



IRISH CATTLE BREEDING FEDERATION

ICBF Dairy & Beef Genetic Evaluations Meetings.

Tuesday 16th November 2010.
Killeshin Hotel, Portlaoise.



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Agenda 1. Dairy Traits & Dairy Breeding Programs.

- **Agenda 1 (10:00 AM – 12:00).**
- 9.30 Tea & Coffee.
- 10.00 Dairy genomics research – Donagh.
- 10.45 Genomics operational – Francis.
- 11.15 Other dairy breeds – Francis.
- 11.30 Dairy trends, dairy breeding programs & EBI updates – Andrew.
- AOB



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Minutes of Meeting 21st July

- Test-day model – update at future meeting
- Rest covered in agenda



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Imputing genotypes from low-cost, less dense genotype arrays

Donagh Berry
Teagasc, Moorepark

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Motivation

- Currently costs ~€150 per genotype with 50,000 SNPs
- reduce the cost of genomic selection

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Imputation

Imputation is a method by which you try and predict, as accurately as possible, the genotype of an animal at a higher density than the genotypes you actually have. This can subsequently be used to obtain genomic EBVs

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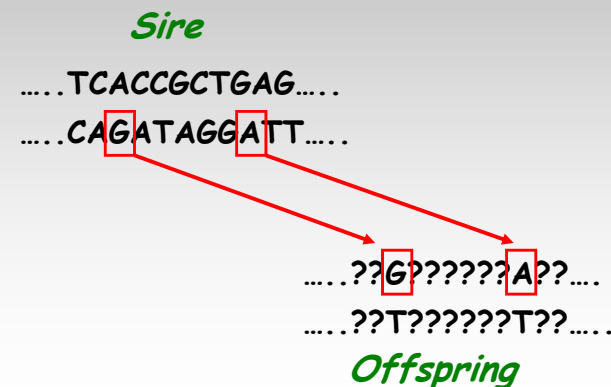
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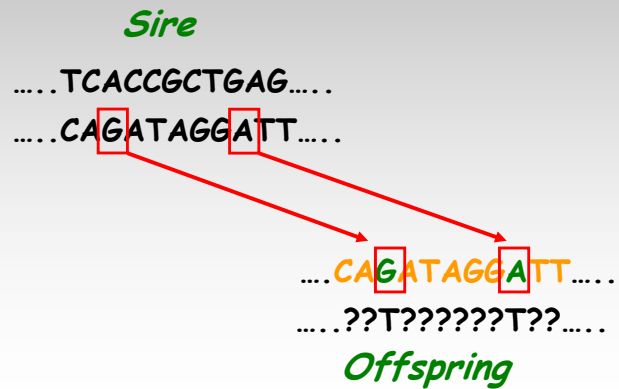
Imputation



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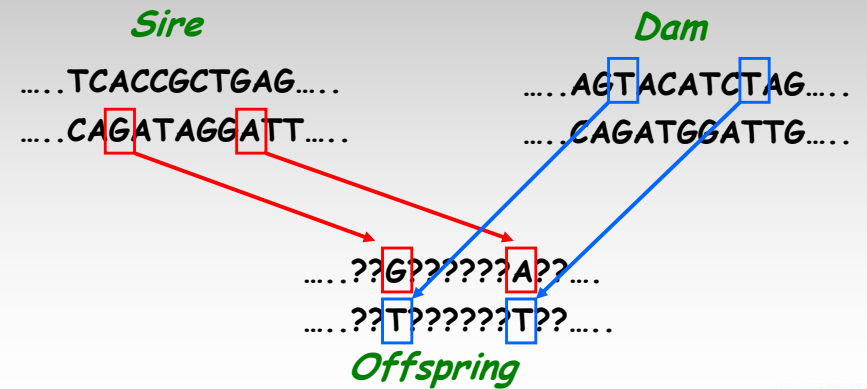
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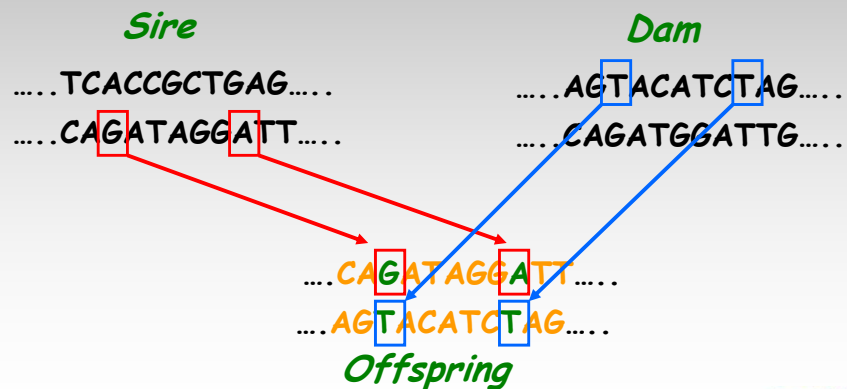
Imputation



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Imputation



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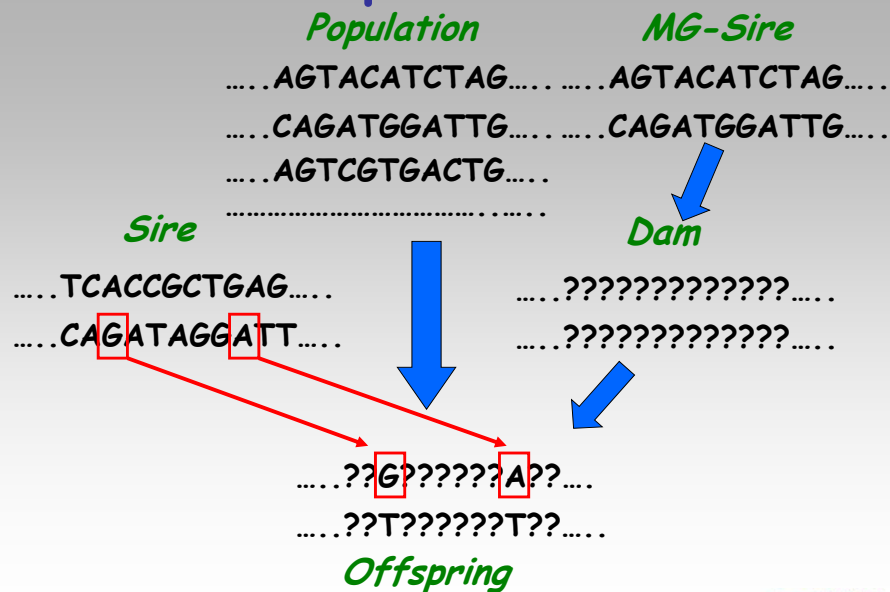
Imputation



