IRISH CATTLE BREEDING FEDERATION

Sheep Ireland
www.sheep.ie

Agriculture and Food Development Authority

# Teagasc, Bioscience Centre and ICBF Meeting – Highfield House, Bandon

6th August 2009

NATIONAL DEVELOPMENT PLAN

# Agenda

- ICBF – mission, skill sets, interests and roles
  - Overview - Brian Wickham
  - Cattle breeding – Andrew Cromie, Ross Evans, Thierry Pabiou
  - Sheep breeding – Timothy Byrne, Thierry Pabiou
  - Data for research – Sean Coughlan
- TEAGASC Biosciences Centre – mission, skill sets, interests & roles
  - Overview - Richard Dewhurst
  - Kieran Meade
  - Orla Keane
  - Chris Creevey
  - Donagh Berry
- General Discussion
  - Facilitating research
  - Facilitating application of research findings
- AOB

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# ICBF & Sheep Ireland - Overview

Teagasc and ICBF Meeting – Highfield House, Bandon

Brian Wickham

6th August 2009

NATIONAL DEVELOPMENT PLAN

# Content

- ICBF
  - Mission
  - Structure
  - Activities
- Sheep Ireland
  - Mission
  - Structure
  - Activities

# Irish Cattle Breeding Federation Society Limited (ICBF)

- ***Established with interim Board in 1997***
- ***Commenced operations in 1998***
- ***Current structure in 2000***
- ***Mission: achieving the greatest possible genetic improvement in the national cattle herd - Dairy and Beef***

*1. ICBF Rules as amended in 2003*

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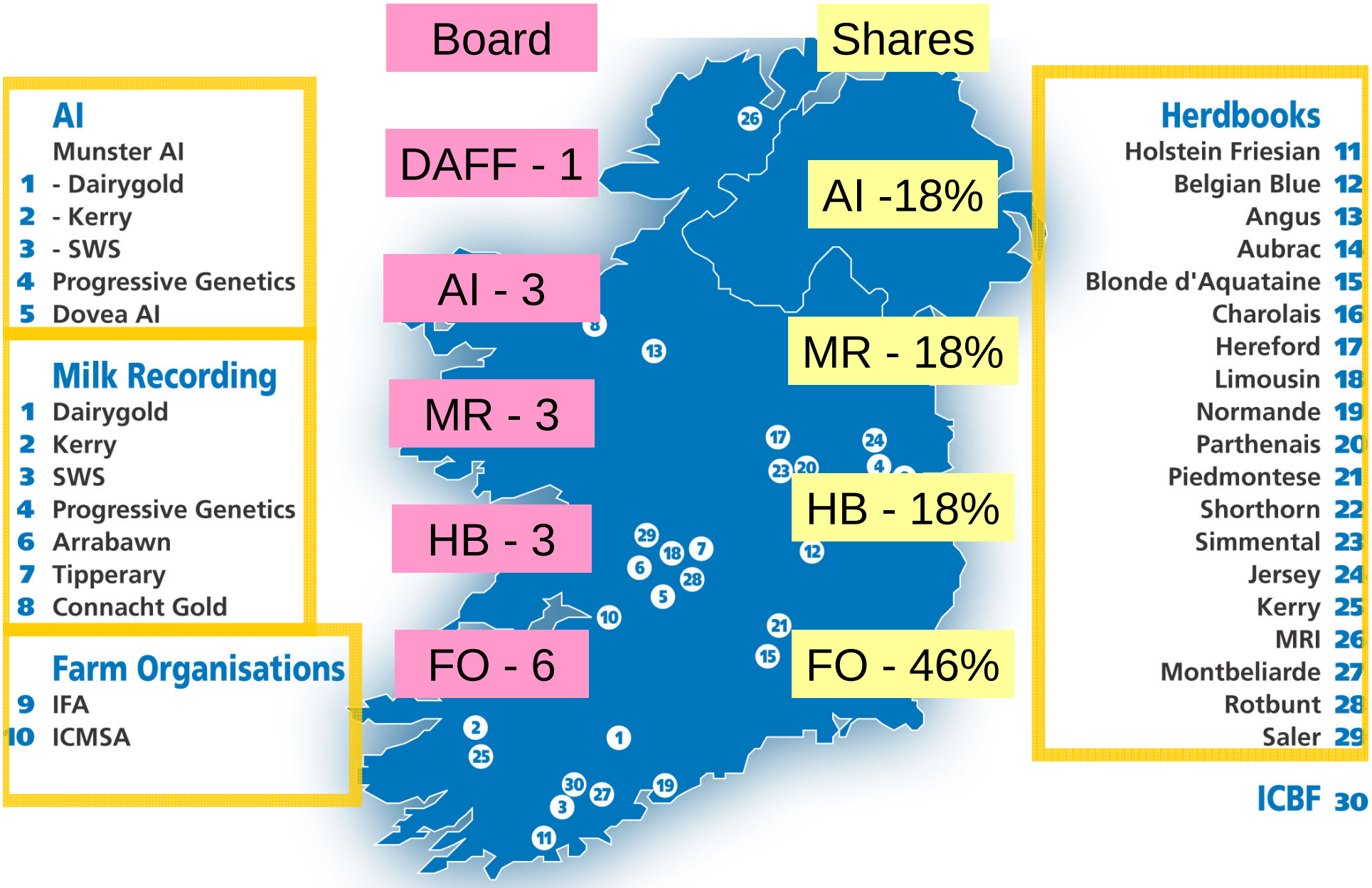
ICBF.com

# MEMBERS, BOARD & SHARES - ICBF



# ICBF - Activities & Services

- Genetic Evaluations
  - Dairy & Beef
- Information Services
  - To Businesses who provide services to farmers: Milk Recording, Herd Book, AI
  - To Farmers: HerdPlus®
- Breeding Scheme Services
  - G€N€ IR€LAND®

# Sheep Ireland

- ***Established with interim Board in 2008***
- ***Commenced operations in 2008***
- ***Mission: To achieve the greatest possible improvement, from genetic and other factors, in the profitability of the national sheep flock for the benefit of Irish farmers and the sheep industry***

# Activities

- ICBF on contract to Sheep Ireland
- Strategy Group – 20 recommendations
- Database
- Genetic evaluations
- LambPlus Service to flock owners

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# Genetic evaluation of dairy and beef cattle
## Ross Evans

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NATIONAL DEVELOPMENT PLAN

# Database

| Source | Traits/Information Recorded | Use |
|---|---|---|
| Milk Recording | Milk, Fat, Protein, SCC | Dairy |
| linear scorers | dairy linear traits | Dairy |
| Animal Events/DAFF | Calving Difficulty, Gestation, Mortality | Dairy & Beef |
| Herdbooks | Pedigree information | Dairy & Beef |
| Meat Factories | Carcass weight, conformation, fat | Dairy & Beef |
| Marts | weights, price per kg | Dairy & Beef |
| On-farm | weights, culling, insems, pds | Dairy & Beef |
| AI handhelds | inseminations | Dairy & Beef |
| Animal Welfare | docility, calf quality | Beef |
| Tully & Teagasc | Weights, feed intake | Beef |
| linear scorers | Beef linear traits | Beef |

# Published Indexes

| Dairy Index: EBI | | |
|---|---|---|
| Traits | relative emphasis | Sub indexes |
| Milk Yield | 12% | Milk 42% |
| Fat Yield | 5% | |
| Protein Yield | 25% | |
| Calving Interval | 24% | Fertility 34% |
| Survival | 11% | |
| Direct Calving difficulty | 4% | Calving 11% |
| Maternal Calving difficu | 2% | |
| Gestation | 5% | |
| Calf Mortality | 1% | |
| Cow weight | 2% | Beef 9% |
| Carcass weight | 4% | |
| Carcass conformation | 2% | |
| Carcass fat | 1% | |
| Somatic Cell Count | 3% | Health 4% |
| Locomotion | 1% | |

| Beef Index (SBV) | | | |
|---|---|---|---|
| | Index | Trait | % |
| Beef Value | Calving Traits (€) | Calving Difficulty | 53% |
| | | Gestation Length | 25% |
| | | Calf Mortality | 22% |
| | Weanling Export (€) | Weaning Weight | 36% |
| | | Calf Quality | 64% |
| | Beef Carcass (€) | Carcass Weight | 46% |
| | | Weaning Weight | 24% |
| | | Carcass Conformatior | 11% |
| | | Dry Matter Intake | 12% |
| | | Carcass Fat | 7% |
| Replacement Value | Daughter Milk & Fertility (€) | Age at First Calving | 9% |
| | | Cow Survival | 29% |
| | | Calving Interval | 17% |
| | | Maternal Calving Diff | 11% |
| | | Maternal Weaning Wt | 33% |
| | | Cull Cow Carcass Wt | 1% |

