IRISH CATTLE BREEDING FEDERATION

ICBF Beef & Dairy Industry Meetings.

Killeshin Hotel, Portlaoise.
7th September.

Transforming Ireland

Agenda.

Dairy breeding only (10 AM – 11 AM).

1. Genomics update - Donagh
2. G€N€ IR€LAND Dairy Update – Andrew
3. AOB

Dairy & beef breeding (11 AM – 3.30 PM).

1. Update on Actions
2. Meeting Schedule
3. Cost:benefit analysis – Peter Amer & Andrew

Break for lunch.

Dairy & beef breeding – Continued.

4. Beef breeding plan – ICBF team
   a. Birth weights - Andrew.
   b. Weight recording - Pat.
   c. Data quality index – Andrew.
   d. G€N€ IR€LAND - Andrew.
   e. Tully - Stephen.
   f. Stock bull evaluation – Peter.
   g. Economic indexes & presentation of indexes - Peter.
5. AOB

Beef breeding only (4.00 PM – 4.30 PM).

1. Maternal traits (milk & fertility) – Andrew.
2. Genomics update – Donagh
3. AOB

(International) developments in genomics in dairying

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Overview

1. Update on recent research and operational system developments
2. Update on performance of genomic selection in Ireland
3. International views from INTERBULL
4. Research plans

ICBF Genomics database

- Database now built by ICBF & being tested
  - ~11k genotypes (50% from IRE & 50% international)
  - Web interface -> request ->script -> extract ->ftp
- Access control
  - Owner of genotypes defines who has access
  - By chip type * breed * country
  - For example, parentage SNP's (ALL), 50k (country 1 only), HD chips (country 1 & country 2)

Performance

- Rapid download.
- 3K & 50K = <1 sec.
- File of genotypes – 13 HD = <1 min
- View at: Vimeo.com/28201884

Conclusions - database

- System being tested internationally

Is genomic selection working?

- G€N€ IR€LAND progeny test bulls
- 69 bulls tested over 2 years
- Comparison
  - Parent average proof in 2005/2006
  - GS proof in 2009/2010
  - Actual progeny test proof in 2011

Mean Bias in Proofs

	Parent Ave 2005/2006	Genomic 2009/2010	Progeny 2011
Protein kg (Gen SD = 6.20)			
Group average (kg)	11.1	10.6	8.1
Group average reliability (%)	37.1	56.8	89.8
Daughters/herds	0/0	0/0	81/54
CI Days (Gen SD = 3.61)			
Group average (days)	-2.0	-2.6	-3.2
Group average reliability (%)	15	41.4	55.6
Daughters/herds	0/0	0/0	81/54
EBI (Gen SD = €74.0)			
Group average (€/lact)	€108.5	€129.4	€116.6
Group average reliability (%)	27.2	51.9	75.8
Daughters/herds	0/0	0/0	81/54

Cromie et al., (2011) INTERBULL

Correlation in proofs

	Parent Ave 2005/2006	Genomic 2009/2010	Progeny 2011
Protein kg			
Parent Average	1.00	0.846	0.631
Genomics		1.00	0.698
Progeny			1.00
CI Days			
Parent Average	1.00	0.772	0.554
Genomics		1.00	0.651
Progeny			1.00
EBI			
Parent Average	1.00	0.372	0.186
Genomics		1.00	0.517
Progeny			1.00

Cromie et al., (2011) INTERBULL

International experiences from INTERULL

- Ireland successfully passed INTERBULL validation test for genomic selection
- Bias (inflation) still exists in many populations and of concern

One-step genomic selection

- Currently we estimated direct genomic values and blend with parental average
  - Two-step approach
- Possible to do in "one-step"
  - Advantages:
    - Non-genotyped relatives receive benefit
    - Reduces bias
    - Accounts for selection

Irish software developments

- Considerable computing power required
- Overhaul of software
  - Handle larger datasets and larger SNP chips
  - More user-friendly
  - Multi-breed (Holstein v Friesian)
- Testing well underway

Prediction bias

- Tendency in Ireland and several other countries for genomic proofs to overestimate (i.e., bias) proofs
- In Ireland: underestimate high bulls and overestimate low bulls
- Several options available and under consideration

Conclusions – Genomics

- Genomic predictions are better than parent average
  - Still not 100% accurate of course!
- Positioning ourselves for increasing quantities of data (SNPs & animals)
- Prioritise research on bias of proofs

Imputation

Slide from July 2011 on SNPchips

Currently 54,001 SNPs

New version 54,609 SNPs

50k chip

~~2,900 SNPs~~

~~*3k chip*~~

~790,000 SNPs

HD chip

High Density chip

Slide from July 2011 on SNPchips

Currently 54,001 SNPs

New version 54,609 SNPs

50k chip

6,909 SNPs

BovineLD

"6k chip"

777,962 SNPs

HD chip

High Density chip

Slide from July 2011 on SNPchips

Currently 54,001 SNPs

New version 54,609 SNPs

50k chip

6,909 SNPs

BovineLD

"6k chip"

Imputation

Imputation – also copied from July 2011

Sire

…..TCACCGCTGAG…..

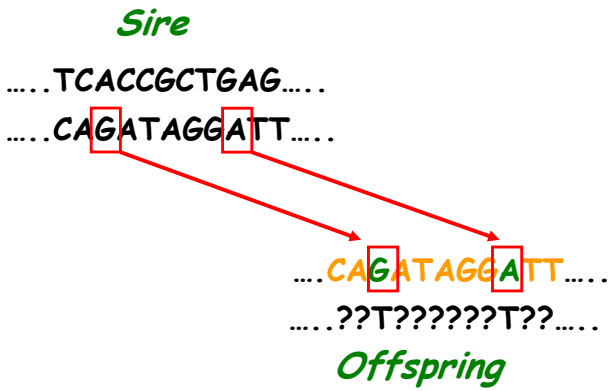
…..CAGATAGGATT…..

…..??G?????A??….

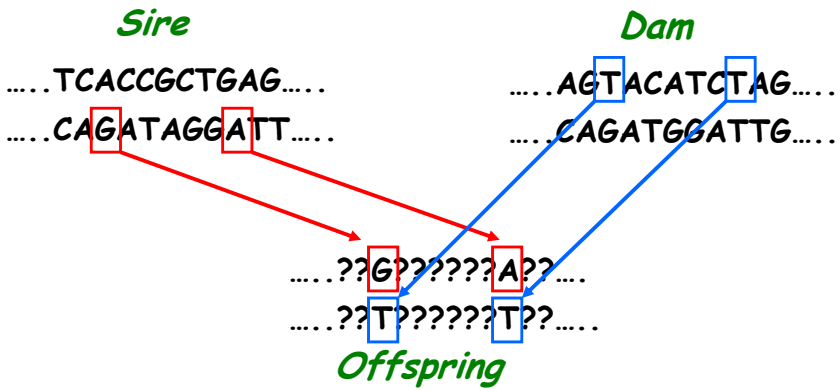
…..??T??????T??…..

Offspring

Imputation – also copied from July 2011



Imputation – also copied from July 2011



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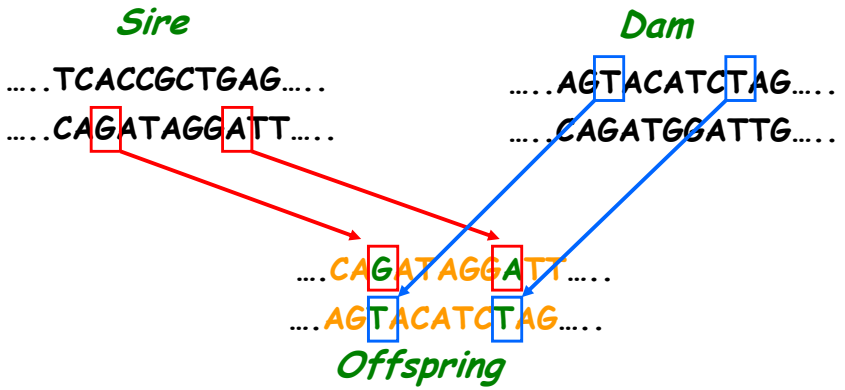

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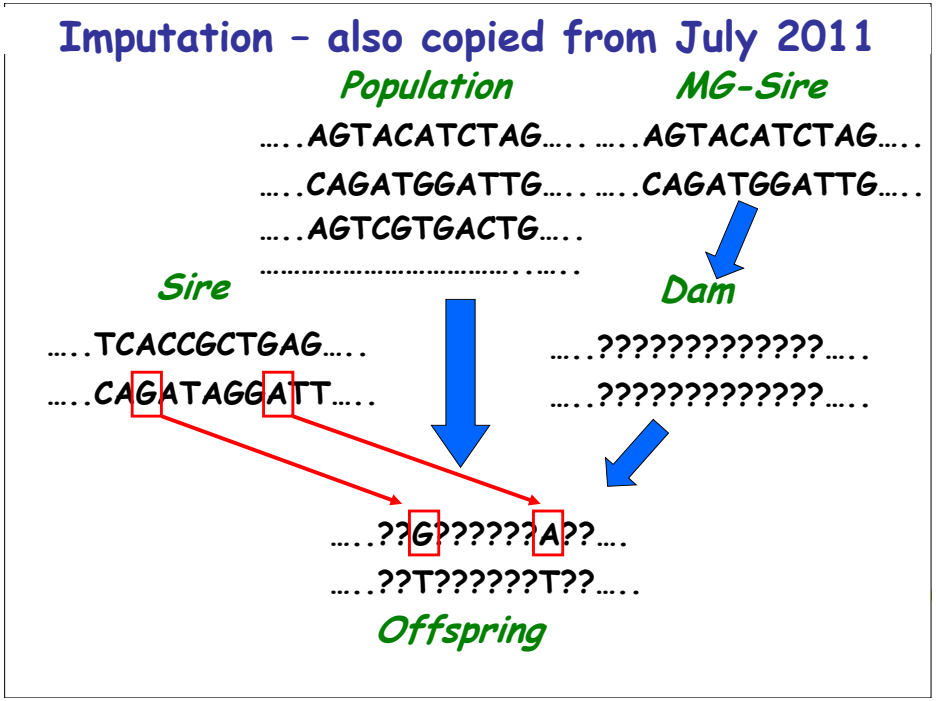