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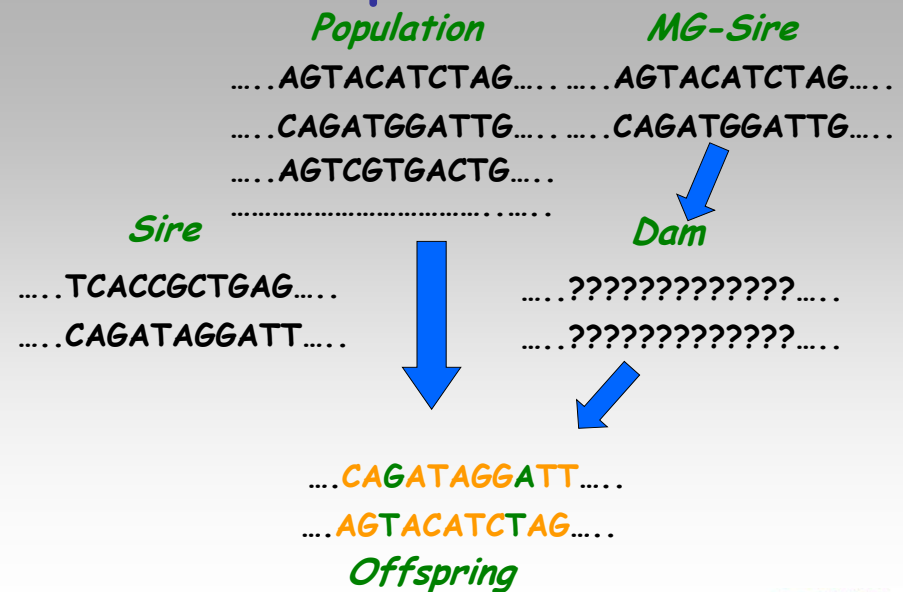
Imputation



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Imputation



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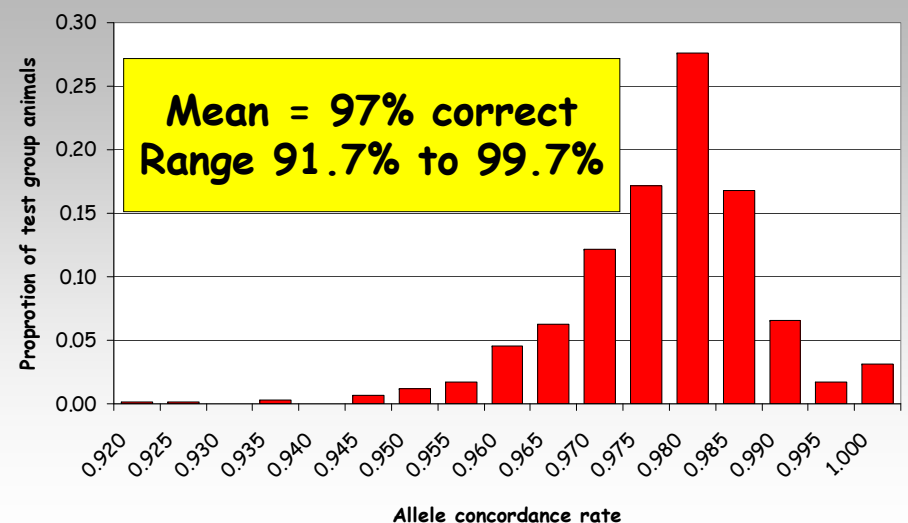
Testing

- 5,496 animals with genotypes on 54,000 SNPs
- 764 >50% Holstein animals born since 2006 assumed to be genotyped only on smaller 3,000 SNP chip
 - Had their 54,000 genotypes so knew the "answer"
- Accuracy
 - Percentage correct alleles (A,B)
 - Impact on genomic predictions

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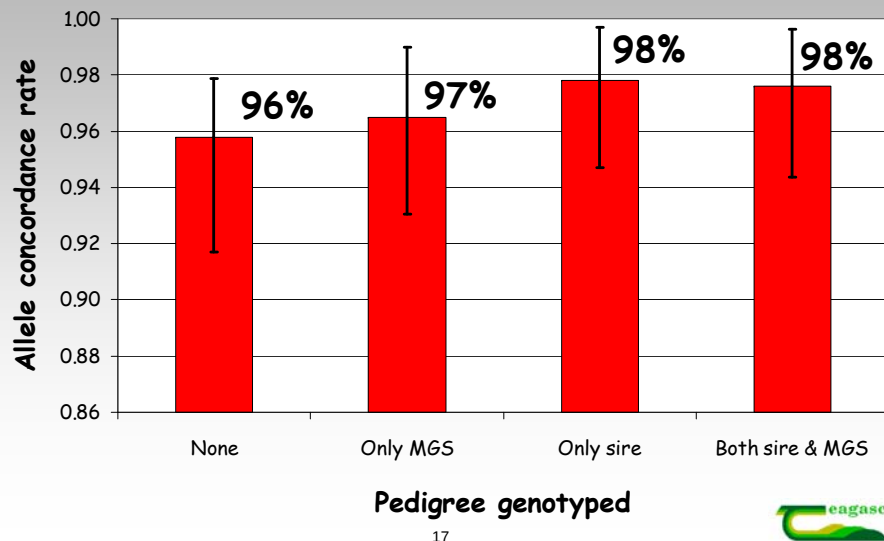
Accuracy per animal



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Accuracy by pedigree genotyped



Impact on genomic predictions

Trait	Training	Bias (se)	r
EBI (€)		-0.828 (0.451)	0.97
Milk yield (kg)	3508	-4.755 (1.072)	0.98
Fat yield (kg)	3508	-0.137 (0.035)	0.97
Protein yield (kg)	3508	-0.148 (0.028)	0.98
Calving interval (days)	1519	-0.049 (0.019)	0.98
Survival (%)	1241	0.023 (0.010)	0.97
Direct calving difficulty (%)	1403	-0.001 (0.014)	0.95
Maternal calving difficulty (%)	1112	-0.003 (0.019)	0.93
Gestation length (days)	1089	-0.024 (0.008)	0.96
Perinatal mortality (%)	547	0.001 (0.007)	0.93
Cow carcass weight (kg)	1042	-0.059 (0.035)	0.99
Progeny carcass weight (kg)	1091	-0.014 (0.040)	0.98
Progeny carcass conformation (scale 1 to 15)	1080	0.006 (0.002)	0.95
Progeny carcass fat (scale 1 to 15)	1040	0.003 (0.001)	0.99
Somatic cell score (loge units)	3508	-0.001 (0.001)	0.97
Locomotion (scale 1 to 9)	736	-1.209 (0.119)	0.92