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# Dairy Genetic Evaluations

- ***Dominated by Holstein-Friesian***
  - <10% other breeds, Montbeliarde, Jersey, Norwegian Red
- ***Milk Evaluation***
  - Across breed evaluation (all dairy breeds)
  - Adjustment for heterosis and recombination
  - Heritability: 0.35 for kg milk, fat, prot, 0.1 SCC
  - Animal Model, repeatability model 1st 5 parities
- ***Fertility Evaluation***
  - Across breed evaluation (all dairy breeds)
  - Adjustment for heterosis and recombination
  - 14 trait evaluation on first 3 parities
    - CIV (x3), SUV (x3), Milk (x3), Lifespan, 4 linear type
  - In process of integrating insemination based traits: CFS, NS, PREG1

# Dairy Genetic Evaluations

## International Evaluations (INTERBULL)

- INTERBULL (Sweden) receive sire EBVs from 32 countries
- Run an international evaluation
- Provide updated EBVS to participating countries to enhance accuracy on imported bulls
- ICBF supply:
- Milk EBVS for Holstein-Friesian and Montbeliarde
- Fertility, longevity and linear EBVS for Holstein-Friesian
- Will look to participate in Calving evaluations shortly

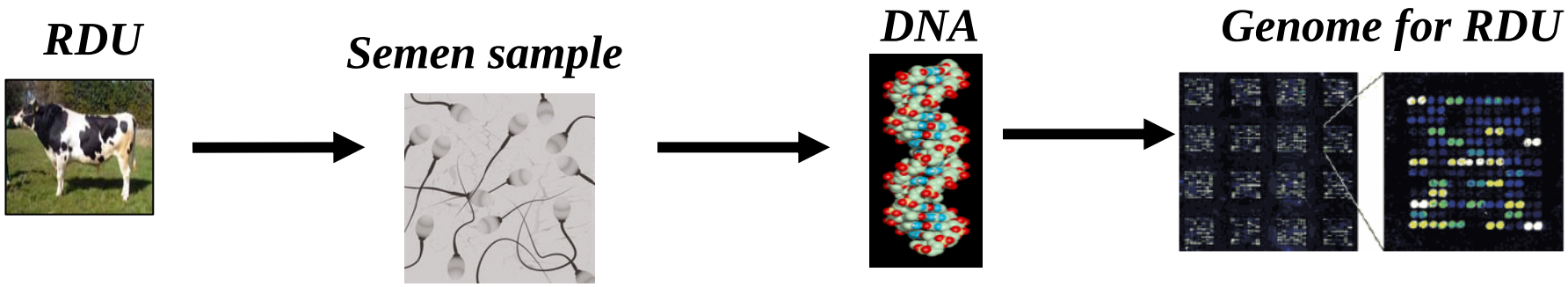
# Dairy Genetic Evaluations

## Genomic Selection *New methodology

***Collected DNA and got gentypes for all well proven AI bulls***

***Why AI bulls?***

- ***Estimate relationship betweeen genotype and well proven daughter performance***
- ***Relationships predict performance of genotyped young sires***




***About 1,000 proven bulls with genomic information at ICBF***

# Example of young sire no daughters milking yet

***Traditional EBI***

***Based on parents***

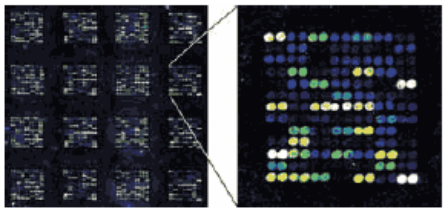
***~ 35% reliability***

***Sire***

***Dam***

***JRU***

***Genomic information***



***~15 daughters for milk production***

***EBI is now based on average EBI of sire and dam but also genomic information ~ 50% reliability***

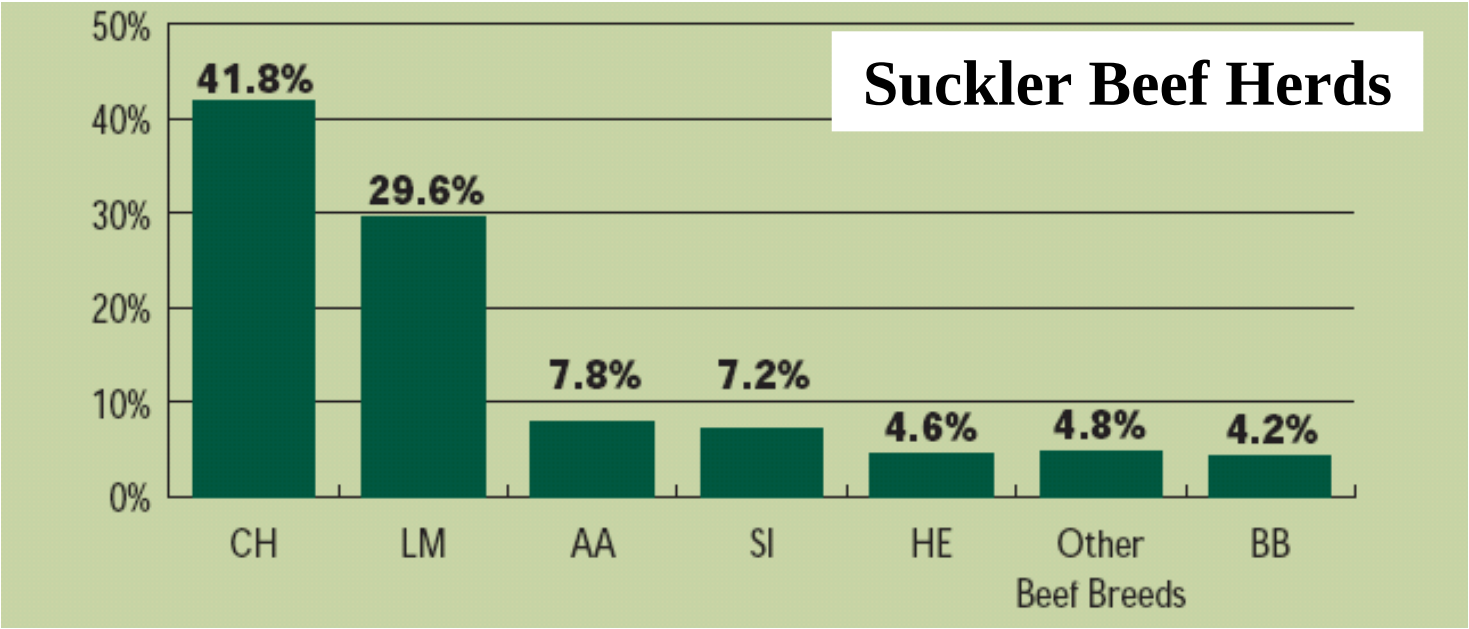
# Dairy Genetic Evaluations

## Genomic Selection

- Launched in Feb 2009 in tandem with normal eval
- Second run in May 2009
- First validation results for production in August 09
  - Test bulls from 2006 with daughters milking this spring
  - Initial results look positive
- Genomically selected bulls on Active Bull list
- Enormous impact on list
- Large uptake by farmers