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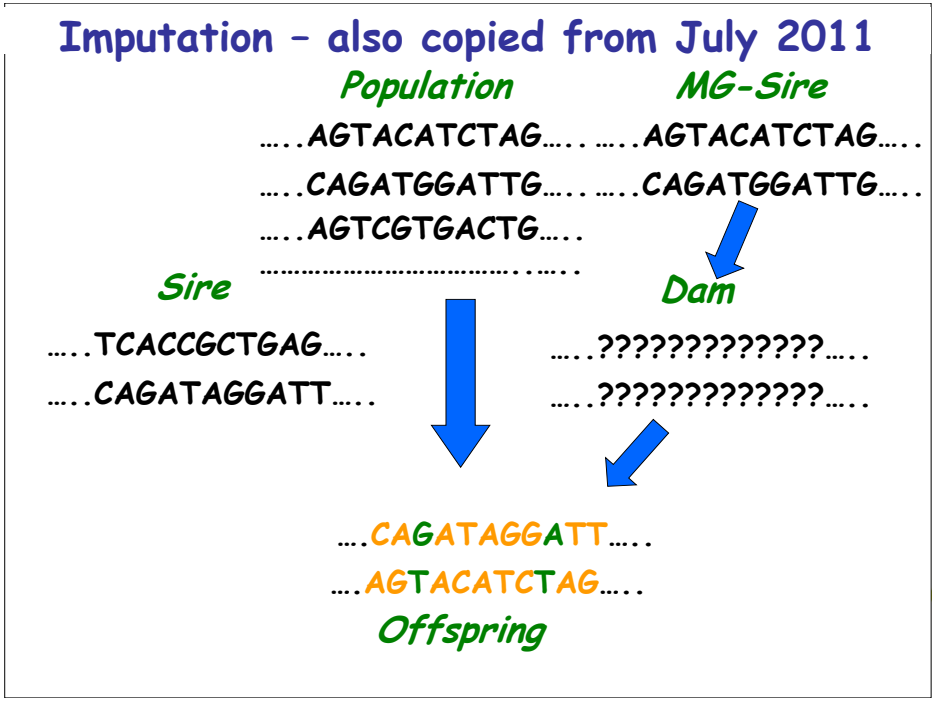
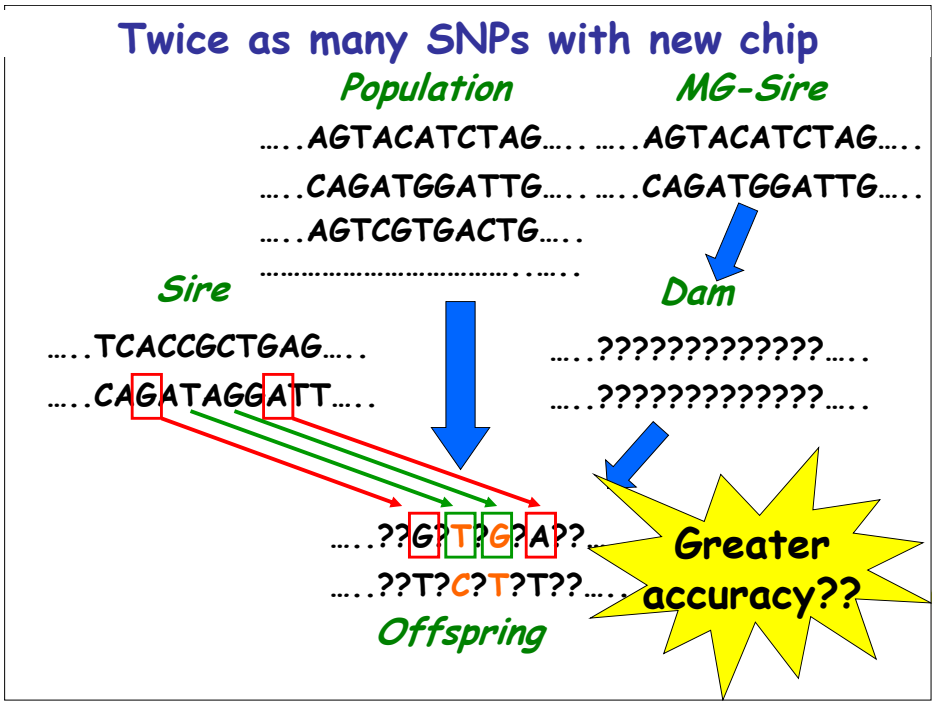


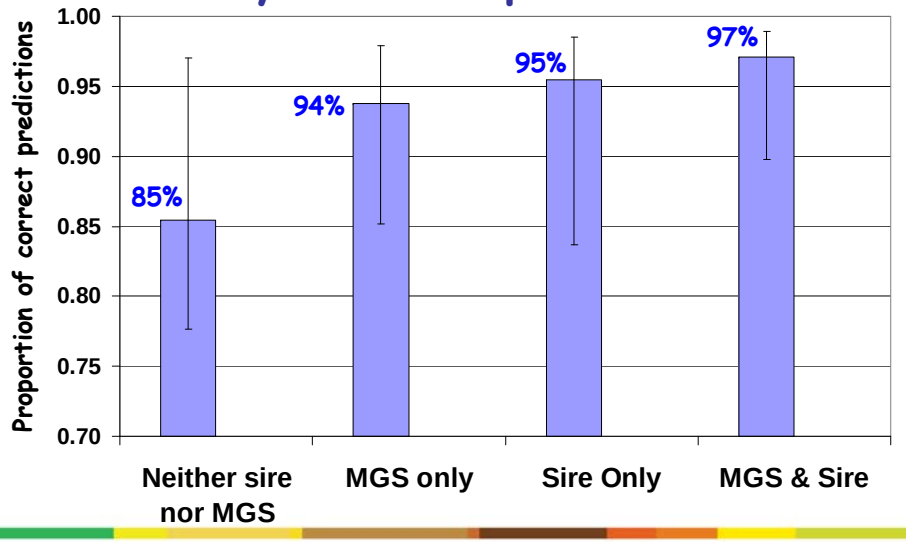
Twice as many SNPs with new chip



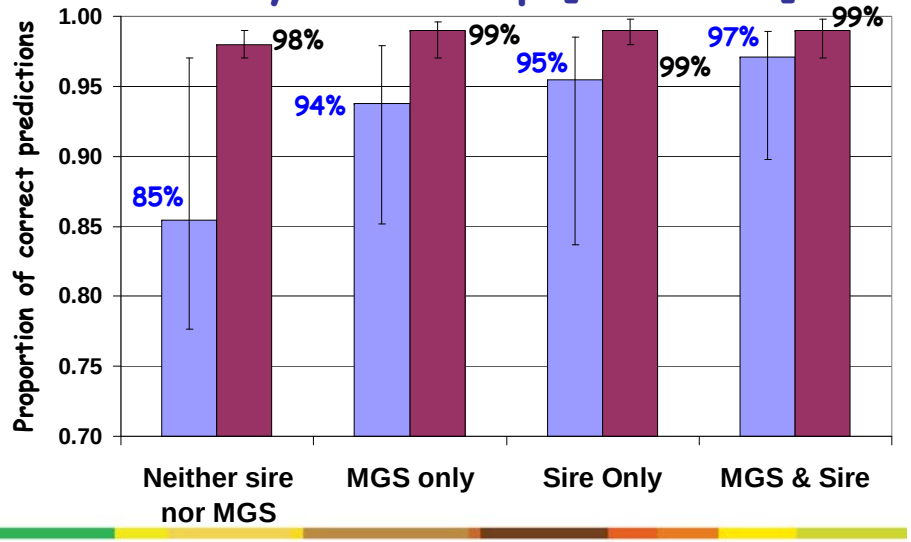
Testing – more copying from Nov 2011

- 5,496 animals with genotypes on 54,000 SNPs
- 764 animals born since 2006 assumed to be genotyped only on smaller ~~3,000~~ 6,909 SNP chip
- Had their 54,000 genotypes so knew the "answer"

Accuracy of 3k chip – Nov 2011



Accuracy of 6k chip [Red bars]



Imputation experiences from INTERBULL

- Beagle (what Ireland uses) appears to be the most accurate software but takes the longest
  - Irish genotyped population size is still relatively small
  - Computing capacity in Ireland is good
  - Can upscale to higher density chips
  - Following up on a few tips on how to run faster
- Unlike Ireland no restriction on existence of back pedigree when imputing

Imputation accuracies from INTERBULL

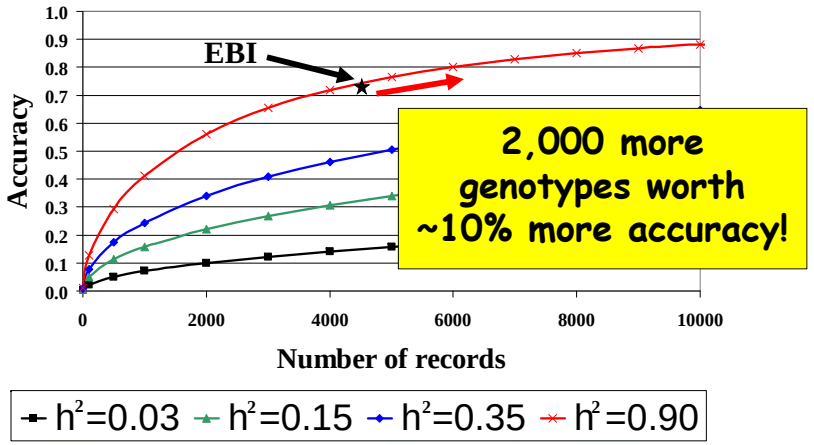
Genotyped	Ireland	Switz_BSW	Switz_MIX	Canada_BSW	Canada_HOL	France (dairy)	Germany
Both parents				0.95 to 0.99	0.95 to 0.99		
Sire & MGS	0.97	0.94	0.93	0.93 to 0.95	0.95 to 0.96		
Sire only	0.95	0.92	0.96		0.95 to 0.96		
MGS only				0.74 to 0.92	0.87 to 0.92		`+0.01
Neither sire/MGS	0.85	0.87	0.83				
Average	0.92	0.91	0.91	0.92	0.95	0.97	0.95 to 0.98

Conclusions - imputation

- Greater accuracy of imputation with newer chip
  - No difference in cost
- Uses Infinium not GoldenGate technology so better call rates and easier for lab
- Software we use is (in my opinion) the best and no immediate need to consider changing
- If animal >50% Holstein consider removing restriction on sire to be genotyped

Still need more genotypes!

Training population size



International training populations

Country	Size
Ireland	4,500 (milk)
UK	11,480
Eurogenomics	14,385
North America	~10,000
New Zealand (HOL)	2290
Australia	2193

Continued international sharing

- IGenoP now operational and being tested
- New genotypes:
  - Australia, Belgium, New Zealand….
  - Still lots of stock bulls

Concluding remarks

- Higher density chip does not add much accuracy of within breed genomics
- International genomic evaluations (GMACE) still have, in my opinion, issues that need to be resolved
- Calculation of reliability

Concluding remarks

- Need to consider moving parentage testing from micro-satellites to SNPs
- Advantages:
  - Internationally this is where we are going so it's just a question of when do we jump
  - Avoids double cost of parentage + genomic selection
- Disadvantages:
  - Need to genotype back-pedigree for SNPs (data already available for many bulls and parentage SNPs likely to be available on many more bulls internationally)

Overall conclusions

- Genomic selection is working
- Ireland in line with international approaches and results
- Still considerable room for improvement

IRISH CATTLE BREEDING FEDERATION

G€N€ IR€LAND – Dairy.

Killeshin Hotel, Portlaoise.
7th September.

NDP National Development Plan Transforming Ireland

G€N€ IR€LAND – Dairy.

- Elite bull mothers.
  - Inseminations from Spring 2011.
- Next Generation Herds.
  - Update on proposition.
- Bull breeding herds.
  - Project for Spring 2011.

Elite Bull Mothers – Recap.

- Objective: How do we generate more high EBI "out-cross" calves for G€N€ IR€LAND breeding program?
  - Avoiding the Oman effect.
- Project group established in Dec 09.
  - ICBF, Teagasc, bull breeders & AI companies.
  - April 2010. Suggested mating sent to 2267 high EBI & outcross bull mothers.
  - November 2010. 1253 of these cows alive, with recorded inseminations, 315 of which were to the suggested bull, 267 with last insem (21%).

Elite Bull Mothers – 2011.

- How can we improve uptake in program?
  - Earlier communication with bull breeders.
- Feb 2011. Letters sent to 3,412 cows.
- Sept 2011. 1727 of these cows alive, with recorded inseminations, 342 of which were to the suggested bull, 285 with last insemination (17%).
  - Ahead of last year – more recorded insems.
  - Big push on DIY herds in next few weeks. Expect a further 100-200 inseminations.
- Very positive development – limited cost.

Next generation herds.

- Proposition currently being developed with Teagasc.
- Objectives of proposition.
  - Difficult to measure traits, e.g., GHG.
  - Development of EBI.
  - Ensure compatibility between "future cow" & "future production system".
  - High EBI males for G€N€ IR€LAND.
- Good progress. Objective of having first herd in place by end of year.
- Discussion underway re: additional herds.

Bull Breeding Herds - Project

- Objective: how can we make genotyping a routine part of rearing dairy herd replacements?
  - Valuable data for future research & training (all animals genotyped + phenotypes=more accurate predictions).
  - High EBI females for G€N€ IR€LAND.
- Recent developments.
  - New 6k chip = higher imputation accuracy.
  - Volume discounts from Ilumina.