Almost unity correlations

Little or no bias

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Conclusions & recommendations

- Accuracy of imputation is high particularly with back pedigree is genotyped
- Only impute where animal is $\geq 50\%$ Holstein sire and MGS genotypes are available
- Excellent concordance with genomic predictions using real genotypes
- Bulls used in AI must have 54,000 SNPs genotyped

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Genomics and other breeds

- Key for successful genomic prediction is representation of the *DNA signature* in the training population
 - Breed (HO, FR, JER, MO, NO...) must be genotyped
 - Animals must have a traditional proof
- Also vital for imputation

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Genomics and Friesians

- 288 ≥50% Friesian AI bulls with DNA
 - 186 with genotypes on Bovine50K
 - 44 of the 186 have genotypes on BovineHD
- Remaining 102 being genotyped on BovineHD
- Research
 - Bovine50K in single/multi-breed
 - BovineHD

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Genomics

- Creation of DB to store genotypes
 - Internally & IGenoP
- Genomic service
 - Development of screens nearing completion
 - Service ready in early 2011
 - 3k Chip now available
- Interbull Validation test
 - Submitted for milk fat and protein

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IGenoP

- North American and Eurogenomics genotypes not accessible
- We are developing an alternative for other countries wanting to share to increase reference population
- Developing a DB to store genotypes and this will be passed to Interbull once completed
- This work is currently well underway

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Genomics

- 300 more bulls for semen collected recently
- Historical hair samples from Weatherbys
- ~2000 genotypes received from Australia
- Overestimation
 - Difficult to see true extent as GS bulls not 99% reliable
 - Looking at ways to reduce overestimation
 - Interbull validation results

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Weatherby's

- Major progress since last meeting.
- Illumina platform installed at Weatherby's
- Evaluation of DNA archive undertaken.
 - Dairy - 25k DNA samples & 800>50% rel.
 - Beef - 32k DNA samples & 3.5k>50% rel.
- Quality Assurance exercise underway.
- Joint service with IHFA being developed.
 - Weatherby's for parentage verification.
 - ICBF for genomic evaluations.
- Single integrated service for industry



Other Dairy Breeds

- Submitted Data to the Interbull test run for production for Jersey and Red Dairy breeds
- Numbers low but correlations are good, passed validation tests; AI feedback on own bulls??
- Production proofs from all countries sending data to Interbull for these breeds
- Recommendations:
 - Send data to routine Interbull run and publish proofs
 - Continue with converted proofs for other traits



Other Dairy Breeds

JERSEY	CAN	DFS	USA	NZL	AUS	GBR	NLD	ZAF	ITA	DEU
Milk	0.84	0.83	0.84	0.81	0.82	0.86	0.87	0.81	0.8	0.82
Fat	0.81	0.84	0.8	0.81	0.82	0.83	0.84	0.81	0.79	0.77
Protein	0.76	0.79	0.8	0.85	0.82	0.83	0.79	0.81	0.79	0.77

RDC	CAN	NOR	USA	NZL	AUS	GBR	DFS	DEU	NLD
Milk	0.84	0.87	0.83	0.84	0.85	0.86	0.82	0.81	0.86
Fat	0.81	0.87	0.77	0.84	0.84	0.83	0.83	0.76	0.83
Protein	0.76	0.87	0.76	0.85	0.84	0.82	0.77	0.76	0.78



IRISH CATTLE BREEDING FEDERATION

Dairy trends, dairy breeding programs & EBI Updates.

Andrew Cromie



1. Dairy Trends - Replacements

County	2008	2009	2010	2011	2012
Cork	251,395	260,091 3.5%	265,903 2.2%	276,664 4.0%	289,557 4.7%
Tipperary	98,238	102,302 4.1%	103,333 1.0%	107,560 4.1%	112,282 4.4%
Limerick	81,341	82,283 1.2%	81,388 -1.1%	82,329 1.2%	83,924 1.9%
Kerry	79,113	79,319 0.3%	77,861 -1.8%	78,214 0.5%	78,822 0.8%
Kilkenny	49,359	51,013 3.4%	53,006 3.9%	55,916 5.5%	59,259 6.0%
Waterford	48,119	50,757 5.5%	51,679 1.8%	53,793 4.1%	56,134 4.4%
Wexford	43,991	45,827 4.2%	46,967 2.5%	49,708 5.8%	52,772 6.2%
Meath	36,916	38,361 3.9%	38,942 1.5%	40,756 4.7%	42,842 5.1%
Cavan	29,699	29,535 -0.6%	29,106 -1.5%	29,284 0.6%	29,696 1.4%
Laois	24,037	25,224 4.9%	25,735 2.0%	26,767 4.0%	27,977 4.5%
Clare	23,986	23,955 -0.1%	23,085 -3.6%	23,128 0.2%	23,244 0.5%
Monaghan	20,825	20,819 0.0%	20,615 -1.0%	21,029 2.0%	21,629 2.9%
Galway	20,552	20,889 1.6%	20,399 -2.3%	20,817 2.1%	21,349 2.6%
Offaly	18,145	18,246 0.6%	18,168 -0.4%	18,596 2.4%	19,225 3.4%
Westmeath	15,741	16,178 2.8%	16,209 0.2%	16,752 3.4%	17,425 4.0%
Wicklow	14,042	14,612 4.1%	14,799 1.3%	15,247 3.0%	15,891 4.2%
Louth	11,444	12,025 5.1%	12,547 4.3%	13,162 4.9%	13,933 5.9%
Mayo	11,885	11,531 -3.0%	11,174 -3.1%	11,033 -1.3%	10,967 -0.6%
Donegal	10,114	10,537 4.2%	10,622 0.8%	10,966 3.2%	11,293 3.0%
Kildare	10,120	10,188 0.7%	10,223 0.3%	10,431 2.0%	10,831 3.8%
Carlow	9,436	9,621 2.0%	9,765 1.5%	10,228 4.7%	10,750 5.1%
Longford	6,479	6,443 -0.6%	6,462 0.3%	6,721 4.0%	7,058 5.0%
Sligo	6,337	6,228 -1.7%	5,823 -6.5%	5,693 -2.2%	5,625 -1.2%
Roscommon	3,997	3,861 -3.4%	3,739 -3.2%	3,767 0.7%	3,779 0.3%
Dublin	2,204	2,111 -4.2%	2,081 -1.4%	2,012 -3.3%	1,979 -1.6%
Leitrim	1,821	1,775 -2.5%	1,758 -1.0%	1,772 0.8%	1,797 1.4%
Total	929,336	953,731 2.6%	961,389 0.8%	992,345 3.2%	1,030,038 3.8%

