THE GLOBAL STANDARD FOR LIVESTOCK DATA

DNA Working Group Webinar Meeting
Friday, 21 April 2017

(15h00 Paris time)

AGENDA

1. Call to Order - Brian Van Doormaal

2. Roll Call of Participants

3. Review of Agenda

4. Summary of Previous Meeting held 30 March 2017 (Attachment)

5. Call for ICAR Accreditation of Genetic Laboratories for Parentage Verification (Attachment)

6. ICAR Accreditation for DNA Data Interpretation Centres (Attachments)

    6.1 Draft ICAR Guidelines for Parentage Verification and Parentage Discovery
    6.2 Analysis of Test Data Files
    6.3 Draft ICAR Accreditation Application Form

7. Status of GenoEx-PSE Service

8. Future Meetings

    8.1 Webinar meeting 19 May at 15h00 Paris time
    8.2 Live meeting during ICAR meetings in Edinburgh, Scotland

9. Adjournment

DNA WG Meeting Notes
30 March 2017 15.00 – 16.10 (Paris time)

1. Call to Order

   Chair Brian Van Doormaal started the Zoom meeting at 15.00 Paris time.

2. Roll Call of Participants

   Brian Van Doormaal (Chair), Dariusz Kamola, Matthew McClure, Ezequiel Nicolazzi and Wim van Haeringen as well as Cesare Mosconi from ICAR.

   Apologies were received from Andre Eggen, Suzanne Harding, Sandra Kipp, Nilesh Nayee, Raffaele Mazza, Carine Megneaud and Romy Morrin-O'Donnell.

3. Review of Agenda

   Brian mentioned that the main agenda for this meeting was the continuation of the agenda from the previous meeting, starting at point 6.2. As an addition item, it was agreed to start the agenda with the email request from ICAR dated March 25, 2017 for input regarding the 2017 round of ICAR accreditation for parentage verification by genetic laboratories.

4. ICAR Accreditation for Parentage Verification by Genetic Laboratories

   Cesare summarized the intent of the email, which was to seek input into how the 2017 round should be conducted. Wim provided background on the processes used in the past noting that focus was generally put on implementing the easiest solution. He noted no specific preference regarding the two options presented by ICAR. By email, Romy had previously commented that option 1 would be fine is ISAG certificates are usually valid for two years and ISAG is in the process of changing the timing of its bi-annual meeting to be every odd year to avoid possible conflicts with WCGALP meetings every even year.

   It was therefore agreed that option 1 would be used by ICAR, which means that the 2017 call for accreditation will be issued in April with a deadline for submission to ICAR by the end of May or early June and the DNA WG will consider the analysis of submissions from each laboratory at its meeting scheduled for Tuesday, June 13, 2017 in Edinburgh. Laboratories may use the ISAG certificate issued in 2016 for this round of accreditation.

   ACTION: Cesare/ICAR to proceed with the 2017 call for accreditation as agreed.

5. Notes of the Previous Meeting and Business Arising

   Brian had circulated the notes of the partial meeting held on February 20, 2017, which were approved for accuracy and content.

   A review of the action items followed with the following highlights:

   - A table describing the number of ISAG 200 SNP for PV and the 554 SNP for PD that were present on many of the chip panels used globally was prepared by Sandra and Matt, and posted on the DNA WG discussion forum. This showed that at least one chip only has 185 of the 200 ISAG chip and there were some chips that had roughly 500 of the 554 PD SNP included. Brian mentioned that these facts may be important as the WG defines guidelines for PV and PD using these SNP lists.

- Regarding the possible exclusion of specific SNP for PV or PD based on evidence from various organizations, as agreed at the previous meeting, Brian noted that any such reasons have not yet been gathered from each organization. Doing so was noted as an action item for the next meeting on April 21.

- Brian also noted that it was agreed that the DNA WG would revise the existing ISAG guidelines from 2012 for PV from SNP genotypes and that similar guidelines are required for conducting Parentage Discovery. He suggested that a discussion document with recommendations be prepared for the next meeting in April and offered to take the lead in preparing it. It was agreed that Matt and Romy would contribute to the development of that document and the associated recommendations and the entire WG would have opportunity for input during the next meeting.

