IRISH CATTLE BREEDING FEDERATION

International Collaboration – Interbeef and IGenoP

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Presentation to BIF Genetic Prediction Committee

Friday 3rd June 2011

NDP National Development Plan Transforming Ireland

Content

- Background – see presentation to Live Animal, Carcass & End Product Committee yesterday
- What is Interbeef
  - Objectives
  - How does it operate
  - Benefits & Costs
  - Current status
- What is IGenoP
  - Objectives
  - How does it operate
  - Benefits & costs
  - Current status
- Challenges
- Summary

INTERBEEF

BACKGROUND

Background: Irish Farmers want to find the best cattle in the world to breed from

1. Rank all candidates on the merit of future progeny - genetic evaluations and indexes in Irish base & scale
2. Candidates – AI bulls worldwide, stock bulls in Ireland, cows & heifers in own herd
3. Complicated by disease regulations & risks.
4. Many beef breeds most of which are part of a larger international populations
5. Ireland needs collaborators in other beef breeding populations

Background

- World has more beef than dairy cattle – many breeds and many countries
- Genetics play a key role in determining beef cattle productivity
- International trade in beef genetic is a very important activity
- There is a need for an organisation to facilitate international collaboration in beef cattle recording & genetic evaluation
- Farmers of beef cattle stand to benefit most

INTERBEEF

STRUCTURE & OPERATIONS

Objectives

A Working Group of ICAR (International Committee for Animal Recording) with **objectives** for beef breeds & traits:

1. Provide forum for sharing knowledge on recording & genetic evaluations
2. Maintain guidelines & standards
3. Conduct international surveys
4. Develop international genetic evaluation services
5. Facilitate use of genomic selection

Operations Model

- Steering Committee comprising:
  - Geographical spread
  - Technical spread
  - Enthusiastic supporters
  - Appointed by ICAR Board
- Secretariat:
  - Interbull Centre, Swedish University of Agricultural Science, Uppsala, Sweden
  - Budget of €100,000/year
  - Provides services to "Service Users"
  - Works with "Research Providers"
- Services Users are ICAR members who are organisations able to represent, for country, breed & trait combinations:
  - Beef database operations
  - Beef performance & ancestry recording service provider(s)
  - Genetic evaluation service providers
- Research Providers
  - Knowledge and expertise to assist with achieving objectives

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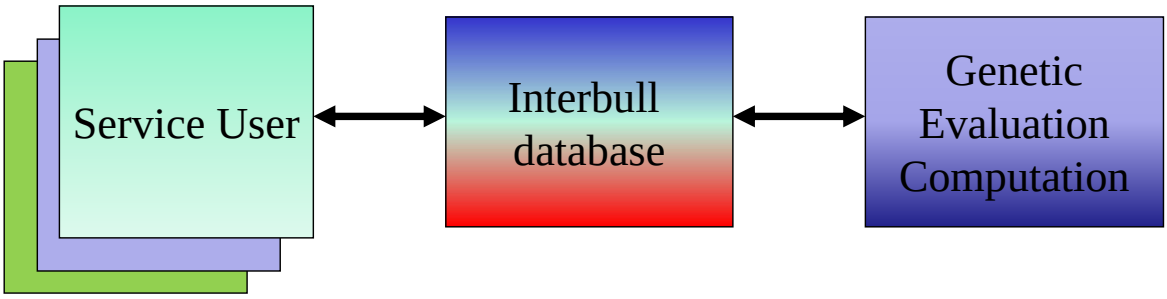
Strategy - Operations



- Service Agreement & Fees
- Rules for Participation - Roles & Responsibilities
- Operating Procedures
- Data Flows & Interfaces
- Quality Control & Query Support
- Methods & Models

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Interbeef

PROGRESS – SO FAR

Progress

- Data Flows & Interfaces – established & tested
- Methods & Models – two breeds, five countries, one trait – established & tested - transferred from INRA to Interbull Centre
- Scientific Advisory Committee – established – integration with national evaluations, across breed evaluations
- Strategic Plan – reviewed and updated
- Call for data and Service Users

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Benefits & Costs

Benefits	Costs
Improved ancestry information – accuracy & completeness	ICAR membership fee - €545
Improved access to genetic evaluations of animals in other countries	Service fees – to be decided
Better targeting of imports & exports	Data provision – non-cash
Knowledge of practices in other countries	Time & Travel -
Improved international collaboration	
Improved competitiveness of beef production	

Summary Statistics by Breed & Country of Birth - Pedigree File for 158,000 weaning weight phenotypes in Ireland, with at least 50% Charolais ancestry.