Bull Breeding Herds - Project

- Recent developments (continued).
  - BVD scheme in 2012, based on tissue tag.
  - Lower than budgeted spend on current G€N€ IR€LAND (incentives) = some additional capital.
- Project commencing in Autumn to target ~500 bull breeding herds.
  - Genotype all female calves in 2012, using new tissue tag.
    - Genomic EBI, BVD test, parentage verification.
  - Introductory offer = €20/calf (target).
  - Test & develop internal system for anticipated increased uptake in future.

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Update on Actions

Item	Description	Action
1	Maternal Weaning Wt. Evaluation	Continue testing
2	Beef Fertility	Continue testing
3	Missing factory data (raised by Laurie Harney - 18th August)	Under investigation
4	Beef Indexes	Progress report this meeting. Feedback from industry awaited.
5	Stock Bull evaluation	Progress report this meeting
6	Beef bulls for dairy cows	Report to next meeting
7	Dairy linear evaluations	Under action joinlty ICBF, Teagasc, UCD.

Meeting Schedule

No.	Date	Meeting
2	Tuesday 1st Nov 2011	Herd Book Technical
3	Thursday 17th Nov 2011	Breeding Consultation
4	Tuesday 28th Feb 2012	Herd Book Technical
5	Wednesday 14th Mar 2012	Breeding Consultation
6	Wednesday 27th Jun 2012	Herd Book Technical
7	Wednesday 11th July 2012	Breeding Consultation
8	Wednesday 22nd Aug 2012	Herd Book Technical
9	Wednesday 12th Sept 2012	Breeding Consultation
10	Wednesday 31st Oct 2012	Herd Book Technical
11	Wednesday 14th Nov 2012	Breeding Consultation

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COST BENEFIT ANALYSIS OF NEW BEEF GENETIC IMPROVEMENT INITIATIVES

Peter Amer

Background

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- ICBF Beef Breeding Review (June 2011)
- Harvest 2020 Beef Activation Group
- Tully
  - performance test >>>> progeny test
  - meat quality and health traits
- Relationships with pedigree breeders
  - Linear scoring
  - Weight recording service
  - Quality control
- Capturing high merit stock bulls for genetic improvement

Where are we now?

- **Genetic trend well below potential**

Improving merit of stock bulls

	SBV increase on previous birth year	
Breed	2007	2008
AA	2.1	3.7
CH	2.9	3.2
HE	3.9	1.2
LM	2.8	5.6
SI	1.3	1.2
Average	**2.6**	**3.0**

Potential is 7 euro plus

Where are we now?

- Genetic trend well below potential
- **Maternal traits are deteriorating**

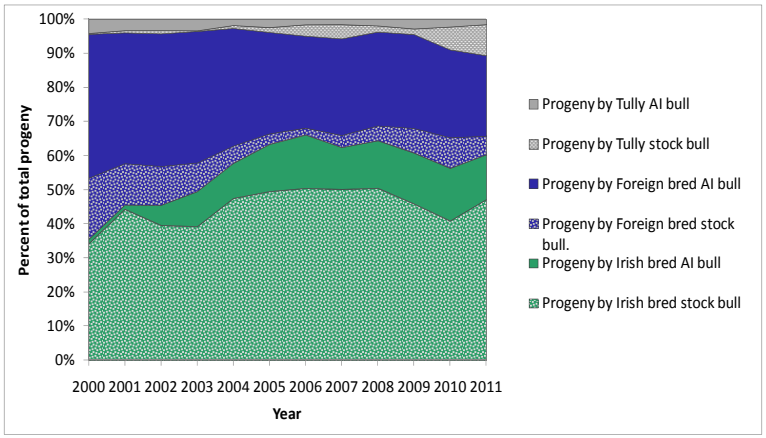
Fertility of suckler cows

	2006	2007	2008	2009	2010	2011
Calves per cow per year	0.82	0.86	0.81	0.81	0.80	0.79
Calving Interval days	399	399	398	399	406	407
Age at first calving	30.5	31.2	31.0	31.4	32.0	32.5
% heifers calved at 22-26 mths						12%

Where are we now?

- Genetic trend well below (20%) potential
- Maternal traits are deteriorating
- **Ineffective use of Tully**

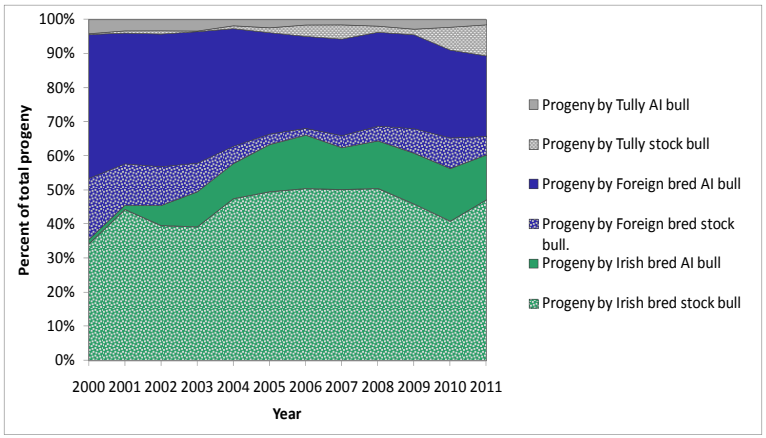
Origin of pedigree herd sires



Where are we now?

- Genetic trend well below (20%) potential
- Maternal traits are deteriorating
- Ineffective use of Tully
- **Major influence of French bulls as sires of stock bulls**

Origin of pedigree herd sires



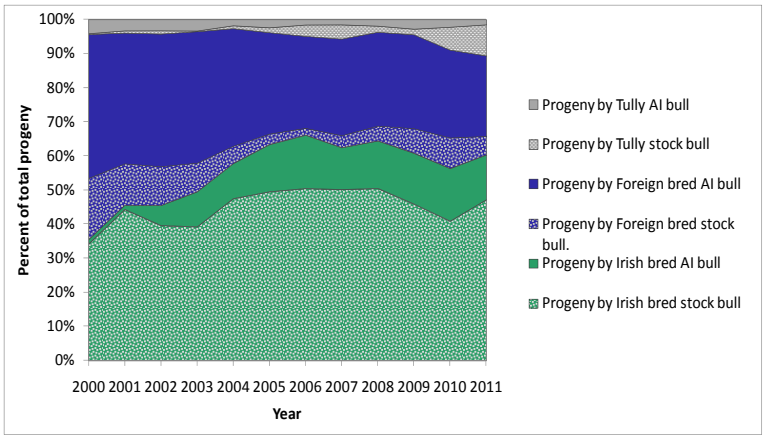
Origin of ped herd sires

	Country of origin of stock bull's sire (% of all sire origins)			
Breed	Ireland	France	Great Britain	Other
AA	61	0	5	29
CH	34	46	0	20
HE	78	0	2	16
LM	34	45	1	21
SI	76	0	3	21

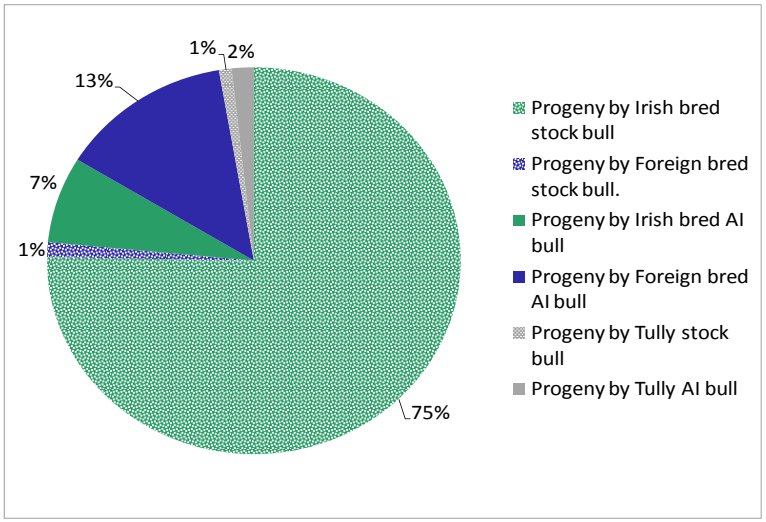
Where are we now?

- Genetic trend well below (20%) potential
- Maternal traits are deteriorating
- Ineffective use of Tully
- Major influence of French bulls as sires of stock bulls
- **Limited use of AI**

Origin of pedigree herd sires



Commercial herd sires



Gene Ireland progeny testing

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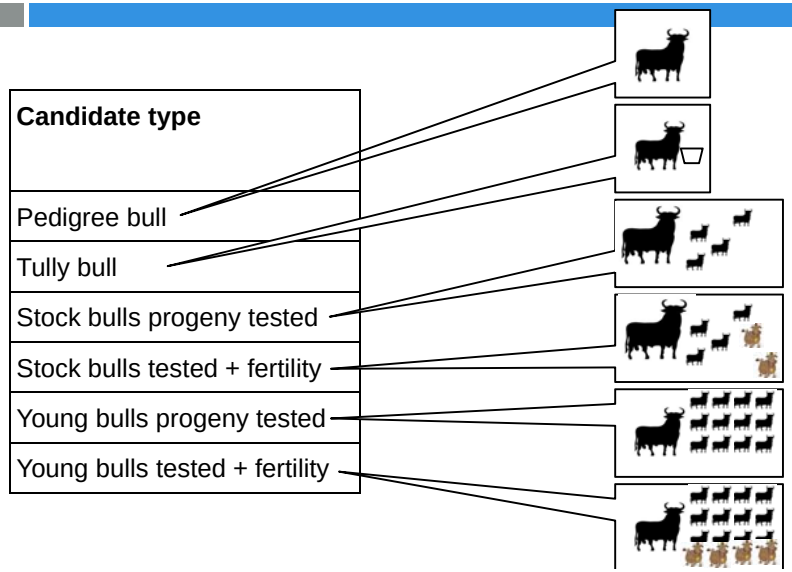

Gene Ireland progeny testing

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Candidate type	Annual progress
Pedigree bull	4.67
Tully bull	4.68
Stock bulls progeny tested	5.62
Stock bulls tested + fertility	5.17
Young bulls progeny tested	7.62
Young bulls tested + fertility	7.06

Need short generation interval (4yo sires versus 8yo now)

Need lots of bulls tested (20:1)

Tully

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- John Crowley PhD - new data
- Current performance test approach is very expensive with limited impact

Candidate type	Annual progress	Double wt on feed intake
Pedigree bull	4.67	+0.15
Tully bull	4.68	+0.16

Tully

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- Current performance test approach is very expensive with limited impact
- **Progeny testing**
  - **Easier fit with Gene Ireland strategy**
  - **Modest value from feed recording**
  - **Add on Meat Quality**
  - **Add on Health trait testing**
  - **Better phenotypes for genomic selection**

Tully

- Current performance test approach is very expensive with limited impact
- Progeny testing
  - Easier fit with Gene Ireland strategy
  - Modest value from feed recording
  - Add on Meat Quality
  - Add on Health trait testing
  - Better phenotypes for genomic selection
- **Key to industry <u>confidence</u> in beef breeding**

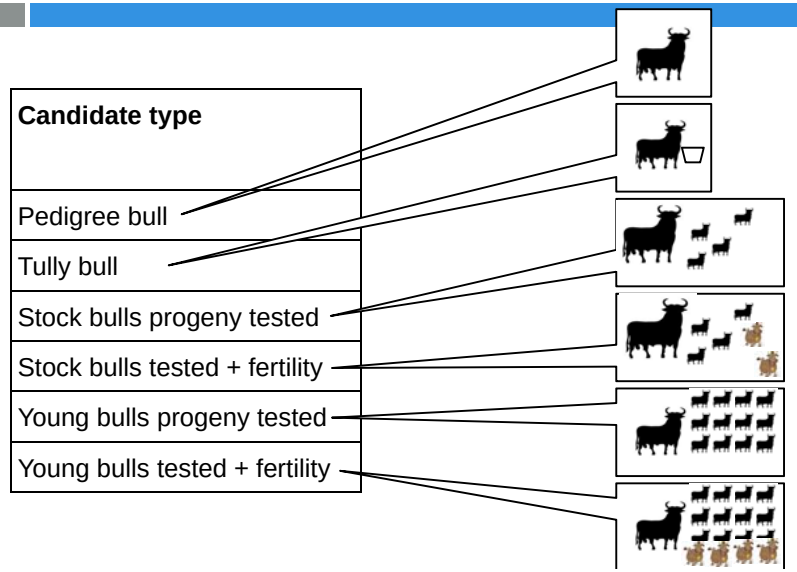
On farm recording

- On farm recording most critical for stock bull selection
  - 50% of pedigree
  - 75% of commercial
- More weight recording is needed on pedigree farms
- Live weight recording >>>growth rate, maternal milk
- Linear scores>>>conformation....functionality?