6. ICAR Accreditation for DNA Data Interpretation Centres

Given that the previous meeting had included agenda items 6.1 and 6.2, and the discussion of business arising and actions from that meeting covered items 6.3 and 6.4, this meeting continued with agenda item 6.5.

6.5 Draft ICAR Accreditation Application Form

Brian mentioned that this form had been prepared with input from ICAR and Interbull but a review by the members of the WG would be beneficial to be sure it is complete and appropriate. It was noted that the circulated ICAR document referred to as Doc Number 05_CER_GNTX_0003, dated July 19, 2016, was incomplete in terms of the final section of Service ICAR fees. Brian mentioned that ICAR had approved an administrative fee of 300 Euro and that renew would be required every two years. It was unclear if the fee of 300 Euro would be required every two years, and if so, it was suggested that it might be better to simply establish a base annual fee that includes the bi-annual renewal cost (say 150 Euro) and perhaps an added 150 Euro for first time applicants (to achieve the current initial fee of 300 Euro).

Discussion ensued regarding the need and benefit of any renewal process since this ICAR accreditation is to prove the organization's ability to properly carry out PV or PD procedures, using a standard test data set, but several of those certified organizations would end up using a higher number of SNP for PV and/or PD at their national/internal level. In any event, if a renewal process is required, it could perhaps be done at a longer interval that every two years.

ACTION: It was agreed to discuss this topic again at the next meeting in April to allow more members of the DNA WG to be involved in formulating any recommendations to ICAR.

7. Status of GenoEX PSE Service

Brian provided an update on the current status of the development of the GenoEx-PSE software and database at the Interbull Centre. Some delays were experienced in this area due to technical issues associated with moving the developed software from the "development" to "production" environment but they have now been resolved. In addition, some additional business rules still needed to be programmed. The Interbull Centre staff intends to share the developed software (entry portal) with Brian for some quick and initial feedback and edits and then open up the request for input/feedback to some of this WG members. This is expected to happen in the coming weeks in advance of the April meeting.

Brian noted that it is important to move forward on both the ICAR accreditation service as well as the GenoEx-PSE development since they are highly interdependent.

8. Proposed Interbull Service for Exchange of "Genetic Trait" Codes

Brian provided a summary of the new service that Interbull plans to offer, especially to users of MACE and/or GMACE services. It was clarified that Interbull plans to include only those genetic traits, and the associated codes, that have been approved by the recognized world level authority, such as the World Holstein-Friesen Federation (WHFF) for that breed and other world federations for various dairy cattle breeds. It was unclear if this service would also include beef cattle breeds and, if so, what organization would be recognized for defining which genetic traits and codes would be included.

9. Emerging DNA technologies

Brian mentioned that the background material included in the meeting package (for the February meeting) was for information purposes. It was noted that the scientific community in the United Stated is seeking scientific evidence and arguments for submission to FDA to counter the current policy position announced to date.

10. Future meetings

Next Zoom meetings are scheduled for April 21 and May 19 at 15.00 Paris time. As usual, members are asked to schedule a 2-hour time slot.

Brian mentioned that the live meeting of the DNA WG has been scheduled for Tuesday, June 13 from 14.00 to 18.00 during the ICAR annual meetings in Edinburgh, Scotland. It is hoped that as many WG members as possible could attend that meeting and they were encouraged to register and book hotel accommodations as soon as possible.

11. Adjournment

With no further business to be discussed, the meeting was adjourned at 16.10 Paris time.