Dairy Trends - AI Usage

	2006		2007		2008		2009		2010	
	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec
Births from dairy cows	892,543	125,868	898,170	120,175	890,519	126,750	879,509	113,909	875,141	
Dairy births from dairy cows	422,905	66,855	440,205	63,878	456,528	76,144	531,947	72,601	551,030	
Female dairy births	209,581	33,220	216,709	31,161	222,264	36,715	258,303	35,644	266,397	
Female AI dairy births	89,673	16,101	104,616	15,691	111,096	18,471	130,669	18,016	135,058	
% Total	42.8%	48.5%	48.3%	50.4%	50.0%	50.3%	50.6%	50.5%	50.7%	
Ave EBI female dairy births	€65.4	€43.5	€70.7	€46.9	€75.0	€54.0	€81.0	€60.0	€91.2	

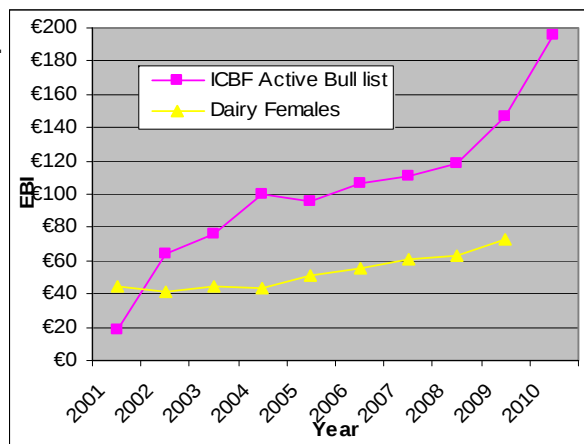
- Female AI dairy births +10%/year.
- Why the increase?
 - EBI & Profit.
 - Increased availability of high EBI AI sires.

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EBI Increase

- Past = no gain.
- Now €10/year and increasing (€20 in BV terms).
 - Influence of genomics.
 - Use of younger bulls



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EBI & National Production.

Data	Herds Ranked on basis of Herd EBI					Difference (Top-Ave)
	Top 20%	Top 20-40%	Average	Btm 20-40%	Btm 20%	
Average herd size	87.2	74.1	66.3	60.4	63.3	
Total milk supply	342,244	290,364	255,312	229,911	243,067	
Fat+Protein (kg/day)	295.0	289.8	281.7	277.1	279.0	16.0
Litres per cow per day	14.6	14.5	14.2	14.0	14.2	0.38
Fat% to end Sept 2010	3.84	3.78	3.75	3.74	3.71	0.13
Protein% to end Sept 2010	3.35	3.31	3.30	3.29	3.27	0.08
Average milk value (cpl)	30.3	29.9	29.6	29.5	29.2	1.11
SCC (,000 cells/ml)	219	232	245	247	258	-38.6
Calving Interval (days)	381.4	387.9	396.1	399.4	407.8	-26.4
Days to calve 50% of herd	32.3	37.0	39.2	41.4	43.2	-10.9
Culling Rate	14.3	13.6	14.2	14.3	14.5	-0.2
% AI bred replacements	25.7	17.8	13.2	12.3	7.8	17.9
Herd EBI 2010	€97.7	€81.8	€71.3	€60.6	€41.0	€56.8
Yearly EBI Gain (2010-2011)	€2.1	€2.7	€2.8	€3.9	€4.6	-€2.5
EBI of 2010 inseminations	€162.7	€159.3	€154.0	€156.2	€155.1	€7.6

- EBI Gain = €10/year. Now to 2020 = €90/gain
- Equivalent to ~30 kg MS, ~ 20 days CI, median calving date of 20th February (now 6th March).

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2. Dairy Breeding Programs – The challenges.

- Dairy farmers & industry value EBI.
- How do we sustain/increase going forward?
- Number, EBI & range of bulls available for AI must increase.
- **But** : Number of bulls progeny tested is on decline, e.g., HF Spring programs.

Data	2005	2006	2007	2008	2009	2010
Count of Bulls	19	39	43	51	38	18
Average of EBI	€99	€114	€124	€137	€154	€165

- **And**: Genetic diversity is of increasing importance, e.g., OJL issue.

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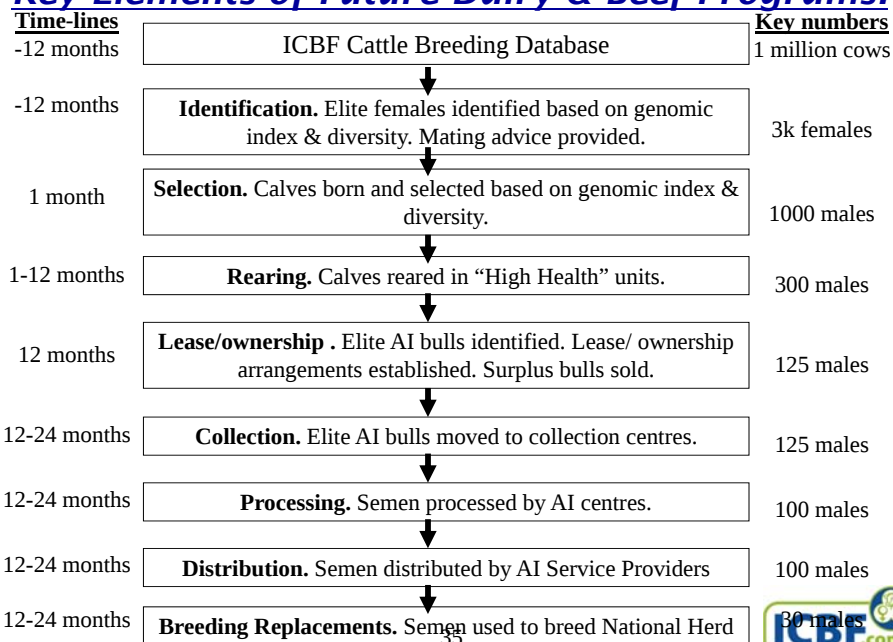
Revised GENE IRELAND Program – Spring 2010

- Maximise long-term genetic gain (€).
 - 100 dairy bulls & 100 beef bulls per annum.
 - ~ €30/cow/year for Irish dairy & beef farmers.
- Provide an ongoing resource for R&D into genomic evaluations.
 - New traits, e.g., mastitis, Green House Gas....
 - New technologies, e.g., 3k SNP chip
 - “Retrain” SNP estimates on an annual basis.
 - R&D herds – commercial & research herds.
- To minimise risk for the breeding program.
 - Ensuring supply of high health status bulls.
 - Manage inbreeding, evaluate new traits & indexes

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Key Elements of Future Dairy & Beef Programs.