Value of farm recording

	Annual SBV response €	Results as absolute deviation from base scenario	
Candidate type	**Base scenario**	Drop linear scores and weights	Drop linear scoring
Pedigree bull	**4.67**	-2.22	-0.25
Tully bull	**4.68**	-2.22	-0.24
Stock bulls progeny tested	**5.62**	-1.11	-0.16
Stock bulls tested + fertility	**5.17**	-0.57	-0.03
Young bulls progeny tested	**7.62**	-1.01	-0.12
Young bulls tested + fertility	**7.06**	-0.38	0.01

Gene Ireland progeny testing



Future proofing

What if feed intake becomes more important?

		Results as absolute deviation from base scenario
Candidate type	**Base scenario**	Weighting on RFI +50%
Pedigree bull	**4.67**	0.15
Tully bull	**4.68**	0.16
Stock bulls progeny tested	**5.62**	0.15
Stock bulls tested + fertility	**5.17**	0.17
Young bulls progeny tested	**7.62**	0.38
Young bulls tested + fertility	**7.06**	0.33

Future proofing

What if meat quality becomes an economically more important trait?

		Results as absolute deviation from base scenario	
Candidate type	**Base scenario**	MQ at 10% importance	MQ at 33% importance
Pedigree bull	**4.67**	0.03	0.43
Tully bull	**4.68**	0.03	0.43
Stock bulls progeny tested	**5.62**	0.02	0.33
Stock bulls tested + fertility	**5.17**	0.02	0.30
Young bulls progeny tested	**7.62**	0.17	2.79
Young bulls tested + fertility	**7.06**	0.16	2.50

Future proofing

What if maternal trait priorities change?

	Economic response due to maternal traits			
Candidate type	Base	Mat trait EW doubled	Mat trait EW tripled	Terminal trait focus
Pedigree bull	0.12	0.64	1.49	-0.09
Tully bull	0.12	0.66	1.52	-0.10
Stock bulls progeny tested	-0.02	0.61	1.80	-0.63
Stock bulls tested + fertility	0.01	0.73	2.00	-0.64
Young bulls progeny tested	-0.26	0.66	2.53	-1.58
Young bulls tested + fertility	0.10	1.54	3.82	-1.10

Cost of trippled EW for maternal traits is less than 20 cents if true value is double

Costs versus benefits

Rate of genetic progress in SBV increases from € 3.00 to € 3.50

€ 200k ongoing annual investment to achieve this

	Millions of Euros (cumulative)		
	PV Benefits	PV Costs	NPV
10 year horizon	€ 16.89	€ 2.71	€ 14.18
20 year horizon	€ 53.80	€ 3.89	€ 49.91
30 year horizon	€ 96.53	€ 4.54	€ 91.99

Bad data.....

- International issue!
- Reduces **confidence**
- Lost opportunity for selection in those herds
- Distortion of data in connected herds

- Data quality auditing
  - Database driven
  - Communication driver – supported improvement
  - Data filtering for genetic evaluations?
  - Identify partner herds – Gene Ireland initiatives?

Summary

- Long run industry benefits justify
  - Revamped Gene Ireland
  - Tully progeny testing for feed intake plus future proof information and options (meat qual/health/genomics)
  - Partnerships (herd books and best practice breeders)
    - More weight recording
    - Maintain linear scoring and build in functionality traits
    - Young bulls and stock bulls to progeny test
    - Stock bulls available for pedigree AI
- Depend on
  - Cost effective design
  - Good data quality
  - Positive relationships
  - **Confidence!**

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Beef breeding only (4.00 PM – 4.30 PM).

1. Maternal traits (milk & fertility) – Andrew.
2. Genomics update – Donagh
3. AOB

IRISH CATTLE BREEDING FEDERATION

Birth Weights.

Killeshin Hotel, Portlaoise.
7th September.

Transforming Ireland

Project – Birth weights (i).

- Objective: To develop a system for routine recording of birth weights.
  - Birth weights are valuable for; (i) growth rate, (ii) mature weight, and (iii) calving traits (difficulty, gestation length & mortality).
- Plans to initiate a project this Autumn.
- 20 herds * 1000 calves. 10 G€N€ IR€LAND and 10 pedigree herds.

Project – Birth weights (ii).

- Collect "actual" birth weights and 3-4 phenotypic measures (e.g., girth, height, length back, canon bone).
- Identify "best" predictors of birth weight. Develop prediction equations.
- Launch service Jan 2011.
  - Actual birth weight or "birth measurement" (database will then derive birth weight based on sex, breed, dam parity….)
  - Developing recording systems in-line with this.
- Goal: birth weights become a part of routine data recording – same as SCWS.

IRISH CATTLE BREEDING FEDERATION

New Weight Recording Project

Pat Donnellan
ICBF.

Wednesday 7th September 2011

NDP National Development Plan Transforming Ireland

Content

- Project Objective
- Weighing Service Overview
- Equipment
- New Weighing Report
- Proposal

Project Objective

To develop a sustainable national Weight Recording Service

Why?

- Currently no National System in place for collecting large numbers of on-farm weights
-
- On-Farm Weight Data has many different and important uses:

Why Weight Record?

- Maternal – Estimate milkability of Suckler Cows
- Growth – Monitor Growth rates/Animal Performance
- Management – Batch cattle based on predicted weights.
- Dairy – Hit Target weights for mating.
- Factories – Forward planning & animsl procurement.
- Research – Various Research trials require weight data.
- Data Quality – Dates of Birth & Growth Rates etc.
- Exported Weanlings – No longer 'lost' from the database.
- Genomics – Important Phenotypic data for analysis.

Weighing Service

- **Proposed Operational Plan:**

1. **Farmer weighs 3 times** (Turn-Out, Summer & Housing)
   - Own Scales
   - Discussion Group Scales
   - Contractor Scales
2. **Weights sent electronically to ICBF**
3. **Receives Herdplus Weighing Report**

Weighing Service

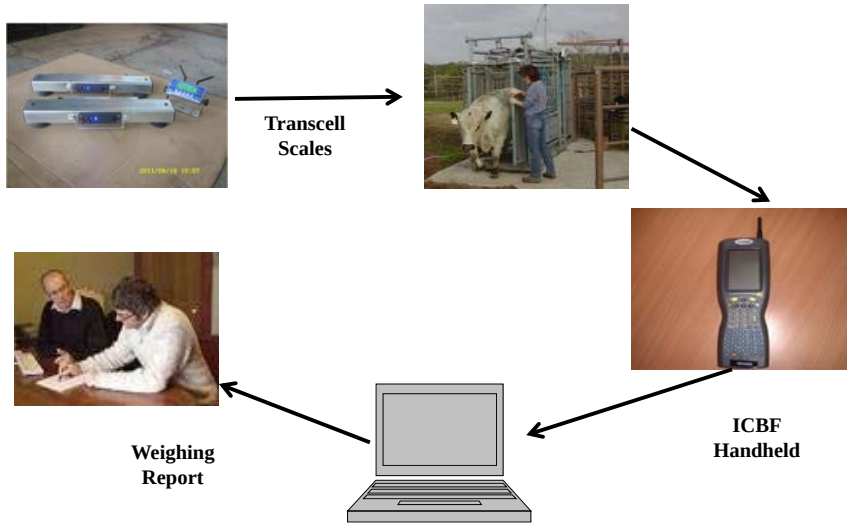
4. **Report shows:**
   - Weights & Daily Gains
   - Predicted Weights also shown*

- ***New 'Weight Predictor' software has been developed in house. (J Crowley ICBF).**
- **Weight Predictor will allow Farmers to better manage animals (target weights & dates).**

Weighing Service

1. Weigh Cells and platform are put into crush.
2. Animal gets onto scales.
3. Once steady weight is detected it is shown on indicator & sent to handheld.
4. At end of session, data is sent to ICBF database, analysed, put into a report and put up online.
5. Report can then be accessed by Herdowner showing weights, daily gains and 'Weight Predictions'.
6. Ideally – Contractor/Advisor etc would also go through report with Herdowner.

Weighing Service



Weighing Service

- **2 Elements of the Project being currently progressed:**
- **Equipment**
- **Reports**

Equipment

- **Aim is to identify weighing equipment that will:**
- **Electronically capture weights on-farm.**
  - **i.e. Weight automatically sent from scales to Handheld (Bluetooth)**
- **Be Longlasting & allow for easy setup & transport between farms.**
- **Be EID compatible.**

Equipment

- **Suitable Weighing Provider located (Transcell - USA)**

- January 2011 – Liaising with Transcell began to design Weigh Cells for Irish Spec.
- 4 Weighing Units delivered to ICBF (Aug 2011).
- Bluetooth Functionality.
- Communicates directly with Handheld.
- EID Compatible.
- Platform currently being designed.

Transcell Weighing Cells

Equipment Testing Plan

Discussion Group Test
- Discussion Group located
- 12 members
- @2000 animals

Contractor Test
- Kerry FRS
- @ 30 Herds in 30km radius
- @1200 animals

Comparison Test
- Tully
- Current Scales v Transcell Scales
- @ 100 Commercial Cattle

Equipment Testing Plan

New Weight Report

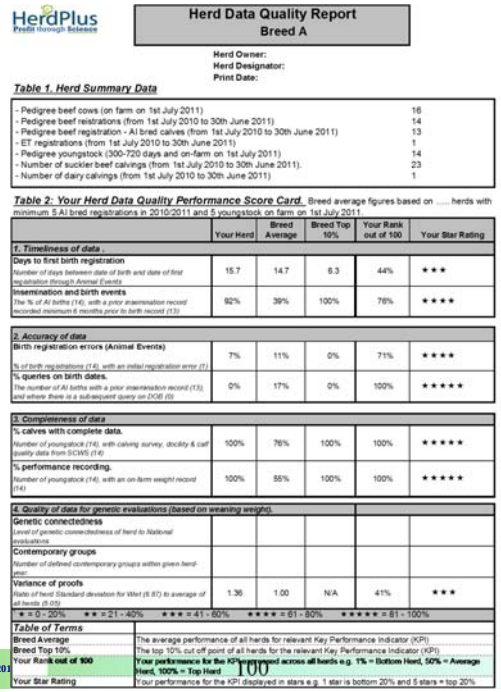
- New Report needs to be simple & easy to follow.
- New Report should include:
  - Summary Front Page
  - Simple Animal Listing including 'Weight Predictor'

Proposal

- <u>Equipment</u>
- Test out new platform & weigh cells (Sep/Oct).
- <u>Report</u>
- Finalise design for report (Sep/Oct)
- <u>Release</u>
- 'Go Live' with new system January 2011

Herd Data Quality Index.

- Objective: Tool to help breeders improve quality of data for beef breeding.
  - Timeliness.
  - Accuracy
  - Completeness.
  - Normality of distribution.
- "Voluntary" program.
- Encourage buyers to purchase bulls from herds with high data quality.
- Exclude herds with poor data quality from genetic evaluations – herds that add bias.