Subject: Proposed draft for the Call for the ICAR accreditation of genetic laboratories for parentage verification by STRs and SNPs in cattle
From: "Cesare Mosconi - ICAR" <mosconi@icar.org>
Date: 20/04/2017 6:09 AM
To: "van Doormaal Brian" <Brian@cdn.ca>
CC: "Martin Burke - ICAR" <martin@icar.org>, "Van Haeringen Wim" <wha@vhladmin.nl>, "Brian Wickham \(ICAR\)" <brian@icar.org>

Dear Brian,

Please find below the proposed “Call for the accreditation of genetic laboratories for parentage verification by STRs and SNPs by cattle”. The call considers that the last ISAG number has been issued in September 2016 and the next one is expected to be launched and finalised in 2018

According to the discussion had at the last Zoom meeting, a tentative calendar for the submission and consideration of the applications could be the following:

- Two months from now for receiving the applications
- Preliminary evaluation in Edinburgh
- Early July: Comments and first decisions taken by the DNA WG
- Mid July: Request of integrations and/or missing documentation to laboratory
- Mid-September : laboratories to provide the requested integrations
- October 2017: Finalisation of the accreditation round

Secretariat will take care of presenting to the DNA WG Members the applicants laboratories and the related documents in a user-friendly way to facilitate their work

See you tomorrow at the Zoom meeting scheduled at h. 15.00 (Paris time)

Cesare

CALL FOR ACCREDITATION

To: ICAR Genetic Laboratories, ICAR Chairperson and Members of SCs and WGs, ICAR Board, ICAR Member Organisation
Re: Launch of the call for ICAR laboratories accreditation 2017 by STRs and SNPs based for parentage verification in cattle

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Dear Colleague,

On behalf of the ICAR DNA Working Group, the ICAR Secretariat is launching the call for laboratories accreditation for STRs and SNPs based parentage verification in cattle" for the year 2017.

ICAR reminds that for both the above accreditations:

- Applicants have to provide the ISAG membership number issued at the last ISAG RT in Sept. 2016 .
- Certifications can be provided in any language if a translation into English is attached to the original documents.

Specific requirements may apply, for details please view the questionnaire documents.

- Accreditation is valid for two years.
- In order to simplify the procedures, those laboratory already accredited in the past by ICAR can use the form specifically prepared for the renewal. The form is available **here**.

More information and procedures can be found in the specific web page of ICAR available **here**.

The necessary forms to apply can be downloaded from the above web page (recalled **here**) and have to be returned by Monday 5 June to this account.

The Secretariat also asks the ICAR Member Organisations to spread the call through your contacts in order to reach the most possible recipients, in particular, the potentially interested genetic laboratories

Best regards

ICAR Secretariat

ISAG INTERNATIONAL SOCIETY FOR ANIMAL GENETICS

Guidelines for cattle parentage verification based on SNP markers

Approved at ISAG conference in Cairns, July 2012

SNP profile:

Minimum number of SNPs in reference core panel (published in ISAG WEB site): 100
Minimum number of SNPs available in profile: 95
(If less than 95 SNPs can be scored, retest the sample or request a new sample).

If mismatches occur in a supposed parentage, the general rule is to first retest the samples involved or request new samples to confirm the determined genotypes. If the genotypes are confirmed the following guidelines are suggested.

Case with offspring and one parent tested
Minimum number of common SNPs in verification offspring: 90
Number of mismatches*: 0-1 -> parentage accepted
Number of mismatches*: 2-3 -> parentage doubtful, backup panel required**
Number of mismatches*: >3 -> parentage excluded.
*: example: offspring = GG, sire = AA
**: When the parentage is doubtful, first genotype the samples with both panels (ISAG and backup). If results remain doubtful, ask customer for the other given parent and or another candidate parent. If there are no other possible parents, then qualify the parentage.

Case with offspring and both parents tested
Minimum number of common SNPs in verification offspring: 85
Number of mismatches*: 0-2 -> parentage accepted
Number of mismatches*: 3-4 -> parentage doubtful, backup panel required**
Number of mismatches*: >4 -> parentage excluded.
*: example: offspring = AG, sire = AA, dam = AA
**: When the parentage is doubtful, first genotype the samples with both panels (ISAG and backup). If results remain doubtful, ask customer for other possible parents. If there are no other possible parents, then qualify the parentage.

In any case, it is recommended that samples be retested if there is parentage exclusion with ISAG and/or back up panels.

