



THE GLOBAL STANDARD
FOR LIVESTOCK DATA

Section 1 – General Rules for ICAR Guidelines

Section 1 - General Rules

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Change Summary

Date of Change	Nature of Change
July 2017	Reformatted using new template.
July 2017	Table of contents added.
July 2017	Heading numbers and heading text edited for clarity and removal of redundant text.
August 2017	Stopped Track changes and accepted all previous changes.
August 2017	Moved the file to the new template (v2017_08_29).
August 2017	Version updated to August 2017.
September- 2017	Version updated to September 2017.
September Sept- 2017	Correct typos and other errors as identified by Matt McClure.
September Sept- 2017	Fix broken links. Correct typos.
October- 2020 17	Hyperlinks have been corrected.
January 20 20 18	Include modifications to chapter 1 Method of Identification proposed by SC ID in 2016.
April 2018	<u>2.1 c amended by replacing four months to record inseminations with recording them as soon as possible and seek solutions to time delays.</u>

1 Methods of identification

1.1 Rules on animal identification

- a. The recorded animal identity ~~must~~ should be the animal's official identity in the member country and ~~must~~ should be unique to that animal.
- b. Where the identity of an individual animal is not unique, the record must so state (e.g. flock or herd identities for sheep/goats/sheep). The identity number used for a flock or herd must be unique ~~for~~ to that flock or herd.
- c. The animal's identity should be visible to the naked eye, or if not visible (such as an electronic or Radio Frequency Identity (RFID)) should be cross-referenced to a visible or human readable identity. ~~The animal's identity must be visible.~~
- d. The animal's identity ~~must remain~~ should be unique and never be re-used.
- e. The animal's identification device/method, must comply with the local or legislative requirements of the country concerned.
- f. Animals, which lose their identity device or whose identity device becomes dysfunctional, must be re-identified ~~and~~, wherever possible, with their original number, provided ~~that~~ there is evidence that the animal is being correctly identified. ~~(Where it is not possible to re-apply the original identity, this is not possible,~~ a cross reference to the original number must be maintained).

1.2 Methods of animal identification

- a. The animal's identity number may be attached to or implanted in the animal by a tag, tattoo, sketch, photo, brand or electronic device.
- b. Animals moving from one country to another should wherever possible, continue to be identified using the identity (and name where applicable) from the country of origin. Provided that identity remains compliant with legislation in the importing country. ~~Animals moving from one member country to another should, wherever possible, continue to be identified using their original identity number and name.~~
- c. In the case of imported animals, where local or national legislation of the importing country requires the original identity to be changed or replaced, ~~where the number has to be changed,~~ the official records should also ~~show~~ hold the original ~~number~~ identity and name. The ~~original number~~ identify and name ~~must~~ should also be ~~reported~~ quoted in addition to the replacement identity in Export Certificates and also in, AI Catalogues or ~~and in~~ catalogues of important international shows and sales. ~~Where an animal is identified using an implanted electronic device, the animal must be marked in a way which indicates the presence of an "electronic identification" device.~~

1.3 Record of identification methods

- a. The member organisation must maintain a record of the ~~approved~~ identification methods used in the countries ~~y~~ in which it operates.
- b. The member organisation must determine, within the constraints of local or national ~~the member country~~ legislation within the country or countries in which it operates, the identification methods ~~to be~~ used on recorded animals and herds or flocks.

1.4 Standards for animal identities

- a. Specific guidelines for use in data exchange for genetic evaluation (Interbull or International Identity) and on printed documents, electronic documents, web pages or any other places where genetic evaluation results may be provided are defined in Section 9.
- b. Details of standards for Electronic Identification Devices can be found in Section 10.
- c. Details of the supported standards of animal identification used in electronic exchange of livestock data, particularly between local, on-farm devices and computers, can be found in Section 15.