HerdPlus
Profit through Science

Herd Data Quality Report
Breed A

Herd Owner:
Herd Designator:
Print Date:

Table 1. Herd Summary Data

- Pedigree beef cows (on farm on 1st July 2011)	16
- Pedigree beef reistrations (from 1st July 2010 to 30th June 2011)	14
- Pedigree beef registration - AI bred calves (from 1st July 2010 to 30th June 2011)	13
- ET registrations (from 1st July 2010 to 30th June 2011)	1
- Pedigree youngstock (300-720 days and on-farm on 1st July 2011)	14
- Number of suckler beef calvings (from 1st July 2010 to 30th June 2011).	23
- Number of dairy calvings (from 1st July 2010 to 30th June 2011)	1

Table 2: Your Herd Data Quality Performance Score Card. Breed average figures based on ..... herds with minimum 5 AI bred registrations in 2010/2011 and 5 youngstock on farm on 1st July 2011.

	Your Herd	Breed Average	Breed Top 10%	Your Rank out of 100	Your Star Rating
1. Timeliness of data .					
Days to first birth registration *Number of days between date of birth and date of first registration through Animal Events*	15.7	14.7	6.3	44%	★★★
Insemination and birth events *The % of AI births (14), with a prior insemination record recorded minimum 6 months prior to birth record (13)*	92%	39%	100%	76%	★★★★
2. Accuracy of data					
Birth registration errors (Animal Events) *% of birth registrations (14), with an initial registration error (1)*	7%	11%	0%	71%	★★★★
% queries on birth dates. *The number of AI births with a prior insemination record (13), and where there is a subsequent query on DOB (0)*	0%	17%	0%	100%	★★★★★
3. Completeness of data					
% calves with complete data. *Number of youngstock (14), with calving survey, docility & calf quality data from ICWS (14)*	100%	76%	100%	100%	★★★★★
% performance recording. *Number of youngstock (14), with an on-farm weight record (14)*	100%	55%	100%	100%	★★★★★
4. Quality of data for genetic evaluations (based on weaning weight).					
Genetic connectedness *Level of genetic connectedness of herd to National evaluations*					
Contemporary groups *Number of defined contemporary groups within given herd-year.*					
Variance of proofs *Ratio of herd Standard deviation for Wwt (5.87) to average of all herds (5.05)*	1.36	1.00	N/A	41%	★★★

★ = 0 - 20% ★★ = 21 - 40% ★★★ = 41 - 60% ★★★★ = 61 - 80% ★★★★★ = 81 - 100%

Table of Terms	
Breed Average	The average performance of all herds for relevant Key Performance Indicator (KPI)
Breed Top 10%	The top 10% cut off point of all herds for the relevant Key Performance Indicator (KPI)
Your Rank out of 100	**Your performance for the KPI compared across all herds e.g. 1% = Bottom Herd, 50% = Average Herd, 100% = Top Herd**
Your Star Rating	Your performance for the KPI displayed in stars e.g. 1 star is bottom 20% and 5 stars = top 20%

Table 1. Herd Summary.

HerdPlus
Profit through Science

Herd Data Quality Report
Breed A

Herd Owner:
Herd Designator:
Print Date:

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Table 2. KPI's (i)

Table 2: Your Herd Data Quality Performance Score Card. Breed average figures based on ….. herds with minimum 5 AI bred registrations in 2010/2011 and 5 youngstock on farm on 1st July 2011.

	Your Herd	Breed Average	Breed Top 10%	Your Rank out of 100	Your Star Rating
1. Timeliness of data .					
Days to first birth registration *Number of days between date of birth and date of first registration through Animal Events*	15.7	14.7	6.3	44%	★★★
Insemination and birth events *The % of AI births (12), with a prior insemination record recorded minimum 6 months prior to birth record (13)*	92%	39%	100%	76%	★★★★
2. Accuracy of data					
Birth registration errors (Animal Events) *% of birth registrations (14), with an initial registration error (1)*	7%	11%	0%	71%	★★★★
% queries on birth dates. *The number of AI births with a prior insemination record (13), and where there is a subsequent query on DOB (0)*	0%	17%	0%	100%	★★★★★

ICBF.com

Table 2. KPI's (ii)

Table 2: Your Herd Data Quality Performance Score Card. Breed average figures based on ….. herds with minimum 5 AI bred registrations in 2010/2011 and 5 youngstock on farm on 1st July 2011.

	Your Herd	Breed Average	Breed Top 10%	Your Rank out of 100	Your Star Rating
3. Completeness of data					
% calves with complete data. *Number of youngstock (14), with calving survey, docility & calf quality data from SCWS (14)*	100%	76%	100%	100%	★★★★★
% performance recording. *Number of youngstock (14), with an on-farm weight record (14)*	100%	55%	100%	100%	★★★★★
4. Quality of data for genetic evaluations (based on weaning weight).					
Genetic connectedness *Level of genetic connectedness of herd to National evaluations*					
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* ★ = 0 - 20% ★★ = 21 - 40% ★★★ = 41 - 60% ★★★★ = 61 - 80% ★★★★★ = 81 - 100%

ICBF.com

What next?

- Continue development work.
  - Finalise list of most appropriate indicators – feedback appreciated.
    - Ongoing process, e.g., birth weights.
  - List of animals that make up KPI's – to support follow-up with breeders?
    - How do I improve the quality of my data?
  - How to handle multiple breeds & commercials?
- Finalise design, start development work. Available January 2011.

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IRISH CATTLE BREEDING FEDERATION

G€N€ IR€LAND - Beef

Killeshin Hotel, Portlaoise.
7th September.

NDP National Development Plan Transforming Ireland

Review of program.

- Amer report has identified the benefits of a well structured progeny test program.
  - Target of 100 bulls tested per annum.
  - Currently testing 10-15.
  - Potential genetic gain = €15/year (€100m to beef industry).
  - Opportunity to focus on maternal traits.
- Other benefits of progeny testing.
  - Improvement in maternal traits.
  - Data for genomics research.
  - Opportunity to become an "exporter" rather than an importer of genetics – genomics and international beef evaluations.
- What are the blockages and how do we overcome?
  - Herds, bulls, structures……

(i) G€N€ IR€LAND - Herds

	2007	2008	2009	2010	2011 Todate
Herds involved in the program	146	468	726	491	254
Straws dispatched	2,920	7,956	12,342	8,860	4,297
Straws/herd	20	17	17	18	17
Bull equivalents tested	4.2	11.4	18	12.6	6

- Peaked in 2009 – incentive + bulls.
- ~500 herds in 2011.

Do we have the herd capacity?

- Yes, 927 herds across 5 years of program.
- Based on 2010/2011 calving data.
  - 37,886 beef cows.
  - 33,164 births.
  - 17,665 AI bred
  - 6,363 maternal replacements.
- Capacity to test 50 bulls/year in these herds alone.
  - Assuming 100 females per bull. Drop to 50 daughters = 100 bulls.

Do we have the bulls?

- Yes. For example, Limousin breed = 15.9k stock bulls currently on farm

	All Bulls		Potential G€N€ IR€LAND 5 Stars SBV & 3 stars M&F	
	Number	SBV	Number	SBV
Young bulls (0-12 mths)	3469	€76.6	623	€102
Older bulls (>= 5 daughters)	645	€57	57	€109

- Opportunity to focus on these 2 groups of bulls – increased genetic gain

What is the process?

- Simplified approach.
  - Past = Young bulls -> Tully -> AI station.
  - Future = Bulls (young & old) -> AI station.
- Identify elite animals for breeding program.
  - ICBF working closely with bull breeders, breed society & partner AI companies.
  - Lists of young bulls, old bulls & females.
  - Target herds & animals.
  - Select animals for program.

What is the process?

- Collect semen.
  - Contracted AI centres
  - Semen for progeny test, bull owner & breeding program (sires of sons).
  - Ownership & royalty arrangements.
- Distribute semen to G€N€ IR€LAND progeny test.
  - Collect data, generate indexes and identify exceptional bulls for breeding sires of sons.

Partnership approach.

- G€N€ IR€LAND launched in 2007.
- Systems and structures are in place.
- Herds & bulls are available.
- Need all partners to be involved to realise €100 m potential gain.
  - ICBF, breeders, herdbooks, AI companies…..

What next?

- Establish if there is industry support for proposition.
  - Benefits; gain, maternal, genomics….world leaders.
- Develop funding plan to support the program.
  - Short-term = to kick-start.
  - Long-term = to ensure a sustainable model.

IRISH CATTLE BREEDING FEDERATION

Tully & GENE IRELAND®
Breeding future Profits

Update on the future role of Tully

Stephen Conroy, ICBF

7th September 2011

Background

- Beef breeding review underway
- Tully
  - Cost/benefit analysis of beef genetic improvements options for Tully
- Review outcome:
  - Commercial animals most viable option going forward

Objectives

Transfer of Tully from bull performance testing centre to testing commercial progeny

Selection Process

- Capacity for 250 animal per intake at present
- Initial selection: (database)
  - Progeny from G€N€ IR€LAND bulls
  - Based on age (gender)
  - Bulls (n = 100)
  - Sire & MGS recorded
- Further selection: (on-farm)
  - Based on weight & health
- Additional selection criteria:
  - 10-15 progeny per sire
  - Higher numbers for recording female fertility traits
  - Adequate semen availability

Progeny available

Name of Bull	Finished G.I program	Progeny born Nov/Dec 2010	**M** Progeny born Nov/Dec 2010	**F** Progeny born Nov/Dec 2010	Breed
Rawburn Lord Rocket	Feb-10	53	28	25	AA
Courtwood Aidan	Dec-09	13	8	5	BA
Sauveur de Monin Chapelle	Jan-10	39	20	19	BB
Evergreen Chestnut	Feb-10	51	29	22	BB
Cottstown Brendan	Nov-09	56	24	32	CH
Celtic Vichy	Feb-10	13	8	5	CH
Chouchou	Feb-10	58	27	31	LM
Milbrook Dartangan	Jan-10	64	32	32	LM
Kyle Chap	Jan-10	31	15	16	PT
Ballymackeogh Hugh	Mar-11	31	16	15	SA
Creaga Dice	Jul-10	28	14	14	SH
Raceview Van Halen	Nov-09	46	22	24	SI
Hillcrest Sylvester	May-10	13	5	8	SI
Total		496	248	248	

Purchasing of animals

- Purchasing Information:
  - Displayed on the ICBF website
  - Based on market value for 5 star progeny
  - Updated every week
  - Minimum of 3 animals per farm
  - Work with group of 25-35 herds initially
  - Subject to parentage testing for sire

Selection Process

- Suggested dates:
  - 10th Oct: Contact farmers with eligible animals
  - 18th October: Start on-farm purchasing/inspections
  - 15th November: Start adaptation period at Tully
  - 1st December: Start performance test
  - 28th February 2011: Finish performance test

Management

- Health:
  - IBR, BVD, RSV, PI3, Pasteurella, Blackleg & other clostridia diseases
  - Export T.B test – on-farm
- Diet:
  - Standard commercial diet to include roughage

Future Work

- Develop standard commercial diet
- Health traits
  - Immune responses, lameness
- Meat quality traits (colour, pH, tenderness, taste)
  - Further investigation & collaboration
- Feeding systems
  - Evaluating these at present

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STOCK BULL PERFORMANCE

Peter Amer

Background

- ICBF database is a potentially rich source of information about stock bulls...
- e.g. Are some AI bulls consistently leaving stock bulls with short working lives?
- Is the overall situation deteriorating?
- Are stock bulls strong for some traits tending to have shorter or longer functional lives?

Investigating....

