Identification and registration of cattle in the Czech Republic

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Abstract

Identification and registration are prerequisites for milk recording, genetic evaluation, veterinary aspects of cattle breeding, agriculture policy and cattle breeding management on farms. This paper provides updates on this area in the Czech Republic as well as information on the role of the Czech Moravian Breeders' Corporation within the domestic system. The comprehensive and unique identification and registration system used in the Czech Republic employs modern IT technologies, data processing and data flow tools. The identification and registration database is interconnected with milk recording and genetic evaluation databases, incorporating a sophisticated system of plausibility checks and on-farm inspections. As part of this system, cattle breeders have access to the Integrated Agricultural Register (IAR), an administration server for identification and registration. All identification criteria respect EU and national legislations as well as the ICAR Guidelines. A uniform cattle identification eartag system was established in the Czech Republic in the early 1960s, building on a long tradition dating to the establishment of the milk recording industry in 1905. The identification system incorporates eartag distribution and logistics, select control mechanisms, plausibility checks, a supervisory programme and parentage verification.

Keywords: Identification and registration, Czech Republic, database, data processing, eartag, eartag distribution and logistics, Integrated Agricultural Register.

Introduction

Animal identification and registration are the most important prerequisites for successful farm management, milk recording, genetic evaluation and other aspects connected to cattle breeding. This paper summarises the identification and registration system for cattle used in the Czech Republic, detailing its key features and integration with other milk recording systems.

Users, organisations and bodies involved in the identification and registration system and their responsibilities

The following organisations are involved in the identification and registration system used in the Czech Republic:

- The Ministry of Agriculture – administrator of the identification and registration system.

- Czech Moravian Breeders' Corporation – delegated organisation responsible for technical implementation of the system.

- Czech Breeding Inspection and State Veterinary Office – responsible for breeder inspections.

- Various breeders and companies permitted access to the farmer portal.

The Czech Moravian Breeders' Corporation, Inc. oversees all processes related to identification and registration and is authorised by the Ministry of Agriculture. The Integrated Agriculture Register (IAR) (IZR in Czech) is a system used to identify and register livestock animals. The Czech Moravian Breeders' Corporation, Inc. uses IAR to ensure routine aspects of identification and registration are met and also engages in consultancy, testing and development of IAR and its farmer portal.

The Czech Moravian Breeders' Corporation, Inc. was established as a limited liability company for the purpose of privatising the National Breeding Company (State Breeding Institute). The founders of the company are the Czech Fleckvieh Breeders' Association, the Holstein Cattle Breeders' Association of the Czech Republic, and the Union of Breeders. The main goal of privatisation was to ensure all activities carried out on behalf of breeders and their associated organisations are subject to scrutiny, e.g. breeding registration administration, processing milk recording and progeny testing results, animal breeding value evaluation, milk and immunogenetic lab analysis, and technical herd book administration. The Czech Moravian Breeders' Corporation, Ltd. assumed control in the above areas, succeeding the National Breeding Company (State Breeding Institute) in November 1996 and becoming an incorporated company in 1999. Subsequently, the company was joined by other breeding organisations, receiving support from the Ministry of Agriculture of the Czech Republic through the Supporting Guaranteed Agricultural and Forestry Fund (State Government). The objective of these joint efforts was to develop the optimal conditions for the administration of animal identification and registration and to establish a common agricultural policy. The Czech Moravian Breeders' Corporation, Inc. is the sole body responsible for maintaining the dairy cattle identification system, dairy production records and genetic evaluation of dairy cattle. There is a uniform national programme in the Czech Republic.

IAR connects with the following external systems via web services:

- Cattle reproduction system: IAR adds information about animal pedigrees and birth reports to the cattle reproduction system.

- Herd book keeping: herd books document all bulls registered for artificial insemination and natural mating. This information is used for natural mating records.

- State Veterinary Office system: the system of State Veterinary Office use information about the location of animals registered by IAR and overseen by the State Veterinary Office. The State Veterinary Office also uses IAR in case of veterinary problems, e.g. possible infections, etc.

- State Agriculture Intervention Fund: IAR information is used to assess entitlement to subsidies.

- Cattle milk recording: the IAR can be used by breeders to access records and apply for subsidies.
- Record keeping for breeders (breeder system): provides IAR reports about births with IAR information on data processing, pedigree, etc.