# Beef Genetic Evaluations

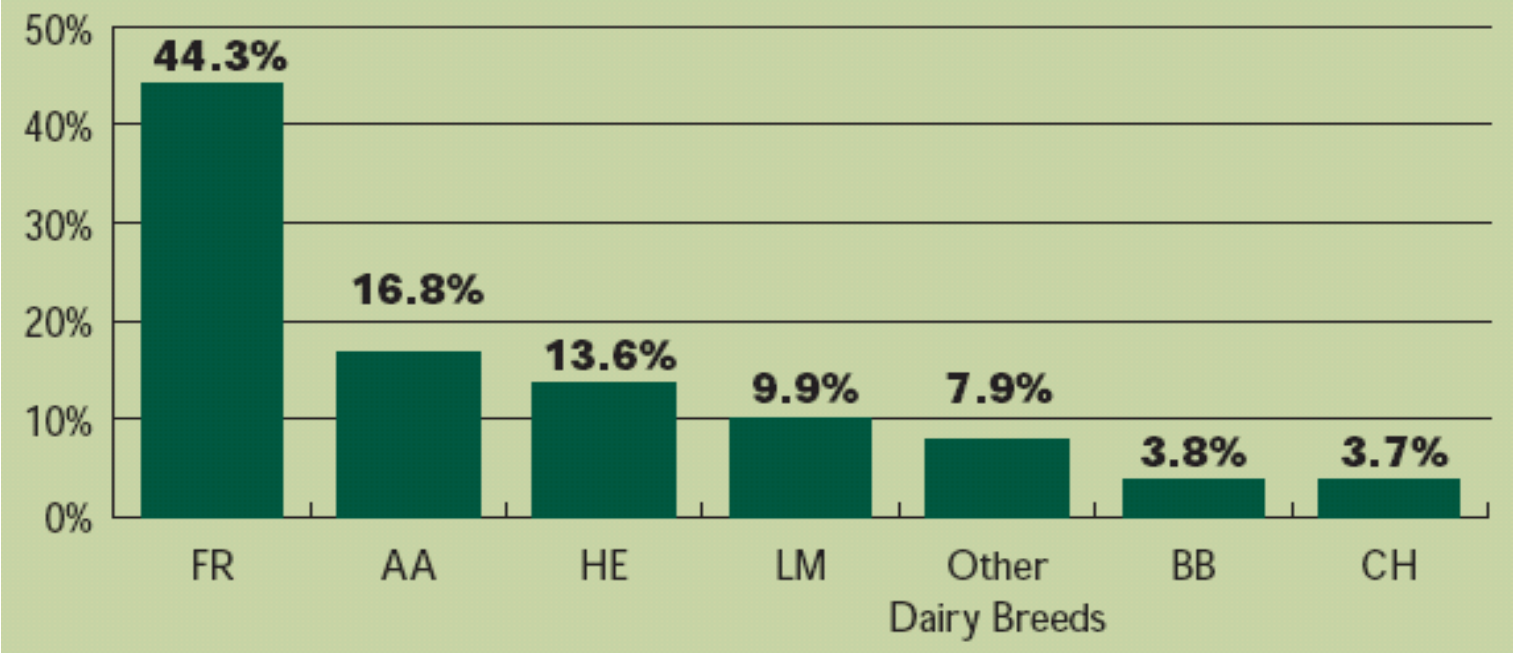
- ***More complexed than dairy traits!***
- **Ideally try to capture all beef performance**
  - **Dairy & Beef herds, Pedigree and Commercial beef**




- ***<u>Breed of Sire Dominated by big six</u>***
  - Smaller numbers of Blonde, Partenaise, Piemontese, Saler, Shorthorn, Aubrac

# Beef Genetic Evaluations

- **Dairy herds:**
  - **dairy sired bull calf**
  - **Beef sired bull calf**



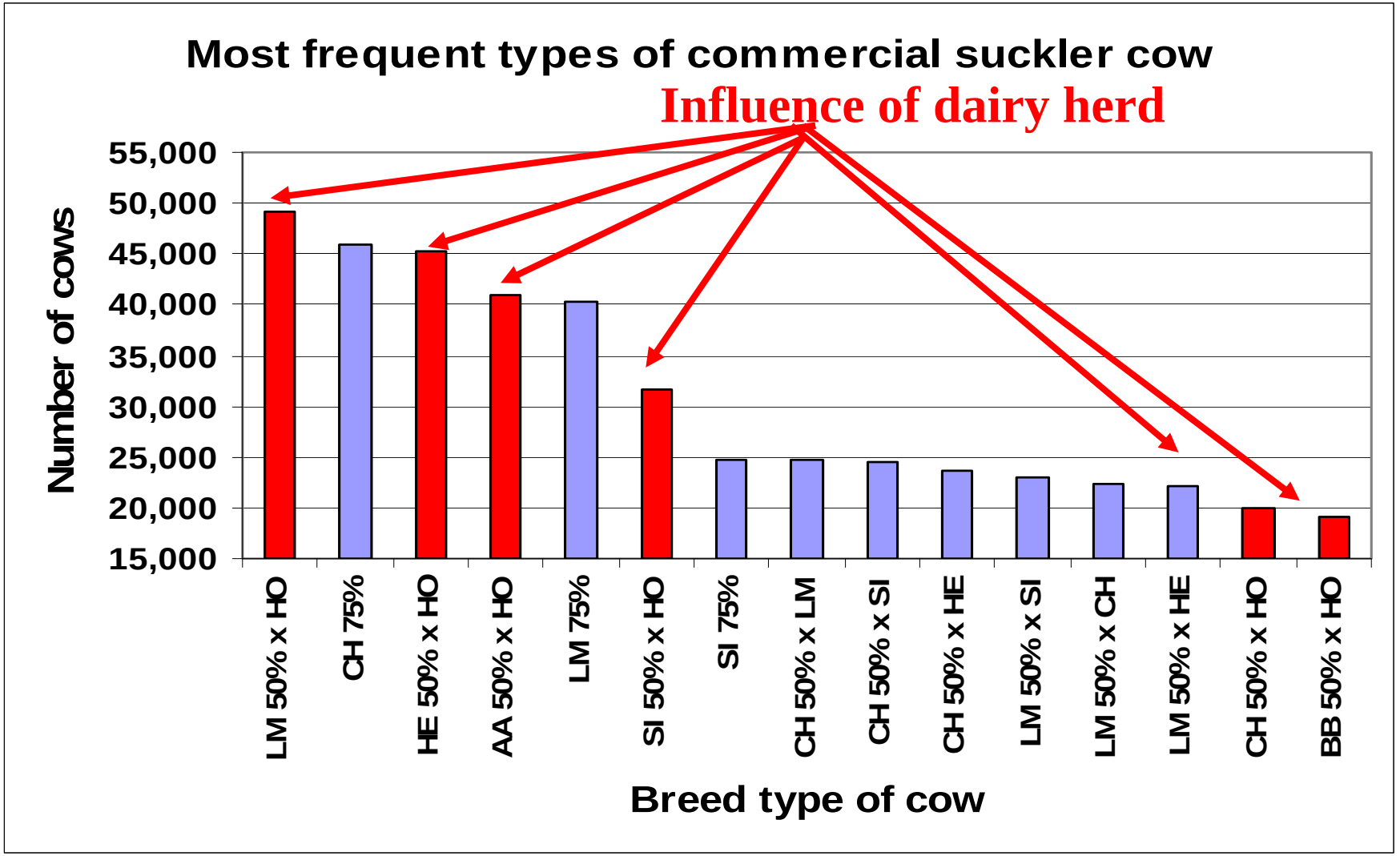

- ***<u>Traditional breeds most popular</u>***
  - Calving ease and gestation important

# Profile of Beef Calving herds

| Type of Calving herd on ICBF database | Count of herds | Count of cows calved | Averages no. of cows per type of herd | | Count of calving herds in various categories of herd size (total beef cows only) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | pedigree | crossbred | <5 | 5 to 9 | 10 to 24 | 25 to 49 | 50 to 99 | >100 |
| Crossbred beef cows only | 40,482 | 503,270 | 0 | 12 | 10,786 | 10,328 | 14,439 | 4,238 | 651 | 40 |
| Pedigree beef & crossbred beef cows | 5,905 | 126,512 | 4 | 17 | 385 | 1,036 | 2,704 | 1,375 | 382 | 23 |
| Pedigree beef, crossbred beef & dairy cows | 967 | 17,712 | 4 | 14 | 135 | 227 | 377 | 168 | 52 | 8 |
| Pedigree beef cows only | 702 | 5,028 | 7 | 0 | 366 | 171 | 135 | 29 | 1 | 0 |
| Pedigree beef & dairy cows | 214 | 1,061 | 5 | 0 | 146 | 38 | 24 | 5 | 1 | 0 |