Recommended Guidelines for Parentage Verification and Parentage Discovery Based on SNP Genotypes

Prepared by: DNA Working Group

Purpose

In 2017, ICAR will commence offering two new services related to the use of SNP genotypes for dairy and beef cattle. The first is the **Geno**type **Ex**change **P**arentage **S**NP **E**xchange (GenoEx-PSE) Service, which allows countries to exchange SNP genotypes for the purpose of offering parentage analysis services to specific breed populations at the national level. The second is the service of ICAR Accreditation for Data Interpretation Centres, which allows organizations wishing to carry out parentage analysis services to be accredited by an independent third party. Organizations wishing to be a service user of GenoEx-PSE must first receive the ICAR Accreditation for Data Interpretation Centres.

In July 2012, the International Society for Animal Genetics (ISAG) approved standards for genotyping laboratories to conduct parentage verification. These *"Guidelines for cattle parentage verification based on SNP markers"* were based on carrying out parentage verification using a set of 200 recommended SNP, with 100 considered as core SNP and a second set of 100 as backup SNP.

The purpose of this document is two-fold:

1. Revise the existing ISAG guidelines for conducting parentage verification in dairy and beef cattle using the 200 SNP recommended by ISAG, and

2. Establish new guidelines for conducting parentage discovery based on the SNP included for this purpose in the GenoEx-PSE genotype exchange service, which initially totals 554.

Principles

When carrying out parentage analysis, which includes parentage verification and/or parentage discovery, the following underlying principles should be considered:

- A consistent set of SNP must be defined for use by all organizations for international recognition of parentage analysis accreditation and for the subsequent delivery of "certified" parentage information.

- Each animal involved in the parentage analysis process (i.e.: animal and each potential parent) must have a SNP genotype available for which a minimum proportion of the defined set of SNP have been called and are available. When establishing such minimum requirements consideration should be given to the inclusion of the defined SNP on various genotyping chips used widely in the population of animals being considered.

- While it is understood that only informative SNP (i.e.: SNP whereby the animal and the parent in question are both homozygous) provide useful information for parentage analysis, it is more practical that guidelines are based on the total number of SNP available for the animal and parent(s) in question. Roughly speaking, about one-third of available SNP for parentage analysis are informative but this proportion depends on the average minor allele frequency of the included SNP within the population of animals being considered.

Parentage Verification

The current ISAG guidelines for parentage verification in cattle are based on a set of 100 core SNP and then a second set of another 100 backup SNP. The guidelines outline a possible two-step process whereby results from the 100 core SNP may be used to either deem the status as "Parentage Accepted" or "Parentage Excluded" and only when this first status is "Parentage Doubtful" does the analysis continue using the second group of 100 backup SNP. This second step of the parentage verification process may then result in a final status of "Parentage Accepted" or "Parentage Excluded". In the event that a second result of "Parentage Doubtful" arises, and new samples and/or genotypes for the animals involved have been processed and the customer cannot identify any other possible parents, the recorded parentage would still be deemed as "Parentage Accepted".

Given the current state of knowledge and experience with using SNP genotypes for parentage verification, the following modifications to the existing ISAG guidelines are recommended:

1. Upon approval by the ICAR DNA Working Group, specific individual SNP included in the current group of 200 SNP recommended by ISAG for parentage verification in cattle, may be deemed inappropriate for inclusion. This reduction in the total set of SNP to be used would be applied by all organizations receiving ICAR Accreditation for Data Interpretation Centres.

   The following table lists the SNP that have shown to cause problems for parent verification and are recommended for exclusion from the original list of 200 recommended by ISAG for parentage verification.

SNP Name (Illumina Bead Chips)	ISAG Group	Reason for Exclusion
ARS-USMARC-Parent-DQ837645-rs29015870	Core	Clustering issues*
ARS-BGFL-NGS-76191	Backup	Clustering issues*
BTA-100621-no-rs	Backup	Clustering issues*
ARS-BFGL-NGS-99210	Backup	Tri-allelic**

* - McClure et al. (2015)
** - GeneSeek (personal communication, 2016)

2. Given the improved accuracy of parentage verification achieved by the inclusion of more SNP, the current two-step process should be replaced by a single analysis based on the full set of approximately 200 SNP for parentage verification, excluding those in 1. above, as approved by the ICAR DNA Working Group.