Selected technical aspects of IAR

Architecture of IAR is designed in accordance with these requirements:

- High accessibility 365 days per year, 7 days per week and 24 hours a day with minimal accessibility 98%. For 100% of accessibility, assisted running times are considered in uncounted cases. Properly reported interruption times are used where times are shorter than 20 hours per month but no longer than 48 hours over the course of one year
- System security – distinguishes internet and intranet users at the application layer level

The IAR system is based on a three-layer architecture:

- Presentation layer.
- Application layer: servers on the Microsoft .NET platform Framework running on an MS Windows Server environment.
- Data layer: Oracle Database 11g system.

The application layer provides a higher level of security and the options to select scalability split into two parts. Communication between both parts runs from the top down. Technology NET.REMOTING is used. This design splits the application and presentation logics to ensure openness for different type of clients. This architectural design enables future extensions and access to other types of client layers, such as mobile clients. All servers in this platform run on Microsoft .NET Framework 4.0 and Microsoft Windows Server 2012 Standard. The database layer consists of the Oracle Database 11g. To aid recovery in the event of hardware issues with the disk field, the database is also accessible in archive mode and regularly backed up.

The IAR system operates on three environments (operational, testing and development). Each environment has separate application and web servers. The number of servers capable of running is based on the environment, i.e. one for development and another for testing and operation. There is a separate web server in the form of a farmer portal from the internal IAR portal web server.

IAR Testing

IAR replaced an older system used identification and registration of animals. The transition period involved making sure the new system would conform with the original version. Key to this was calculating animal pedigrees (parents and breeds) based on birth reports in the form of official printed accompanying documents. All records needed to be validated against the old system. Animal locations were also maintained from the previous system in order to prepare inventory lists. IAR also took over identification and registration (data migration) data from the original system. All migration was tested in detail based on comparing outputs from both systems in parallel after processing data records from both systems. Any differences were duly accounted for and explained.

Development of IAR

Automated data processing has been routinely used for cattle milk recording and performance recording of other livestock in the CR since 1960s. A modernised identification and registration system was subsequently implemented with the introduction of new EU legislation. In 2006, work began on updating this system with a focus on:

- Detailed analysis and
- Implementation

Timeframe of updates:

01/2008 – migration of data and opening of modules for routine practice

06/2009 – all modules made available for routine practice

01/2010 – breeder module launched

02/2011 – online data processing of identification and registration reports

2015 – breeder module allowing users to request welfare subsidies

2016 – 2018 – breeder module updated

Basic principle of animal registration and identification in the Czech Republic

The breeder sends the report, including eartag number, birth and import details

- The report is then processed and reviewed:
    - Eartag data reviewed for accuracy
    - Pedigree calculated
    - Animal location verified
- Results are sent to the breeders:
    - Successful registration
    - Unsuccessful registration (with reasons given in the report)
- Communication via standard tools

Pedigree calculation

Birth report – all data, including details on natural mating where relevant, sent to breeding database for pedigree calculation

- Pedigree calculation:
    - Pedigree calculated in the breeder database from the identification and registration database + data from the database including details on cattle reproduction (artificial insemination, ET)
- Calculation results returned to the identification and registration database, including:
    - Line and register of father
    - Breed

- ▪ Donor number (in the case of ET)
- Pedigree recorded in the identification and registration database
- Pedigree calculated
- System generates accompanying documents on the animal
- Accompanying documents are printed

Official accompanying documents are protected against falsification. The following protection tools are used:

- Printing below eartag number
- QR includes eartag number, date of birth, breed, breed composition, eartag of mother, line-register of father
- Barcode includes eartag number
- On the reverse side – water mark with ICAR logo

Different aspects of identification and eartag logistics

Several methods are used for animal identification consisting of:

- Plastic eartags
- RFID
- Linkage from farm IDs to official IDs

Eartags (incl. duplicates) can be ordered via the IAR system:

- Breeders can only request eartags for animals registered in the ordering system
- Breeders can only order duplicates for animals in a holding

Czech Cattle ID Structure

Except for horses, donkeys and their crossbreds, animal ID numbers contain a unique alphanumeric code with a maximum of fourteen characters

1. The first two letters denote the country of origin, e.g. CZ for the Czech Republic.
2. These letters are followed by nine digits given a unique numeric sequence.
3. The seventh digit is used to identify bovine animals. The eartag must contain the number 0 for males and the number 9 for females, while the last two digits must be identical to the first two numbers of the registration number of the holding the animal was born in.