	CAN	DEU	DNK	FRA	GBR	IRL	ITA	NLD	NZL	USA	Total
MON				21		105					126
AAN					1	651					652
BAQ				20		98					118
BBL						18					18
CHA		26	4	848	210	82751	29		1	4	83873
HER						440					440
HOL	63	32	5	61	1431	4734	15	225	34	67	6667
JER			2			30			3		35
LIM	1			34	2	5164					5201
MSH						356					356
RDC						8					8
SAL				24	1	263					288
SIM				1	124	1535					1660
Total	64	58	11	1009	1769	96153	44	225	38	71	99442

Summary

- Interbeef is facilitating international genetic evaluation of beef breeds & traits – potential to increase accuracy of evaluation for foreign selection candidates.

Aknowledgments

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IGenoP

BACKGROUND & OBJECTIVES

IGenoP (International Genomic Partnership) - Background

- Genomic technology has great promise for cattle breeding – more gain and less cost
- Size of training population is very important – few countries have enough
- Genotyping is (still) relatively expensive
- International collaboration is highly desirable

IGenoP - Objectives

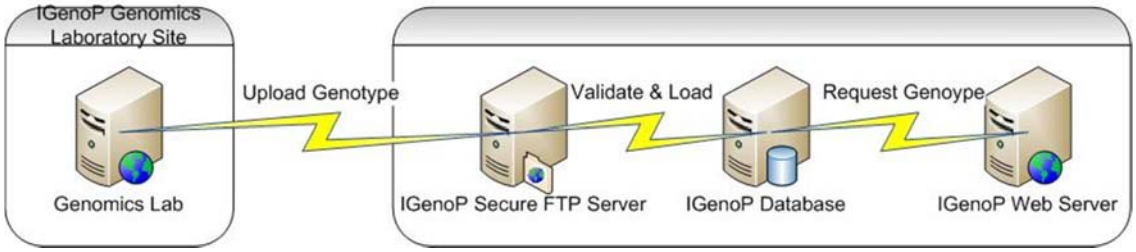
- Increase the accuracy of local genetic evaluations by enabling the use of genomic information
- To facilitate local evaluation of selection candidates from other countries
- To ensure local evaluation systems are free from bias due to genomic pre-selection
- To facilitate an efficient service by local organisations

IGenoP – Operational Concept

- An international collaboration of animal evaluation units to share genotypes
- Establishment of a database of shared genotypes at the Interbull Centre
- Use of shared genotypes and phenotypes for training genomic evaluations for each partner
- Use of shared genotypes, and local SNP estimates, for evaluation of national selection candidates (local and imports)
- Prototype established

IGenoP

OPERATIONAL PROTOTYPE



- Infrastructure in place (3K, 50K, 800K, …)
  - Genotype file(s) automatically download from secure ftp site
  - Files parsed
    - Valid ID
    - Standardise SNPs for storage
  - Loaded to Database
    - Individual animal parentage SNP's (116)
    - Individual animal genotype file
    - Parentage validation
    - Verification of SNP_MAP (to cater for evolving chips)

- Query & Download Facility (on-line & batch)
  - Validation of animal ID
  - Verification of user permissions (based on agreement)
  - Return summary of genotype details
    - Animal ID
    - Call Rate
    - Chip Details
  - Automatic extraction of Genotype & summary file to secure FTP for download

DRAFT AGREEMENT

Draft Agreement

Version 1 complete – in legal form

Key elements:

- **Parties:** ICAR, Interbull, Animal Evaluation Units (Contributors) & Laboratories
- **Purpose:** researching, developing and operating genetic evaluation services in the base and scale of a contributor's own country, breed and trait set combination
- **Decision making:** Interbull Steering Committee, Annual Meeting in accordance with the rules and procedures adopted by ICAR

Obligations

Contributors (AE Units) must:

- Provide all genotypes owned or available to contribute & maintain authorisation(s)
- Contribute genotypes of bulls (and cows?) exclusively progeny tested in own country
- Provide genomic evaluations on non-discriminatory basis

Must not:

- Provide genomic evaluations in base & scale of any other
- Supply genotypes that they do not own or have the right to supply
- Pass information obtained through IGenoP to third parties

Obligations

Interbull Centre:

- Securely holds the genotypes in a database and ensures they are available
- Operates a secure website for transfer of genotypes to only those with appropriate authorisation
- Arranges all meetings and provides administrative support
- Determine and collect fees to over costs of providing service

Draft Agreement - Obligations

Authorised Laboratory(s):

- Upload genotypes & download parentage SNP's

ICAR:

- ensures that phenotypic data of relevance to commercial cattle production continues to be collected according to well defined standards on a worldwide basis
- provides administrative support by facilitating membership to organisations wishing to become involved as Contributors or Laboratories.

Summary

1. IGenoP is a service that will enable national Animal Evaluation Units to provide more accurate genomic evaluations for national and international selection candidates.

2. The prototype established in Ireland has proven the concept.

3. Interbull working with interested Animal Evaluation Units could have the service available quickly.