3. The required minimums in terms of number of SNP, as outlined in the current ISAG guidelines, must be scaled to reflect the total number of SNP to be used for parentage verification analysis. For example, if the total number of SNP from those recommended by ISAG, is reduced from 200 to 195, then the minimum number of SNP available in the profile of each animal and potential parent must be scaled to 185 (from the current minimum of 95/100).

4. For assigning the parentage verification status according to the number of SNP conflicts found, the revised recommended rules are the following:

   Step 1: Conduct a separate verification for each combination of the animal with its recorded sire and/or dam with a SNP genotype. The informative SNP are those for which the animal and reported parent are both homozygous and a conflict is considered when they are each homozygous for a different allele for any informative SNP. Based on the minimum criteria of 185 SNP available for the animal and each parent, the minimum number of common SNP available for verifying each animal-parent combination is 175.

For this step, the following rules apply for assigning the parentage verification status:

- Number of mismatches/SNP conflicts: 0 - 2 => Parentage Accepted
- Number of mismatches/SNP conflicts: 3 - 5 => Parentage Doubtful
- Number of mismatches/SNP conflicts: >5 => Parentage Excluded

Step 2: In the case that both sire and dam have a status of "Parentage Accepted" from Step 1, verify that the combination of those parents is acceptable. In this case the informative SNP are those for which both verified parents are homozygous and the progeny is heterozygous. A conflict exists when the parents are homozygous for the same allele at any informative SNP while the progeny is heterozygous. In this case, the minimum number of common SNP available is 165.

For this step, the following rules apply for confirming the parentage verification status for the combination of verified parents:

- Number of mismatches/SNP conflicts: 0 - 3 => Parentage Accepted
- Number of mismatches/SNP conflicts: 4 - 7 => Parentage Doubtful
- Number of mismatches/SNP conflicts: >7 => Parentage Excluded

5. For animals with only one parent genotyped, only those animal-parent combinations achieving the status of "Parentage Accepted" from Step 1 would qualify for the organization to issue an official confirmation of parentage for that parent. For animals with both parents genotyped, only those animals achieving the status of "Parentage Accepted" from Step 2 would qualify for the organization to issue an official confirmation of parentage including both parents.

6. As an added service for those organizations receiving ICAR accreditation to carry out parentage discovery, the process outlined below could be applied to all animals for which the parentage verification result was either "Parentage Doubtful" or "Parentage Excluded" in either Step or Step 2 above.

Parentage Discovery

No international guidelines currently exist for organizations to carry out parentage discovery even though most, if not all, genetic evaluation service providers have developed such processes internally. As with parentage verification, the accuracy of parentage discovery is improved as the number of SNP included increases. For the GenoEx-PSE service, a list totalling 554 SNP have been defined for the genotype exchanges involving service users that have been accredited by ICAR for this level of parentage analysis and have agreed to upload these SNP to the GenoEx-PSE database at the Interbull Centre, which is the requirement for downloading the same. These 554 SNP include the 200 SNP recommended by ISAG for parentage verification in cattle as well as an additional group of 354 SNP. In addition to the 200 SNP for parentage verification another 75 for parentage discovery are spread across chromosomes 1 to 29 while the remaining 279 SNP were selected from only ten chromosomes, specifically 1, 2, 3, 5, 7, 8, 11, 13, 19 and 21. This strategy for SNP selection was adopted to reduce the accuracy of genotype imputation and genomic predictions in the event that a GenoEx-PSE service users attempts to use the exchanged genotype in this manner even though it is clearly prohibited as outlined in the GenoEx-PSE Service Agreement.

To be consistent with the principles and revised guidelines for parentage verification outlined above, the following are recommended guidelines for parentage discovery:

1. The ICAR DNA Working Group may, from time to time, identify and approve SNP that must be excluded for carrying out parentage discovery. Any such SNP would include those approved for

exclusion for parentage verification and may also include other SNP once there is sufficient reason to do so.

