



THE GLOBAL STANDARD
FOR LIVESTOCK DATA



GEN  EX

Parentage SNP Exchange (PSE)

Brian Van Doormaal

Presented at the Interbull Open Meeting
Puerto Varas, Chile
October 24, 2016





Today's Presentation

- GenoEx-PSE Service Agreement
- Quick summary of technical elements of GenoEx-PSE
- ICAR Accreditation for DNA Data Interpretation Centres
- Fees



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

- Authorized Service User – 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 Contracted Service Provider
 - 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



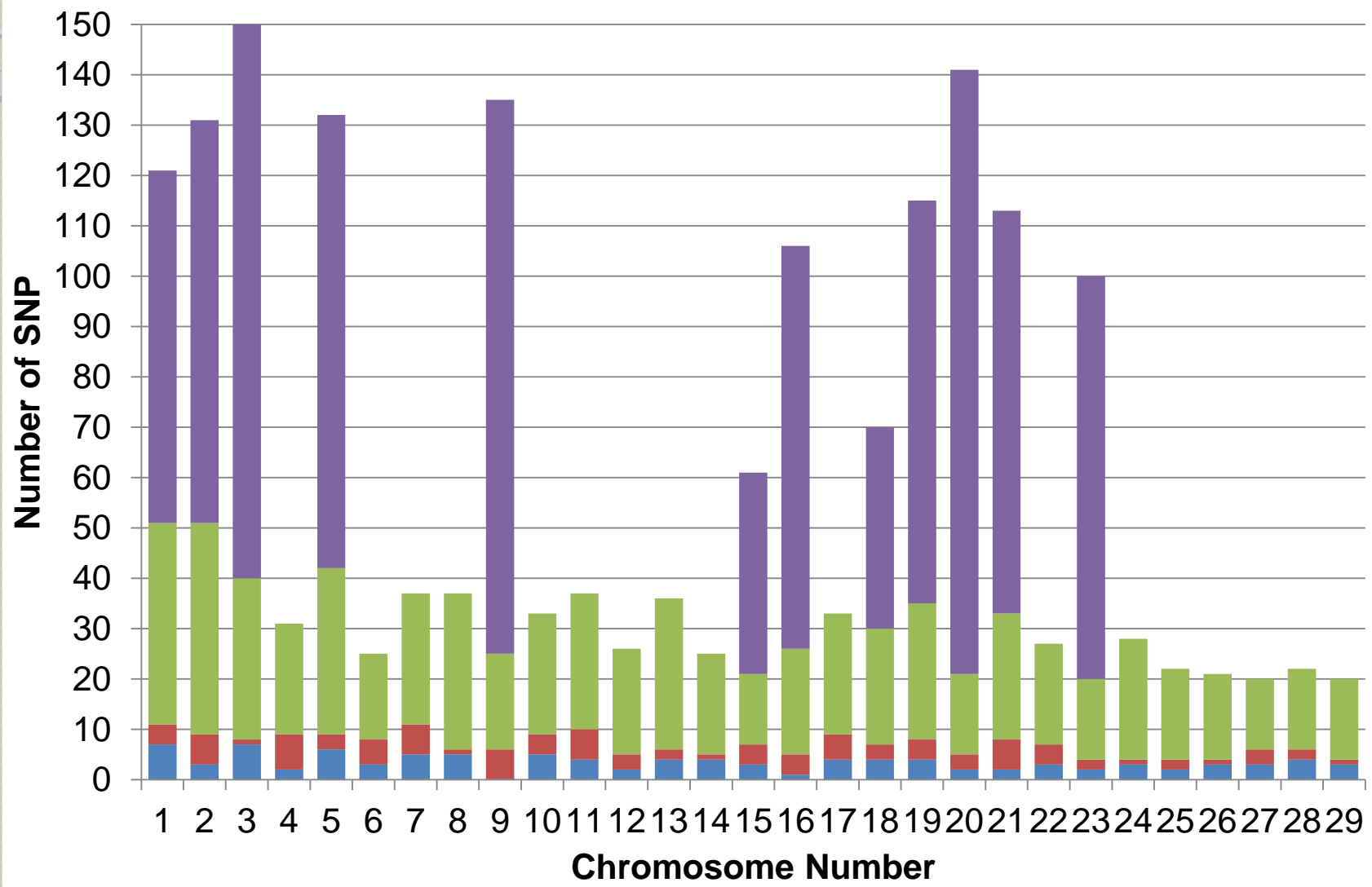
SNP Groups

- 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

■ ISAG-Core ■ ISAG-Extra ■ Added for Discovery ■ Added for MS Imputation





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



THE GLOBAL STANDARD
FOR LIVESTOCK DATA

- 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 provide 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



THE GLOBAL STANDARD
FOR LIVESTOCK DATA



GEN  EX

Parentage SNP Exchange (PSE)

Thank You!