- Herd movements, pedigree file, breed information, breeding values
  - Herd type (dairy, pedigree, suckler)
  - Other bulls used at the same time (connectedness)
  - Exclude AI bulls
- Functional life traits
  - Number of progeny
  - Length of time from first to last progeny birth
  - Censoring (young bulls still out working look like they have short functional life)

Scoring systems

- Examples

1=progeny in calendar year
0= no progeny in calendar year

D=Dead
E=Exported
S=Slaughtered

String	Count	Value
1S/1D/1E	5770	1
11S/11D	2149	2
10S	1497	1
10	919	1
111S	809	3
11	529	2
110	448	2
110S	415	2
100	314	1
1110	264	3
100S	232	1
1100	170	2
111	125	3
1110S	110	3

Scoring systems

- Service length A
  - Number of days from conception of first progeny born until last recorded movement
- Service length B
  - Number of consecutive years in which a bull has progeny

Options

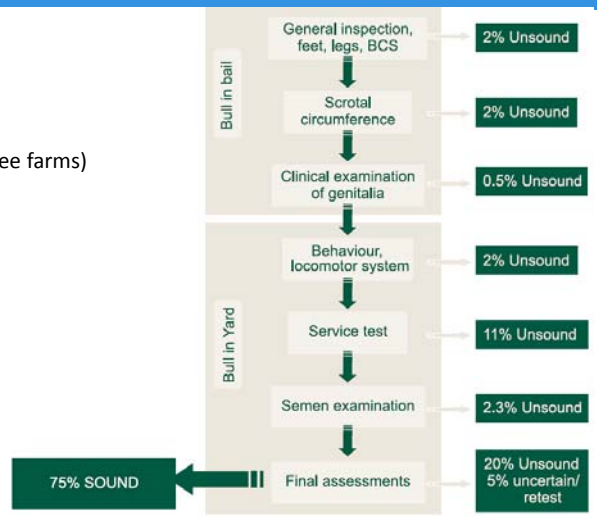
- Check for heritability
- Check for correlations with linear scores, breeding values and indexes
- Diagnostics to check trends over time
- Report to breeders on stock bull performance?

- Functionality scores

Functionality example

NZ study

415 bulls
175 young bulls (pedigree farms)
240 older bulls



BEEF INDEX ISSUES AND OPTIONS

Peter Amer

Background

- Beef indexes developed some time ago
- Many modifications
- Intentions
  - Help pedigree breeders and farmers make better selection decisions
  - Simplify complexity
  - Facilitate tactical selection (horses for courses)
- Issues
  - Sub indexes work differently to dairy and beef
  - New cut data?
  - Amount of emphasis on maternal traits?

Many purposes

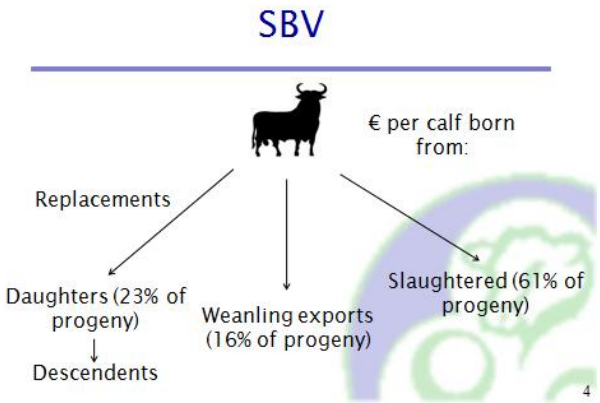
- To produce a calf for export
- Easy calving bull for heifers or dairy herd
- All round bull to produce good calves and replacements
- Stock bull to breed replacement heifers
- Others.....?

Strategically

- Small population
- Seeking to make long term improvements
- Advantage of one index for all purposes
- Strategic objective
  - Best long term industry outcome
  - Genetic exporters rather than importers

- But conflict with specific “purposes” of bull and semen buyers?

SBV and sub indexes



Currently.....

- Unfavourable trend in maternal and calving traits.....
- May get worse with current index weights (all round bull focus)

Industry trend

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Fertility of suckler cows

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	2006	2007	2008	2009	2010	2011
Calves per cow per year	0.82	0.86	0.81	0.81	0.80	0.79
Calving Interval days	399	399	398	399	406	407
Age at first calving	30.5	31.2	31.0	31.4	32.0	32.5
% heifers calved at 22-26 mths						12%

Projected.....

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Annual responses €	Ped bull	Tully bull	Stock Bull PT	Stock bull PT + daughters	Young bull PT	Young bull PT + daughters
Calving[1]	-0.89	-0.88	-0.64	-0.58	-0.42	-0.37
Maternal[1]	0.12	0.12	-0.02	0.01	-0.26	0.10
Growth[2]	4.03	4.02	4.51	4.12	5.68	5.08
RFI	0.23	0.25	0.20	0.20	0.64	0.49
Carcase yield[3]	1.18	1.18	1.57	1.43	1.99	1.76
Meat Quality	0.00	0.00	0.00	0.00	0.00	0.00
Total €/yr	4.67	4.68	5.62	5.17	7.62	7.06

Increase maternal wt

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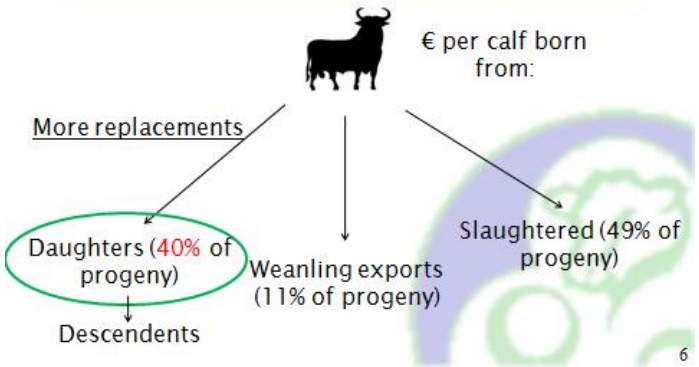
SBV Maternal



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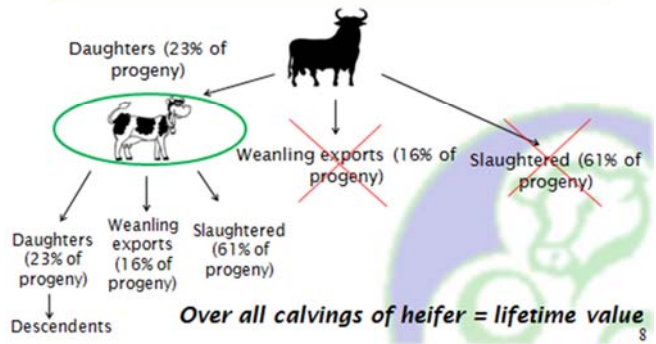
SCBV – heifer selection



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Breed ranking by index

	SBV	SBVMat	SCBV	SCBVMat
AA	12	11	5	4
AU	5	5	4	5
BA	9	12	12	12
BB	2	2	10	10
CH	3	3	11	11
HE	11	10	3	3
LM	4	4	9	9
PI	8	9	8	8
PT	6	6	6	6
SA	7	7	7	7
SH	10	8	2	1
SI	1	1	1	2

12

Adding up

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- Not all sub indexes presented
- Sub indexes don't add up to SBV
- Would a reformulation such that sub indexes add up to the SBV help understanding?
- i.e.
  - SBV=WCSI+BPSI+MSI+CSI
- Currently...
  - SBV =.16 x WCSI + .61 x BPSI + .23 MSI + other stuff

Issues

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- Cut weights – Thierry Pabiou
- More weighting on maternal traits
- What should be presented (Indexes, Sub Indexes, BVs)
- New Teagasc models
- Process needed
  - User survey
  - Test new economic values
  - ……?

Agenda.

Dairy breeding only (10 AM – 11 AM).

1. Genomics update - Donagh
2. G€N€ IR€LAND Dairy Update – Andrew
3. AOB

Dairy & beef breeding (11 AM – 3.30 PM).

1. Update on Actions
2. Meeting Schedule
3. Cost:benefit analysis – Peter Amer & Andrew

Break for lunch.

Dairy & beef breeding – Continued.

4. Beef breeding plan – ICBF team
   a. Birth weights - Andrew.
   b. Weight recording - Pat.
   c. Data quality index – Andrew.
   d. G€N€ IR€LAND - Andrew.
   e. Tully - Stephen.
   f. Stock bull evaluation – Peter.
   g. Economic indexes & presentation of indexes - Peter.
5. AOB

Beef breeding only (4.00 PM – 4.30 PM).

1. Maternal traits (milk & fertility) – Andrew.
2. Genomics update – Donagh
3. AOB

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IRISH CATTLE BREEDING FEDERATION

Maternal weaning weight evaluation

Transforming Ireland

Current evaluations

- Goal trait:
  - 150 to 300 day weaning weight
- Predictor traits
  - 300 to 600 day live-weight
  - Dairy herd milk yield
  - Foreign ebvs (France and UK)

→**Existing evaluation has weaknesses**

- **Unable to correctly pull out breed effects: UK estimates used from paper of Roughsedge (2001)**
- **Bulls not lining up with expectation or compared to foreign data**

Proposal

- **Increase reliability and relevance of trait**
  - **Re-definition of the pertinent trait**
  - **Including predictor traits**
    - **Other weight data available**
    - **cow milkability score**
    - **Other traits?**
  - **Exploiting information on the link between genetics for growth (direct effect) and genes for milk (maternal effect)**
  - **Break up contemporary groups post 250 days into male and female to reflect on farm management practises**

When is maternal weight maternal weight?

- **Estimate contribution of direct (i.e., growth) and maternal (i.e., milk) to differences in animals across different ages**

	Heritability	
	Direct	Maternal
A 0-10	0.46	0.24
B 10-50	0.49	0.08
C 50-150	0.28	0.23
D 150-250	0.36	0.25
E 250-350	0.39	0.24
F 350-450	0.44	0.18
G 450-550	0.41	0.12
H 550-700	0.33	0.12

Starts to decline

When is maternal weight maternal weight?

- Estimate contribution of direct (i.e., growth) and maternal (i.e., milk) to differences in animals across different ages

	Heritability		Correlation
	Direct	Maternal	with milkability
A 0-10	0.46	0.24	0.16
B 10-50	0.49	0.08	0.00
C 50-150	0.28	0.23	0.24
D 150-250	0.36	0.25	0.71
E 250-350	0.39	0.24	0.35
F 350-450	0.44	0.18	0.29
G 450-550	0.41	0.12	0.56
H 550-700	0.33	0.12	0.32

h^2=0.40

Exploiting growth v milk correlation

- Irish data indicating that across breed "growth trait" and "milkiness" are generally antagonistic
- Currently no assumed genetic correlation between direct (i.e., Growth) and maternal (i.e., milk) weaning weight
- Benefit would be an increased reliability for milk in daughters based on a sires direct weaning records
  - France use -0.30; UK use -0.43
- Average of -0.51 estimated from irish data across the age groups investigated;

Test proofs

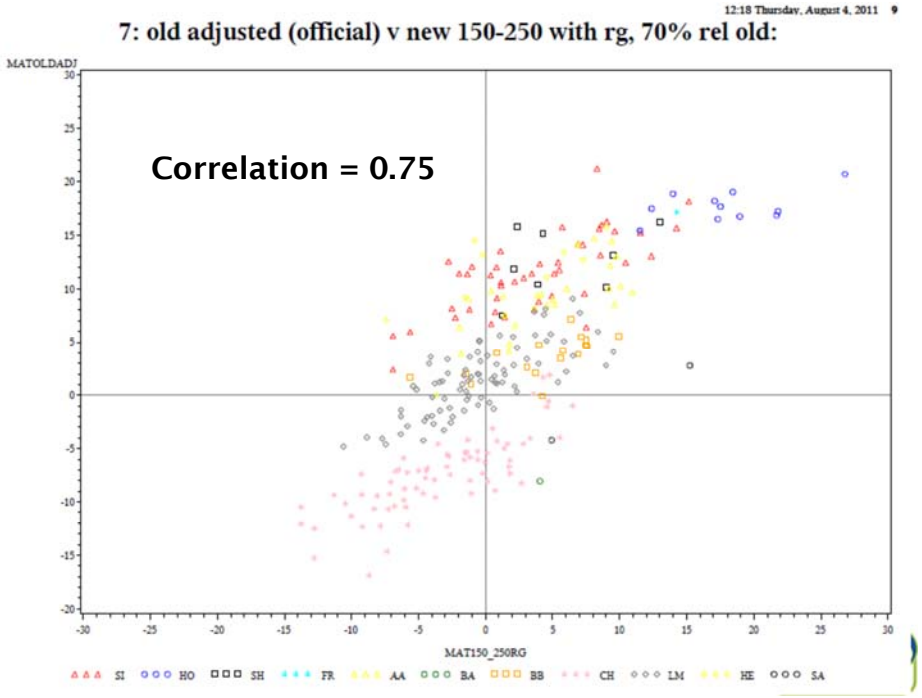
- Version 1 sent out Thursday 28th July
- Version 2 sent out 15th August
  - Addition of older weight records, CMMS file in v1 only had IE tag numbers
  - Addition of more recent weight data
  - Correction for parity of dam
  - Base corrected

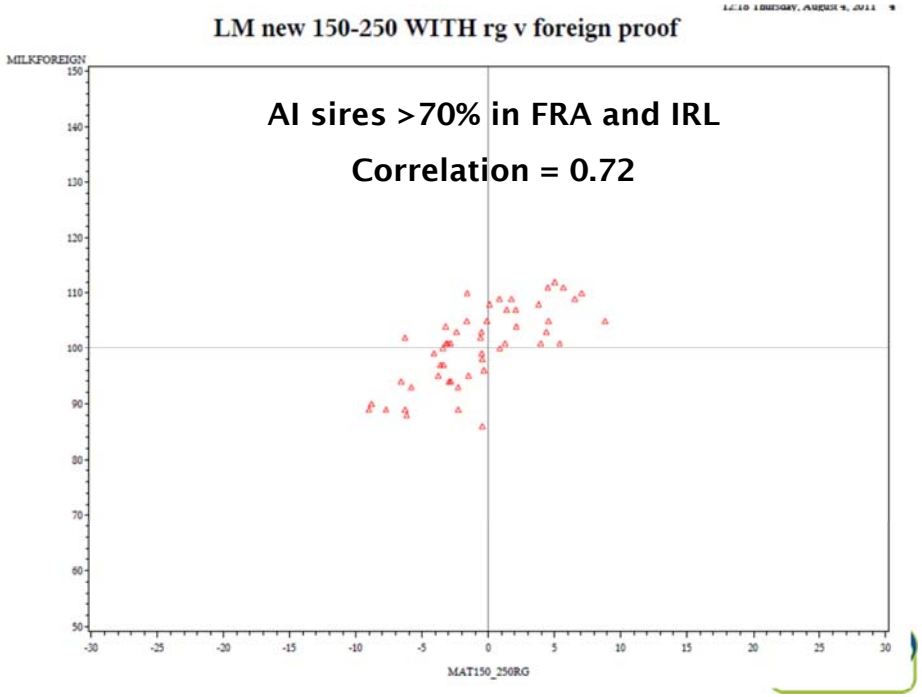
Num of records in new evaluation

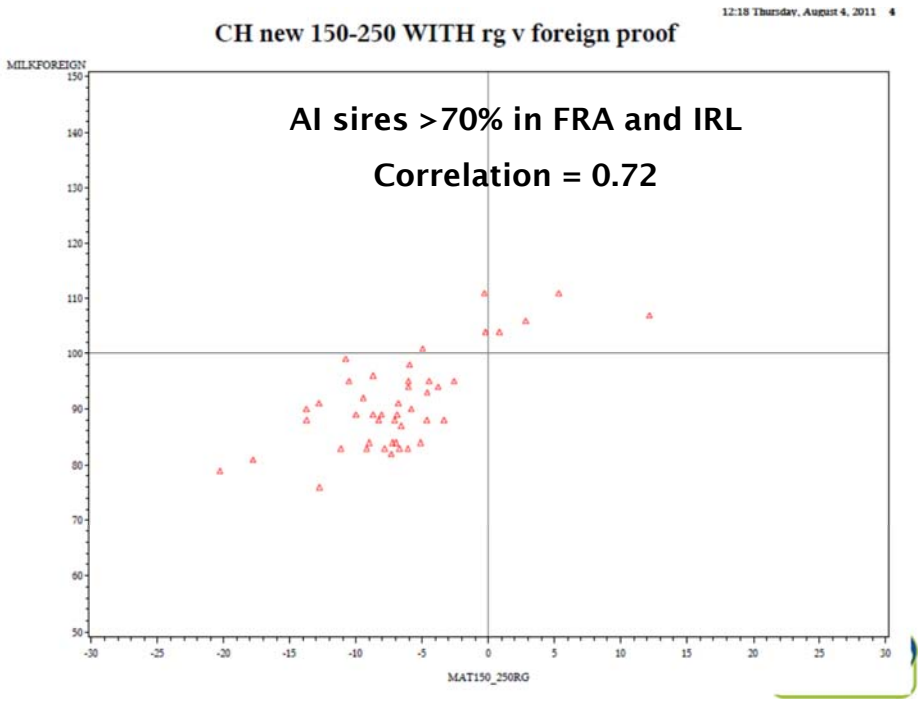
trait	animal records	num records pedigree	num records maternal grandsire	num records mgs & ped
age 0-10	94,126	88,197	88,416	85,622
age 10- 50	1,559	923	1,179	898
age 50-150	41,680	25,353	27,514	23,813
age 150-250	327,204	61,715	104,344	49,305
age 250-350	324,229	71,812	114,323	59,326
age 350-450	216,863	49,194	73,539	40,152
age 450-550	73,346	14,064	22,551	10,901
age 550-700	142,205	17,317	34,230	10,602
cow milk score	120,374	13,416		
Total	**1,341,586**	**341,991**	**466,096**	**280,619**

Weights with a MGS by birth year

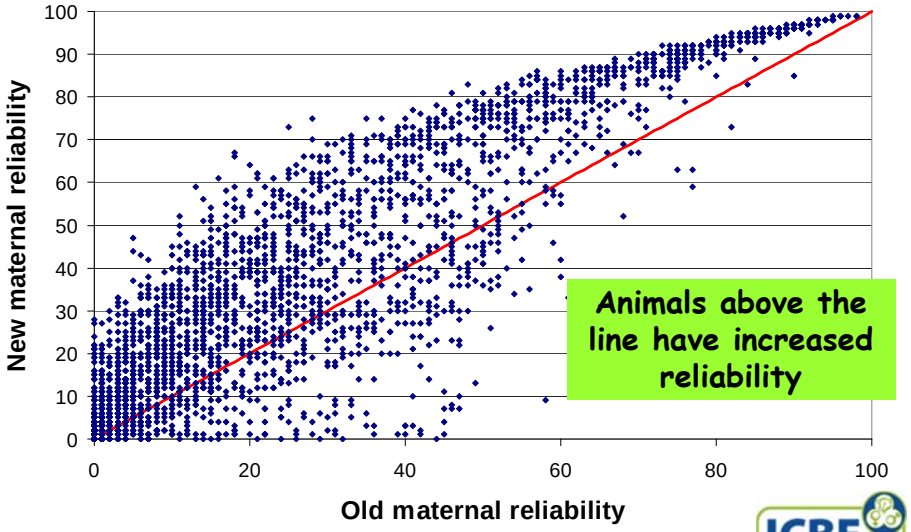
byr	Number of weight records							
	0_10 days	10_50 days	50_150 days	150_250 days	250_350 days	350_450 days	450_550 days	550_700 days
2001	11,452	95	1,814	3,773	3,360	3,150	905	576
2002	12,152	138	2,684	3,635	4,322	3,312	636	734
2003	7,251	123	1,685	2,701	2,679	2,728	711	1,113
2004	518	4	214	2,188	3,953	3,037	1,027	1,871
2005	583	27	348	3,374	4,412	4,004	1,388	2,230
2006	805	15	297	4,438	5,725	4,158	1,527	3,172
2007	815	10	395	5,896	8,476	5,861	2,288	4,242
2008	1,225	56	952	16,748	20,531	11,352	4,785	10,185
2009	1,031	79	1,273	17,210	19,993	12,487	5,069	9,324
2010	1,037	96	1,451	23,115	21,049	9,667	942	21
2011	745	211	360	373				







Old versus new maternal reliability



Feedback

- Feedback from Limousine, Simmental and Charolais societies and NCBC
- Some bulls more IN line now
- More bulls more OUT of line now

- Extreme movers:
- Bulls at extreme for direct weaning weight and with no daughters yet
  - Hit hard by genetic correlation of -0.51

Next steps

- Testing level of negative correlation between direct and maternal weaning weight
- Other predictor traits?
- Specific heterosis effects
  - CH x SI: 5% heterosis for milk
  - LM x HO: 8% heterosis for milk etc.

- Look at AI sires with 70% reliability across a range of traits

Correlations with other traits

Possible predictor Trait	*Current Milk pd*	*NEW Test Milk pd*
Weaning weight	-0.10	-0.15
Carcass weight	-0.57	-0.43
Carcass conformation	-0.49	-0.33
Carcass fat	0.51	0.35
Skeletal Composite	0.03	-0.06
Muscle Composite	-0.03	-0.22
Development of hind Quarter	-0.32	-0.24
Loin Development	-0.37	-0.36
Current Milk index		0.71

Time table

- More testing in coming weeks
- Test proofs made available at end of each iteration of testing
- Hopefully implementation in December full evaluation update
- More weight records available
- New drive to get cow milkability scores?

IRISH CATTLE BREEDING FEDERATION

Beef Fertility evaluations

Ross Evans & Donagh Berry

NDP National Development Plan Transforming Ireland

Current beef evaluations

- Parity 1 only
- Contemporary group defined within parity 1 animals (loss of data)
- Calving interval and survival in multi-trait evaluation

→Low reliability!!

Proposal – increase reliability

- **More data (i.e., more lactations and more recordings – suckler welfare scheme)**
- **Better statistical model – increase heritability**
- **Use of predictor traits**

Proposal – increase reliability

- **More data (i.e., more lactations and more recordings – suckler welfare scheme)**
  - Lactations 1 to 10
  - Redefinition of contemporary group across parities
- **Better statistical model – increase heritability**
  - Better definition of contemporary group for age at first calving
  - Repeatability model
- **Use of predictor traits (e.g., live ultrasound measures as predictors of carcass quality)**
  - We know body condition score (i.e., fat) is related to fertility so what about carcass fat?
  - Live-weight, muscularity, docility, price ……

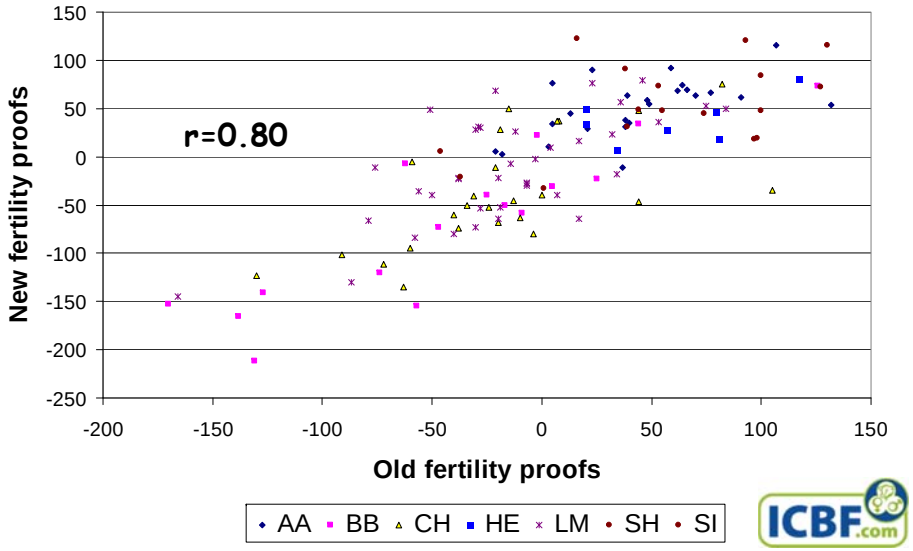
Research

1. **Increase number of lactations to 10 and re-estimate genetic parameters**
   - Fertility traits: Age at first calving, calving interval, survival, calving in the first 42 days of calving season (heifers and cows separately)
2. **Investigate potential genetic predictors of fertility**
   - Calving difficulty
   - Linear type traits
   - Cow live-weight, price, and carcass weight, conformation and fat
   - Progeny live-weight, price, and carcass weight, conformation and fat
   - Farmer scored weanling quality and docility
- **8 months computing time – large dataset to get good estimates**