2. Organizations carrying out parentage discovery services must implement quality assurance procedures that ensure the following:
    - That a discovered parent is older than the animal and, in fact, not an offspring
    - That a discovered parent is of the appropriate sex such that sires are male and dams are female
    - That genetically identical animals are pre-identified such that a discovered parent is reported as any one of the genetically identical siblings

3. Based on a recent assessment of SNP lists associated with various SNP chips used internationally to genotype dairy and/or beef cattle, each chip has at least 500 in common with the 554 SNP recommended for parentage discovery. Given possible call rates of genotypes for the animal and any potential parent to be discovered, it is recommended that each genotype included in such an analysis have a minimum of 450 of the 554 SNP available in order to conduct parentage discovery.

4. Given that genotyping SNP chips actively being used in cattle populations globally have a varying number of the 554 SNP defined for inclusion in the GenoEx-PSE service, parentage discovery results must be based on a percentage of SNP available between the animal and any potential parent being considered. The following is recommended for assigning the parent discovery status:

    Step 1: In separate processes, attempt to discover either the sire (i.e.: male older than animal with fewest conflicts) or dam (i.e.: female older than animal with fewest conflicts) of the animal based on SNP genotypes available. Based on the minimum criteria for each SNP genotype to be included, as outlined in point 3 above, a minimum number of common SNP between the animal and each parent will be 350.

    For this step, the following rules apply for assigning the status of each parent discovered:

    - Percentage of common SNP with a conflict: 0 to <1.0% => Parent Discovered
    - Percentage of common SNP with a conflict: 1.0 to <3.0% => Parent Doubtful
    - Percentage of common SNP with a conflict:: ≥3.0% => Parent Excluded

    Step 2: In the case that an animal has both a sire and dam with a successful status of "Parent Discovered" from Step 1, this parent combination must also be verified.

    For this step, the following rules apply for assigning the status of the combination of parents discovered:

    - Percentage of common SNP with a conflict: 0 to <1.5% => Parents Discovered
    - Percentage of common SNP with a conflict: 1.5 to <4.0% => Parents Doubtful
    - Percentage of common SNP with a conflict:: ≥4.0% => Parents Excluded

5. For animals with only one parent with the status of "Parent Discovered" in Step 1, only that animal-parent combination would qualify for the organization to issue an official confirmation of parentage for that parent. For animals with both parents with the status of "Parent Discovered" in Step 1, only those animals achieving the status of "Parents Discovered" from Step 2 would qualify for the organization to issue an official confirmation of parentage with the status of "Parentage Accepted" for both parents.

ACTIVITY AREA REFERENCE DOCUMENT

CERTIFICATION SERVICES – GENETICS
ICAR Accreditation of DNA Data Interpretation Centres

Doc number	05_CER_GNTX_0003
Author	Martin Burke
Date First Draft	19th July 2016

Latest revision author	Martin Burke
Latest revision date	20th December 2016

PURPOSE

ICAR offers two separate areas in Accreditation for Organisations involved in DNA analysis and interpretation ;

1) ICAR Accreditation of laboratories (so called wet labs) who analyse biomaterial to produce DNA Genotypes (DNA Data) and is described in ICAR SOP 05_CER_GNTX_0002.

2) ICAR Accreditation of **DNA Data Interpretation Centres** who take the DNA Data from the 'wet labs' in 1) above and interpret the data for a number of purposes as is described in this ICAR SOP 05_CER_GNTX_0003.

DNA Data Interpretation covered by this accreditation procedure includes applications for;

1. Parentage verification
2. Parentage discovery
3. Microsatellite imputation from SNPs (will not be part of the initial offering in 2016)
4. Animal identification verification.

For definitions see the 'Terms & Definitions' table below and for further technical background see ICAR Guidelines Section 4 – Guideline B.

SCOPE

This SOP concerns the Organisations involved in DNA analysis and interpretation, the DNA Working Group, the Interbull Centre, the ICAR Secretariat and Service-ICAR. Given that it is a commercial activity, it is also related to area 02_ADM (Admin/Finance).