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i. Genotypes, bulls, cows – project.

- Scientific basis work undertaken by Noirin McHugh, Theo Meuwissen & Anna Sonnesson.
- Simulation based on data structure from Ireland.
 - Commercial cow population (1 million cows)
 - Elite females, i.e. genotyped bull mothers (500 up to all cows)
 - Genotyped males, i.e., genotyped for potential AI (100-1000).
 - Selected for progeny test (20 – 100 sires)
 - Year of first widespread AI (2-6 years).
 - Vary level of genotyping, age at 1st AI, level of progeny testing & cows available for the breeding program.
- Papers submitted to Journal Dairy Science.
- Meeting to discuss and present results on Wed 8 Dec.

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i. Genotypes, bulls, cows – High level outcomes.

- Use of genomics has potential to double rates of EBI gain, when used as a pre-selection tool for males.
 - Highest gain from 1000 bulls genotyped and AI at 2 years.
- Use of genomics has potential to treble rates of EBI gain, when used as a pre-selection tool for female & males.
 - Highest gain from all females available, 500 males genotyped & AI 2 years.
- Number of bulls progeny tested (100 down to 20) has little impact on genetic gain, but does result in increased inbreeding and lower rel.
- It is advisable to maintain a progeny test structure, to ensure accurate estimation of SNP effects (future rel) and maintain genetic diversity.

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ii. Cost:benefits

- Work being undertaken by Peter Amer.
- Trade off between cost & benefit.
- Cost elements – genotypes (males & females), progeny testing, data recording, cost of disease etc.
- Benefits – long-term genetic gain (EBI, inbreeding level & reliability).
- Meeting to discuss and present results on Wednesday 8th December.

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iii. Inbreeding & genetic gain - Project.

- Breeding program project. Outcome from January dairy breeding consultation meeting.
- Sub-group established – ICBF, Teagasc bull breeders & AI companies.
 - Two meetings in Spring time.
- High EBI & diverse cows identified (2,200).
- Panel of high EBI & diverse sires of sons identified (~50 bulls).
- Matings allocated and communicated with farmers (Teagasc research).

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iii. Inbreeding & genetic gain – Outcomes.

- From initial list of 2,280 cows.
 - 1340 inseminated during period of project (1st April – 30th September).
 - 348 (26%) inseminated to suggested matings.
 - 265 (20%) have suggested bull as last insemination.
 - 41 different sires, max of 20 inseminations to any one bull.
- For limited effort, major positive outcome.
 - 265 last inseminations = 80-100 high EBI, highly diverse bull calves being born next Spring.
- Meeting with sub-group next week re: plans.

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iv. R&D data for genomics.

- Working with Teagasc to establish a “next generation” herd at Moorepark.
- Objective: Continually test the EBI.
- 200 cow herd, 40 replacements per year, generating surplus males & females.
- High EBI & diverse heifer calves purchased from commercial herds (e.g., output from breeding programs research).
- Opportunity to link with AI companies in the provision of breeding bulls.
- Work ongoing with Teagasc.

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3. EBI updates.

- No major changes to prices, costs or assumption in farm systems model.
- Labour sub-index – development work has been on hold. Other priorities.
- Calving sub-index – no change to economic value. Considering a change to how we present the evaluation – see later (Francis).

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Recommendations

- Make available dairy trends data to wider industry, e.g., 2020 report.
- Proceed with breeding programs work.
 - Next stage of stakeholder meetings.
 - Project group meetings.
- EBI Developments.
 - No changes proposed for 2011.

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Agenda 2. Dairy & Beef Traits

- **Agenda 2 (12.15 – 2.15)**
- 12.15 Female fertility traits – Ross.
 - » Dairy & beef.
 - » Male fertility update.
- 1.00 Lunch.
- 1.30 Calving traits – Francis.
- 2.00 DNA Archive for AI Bulls – Brian
- AOB

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Minutes of Meeting 21st July

- Male fertility – nothing new to report – any feedback?
- Beef cut data – report at future meeting, work in procees
- AI Application process – implemented – HB notification will occur - link to Vet Reg. – under investigation?
- Rest covered in agenda

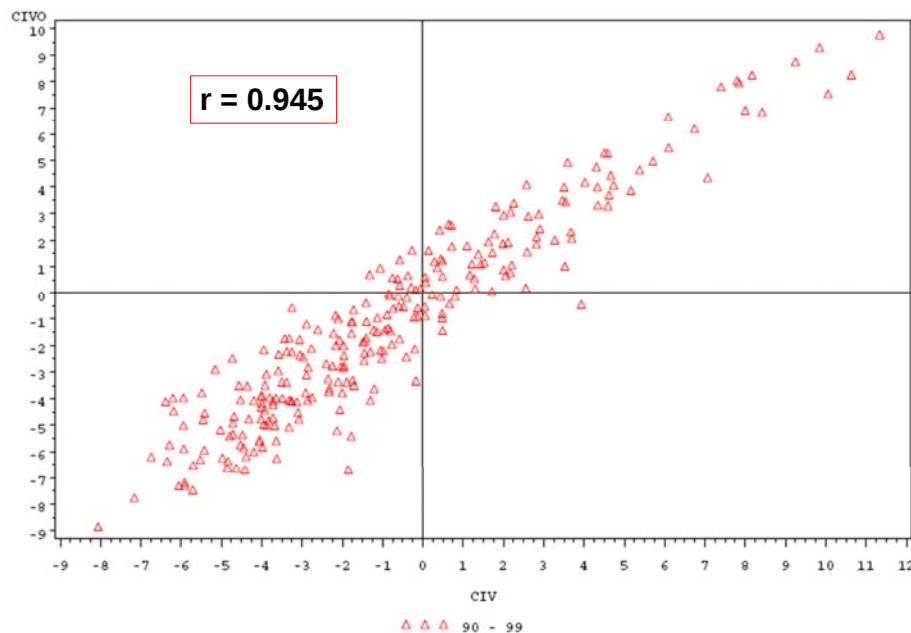
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New female fertility evaluation update

- July 10 update: Still too much re-ranking concerns to switch to new yet
- Problematic re-ranking cases still being investigated
- Key questions:
 - Software causing differences
 - Parameters causing differences
 - New animal data causing differences

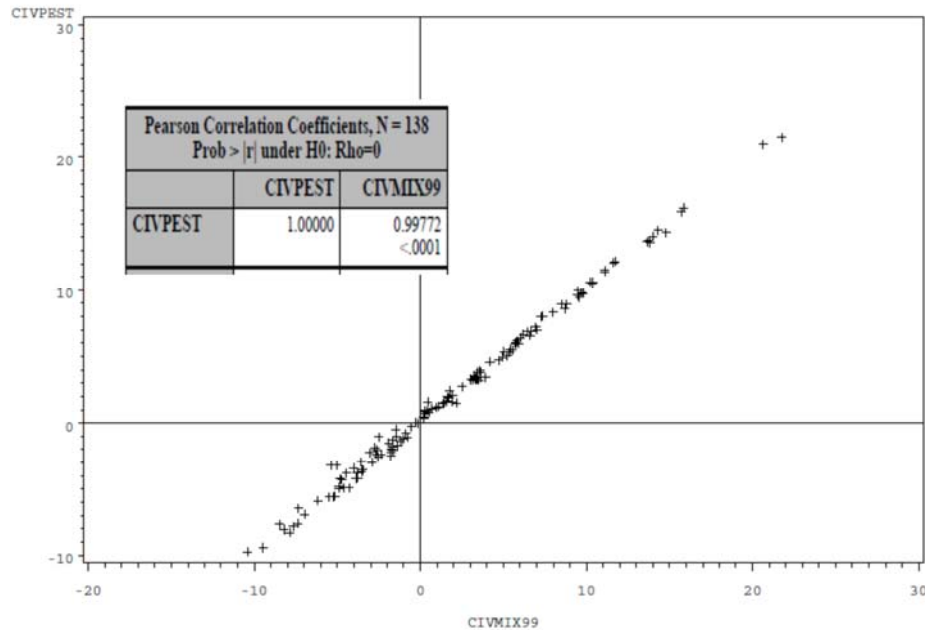
AI sires CIV combined old v new 1st 3 par



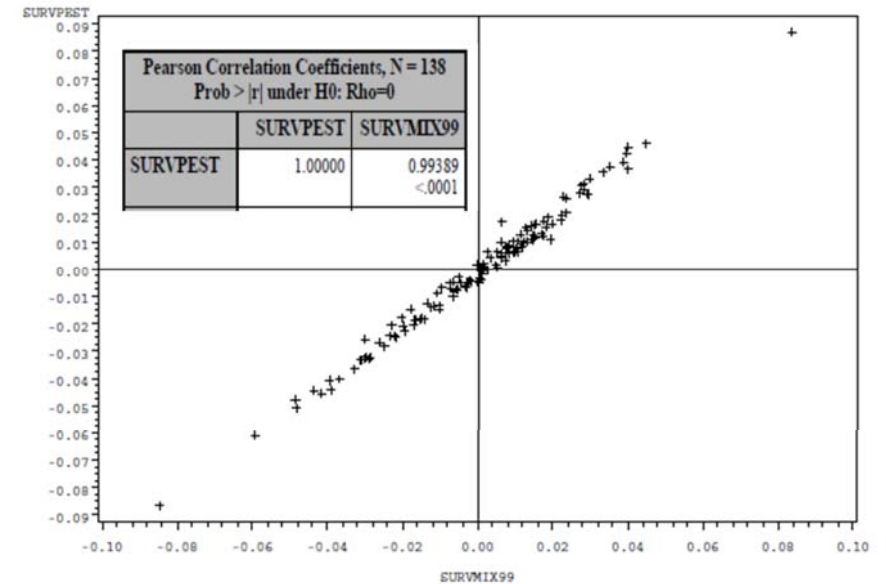
Software comparison

- Need to move from PEST to MIX99 to handle larger model and calculate reliabilities on cows
- Test compatibility of software
- 1 million cows
 - Holstein main breed fraction
 - Contemporary group size of 8
 - Compare sires with >500 daughters

CIV: PEST v MIX99



SURV: PEST v MIX99



Summary of software comparison

- More iterations in both packages increased correlations
- Correlations for CIV and SU average of 1st 3 parities >0.99
- Conclusion: Proceed with MIX99 software for new model

New parameters

- Re-run of new parameters to ensure changes holding up
- Some changes in survival-calving interval correlation
- Testing of parameter effect in same software (MIX99) using same data (July 10 run)

Compare old v new parameters

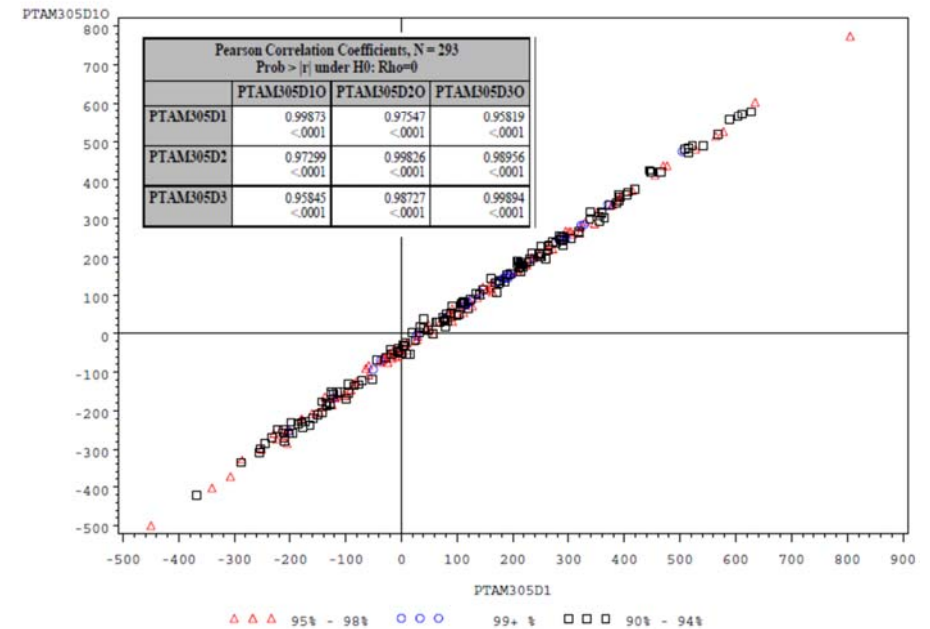
	survival 1		survival 2		survival 3	
	old	new	old	new	old	new
civ 1	-0.20	-0.58	-0.03	-0.62	0.00	-0.45
civ 2	-0.24	-0.61	-0.12	-0.70	-0.09	-0.61
civ 3	0.02	-0.26	0.06	-0.53	0.13	-0.55

	civ 1		civ 2		civ 3	
	old	new	old	new	old	new
milk1	0.51	0.36	0.50	0.39	0.64	0.41
milk2	0.51	0.25	0.49	0.35	0.62	0.36
milk3	0.44	0.28	0.47	0.40	0.67	0.42