- **Pedigree herd size is small but substantial linkage with commercial herds**
- **~30% of herd replacements in commercial herds sourced from dairy herds**

# Influence of dairy herd on Commercial Suckler herds




**807,667 cows: not purebred, calved since 1/1/08, still alive and at least 75% breed % known**

# Beef Genetic Evaluations

- ***Calving Performance:***
  - Calving difficulty, gestation, mortality, maternal calving diff
- ***Beef Performance***
  - 18 traits :9 goal traits, 7 linears, 2 foreign EBV
    - weaning weight, Calf quality, Mart price per kg
      Liveweight, Feed Intake, Carcass weight, conformation,
      Fat, Cull cow weight
- ***Fertility Evaluation***
  - AFC, CIV, SUV, Similar to dairy fertility evaluation
- ***Docility Evaluation *New***
  - Combines Farmer scores and linear scores (across breed)
- ***Linear type Evaluation *New***
  - 14 linear score traits (across breed)


## €uro-Star Rating (ICBF, April 2009)

| | | | | | |
|---|---|---|---|---|---|
| **AI Code:** | EDJ | **Breed:** | BB (100%) | **Sire:** | SEDUISANT DE FOOZ / S182 |
| **Animal Name:** | ESPOIR DU JARDIN | **Owner:** | NATIONAL CATTLE BREEDING CNTR | **Dam:** | DU JARDIN JONCONDE / 95647926191 |
| **Date of Birth:** | 20-JAN-1999 | **Date of Evaluation:** | April 2009 | **MGS:** | OPIUM DE CHOCQUENEE / ODC |
| **National ID:** | | €uro-star Index | Calving Traits | Weanling | Beef Carcass | Milk and Fertility |
| **International ID:** | | Pedigree | Prev Eval | | | |

Blups

| % Rank | Within Breed | | Index | Data rel | Across Breed | % Rank |
|---|---|---|---|---|---|---|
| 38 | ★★ | **Suckler Beef Value** | **€152** | **96%** | ★★★ | 64 |
| | | **Beef Value** | | | | |
| 89 | ★★★★★ | Calving Traits | €-7 | 98% | ★★★★ | 52 |
| 36 | ★★ | Weanling | €129 | 99% | ★★★★★ | 89 |
| 24 | ★★ | Beef Carcass | €149 | 98% | ★★★★ | 76 |
| | | **Replacement Value** | | | | |
| 16 | ★ | Milk & Fertility | €-194 | 57% | ★ | 11 |
| 56 | ★★★ | Calf Quality | €393 | 97% | ★★★★ | 78 |
| | | **Other Key Traits** | | | | |
| 88 | ★★★★★ | Difficulty Calving | 7.27% | 99% | ★★ | 22 |
| | | Docility | % | % | | |
| 44 | ★★★ | Milk (Maternal Wean Weight Kg) | 2.46 | 32% | ★★★ | 52 |

Data Rel: 40% - 60% = Ave  20 - 40% = Below Ave  <20% = Poor

Help on understanding Percentiles - Click Here

# Published Indexes

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# InterBeef

Teagasc and ICBF Meeting – Highfield House, Bandon

Thierry Pabiou (ICBF)

6th August 2009

NATIONAL DEVELOPMENT PLAN

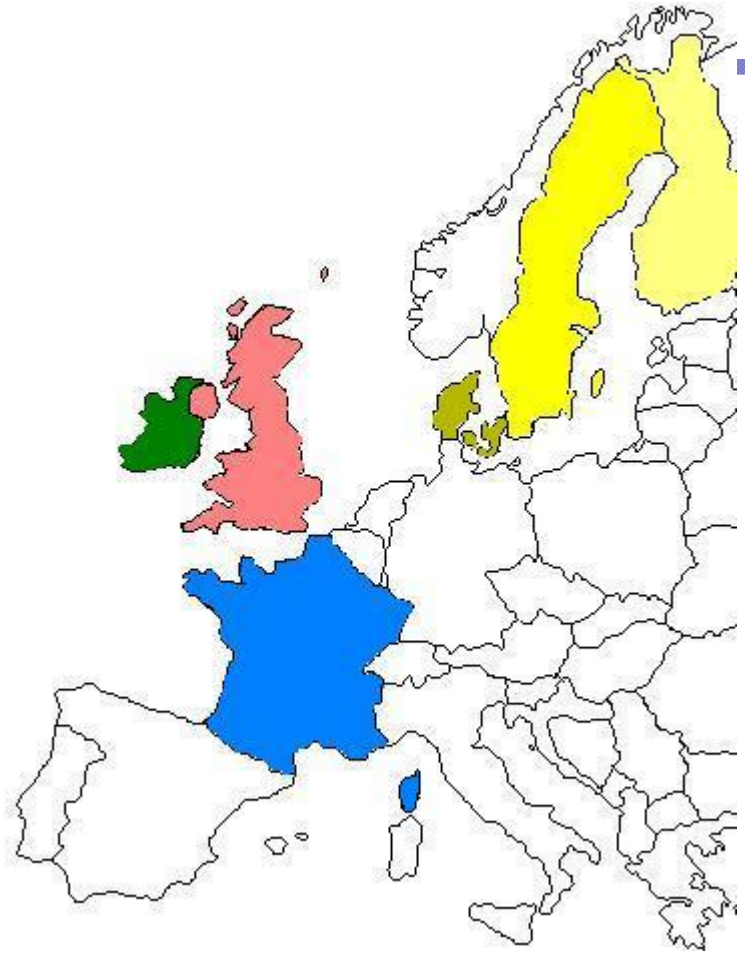
# Objective

- Provide a genetic evaluation for beef cattle based on national and international data

# Background

- EUBEEVAL project
  - Defined feasibility (FRA – AUS) => Animal Model used across countries
  - Pilot evaluation 2003 (FRA-IRL-GBR)
- InterBeef
  - Service of Interbull
  - Financed by member countries & ICAR
  - Steering committee & Scientific advisor group
  - 2006-2009: Prototype evaluations
  - 2010+ : Routine evaluation

# Countries Involved



- Ireland
- France (+ Lux)
- Great Britain
- Sweden
- Finland
- Denmark

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ICBF.com

# Breeds & Trait

- Limousin & Charolais
  - Pure breed

- Weaning Weight
  - Multitrait model => Direct & Maternal

# Conclusion

- Last Test Evaluation: spring 2009

- Extension of InterBeef missions
  - Across Breeds
  - To other traits (i.e., carcass traits)
  - Open to other countries

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# Using Carcass Images in Animal Breeding

Teagasc and ICBF Meeting – Highfield House, Bandon

Thierry Pabiou (PhD project - ICBF)

6th August 2009

NATIONAL DEVELOPMENT PLAN

# Objective

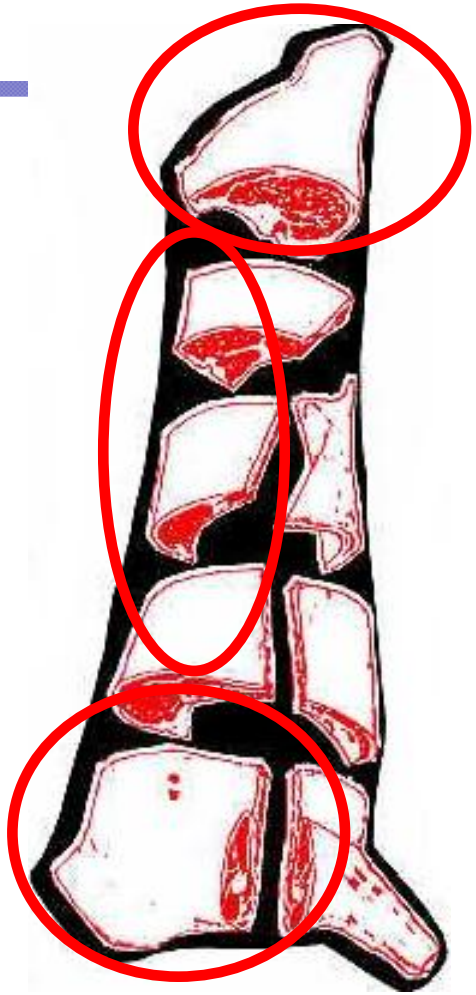
- Using the carcass digital images taken after slaughter to predict meat yields => Improve Carcass Payment to Irish Farmers

# Background

- VBS2000 (E+V, Ger.)
  - Approved since 2001 for EUROP beef grading in Ireland
  - 2D & 3D images / carcass
  - Used in 26 slaughter houses across Ireland
  - Images stored at ICBF since July 2005

# Using Images to Predict Yields

***Multiple Regression Analysis***



# Work Achieve

- Experimental (n = 413 steers) & Commercial (n = 635 heifers) Dissections
- Genetic Analysis of 11 meat yields
  - Variability in meat yields
- Multiple Regression
  - VIA => 4 groups of meat cuts

# Conclusion

- Satisfactory regression results using VIA
- Need to apply regression to all VIA stored at ICBF (+2 million)
- Integrate results in breeding program

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# G€N€ IR€LAND
# Overview

Meeting with Teagasc BioSciences Group.