TERMS & DEFINITIONS

Term	Definition
Animal Identification verification	The process by which a DNA analysis of a tissue sample is used to determine if the sample can be excluded as originating from a particular animal.
DNA Data Handling and Interpretation Test	This is a prerequisite compliance test which each DNA Data Interpretation Centre Applicant has to pass before ICAR Accreditation can be granted. ICAR's reference institute sends a predetermined set of SNPs to the Applicant with a series of accompanying animal and/or parentage analysis tasks to complete. The Applicant is asked to complete the interpretation tasks and return the required answers/results which are then assessed by ICAR's reference institute. Applicants must pass this assessment to gain Accreditation status.
ICAR accreditation	Formal Recognition by ICAR that an organisation has provided sufficient evidence that it has the competency, authority and experience to conduct DNA data interpretation for the purposes outlined in this Standard Operation procedure.
MAF	Minor allele frequency.
Microsatellite	Refer to definition of STR in this table.
Microsatellite imputation from SNPs	The process by which the microsatellite (STR) profiles of an animal may be imputed from SNP genotypes for the purpose of parentage verification.
Parentage discovery	The process by which a set of SNPs from an animal's genotype are compared to a database of SNP genotypes for older animals in order to identify the most likely sire and/or dam, if not already confirmed by Parentage Verification.
Parentage verification	The process by which the genotypes of the recorded parents (sire and/or dam) of an animal are examined relative to the genotype of the animal to determine if one or other does not qualify as a parent.
SI	Service ICAR
SNP	Single nucleotide polymorphism
SOP	Standard Operating Procedure in ICAR
STR	Abbreviation for short-tandem-repeat and commonly referred to as a microsatellite.

RESPONSIBILITIES

Services Executive: Administration of the Accreditation Applications in Service-ICAR for applicant DNA Data Interpretation Centres.
Administration Executive: Contractual and financial transactions between the Accredited DNA Data Interpretation Centres, the Interbull Centre and Service-ICAR.
Information Executive: Maintenance of ICAR web listing of Accredited DNA Data Interpretation Centres.
DNA Working Group (WG): Maintenance of Guidelines, policies as well as review and approval / rejection of Accreditation Applications (including design of the 'DNA Data Handling and Interpretation Test'.
Interbull Centre: Provide SNP database exchange and validation service for 'DNA Data Handling and Interpretation Test'.

PROCEDURE

ICAR Accreditation of Centres Performing DNA Data Interpretation

The DNA Data Interpretation Centre Accreditation process comprises the following steps:

1. Application for accreditation.
2. Review of application.
3. Data handling and interpretation test
4. Granting of accreditation and on-going compliance monitoring.

1. Application

Organisations requesting DNA Data Interpretation Centre Accreditation from ICAR must apply by downloading, filling in and submitting the Application form and administration fee to ICAR. The Application form will be found in Annex V Guidelines Section 4 and must be filled out accurately and completely, providing necessary documentation as required, and submitted.

2. Review of Application

The form will be evaluated by the Chair and/or nominated members of ICAR's DNA Working Group (WG). The DNA WG will review the application in line with criteria specified in the ICAR Guidelines, specifically in Section 4 Guideline B.

Based on this review and the successful passing of the 'DNA Data Handling and Interpretation Test' therein, the DNA WG shall either approve, request further information or reject the application through a letter from ICAR. In the case of rejection, ICAR advises that no resubmission is allowed within ninety days of the failed application. After the ninety days have elapsed then the Applicant is entitled to submit again.

3. DNA Data Handling and Interpretation Test

The DNA WG will define the DNA Data Handling and Interpretation Test protocol, quantity of SNPs, file exchange rules, pass/fail criteria, etc. This test will be outsourced to and coordinated by the Interbull Centre on behalf of Service ICAR. This test will be detailed as an Annex in our Guidelines.

4. Granting of accreditation and on-going monitoring

Notice of successful DNA Data Interpretation Centre Accreditation will be sent to the Organisation by ICAR and the Organisation's name will be added to ICAR's Website listing of Accredited DNA Data Interpretation Centres. To ensure the ongoing compliance of Accredited DNA Data Interpretation Centres, ICAR's reference centre will send, every two years, a version of the DNA Data Handling and Interpretation Test to each Centre. The Centre will return test files and their results will be assessed and filed as a record of ongoing compliance.

