breeders), where individual animal performance data (e.g. milk yield, lambing results) are recorded on a routine basis. The integration of automatic reading into farm software needs further attention by the manufacturers (RFID, farm software), on the basis of predefined criteria. The use of electronic identification on farms requires a basic level of technical knowledge and PC-skills. Appropriate training was reported to be an important element during the introduction of electronic identification. If the sheep industry is less IT literate than other agricultural branches, solutions need to be considered where service providers could handle the electronic identification for farmers (e.g. transporters read animals during loading and notify the movements on behalf of the keeper). In particular for smaller farms, the option to notify animal movements without electronic reading remains, so that the costs for the technical equipment can be restricted to the costs for identifiers without reducing the benefits downstream.

Markets/assembly centres

Electronic identification is an efficient way to trace the movements of individual animals via markets. The possibility of regrouping animals from different origins at markets in order to sell them in homogenous lots has been reported as an advantage of electronic identification. At least in some Member States, markets are characterised by extremely high animal flows (>2000 animals auctioneered per hour). The RFID system must ensure at least the "selling speed" in the auction ring. Through a careful installation of the reading system it is possible to prevent most of the risks of poor performance (electromagnetic interferences, management of exceptions). The technical requirements for the equipment are very high, because poor reading performance and the inability to handle anomalies would bring normal market operations to a halt. Detecting and recording non-read animals (e.g. electronic identifier not existing or not functioning) in high animal flows is therefore a key issue which needs further consideration. The presence of metal constructions, which are easily cleaned and disinfected, constitutes an additional challenge for the reading technology in markets and assembly centres. Equipping such places with high performance dynamic reading systems do require investments considerably higher than for visual reading, the amortisation of which depends to a large extent on its utilisation. However, if compared with the visual reading of individual animal codes, electronic identification is a feasible solution for ensuring individual traceability via markets.

Slaughterhouses

Recording of individual animal codes guarantees traceability within the food chain by providing a clear link to the history of each individual animal. Pre-slaughter reading and post-slaughter reading have been tested in several projects, and both have been demonstrated to be feasible. The identifiers can be read in the lairage area (to confirm delivery of the animal(s) to the plant), as well as at the beginning of the slaughter chain (to confirm slaughter) and at the end of the slaughter chain (to confirm identifier recovery). Concerning the reading efficiency reference is made to the preceding paragraph. Manual recovery of identifiers is feasible; however automatic recovery of identifiers needs further technical developments. In order to ensure the uniqueness of the animal identification code any fraudulent second use of electronic identifiers should be prevented.

2.3. Economic aspects

The estimation of costs for the 27 Member States depends on the number of small ruminants to be tagged with electronic identifiers, and the number of holdings to be equipped with electronic readers and data processing equipment. Besides the prices of the equipment used (e. g. 1-2€ for electronic identifiers, handheld readers from less than 200€, static readers from 1000€), the total cost will depend on how Member States make use of several derogations in Regulation (EC) 21/2004 and the percentage of small holdings (e.g. hobby farms) which are able to notify individual animal codes after manual reading.

Calculations carried out by several Member States and also by the Joint Research Centre of the Commission showed that costs for readers and data processing equipment constitute a substantial part of the total annual costs. A gradual introduction of electronic identification, starting with the electronic tagging as a first step and linking the movement information with the individual animal codes as a second step, would save expenses during the introductory period.

Taking into account that manual recording of individual animal codes in large herds of sheep and goats would require a large expenditure of human labour, automatic reading systems can contribute to reduce this effort. Electronic identification as fundamental part of individual traceability, not only reduces the risks but can also provide efficiency benefits for instance in the fields of farm management, animal breeding, official controls and food safety. The multi-purpose use of electronic identification systems is an important incentive for the small ruminant farming industry and the other related industries and hence facilitates implementation. Therefore "on-farm-benefits" play a key role for the general acceptance and efficient introduction of electronic identification.

2.4. Future requirements

The results of the Member States' projects show that electronic identification of sheep and goats functions under a wide range of production conditions. Only in one Member State problems, detecting, isolating and recording of non-read animals in high animal flows were reported as a limiting factor under extreme conditions. Recent trials in the Member State concerned demonstrated that these problems could be solved.

The benefits of electronic identification are limited if the animal code is just displayed on the reader and not entered into the software solutions for movement reporting or farm management. The adoption of international standards concerning data format and communication will address most of the problems of the present limited availability of fully adapted, open reader-compatible software solutions. The multiple use (e.g. flock management, breeding, performance recording) of electronic identification beyond its initial sanitary purposes (movement control, disease eradication) is seen as an important incentive for wider acceptance.

3. CONCLUSIONS

Regulation (EC) No 21/2004 introduced the principle of individual traceability of sheep and goats, which should be upheld in order to meet the current and future requirements of an identification system aimed at ensuring a high standard of animal health and food safety.

- The traceability of movements of individual animals via different holdings requires the recording of individual animal data for each movement. Electronic systems ensure the automatic reading and recording of individual animal data, especially for small ruminants, which are often moved in large numbers and sometimes via markets or assembly centres where the composition of these groups changes.
- Electronic reading systems are dispensable when individual animal codes can be read visually and recorded manually (e.g. small animal groups) or in the case of group identification (e.g. holding code).
- Taking into account the different management and environmental conditions in the Member States, Community legislation should not promote one or another technical solution. It is a matter of subsidiarity to select equipment for electronic identification in accordance with the specific national needs. Community legislation already fixes basic technical standards. The responsibility for approval of devices lies with the competent authorities of the Member States with the purpose that such devices allow establishing the identity of animals traded between Member States. However, the Commission's role is crucial to guarantee that a common approach and agreed standards apply across the Community and to provide support to the Member States. The possibility to establish a Community Reference Laboratory (CRL) should be considered.

- To accommodate technical developments and experience with certain types of identifiers and the specific needs in certain fields of application, Member States should also be allowed to approve new types of identifiers (e.g. electronic mark on the pastern, injectable transponders) provided that the maximum period for tagging, as laid down in Regulation (EC) No 21/2004 are respected and that each type of identifier is kept out of the food chain.
- The basic technical conditions to identify small ruminants in their holding of birth with electronic identifiers are fulfilled. However the date of obligatory introduction of electronic identification should consider the time-frame needed for the Member States to carry out the necessary legal and organisational arrangements before that date.
- The experience with the implementation of electronic identification in some Member States has shown that considerable investments in reading technology of high performance at different places in the whole production chain are essential for the functioning of the system.
- The successive electronic tagging of young animals in their holding of birth will lead to a situation where animals with and without electronic identifiers would have to be managed together during an introductory period. It is therefore intended to dissociate the date from which the movement information should contain individual animal codes (point C.2 of the Annex to Regulation (EC) No 21/2004), from the date in Article 9(3) of Regulation (EC) No 21/2004.
- For the reasons explained above, at this stage it would not be possible to fully justify any decision as regards the final date of obligatory introduction of electronic identification at Community level. It is therefore recommended to have a wider stakeholder discussion in particular about the economic impact of the introduction of individual traceability and electronic identification before a final date in Regulation (EC) No 21/2004 is fixed. Such a date should be set by the Commission under the comitology procedure in accordance with clear conditions laid down by the Council. The Commission envisages establishing such a date in 2008, in view of the possible implementation of electronic identification in all Member States by end 2009. However, the legal framework should allow Member States to implement electronic identification according to their national needs also before the final date in Regulation (EC) No 21/2004. This will also be of help for a well reflected decision on the final date of obligatory introduction at Community level.