Andrew Cromie

NATIONAL DEVELOPMENT PLAN

# *Genetic Improvement*

- Achieving genetic gain…
  - Database (Animal Events, milk, beef….)
  - Indexes (EBI & €uro-Star)
  - *Breeding program (G€N€ IR€LAND Dairy and Beef Programs).*
- Importance of breeding program often under-estimated.
  - Impact of genomics in 2009.
  - 30 high EBI "lay-off bulls" on ICBF Active Bull List!

# G€N€ IR€LAND – Background.

- Dairy program launched Spring 2005.
- Beef program launched Spring 2007.
- Program objectives;
  - *Increase scale* – 100 bulls/year.
  - *Increase genetic index* - €20/year potential gain.
  - *Increase efficiency* – 700 straws to return 100 replacement females.

# GENE IRELAND – A unique service

- ICBF provide services for; (i) procurement, (ii) progeny testing & (iii) evaluation.
  - Service driven from database & web-based.
- AI companies/breeders own bulls & collect semen (~70 dairy bulls & 20 beef bulls).
- ICBF contract herds (1200 dairy & 700 beef).
- AI companies forward semen to ICBF who distribute semen to participating herds.
- ICBF responsible for data collection, genetic evaluations & publication.
- Major industry support for initiative.

# *Where next?*

- Increase genetic gain for dairy & beef industries.
- More direct focus on breed development.
  - Working with herdbooks, AI companies, breeders.
- Three key requirements.
  - Identify 5-10 elite foundation bulls/year.
  - Identify 100 “top breeders”.
  - Identify 500 elite females that are owned by these “top breeders”.
  - Exact numbers will vary depending on number of animals in relevant breeds.
- Confident of increasing genetic gain in future

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# Sheep Ireland

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Thierry Pabiou (ICBF - Sheep Ireland) & Tim Byrne (AbacusBio)

6th August 2009

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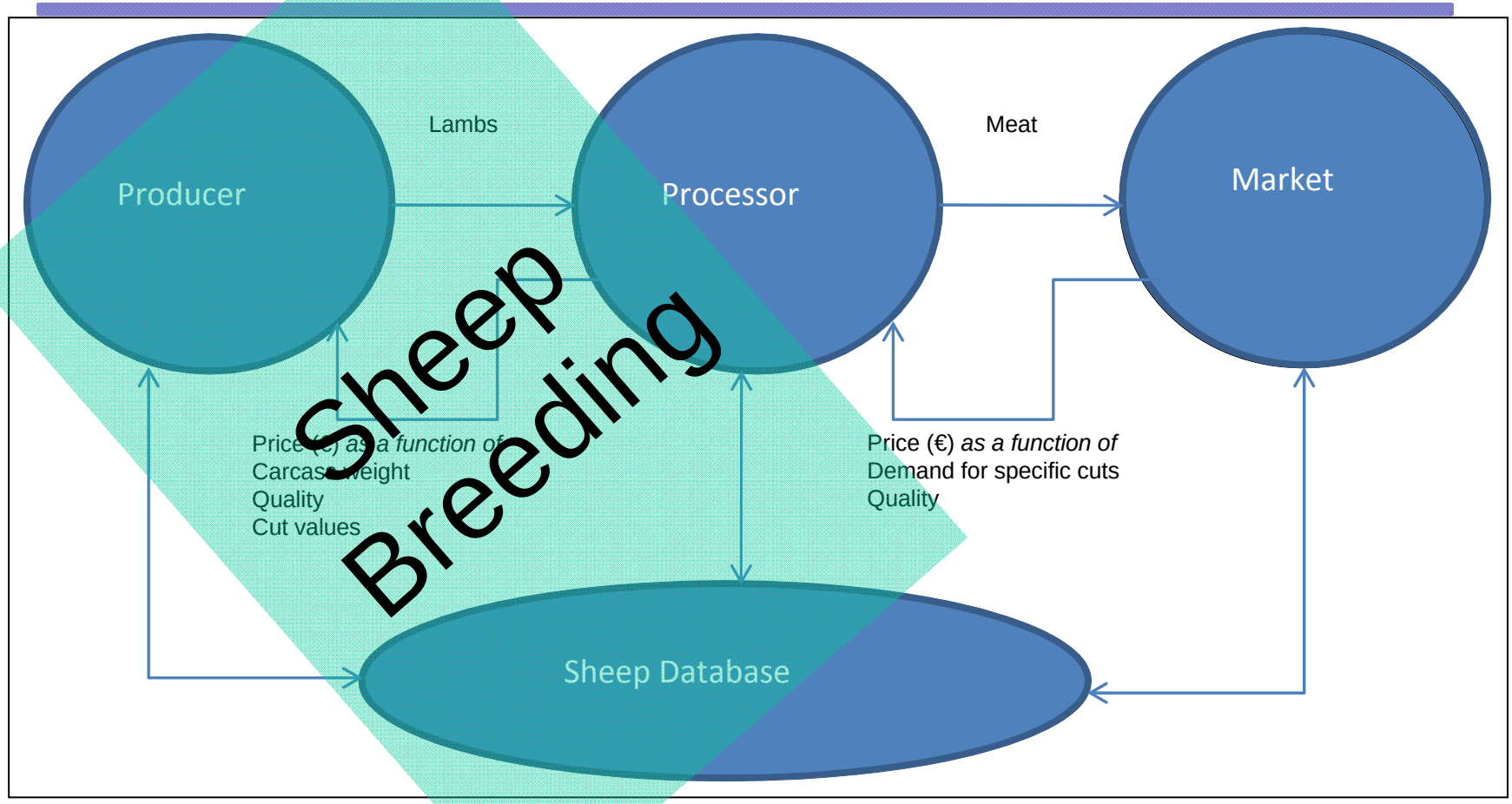
NATIONAL DEVELOPMENT PLAN