To maintain its Accreditation status, the DNA Data Interpretation Centre must participate in and pass all DNA Data Handling and Interpretation Tests.

Service ICAR Fees for Accreditation of DNA Data Interpretation Centres

Application Fee: Service ICAR announced in Chile ICAR2016 that fees of €300 per application to accompany each application (to be paid before testing can commence).

RELATED DOCUMENTS

ICAR Guidelines Section 4 – Guideline B.
GenoEx-PSE Service Agreement
05_CER_GNTX_0002 ICAR Accreditation of DNA Analysis Laboratories (Wet Labs)
DNA Working Group Terms of Reference
Application Form Annex V Guidelines Section 4
Data Handling and Interpretation test protocol – Annex X Guidelines Section 4

Annex V *(19th August 2016)*

ICAR DNA Working Group
Application Form for Centres seeking ICAR Accreditation status for DNA Data Interpretation

To be returned by e-mail to: DNA@icar.org

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1. APPLICANT ADDRESS DETAILS (fill out)

Country: .....

Organisation Name: .....

Organisation Dept.: .....

Contact person: .....

Address: .....

Telephone: .....

E-mail: .....

EU VAT no……

or Tax Registration no. (For non EU applicants)……

2. ICAR MEMBER WHO NOMINATES APPLICANT CONTACT/ ADDRESS DETAILS (fill out) (N/A if Applicant in 1. is already an ICAR Member)

Country: .....

ICAR Member Organisation: .....

Contact person: .....

Address: .....

Telephone: .....

E-mail: .....

3. APPLICANT EDUCATION, TRAINING, AND EXPERIENCE OF EMPLOYEE RESPONSIBLE FOR CONDUCTING DNA DATA INTERPRETATION

a. Level of education of the head of the DNA Data Interpretation activities (tick the box and describe)

- ☐ Ph.D. in .....
- ☐ Masters of Science in .....
- ☐ Bachelors of Science in.....
- ☐ Other .....
- ☐ None

b. Experience of senior employee in conducting DNA Data Interpretation (tick)

- ☐ More than 5 years
- ☐ More than 2 years but less than 5 years
- ☐ Less than 2 years

Annex V *(19th August 2016)*

4. EXPERIENCE USING SNPS FOR DNA DATA INTERPRETATION

a. Describe briefly:

Overview of your Organisations SNP Parentage Analysis Software/Process (Cite scientific reference publications when available)

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.....

List key Customers of your existing DNA Data Interpretation Services and estimated annual volume for each in the table below;

DNA Data Interpretation Service	Customer	Annual Volume
1. Parentage verification		
2. Parentage discovery		
3. Microsatellite imputation from SNPs		
4. Animal identification verification		

Comments:.....
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Procedure and key statistics for error and repeatability checking (for SNP genotypes incoming and Parentage Analysis results outgoing) Define, Unresolved figures, Mismatches,

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b. Other pertinent information to add? (describe)

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Annex V *(19th August 2016)*

5. NAME & CERTIFICATION STATUS OF THE LABORATORIES WHICH PROVIDES THE DNA DATA TO YOUR CENTRE.

Table 1. The Top 5 Laboratories (by volume) supplying genotypes to your Centre.

Name of Lab supplying genotypes?	What % of your supply	% Call Rate	ISAG Accredited?	ICAR Accredited?

Other Comments re your source(s) of genotypes?

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6. LEVEL OF ICAR ACCREDITATION FOR WHICH YOUR ORGANISATION IS APPLYING?

a. Please indicate to what level of DNA Data Interpretation (tick) you wish your Organisation to be listed (will be indicated on ICARs Accreditation Listing on our website):

☐ (1) Parentage Verification
☐ (2) Parentage Discovery
☐ (3) Microsatellite Imputation from SNPs
☐ (4) Animal Identification Verification

Note: Please tick each that applies to your application.

Applicant Name (Print):_____

Applicant Signature:_____ Date:_____

This Box for ICAR Office Use Only;

Application No.:

Date Rec'd:

Date To DNA WG:

Date Interbull Centre send out:

Date back from Applicant to Interbull

Interbull Pass/Fail:

Date Notification to Applicant: