THE GLOBAL STANDARD FOR LIVESTOCK DATA

GENOEX

Parentage **S**NP **E**xchange (PSE)

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Today's Presentation

- Background/Principles

- GenoEx-PSE Service Agreement

- Quick summary of technical elements of GenoEx-PSE

- ICAR Accreditation for DNA Data Interpretation Centres

- Fees

GenoEx-PSE Service Launch

- Published in ICAR Newsletter October 2016

- Special 'News flash' to ICAR members and Interbull distribution list

- Presentations and discussions at ICAR and Interbull meetings in Chile

- Documentation, software development and GenoEx-PSE Code of Practise to be finalized based on discussions

Principles

- Breed associations globally have been manually sharing microsatellite profiles as a process for maintaining herdbook integrity

- First principle of GenoEx-PSE is to facilitate this process for [dairy and beef breed] organizations already responsible/active in parentage integrity

- In reality, various genotyping labs have also become more involved in carrying out the function of parentage verification analysis

Principles *(cont'd)*

- SNP information exchanged via GenoEx-PSE must only be used for parentage analysis. Other uses, including the estimation of genomic predictions, are absolutely forbidden
- Service is entirely a voluntary initiative allowing countries to enter when comfortable
  - ➢ All Service Users can access all SNP genotypes
  - ➢ Policies also established to handle changes in Service Users as some enter and some leave
- ICAR will document and publish a list of Service Users but will not be involved in any eligibility disputes at the national level

GenoEx-PSE Service Users

- <u>Authorized Service User</u> – Organizations in charge of parentage certification at national level or otherwise providing parentage verification and/or certification services

  ➢ Can have multiple per country, which may vary by breed, herdbook vs non-herdbook, etc.

- Authorized Service User may designate a <u>Contracted Service Provider</u>

  ➢ Typically a genetic evaluation unit or genotyping lab

- ICAR member to inform ICAR of signatory organization(s) from each country

GenoEx-PSE Signatories

- Current DRAFT version of the Service Agreement Contract has three signatories:
- **Service ICAR**, as the legal subsidiary of ICAR responsible for its various services
- **Interbull Centre**, as the entity responsible for delivering the service and is legally part of the Swedish University of Agricultural Sciences (SLU)
- **Service User**, which is normally the Authorized Service User unless a Contracted Service Provider is designated

GenoEx-PSE Signatories

- Some feedback was received questioning the need for such a 3-party agreement
- Alternatives include:
  - Service User and Service ICAR/ICAR
  - Service User and Interbull Centre/SLU
- ICAR-Interbull Operations Task Force has discussed this question
  - Review of existing service agreements and governance model is currently ongoing
  - Customers are waiting for GenoEx-PSE
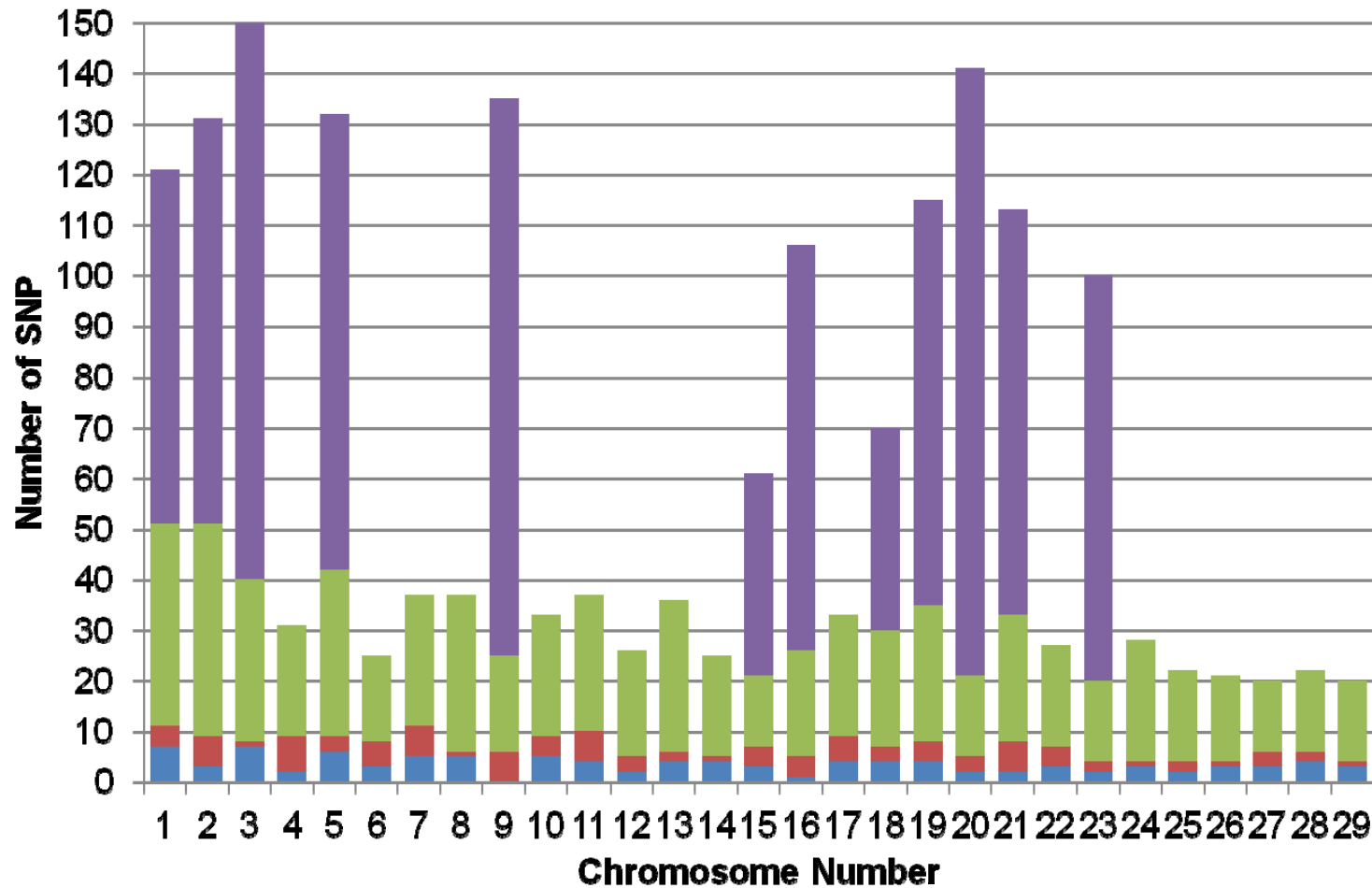 - Recommended that GenoEx-PSE proceed with current 3-party agreement for interested countries