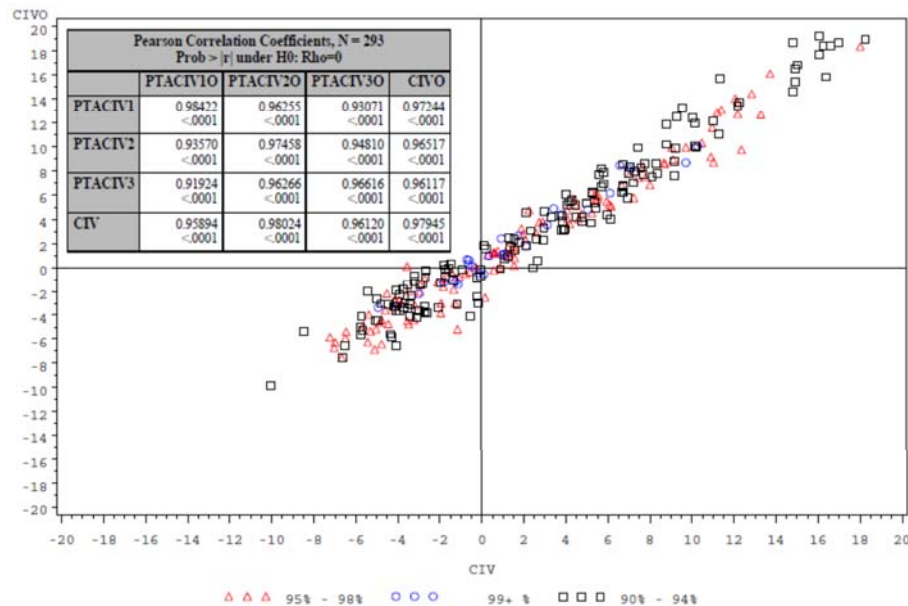
	survival 1		survival 2		survival 3	
	old	new	old	new	old	new
milk1	0.25	0.00	0.55	-0.11	0.43	-0.19
milk2	0.13	0.04	0.48	-0.16	0.39	-0.20
milk3	0.32	0.06	0.42	-0.09	0.47	-0.14

- Increase in genetic correlation between CIV and survival
- Reduction in genetic correlation between milk and CIV
- Reversal of correlation between milk and survival

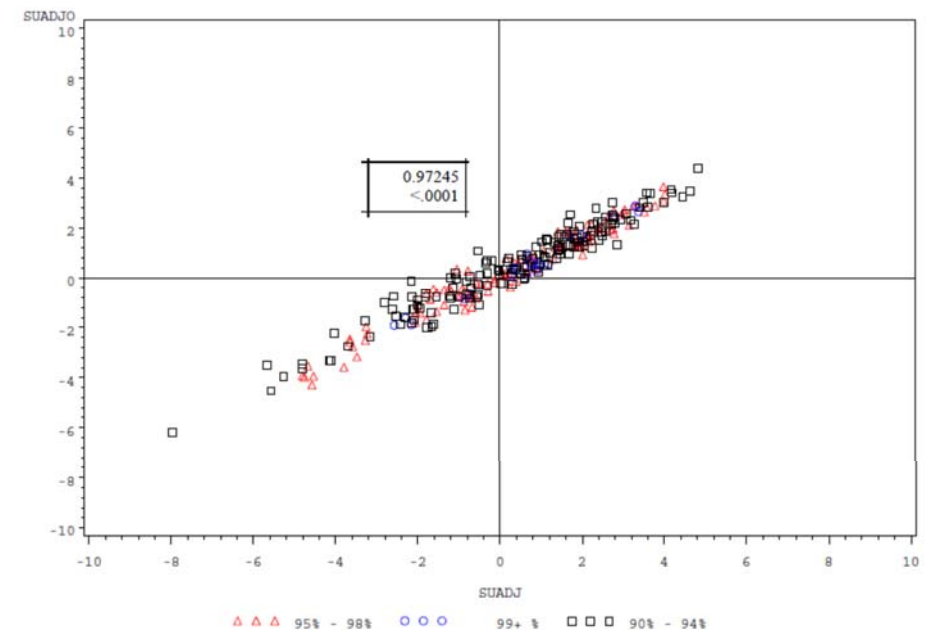
AI sires MILK YIELD 1 old v new



AI sires CIV AVERAGE of 1st 3 old v new



AI sires old SU (adj) v new SU (adj)