~~The animal identity number will be a maximum of 12 digits (including check digits where used) and the three digit numeric code representing the name of the country in accordance with ISO 3166 shall be added to identify the country of origin. Three digit numeric ISO codes must be used for data transfer and storage. In printed documents the ISO alpha country code should be used.~~

2 Parentage recording methods

2.1 Recording of parentage information

- a. The identity of the animal served and the service sire must be recorded on the farm on the day of the service.
- b. The insemination records issued by the AI Organisation (or the records kept by the DIY AI user) must include the date, the official identity and if available the name of the served animal and the identity and name of the service sire.
- c. The recording organisation should record the service information, as soon as possible after the animal has been served, and seek solutions to time delays.~~The recording organisation should record the service information, as soon as possible but no later than four months after the animal has been served.~~
- d. The sex and identity of the progeny should be recorded on the day of birth and notified to the responsible organisation no later than the first recording visit after their occurrence.
- e. In the case of embryo transfer the records must show the genetic dam and the recipient dam as well as the service sire.

2.2 Verification of parentage

The following checks must be carried out before a parentage record can be considered official.

- a. That the served animal is properly identified.
- b. That the service sire is properly identified.
- c. That the Date of Birth is within $\pm 6\%$ of the average gestation length for the recorded service date for the breed of service sire.
- d. That the progeny of the served animal is properly identified.

- e. That the service sire is verified either by an AI record or by evidence that the service sire was on farm on the day of service, or by a declaration by a Veterinary Surgeon (e.g. in the case of Embryo transfer).

2.3 Supervision of parentage

2.3.1 Scope

The present guideline aims to provide guidelines for the relevant matters which must be undertaken to enable an organisation to use genomic data for parentage verification.

2.3.2 Blood typing

The use of blood typing for determining parentage verification may still be used nationally, but it is not recommended when exchanging parentage data. As there are no comparable ring tests between laboratories we therefore cannot assume consistency of results. When in doubt of any parentage, a DNA-test should be done. If no material is available from both parents, the animal should be excluded/not allowed for semen production or embryo production.

2.3.3 Microsatellite or SNP parentage analysis

Following advances in molecular biology described in [Section 4](#) of these Guidelines, further information to enable organisations to utilise SNP parentage analysis is required.

Genomic parentage verification may be completed using microsatellites or SNPs. To absolutely verify the parentage, both parent's DNA is required, however verification of only the Dam may be acceptable if sire genetics are unavailable.

Historically, many animals' DNA has been analysed using microsatellites, but increasingly animals are being genotyped on SNP chips. SNP chips may range in size from those that solely contain parentage SNPs to the high density chips used for genomic evaluation. The important thing is that they must contain the ICAR recognised parentage SNPs and that the analysis is completed at an ICAR accredited laboratory. This standard ensures that the parentage SNPs are exchangeable between organisations. If an animal has been genotyped for genomic evaluation using a chip which has these SNPs, it should be possible to request the parentage SNPs.

The transition from the microsatellite to the SNP method of parentage verification is problematical. Parentage microsatellites can be imputed from additional high density SNPs specifically chosen for that purpose and available on some SNP chips. Using higher density SNP chips gives the organization more information about the animal; it can aid sire identification, help identify the maternal grandsire, be used for genomic evaluation and can be used to check for genetic disease and traits. Alternatively organisations may decide to request the 120 parentage SNP and microsatellite genotypes

A list of ICAR accredited labs, for either microsatellite or SNP parentage verification, is available [here](#) on the ICAR website. The laboratory accreditation process is explained in full in [Section 4](#) of the ICAR Guidelines.

2.3.4 Parentage verification procedure

To be able to use genotypes for parentage verification, an organisation must have in place a system that documents the requesting, sampling, processing, analysis and reporting of samples of DNA.

To obtain a good DNA analysis, a good sample of DNA is required. Samples may be of blood, semen, mucus, tissue or hair follicle, etc. The important criteria are that there is sufficient good quality DNA in the sample.

When collected, samples must be clearly identified, so that upon receipt at the laboratory they can be recorded accurately as belonging to a particular animal. Once the sample is analysed, the Parentage SNPs/Microsatellites from the calf must be compared with those from its sire and dam to decide whether the calf is related to the two parents. This interpretation may be completed by the laboratory as a service, or by the requesting organisation.

The organisation which has interpreted the DNA results will issue upon request a parentage certificate for the animal.

If the interpreted DNA results do not verify the alleged parents, additional sampling may be required.

2.3.5 Reconstruction of microsatellites for missing parents

Reconstruction of a parents' genotype for parentage verification should not be used except when there is no other option available, for example, when a parent is deceased and no DNA sample is available.

Where there is no other option, it is recommended that the microsatellite loci from five offspring are used to reconstruct the missing parent; otherwise there may not be enough data to correctly determine the parentage, particularly if the animal is inbred. Where ever possible the microsatellite genotypes used should be from direct genotyping of the offspring not reconstructed or imputed microsatellite genotypes.

There should be a flag on the reconstructed genotype to indicate that the genotype was reconstructed and, therefore, the parentage verification was from a derived genotype.

As an additional tool, grandparents' genotypes may be used to verify the parentage.

The reliability of the parentage verification is also determined by genetic diversity that is available within the progeny as well as the qualified parent.

Guidelines for imputing MS from SNP and reconstructing MS from offspring and SNP verification to verify parentage will follow as a later release of these guidelines.

2.3.6 Visual inspection of the progeny.

Visual inspection cannot be used alone to verify parentage but can be used as a rough indicator of parentage where the sire can be easily identified by the type of calf that is born.

Visual inspection is better for exclusion rather than for verification.

2.4 Recommendation for recording and validation of AI data

2.4.1 Object of the recommendation

The purpose of this recommendation is to improve quality of data in Artificial Insemination of cattle (AI) by harmonising and improving data collection for guaranty high level of exchanges at international level. It recommends the minimum items that should be recorded for using AI data and the minimum of controls that data must undergo for being declared as valid. Annex 2.5 describes the minimum requirements for purposes other than genetic.

2.4.2 Field of application of the recommendation

The recommendation applies usage of AI data for genetic purposes such as:

- a. Using AI data to establish parentage of bovines prior to registration in the herd-book and/or in files used for genetic evaluations for any trait.
- b. Printing AI on pedigrees of pregnant females.
- c. Genetic evaluation fertility of bulls, daughter fertility and establishment of Non-Return-Rates.

It applies to bovine populations for which parentage is systematically recorded such as herds on performance recording (milk and beef) and / or herds registered in the herd-book.

Its applies to countries where bodies are approved to enter AI data in the genetic data processing system for the above mentioned purposes.

It non applies to non genetic purpose

2.4.3 Definitions

- a. **First AI:** first insemination to breed a heifer or after the end of each pregnancy to breed a cow.
- b. **Return:** AI carried out after a first tentative within a given reproductive period. A rank is attached to each return.
- c. **Rank:** order of the return after the First AI (2, 3, 4,...).
- d. **Fecundating AI:** AI which is not followed by a return during a given period of time (2-3-4 months), or followed by a positive recorded pregnancy diagnose, or by a calving after a period matching with the gestation length of the breed(s).
- e. **Double AI:** two AI carried within a short lap of time, e. g 48 hours, on the same female with or not the same bull. This information is recorded to avoid rejection when verification of dates.
- f. **Operator:** person performing the artificial insemination, hired by AI stations, freelance, veterinarian technician, farmer.
- g. **Special characteristics:** technical indication related to the semen (liquid / frozen, dilution), or to the straw (split-unit), or to special purpose of the AI (embryo production)

2.4.4 Recording of AI data

Data mentioned below are those that have to be transmitted to a data processing centre in charge of genetic procedures. In general the format of those data is not defined by this recommendation.

Items 2.4.4.4 to 2.2.4.11, below, have to be recorded.