SNP Groups

- Parentage Verification
  - ➢200 SNP recommended by ISAG
  - ➢100 Core SNP plus 100 Extra SNP
- Parentage Discovery
  - ➢200 ISAG SNP
  - ➢Plus 675 other SNP (total 875) based on research in USA, Ireland and Australia
- Microsatellite Imputation
  - ➢Additional 980 SNP deemed most useful for imputation to microsatellite SNP profiles to allow for parentage verification on that basis
  - ➢Overall total of 1,855 SNP for possible exchange

Parentage SNP by Chromosome

Data Exchange Formats

- Two files for each upload and download
  1. Information related to the group of animals with a SNP genotype to be transferred
     - Includes Service User, Source Country, Animal ID, Lab, Sample ID and fields associated with the full genotype (i.e.: LD, MD, HD) from which the parentage SNP were taken
     - Only 1 record permitted per Animal ID
  2. Information related to the actual SNP genotypes for the animals in 1)
     - Includes Animal ID, SNP Name, allele 1 and 2 results
     - SNP results in either AB or TOP format
- Variable length, comma delimited file in .csv

Data Exchange Rights & Options

- Only Service Users with a signed agreement can upload and download data
  - ➢ Each Service User has designated "population(s)" of animals under its responsibility, normally defined by country/region, breed(s), herdbook or not, etc...
- GenoEx-PSE will "time stamp" all data transfers by each Service User
  - ➢ Uploads only need to involve new animals but may also include more complete SNP genotypes
  - ➢ Downloads may be either (a) all new genotypes for males and/or females, or (b) based on request list

Level of Service & Obligations

- Service User will define the level of service desired
  - Parentage Verification vs Discovery vs Microsatellite
- Must routinely (minimum 3X/year) upload all genotypes for "targeted" animals to access desired genotypes for same group of SNP
- "Targeted" animals to be routinely uploaded:
  - AI sires and their dams
  - Foreign-born sires with daughters born in your country
  - Parents of animals born by embryo transfer (ET)
  - Other special cases as needed

Service User Obligations *(cont'd)*

- Shall report to the authorized organization in the animal's country of birth, any pedigree conflicts identified via GenoEx-PSE

- Follow ICAR rules and regulations related to the GenoEx-PSE services

  ➢ Interbull maintain a GenoEx-PSE Code of Practise

- All SNP data accessed via GenoEx-PSE must not be forwarded, shared or exchanged with any third party organization

- Follow ICAR accreditation rules and policies

ICAR Accreditation

- ICAR has existing accreditation procedures for laboratories processing DNA into genotypes
- New ICAR accreditation service will be introduced in conjunction with GenoEx-PSE
  - ➢ Accreditation for DNA Data Interpretation Centres
  - ➢ Proposal includes an initial application followed by a accreditation renewal every two years
  - ➢ Initially excluding Microsatellite Imputation
  - ➢ Application form and fee submitted to ICAR
  - ➢ Interbull Centre provides applicant with Test Data Set
  - ➢ Applicant returns Parentage Analysis results to Interbull, with "pass" or "fail" status given to ICAR

GenoEx-PSE Fees

- Interbull SC recommended a flat rate annual fee of 1 000 Euro per Service User for GenoEx-PSE
  - ➤ To be reviewed over time
  - ➤ Difficult to predict the number of Service Users
  - ➤ Goal is for cost recovery for ongoing maintenance and staff time at Interbull Centre
- ICAR Accreditation for Interpretation Centres
  - ➤ ICAR has set administration fee of 300 Euro per application (initial and bi-annual renewal)
  - ➤ Interbull Centre will wait to establish any fee for conducting data analysis on behalf of Service ICAR

Benefits of Participation

- Countries with national genomic evaluations would already be doing Parentage Analysis
  - ➢ Have genotypes for essentially all dams and AI sires
  - ➢ Potentially missing genotypes for some sires
- Exchange of SNP genotypes will lead to quicker transition away from global "standard" of microsatellite profiles
  - ➢ Breed associations have motivation to participate
  - ➢ AI and breeders involved with exporting can eliminate costs due to genotyping duplication
- AI bull owners will have more accurate identity of daughters in countries importing semen

Demo and discussion

In the ICAR Booth:

- A demo is running

- Interbull Centre staff will be available to answer questions right after this session