Practical example of a cattle ID

CZ999999999KKK is the ID number unique to each cow, where

- CZ = country code
- 999999999 = eartag order number

- KKK = sex and region ID of the animal's birth
- Example
    - CZ000141013**962** = female
    - CZ000645137**062** = male
    - **62** = South Moravian region

Eartag issue procedure, eartag logistics

The following four manufacturers are certified to issue cattle eartags in the Czech Republic:

- Czech Moravian Breeders' Corporation, Inc. (prints and issues DATAMARS eartags)
- HEMA MALSICE (provides Allflex eartags)
- DITA (a disabled community production cooperative)
- EUROPACK, Ltd.

The Czech Moravian Breeders' Corporation, Inc. allocates a unique ID to each individual animal and is authorised to sell and issue eartags upon request by breeders and databases. There is a single national identification scheme. All technical aspects relating to the issuing of eartags are overseen by the Czech Moravian Breeders' Corporation, Inc in respect of EU and national legislation. Each animal's identity is visible, unique and never reused. Animal identification devices and methods comply with legislative requirements.

Eartag logistic process

- The entrusted person (Czech Moravian Breeders' Corporation, Inc.) shall ensure that identification means or duplicates thereof are sent to a keeper within 8 working days upon receipt of the request for means of identification or duplicates thereof.
- The entrusted person shall record the date of the request for means of identification or duplicates thereof.
- For keepers of bovine animals, sheep and goats, the entrusted person shall record the identification device allocated to individual keepers for their holdings within a single region, recording the date of allocation and the number of the allocated identification, including numerical sequences for the region and keeper.
- The entrusted person shall provide keepers of bovine animals, sheep and goats a sufficient number of eartags so that within a single region the supply of such identification sets does not exceed the number requested.
- The entrusted person shall record a duplicate means of identification issued for individual animals in the animal register database, recording the date of issue and the sequence number of the specific duplicate.
- Breeder registration in the central registry is verified based on the breeder's written application for the issue of a number range.
- The breeder's use of the eartags is subsequently verified over the course of the year.
- The breeder can only request a limited number of new eartags depending on the number of cows in the herd.

- A particular number range is issued to the breeder depending on region.

- These eartags may not be used by other breeders, with the issued range of numbers and birth data on all animals recorded in the central registry subject to regular inspections.

- The verified order for a new range of numbers is sent to an eartag manufacturer and chosen by the breeder.

- The breeder may choose from four manufacturers.

- Information about the production and issuing of eartags is then sent by the manufacturer to the Czech Moravian Breeders' Corporation, Inc. for data archiving.

Upon receipt of an application for a duplicate, the animal's data are verified in the central registry. It must also be verified that the animal is alive and owned by the breeder who has applied for the duplicate. Duplicate numbers are entered into a duplicate database, with the required duplicate number then issued by a software application. The order generated is subsequently sent to the manufacturer. The duplicate order is assigned Roman digits, with the confirmed set issued to the Czech Moravian Breeders' Corporation, Inc. with the date of production.

Checks carried out to ensure correct animal identification and avoid duplication

The following inspections are key to ensuring correct animal identification:

- Routine checks

- Eartag issue procedure

- The Czech Moravian Breeders' Corporation, Inc. (CMBC) oversees a system of supervision and quality control, with all inspectors serving as employees of the CMBC

- State supervision

- SNP technology used, replaced by STR during the transition period

- DNA analysis and parentage verification are used for:

  - Breeders

  - Czech Breeding Inspection – checks and supervision

  - Performance recording, herd books

  - Bulls, mothers of bulls, fathers of mothers

- Heifer pedigree – harem mating

- Pedigree verification applies to all animals born and recorded within the system

- Plausibility checks are implemented for reproduction, fertility and in identification and registration datbases

Sample identification

Barcodes are used for 100% identification using milk recording vials, while only electronic data capture (PDA) is used during milk recording.

Conclusion

This presentation summarises the key aspects of identification in the Czech Republic in accordance with EU legislation, national legislation and the ICAR Guidelines. The challenge for ICAR going forward will be to improve automation in all areas, but particularly with regard to identification of big herds (1,000 – 2,000 cows) and to design new modern tools to expedite development in this area. ICAR working groups must continue to collaborate on existing multidisciplinary approaches to automation.