2.4.4.1 Summary of items constituting the data set when AI are recorded:

When AI are recorded, some items have to be registered compulsory, by hand (paper form) or by electronic devices (laptop computers, PDA.). Those data will constitute the basic database.

Requested data are:

- a. AI centre or organisation/body in charge of processing AI for genetic purposes.

- b. Operator.
- c. Date.
- d. Herd.
- e. Female inseminated.
- f. AI bull.
- g. Some data will help the data processing and then used for optimisation of it.

Options:

For an improved system of recording desirable data may be added

- a. Rank.
- b. Double AI.
- c. Special characteristics.
- d. Batch number of straw.

2.4.4.2 Order of items

Recommendation does not address the order of items. The description of order has to be mentioned when data are exchanged.

2.4.4.3 Support

AI data are recorded either on forms either on electronic data files.

2.4.4.4 AI Centre or organisation/body issuing AI data

AI records have to be traced back to the AI centre or organisation issuing AI data.

2.4.4.5 Operator

The responsible organisation has to use a system to identify the operators in order to track back each insemination. Operators may be: technicians employed by the station, vets or inseminators under contract, free-lance operators, and farmers.

2.4.4.6 Date

The date of the day when the female was inseminated has to be recorded for each AI.

2.4.4.7 Herd

Herds have to be identified within the national system of registration dedicated to genetic data processing

2.4.4.8 Female inseminated

Females have to be identified within the national system of registration dedicated to genetic data processing. **The identification number of females including country code has to be recorded for each AI.**

Options

Breed code may be optional recorded. The date of birth and the number of calving may not be recorded if the registration system is recording this information. Name and internal working number are not recorded compulsory.

2.4.4.9 AI bull

The female has to be bred by semen of an AI bull, known through the reference of its semen. The identification of the bull is that defined by the “ICAR guidelines for straw identification for bovine semen” as the international identification code or a world-wide unique bull code.

One of those codes has to be recorded for each AI.

If a bull code is used, it must be linked with the international identification code after the recording, for genetic purposes.

2.4.4.10 Rank

The rank of intervention of each AI carried out within the same reproductive cycle has to be determined either by recording, either by the date known in the computer.

The number of the rank is 1 for the first AI or greater or equal to the rank of the previous AI plus 1 for each return.

In case of double AI the number of the rank has to be equal to the rank of the previous AI.

Remark: computer can determine the rank. The farmer or technician should not enter this information in the computer or write it down.

2.4.4.11 Double AI

The existence of a double AI has to be mentioned either by recording of a code or automatically.

2.4.4.12 Special characteristics

Special characteristics regarding the used straw, the semen or the service itself may be recorded in order to help the interpretation of AI data. The data dictionary accompanying data file must describe those characteristics.

It could be mentioned: freezing technology, dilution characteristics, split straw, sexed semen, AI for embryo production, etc. ...

2.4.5 Tests for validation of AI data

After recording AI data have to undergo series of test prior to be used in the genetic system. Those tests may be carried out at various levels according to the organisation and the equipment.

2.4.5.1 Completeness and integrity of data

Each item recorded must be checked against the data model to prove the intrinsic validity of data. All necessary data have to be available prior processing.

2.4.5.2 Test of coherence

When arriving in the database the items of AI records have to be checked against existing files to prove their coherence with existing information:

- a. The number of the organisation is known in the base.
- b. The number of the operator recorded is declared by a recognised organisation.
- c. The herd is registered.
- d. The female is registered.

- e. The AI bull is registered.

~~Moreover~~ Moreover, regarding the female:

- a. The identification corresponds to an animal registered as a female.
- b. The female is old enough to be bred (parameters defining the authorised limits are set up by country/breed/operator).
- c. If two AI are carried out on the same female on the same day an alarm message has to be edited.
- d. The female is alive.

Moreover regarding the AI bull, it is recommended that the semen used correspond to a declared stock in the database.