# Place in the Supply Chain

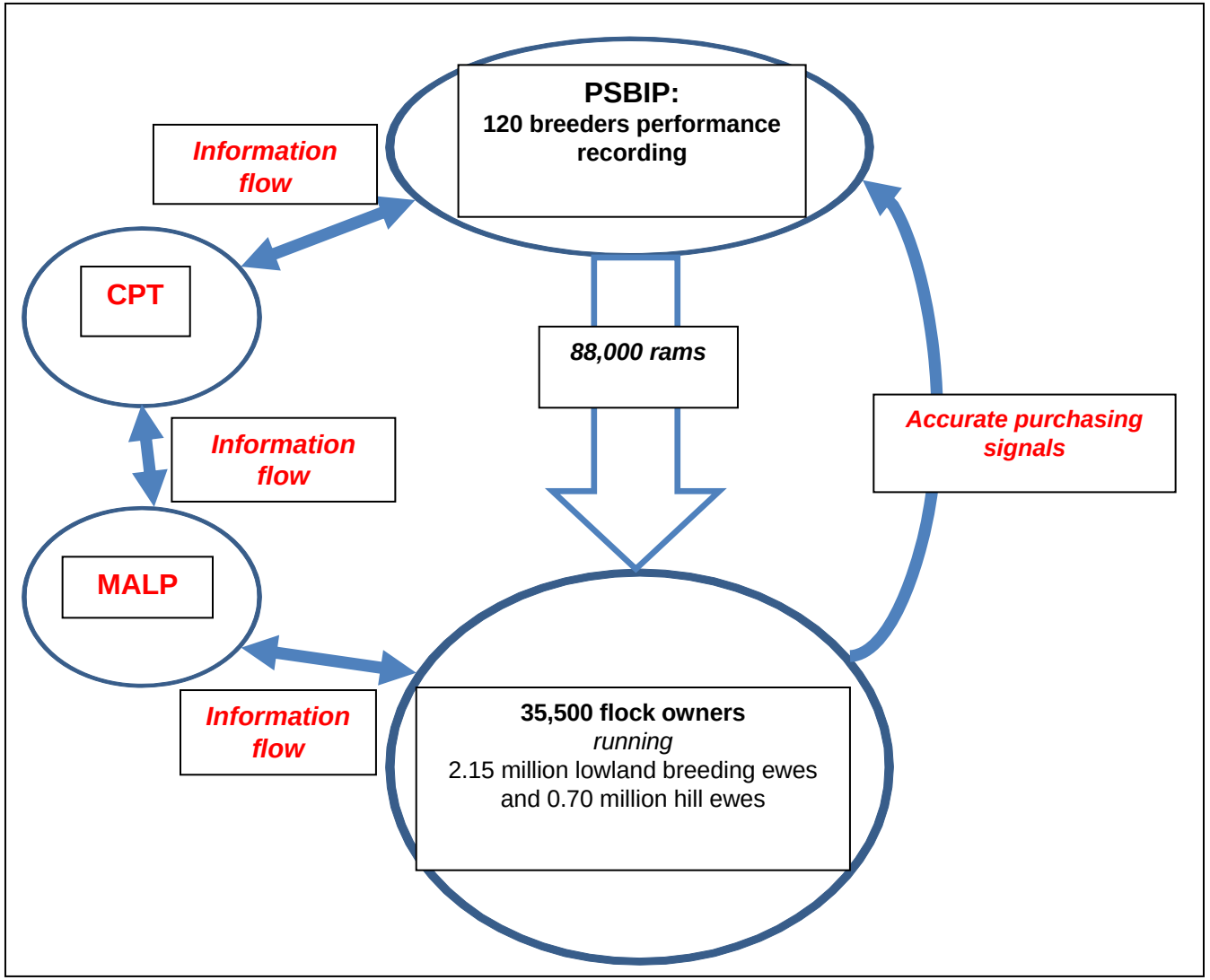
***a long-term highly-profitable Irish sheep industry***



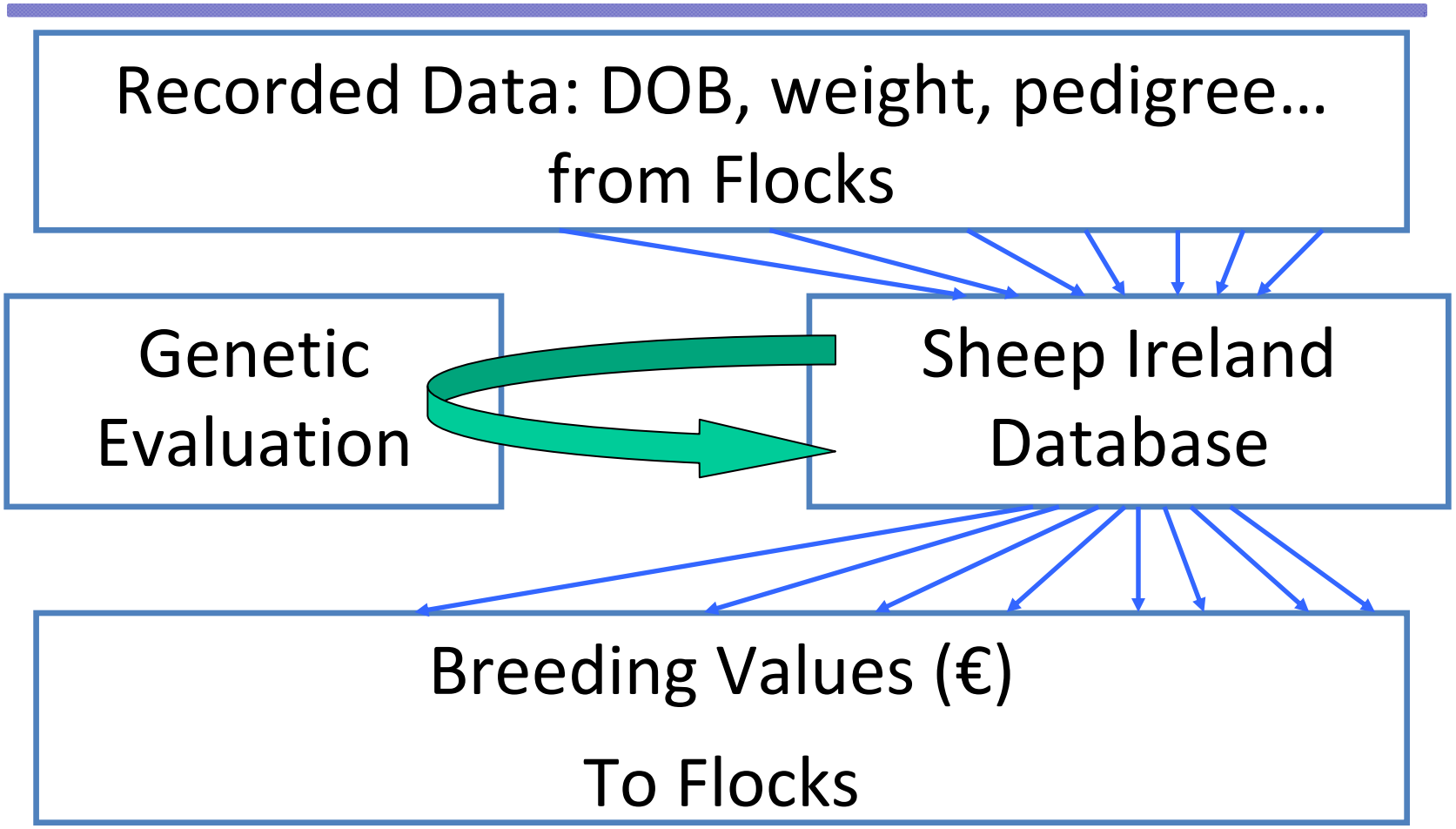
# Overview

- Impact of the proposed improvement scheme
- Recommendations for:
  - Individual animal ID
  - Data recording
  - Genetic evaluations
  - Breeding and demonstration schemes
  - Support structure for development and function

# Impact of the proposed improvement scheme



# Overview

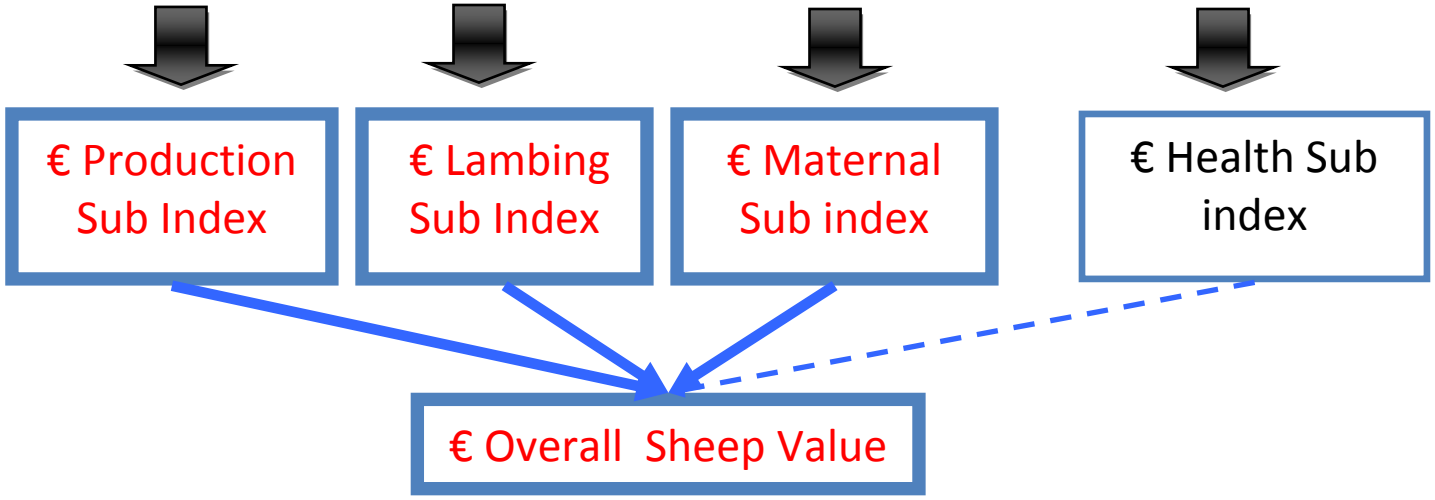

Recorded Data: DOB, weight, pedigree…
from Flocks
Genetic
Evaluation
Sheep Ireland
Database
Breeding Values (€)
To Flocks

# Genetic Evaluation

- The Data
  - Identification & Pedigree
  - At Lambing: DOB, Number of lambs, lambing ease, Weight, Mortality
  - Until slaughter: Weights, US Scan for muscle and fat
  - To come: Health Traits

# Genetic Evaluation

- The Breeding Values



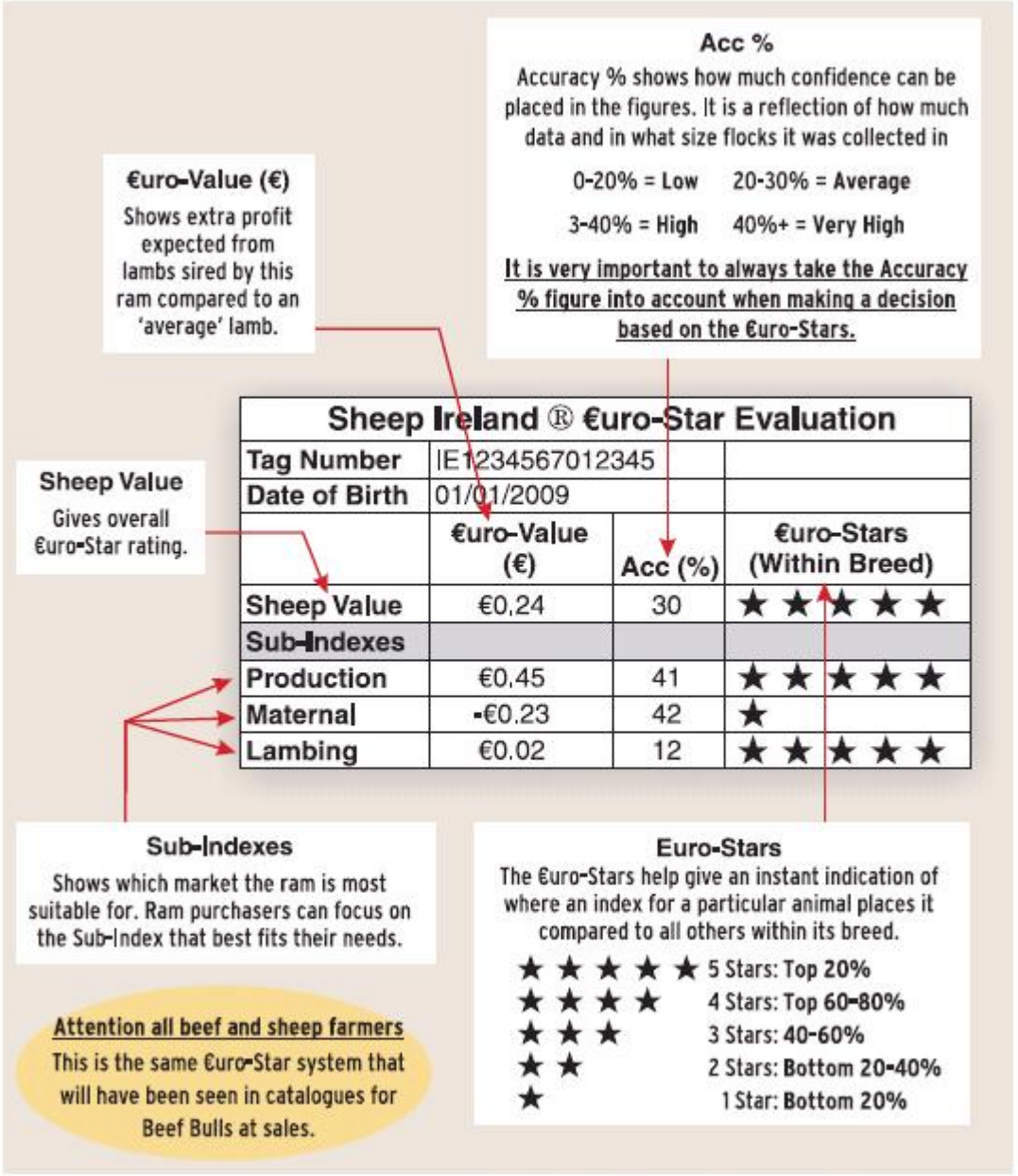

All index are given in € value

*(Work accomplished by Tim Byrne & colleagues, AbacusBio)*

And conjointly presented in €uro-Star format

# Example

- Source: Irish Farmers Journal. 25/07/2009. Sheep Supplement.




An example of what ram purchasers can expect to see in sales catalogues this year.

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# *ICBF Information Systems – Providing Data for Research*