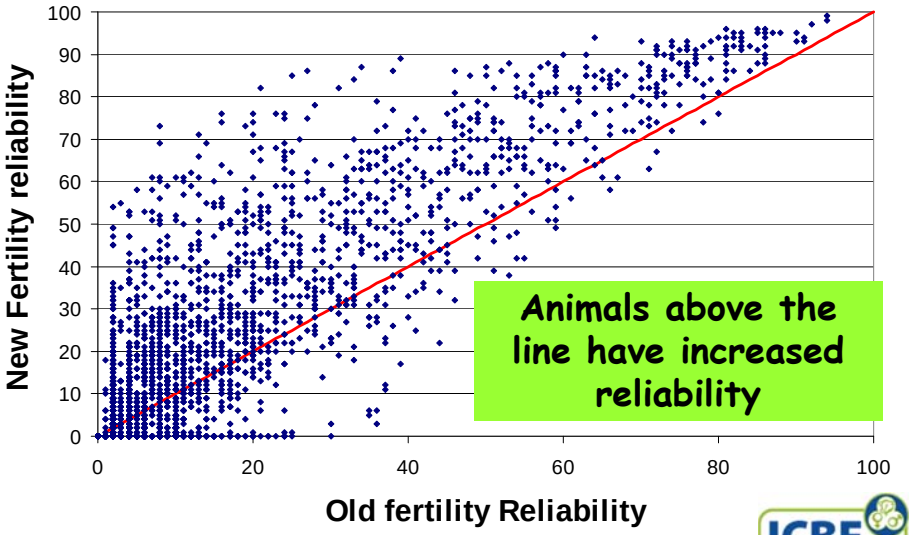
Results

1. **Repeatability model is a good compromise between biology (i.e., genetic architecture) and more data**
2. **Genetic predictors of fertility**
   - Dystocia direct and dystocia maternal
     - *More difficult calving → worse fertility*
   - Weanling calf quality & docility (farmer scored)
     - *Better quality and docility → worse fertility*
     - *Good heritability estimates (0.26 to 0.28)*
   - Weaning & post-weaning liveweight
     - *Heavier animals worse fertility*
   - Progeny carcass weight, conformation, and fat
     - *Heavier, better conformation and lower fat score → worse fertility*
   - cow milk score and docility score (farmer scored)
     - poorer milkability and docility → poorer survival

Increasing number of parities Proofs (rel. >65%)



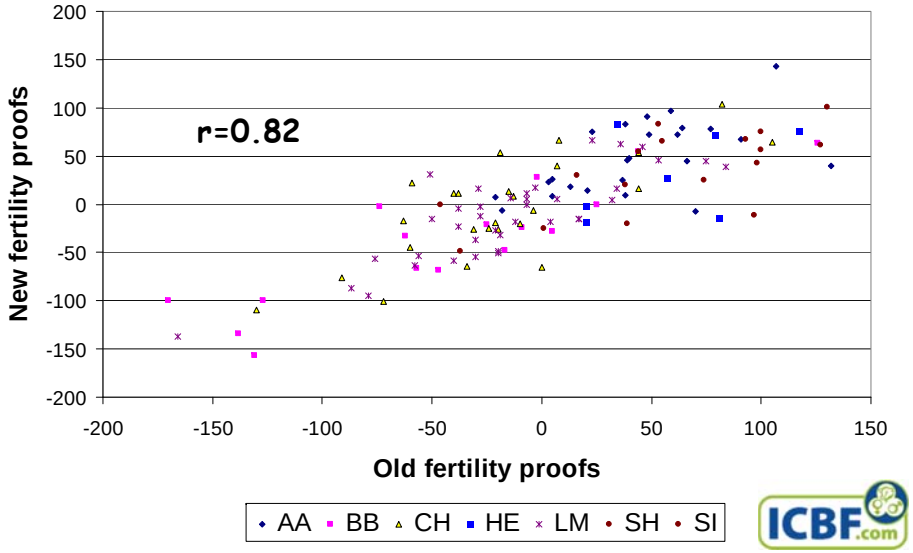
Increasing number of parities Reliability



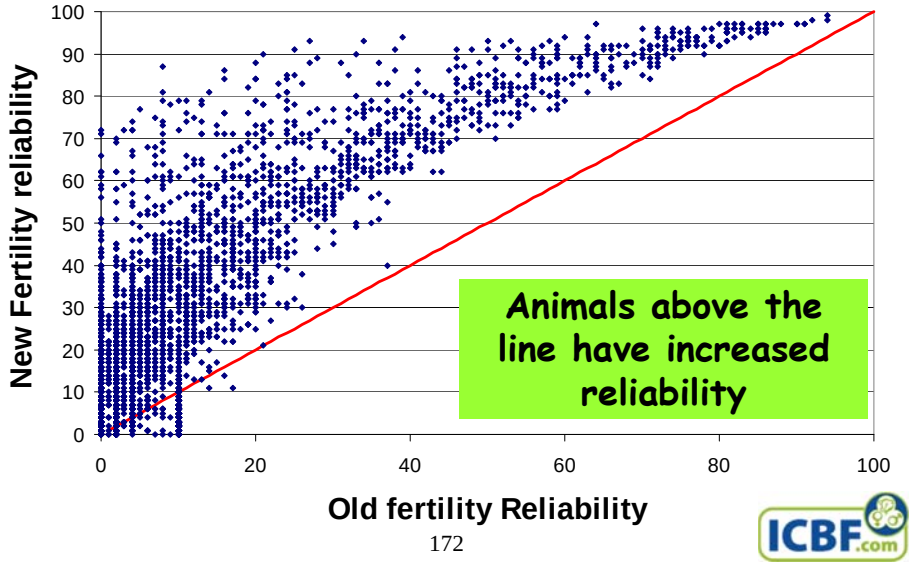
Increasing number of parities Summary

- 3150 AI bulls
- Good correlation given the changes
  - Lots more data
  - Contemporary group definition
- +9 percentage unit increase in reliability (i.e., 61% increase from 15% → 24%)
- Decrease in reliability of some bulls due to stricter definition of contemporary group

Also using predictor traits Proofs



Also using predictor traits reliability



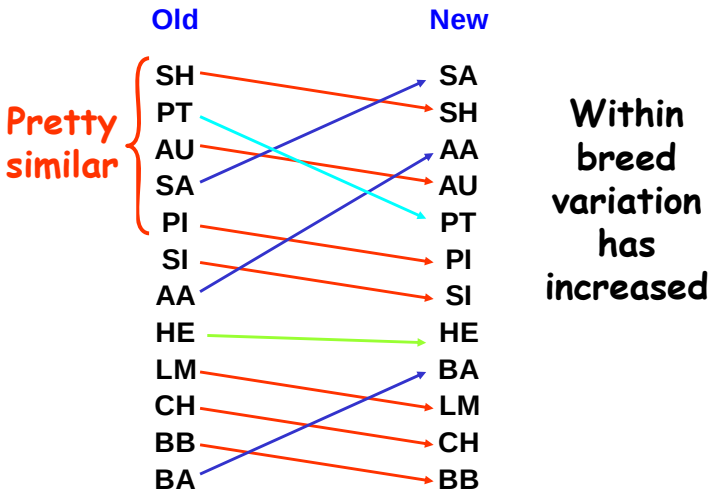
Also using predictor traits Summary

- 3150 AI bulls
- Good correlation given the changes
  - Lots more data information from correlated traits
- +19 percentage unit increase in reliability (i.e., 300% increase; 15% → 44%)
- Proofs for 15% more bulls that previously had a reliability of zero
  - Average reliability now of 14% (range: 1% to 72%)

Breed means – old v new evaluations

	Proofs		Reliability	
Breed	Old	New	Old	New
AA	57	56	17	33
AU	94	53	9	24
BA	-46	21	10	27
BB	-31	-44	13	29
CH	-1	-6	14	39
HE	44	23	11	24
LM	3	5	23	49
PI	89	30	7	18
PT	94	42	7	22
SA	89	63	17	38
SH	105	62	12	27
SI	63	25	18	40

Breed means – old v new evaluations



Within breed variation has increased

Conclusions

- Lots more data
  - More parities and traits
- Increased reliability of proofs
- More accurate reflection of reality

- Feedback?

Beef Genomic Selection – update

Donagh Berry[1], Francis Kearney[2] & Andrew Cromie[2]

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Laboratory progress

- High density SNPchips for 2,688 animals ordered from Illumina
- 2,141 samples retrieved from Weatherby's archive
  - Remaining from Teagasc/ICBF DNA bank
- DNA extracted from 596 from Weatherbys (42 unusable)

Laboratory progress

- Previously genotyped: 420
- Recently genotyped +391
  - Call rate: 99%

Software development

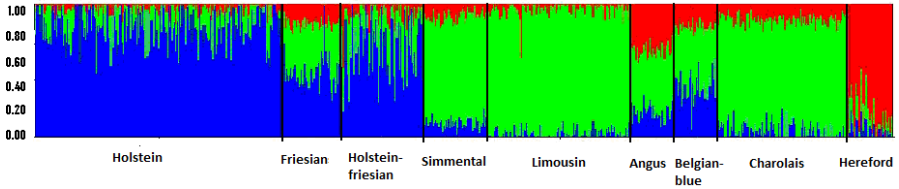
- Multi-breed genomic selection
- Testing phase

International experience - other

- New Zealand (dairy)
  - HD chip has 777,000 SNPs
  - Simulations suggest need >300,000 for across-breed
  - After edits 329,000 SNPs
  - Holstein → Jersey: prediction possible
  - Jersey → Holstein: not good *(small JER pop)*
- Australia
  - ~3,000 beef genotypes
  - Multi-breed genomic selection does not work
  - Includes *Bos indicus*

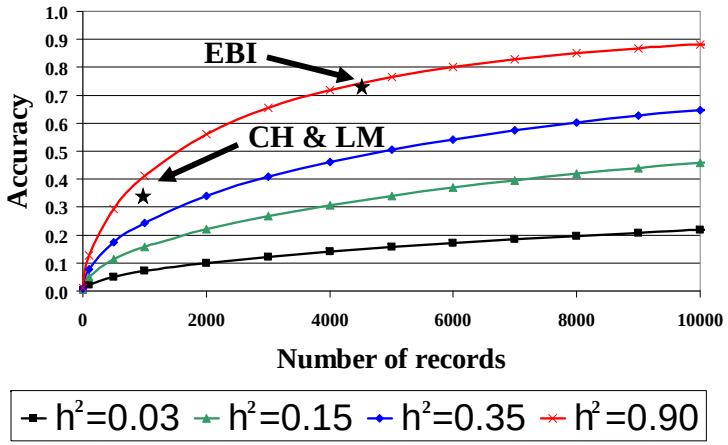
Comment

- Likely a function of breed similarity



- Will likely be dependent on relationship between training and candidate bulls

International collaboration



International collaboration

- France Limousins
  - Formalising exchange of LM genotypes
- UK limousins
  - 700 LM bulls to be exchanged
- Australia
  - Several different breeds

Conclusions

- Laboratory and computational developments on-target
- Differing commentary on success of multi-breed genomic selection (using current methods)
  - Potential of within-breed selection at least within 2 breeds
  - Will likely be dependent on relationship between training and candidate bulls
- International collaboration and more genotypes even more vital