2.4.5.3 Likelihood tests

In order to secure the information likelihood tests have to be carried out:

- a. The female was registered in the herd the day where the insemination was carried out.
- b. The bull was recognised as an AI bull when the semen was used.
- c. There was a minimum period between the first AI and the last return of the previous cycle of the registered end of pregnancy (parameters defining the authorised limits are set-up by country/breed/operator).
- d. The herd identified is an active one (cattle are recorded within this particular herd).

2.4.6 Transmission of AI data to databases for parentage assessment

This recommendation aims to improve parentage assessment when AI data are brought together with other relevant data such as birth date.

Some extra conditions are required on the transmission of AI data:

- a. AI data have to be transmitted on a regular frequency to the data base where there are brought together with birth data.
- b. AI data have to be available in this data base prior to the arrival of birth data.
- c. All AI data have to be available in the data base whatever they are successful or not.

By bringing together all AI data and birth data, it is possible to assess the fecundating AI according to the dates recorded for birth and AI and the gestation length of the females of the breed. If only this information is required to be transmitted, the responsible body in charge of data processing has to describe the used method.

2.4.7 Quality controls

The efficiency of any information system depends on the quality of data proving that the expected result fits with the goal. For AI, regarding the genetic applications it deals with the accuracy of the records and with the proof that the progeny from mating was born from foreseen parents.

It is recommended that the organisation in charge with AI data processing carries out following controls and implement relevant indicators:

- a. Counting of failures on each test suggested above, in terms of completeness, integrity, coherence and likelihood of AI data.

- b. Implementing random sampling test using **Blood typing, Micro satellite, or SNP parentage analysis** to prove (or reject) the parentage of some groups of animals or specific animals.

2.5 Minimum requirements for purposes other than genetic

AI data are used for purposes other than strictly genetic, for management of the reproduction at herd or individual level.

In such a case bull information is not crucial, but the precise inventory of the herd with the in & out date of females is very important.

In addition to the recorded items on AI describe above, such as AI and births records, other data should be registered:

- a. Dates of the end of any pregnancy including stillborn.
- b. Observations of heat detection.
- c. Females treated for oestrus synchronisation. (note that in some cases it is important to record the protocol with dates, products, on the group that has been treated).
- d. Pregnancy diagnose (method, results).

For each item the identification of female has to be recorded with an unique number at least within the herd.

3 Performance recording of milk

The ICAR Agreement (refer to Section o of the ICAR Guidelines) allows organisations a degree of freedom in deciding recording practices.

ICAR recording methods are:

Method A

All the recordings are undertaken by an official representative of the Recording Organisation. This includes recordings undertaken by approved on farm systems that are supervised by an official representative of the recording organisation and that cannot be manipulated by the farmer or his nominee.

or

Method B

All the recordings are undertaken by the farmer or his nominee.

or

Method C

The recordings are undertaken by the farmer or his nominee, and by an official representative of the Recording Organisation.

- a. For official records an ICAR approved supervisory system must be maintained and check data regularly documented to provide authentication for the records.
- b. ICAR Members must ensure that any of their associate recording organisations fully comply with ICAR approved recording methods and practices.

4 Rules on individual animal certificates

4.1 Basic rules

- a. An official certificate issued by an ICAR Member should contain all the information essential to establishing the identity and value of an animal.
- b. An official certificate must clearly indicate the recording methods used to produce the official record.
- c. An official certificate must contain the latest information available on the date of issue.
- d. Where any estimated information is included in an official certificate, this must be clearly indicated.

4.2 The following details must be reported

- a. The (ICAR member) organisation issuing the certificate.
- b. The date of issue of the Certificate.
- c. The identity number and name of the animal.
- d. The animal s "original number" and name, if different.
- e. The date of birth of the animal.
- f. The identity and names of the animal, sire and dam and of its grand sires and grand dams.
- g. The breed of the animal, or in the case of cross breed animals, the main breed percentages in the animal s breeding.
- h. The sex of the animal.
- i. That the animal is a known carrier of a genetic defect, defined by the International Breed Federation concerned.