Sean Coughlan

6th August 2009

NDP
NATIONAL DEVELOPMENT PLAN

# One Database, Many Partners
# less duplication and cost for farmers

## AI

Munster AI
1 - Dairygold
2 - Kerry
3 - SWS
4 Progressive Genetics
5 Dovea AI

## Milk Recording

1 Dairygold
2 Kerry
3 SWS
4 Progressive Genetics
6 Arrabawn
7 Tipperary
8 Connacht Gold

## Farm Organisations

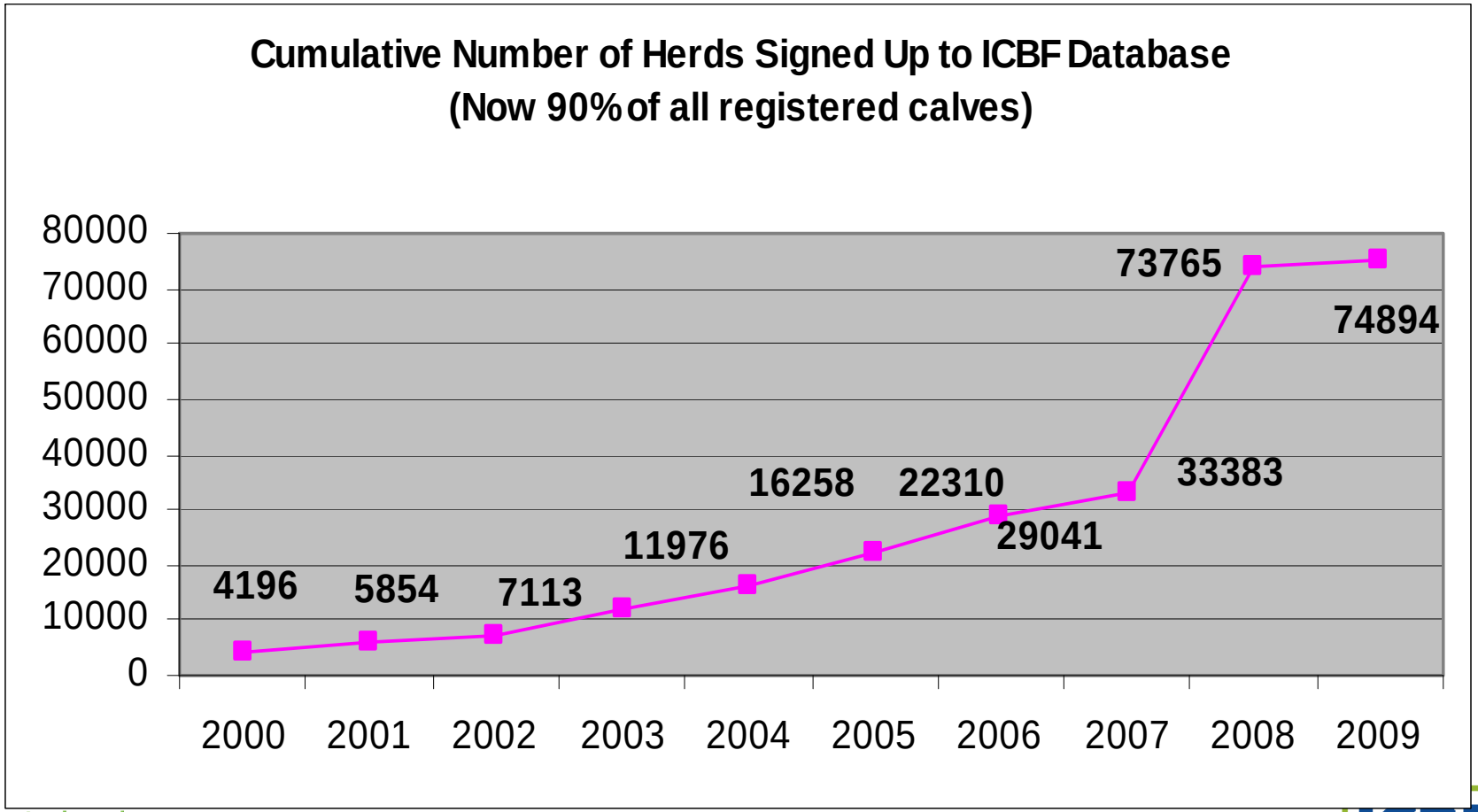
9 IFA
10 ICMSA

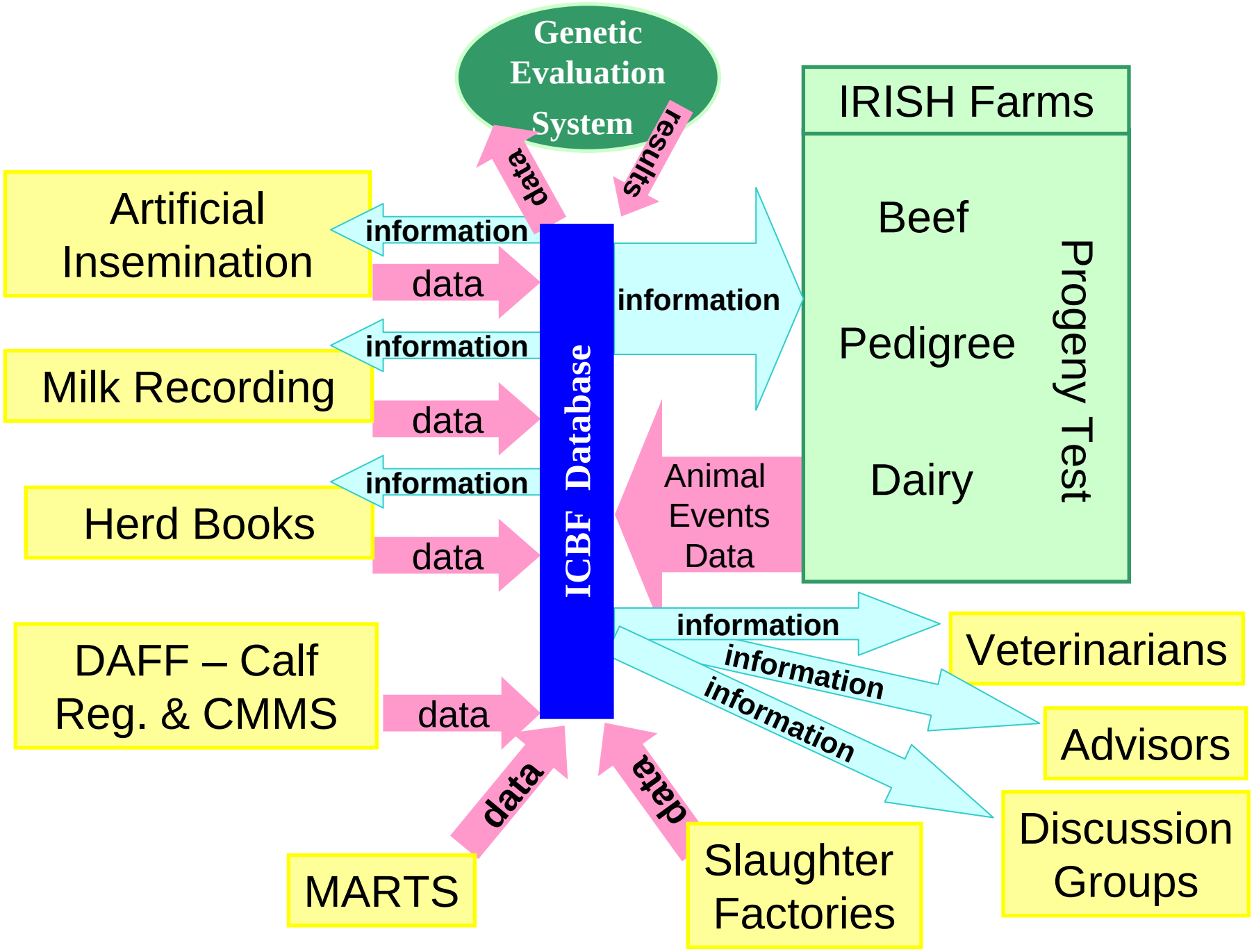

## Herdbooks

Holstein Friesian 11
Belgian Blue 12
Angus 13
Aubrac 14
Blonde d'Aquataine 15
Charolais 16
Hereford 17
Limousin 18
Normande 19
Parthenais 20
Piedmontese 21
Shorthorn 22
Simmental 23
Jersey 24
Kerry 25
MRI 26
Montbeliarde 27
Rotbunt 28
Saler 29

## ICBF 30

# ICBF Database has 90% coverage of breeding animals in Ireland




Genetic Evaluation System
data
results
IRISH Farms
Beef
Pedigree
Dairy
Progeny Test
Artificial Insemination
information
data
Milk Recording
information
data
Herd Books
information
data
DAFF – Calf Reg. & CMMS
data
ICBF Database
information
Animal Events Data
information
information
information
Veterinarians
Advisors
Discussion Groups
MARTS
data
Slaughter Factories
data

# *ICBF Data Volumes*

- Records
  - ~ 21 million animal records
  - ~ 44 million animal movements
  - ~ 8 million animal weights
  - ~ 4 million insemination records
  - ~ 24 million calvings
  - ~ 50 million milk records
  - ~ 5 million animal measurements (various)

# *Who do we actively work with in providing research data?*

- Teagasc
  - Animal Breeding
    - Genomic Research
    - Fertility/Insemination data
    - Lameness/health traits
  - Animal Health (Riona Sayers, Finola McCoy)
    - (Mastitis, Biosecurity projects)
- UCD
  - Tully performance data
- CVERA (Simon More et al)
  - SCC/Milk Production/TB

# *Who do we actively work with in providing research data?*

- Interbull
- Interbeef
- Wageningen University (Netherlands)
- Uppsala university (Sweden)
- LIC (NZ)

## Data held on the ICBF database is available for use in AHI research. The data will be provided by ICBF to the relevant researcher on the following basis:

1. Data is only used in the research for which it is supplied. That is, it is not to be supplied to any other party or used for any other research without our written agreement.
2. Data is protected and individuals (animals, people and organisations) are not identified in the resulting publications.
3. The results of the research are available to ICBF for use in its services to the Irish breeding and farming industry without licence fees applying.
4. ICBF is acknowledged as the source of data in all resulting publications.
5. ICBF is consulted prior to publication of any results. We would like the opportunity to comment on any aspect of the publication prior to its release.
6. ICBF is reimbursed for the cost of data extraction.

# Agenda

- ICBF – mission, skill sets, interests and roles
  - Overview - Brian Wickham
  - Cattle breeding – Andrew Cromie, Ross Evans, Thierry Pabiou
  - Sheep breeding – Timothy Byrne, Thierry Pabiou
  - Data for research – Sean Coughlan
- TEAGASC Biosciences Centre – mission, skill sets, interests & roles
  - Overview - Richard Dewhurst
  - Kieran Meade
  - Orla Keane
  - Chris Creevey
  - Donagh Berry
- General Discussion
  - Facilitating research
  - Facilitating application of research findings
- AOB

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