4.3 The following details may be reported

- a. The name and address of the breeder of the animal.
- b. The date of the animal moved to the present location, if other than the date of birth.
- c. The date of commencement and the end date for each period production record.
- d. The events which started and ended each production period.
- e. The individual recording day production records.
- f. Any health event recorded for the animal.
- g. The dates and service sire of any recorded services.
- h. The identity and sex of any progeny of the animal.
- i. If the animal has been flushed to produced ova, the flushing dates and the number of viable ova collected.
- j. If the animal has been used as a 'recipient following ET, the date of transfer, the genetic sire and dam of the embryo and the sex of the embryo.
- k. The fertility records of the animal, including its current fertility status.

- l. Additional traits records and evaluations, such as milkability and locomotion scores.
- m. That the animal is dead.
- n. The number of true recording (no missing values) contained in the record for each production period.
- o. The name of the register in which the record is held
- p. The animal s genetic evaluations.
- q. The animal s records of production.
- r. The animal s type classification evaluations.
- s. Any events which have significantly affected the animal's records.
- t. The location of the animal on the date of the last recording.
- u. The methodology used in the production of the record, where this is other than the Reference Method.

5 Supervision of milk recording

5.1 Basic rules

- a. ICAR Members involved in farm animal recording shall establish a system of supervision and quality control.
- b. ICAR Members demonstrate that they have sufficient supervision by registering their supervisory practices with the ICAR Secretariat and by reporting on the checks carried out in the year.

5.2 Rules on supervisory practices

The supervision must ascertain the following:

- a. That all recordings are carried out using ICAR approved methods and equipment.
- b. That the recording devices are properly installed, accurately calibrated and properly used.
- c. That the animals being recorded are properly and clearly identified.
- d. That there are routine checks in place to detect and identify information that is inconsistent and cannot be accurate.
- e. That action is taken to deal with inconsistent and inaccurate information, either by replacing it with the correct information (missing values procedures) or by deleting information known to be inaccurate from the official record.
- f. That where 'supervision is carried out by a person, the supervisor must not be the person who did the recording or calculation being supervised.

5.3 Recommended supervisory practices

The following additional supervisory practices are recommended:

- a. That quality control checks should be part of the normal recording working practices and systems, rather than occasional extra spot checks.

- b. That the results of routine quality control checks should be reported to the recording organisations, users, to the regulators, and in the annual report of that organisation.
- c. That an occasional check repeat recordings should be carried out on leading herds, flocks and individual animals, to maintain the reputation for accuracy, of the recording organisation and of ICAR member organisations.

6 Registration of recording methods

6.1 Duties of member organisations operating or approving recording services

Each member organisation is obliged to inform ICAR on recording methods used.

ICAR should be informed, when the methods change. The description of the methods of recording should include the following items:

6.2 Identification and parentage

- a. The method of recording the date of birth/breed and the sex of the animal.
- b. The method of recording parentage.
- c. The method used and description of method of supervision employed.
- d. The frequency of recording.
- e. The methods used for checking the accuracy of record collection.
- f. The methods used for checking the accuracy of record processing.

6.3 Production (milk)

- a. The method of recording milk yield.
- b. The frequency of recording.
- c. Sample testing procedures.
- d. The number of milkings at which yields and samples are collected if there is a difference between yield and sample recording numbers.
- e. The methods used for checking the accuracy of records collection.
- f. The methods used for checking the accuracy of records processing.
- g. The methods used to calculate 'official lactation totals.
- h. The accuracy of the recording method used, calculated in a manner determined by ICAR, expressed in relation to the 'standard method.

6.4 Production (meat and other traits)

The method of recording.

- a. The methods used for checking the accuracy of record collection.
- b. The methods used for checking the accuracy of records processing.
- c. The methods used to calculate official records .
- d. The accuracy of the recording method used, calculated in a manner determined by the Committee.