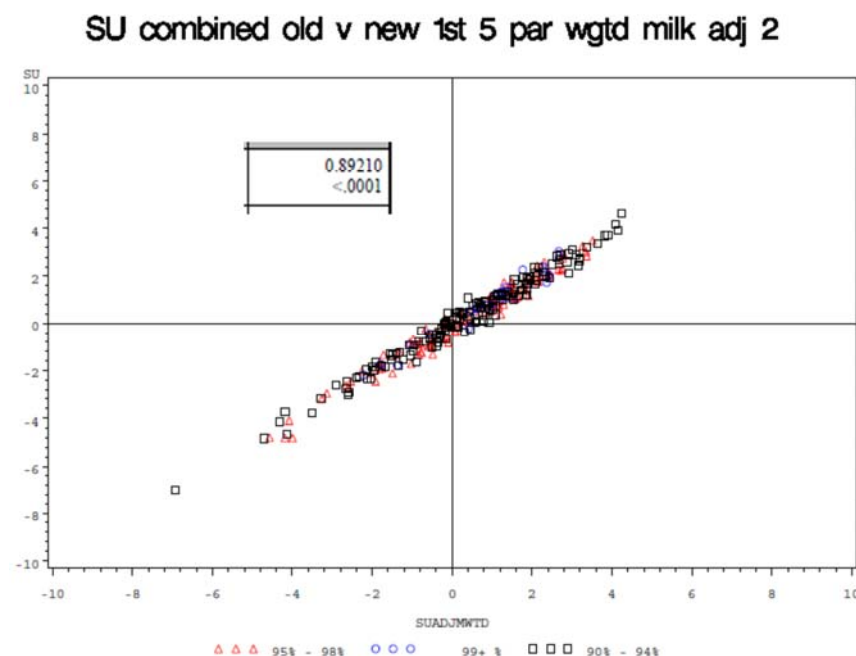
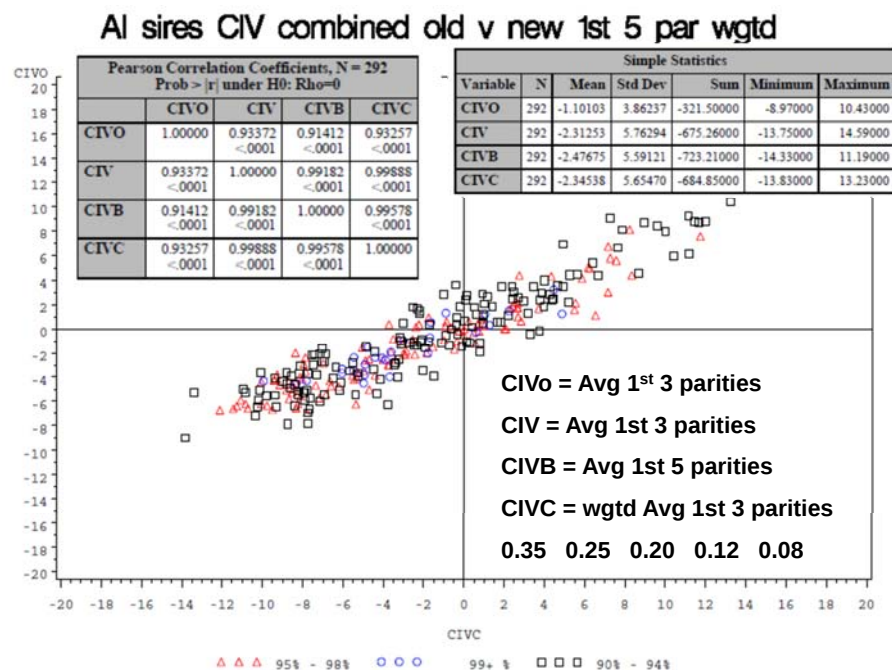


Summary of parameter comparison

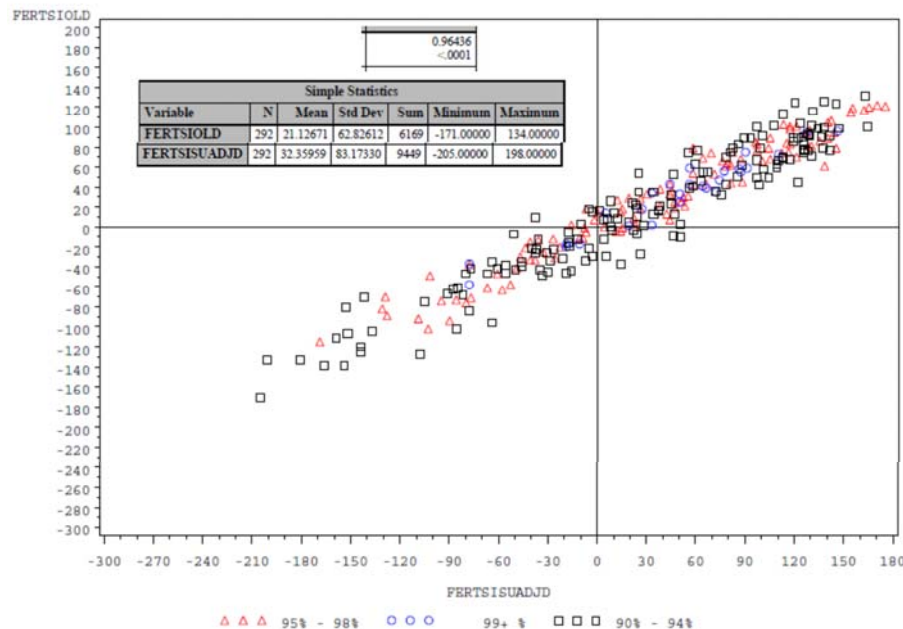
- Milk yield will have reduced influence on calving interval proofs
 - Relationship still antagonistic
- Survival relationship with calving interval and milk yield has changed considerably
 - Should not be large differences for well proven AI sires but likely changes for low reliability sires and cows due to the low heritability

OLD versus NEW comparison

- New software: PEST to MIX99
- New genetic parameters
- New traits: parity 4,5, CFS x3 , NS x 3, afc
- 23 traits in total
- Increase CIV cut-off limit 600 to 800 day
- Inclusion of cows which have had no milk yields but have civ, su and cfs



FERTILITY SI old v new 1st 5 par wgt'd milk adj 2



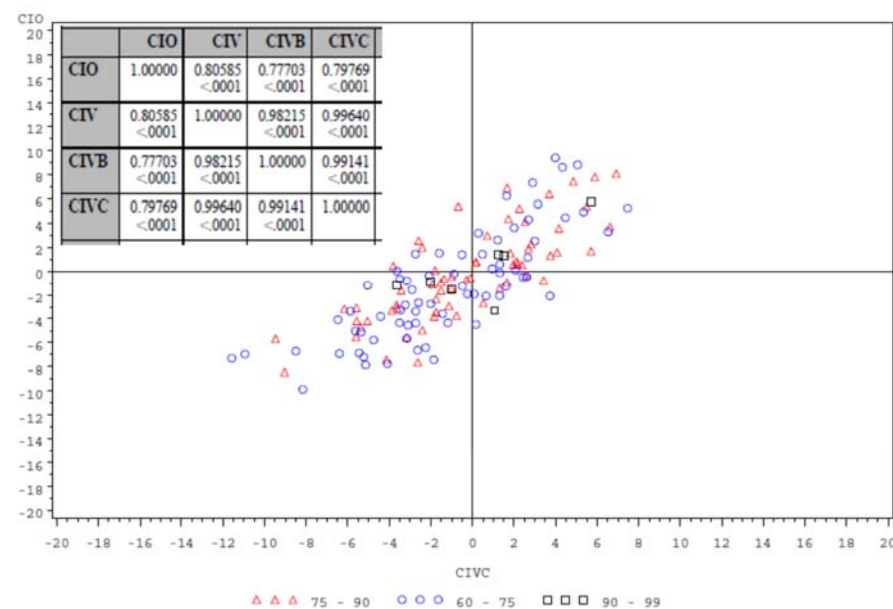
Current status

- Some problems with reliability calculations
- In process of solving these at the moment
- Some final test runs on impact of including cows with no milk, 600-800 day civs, specific heterosis effects
- File of proofs circulated for feedback when reliabilities operational

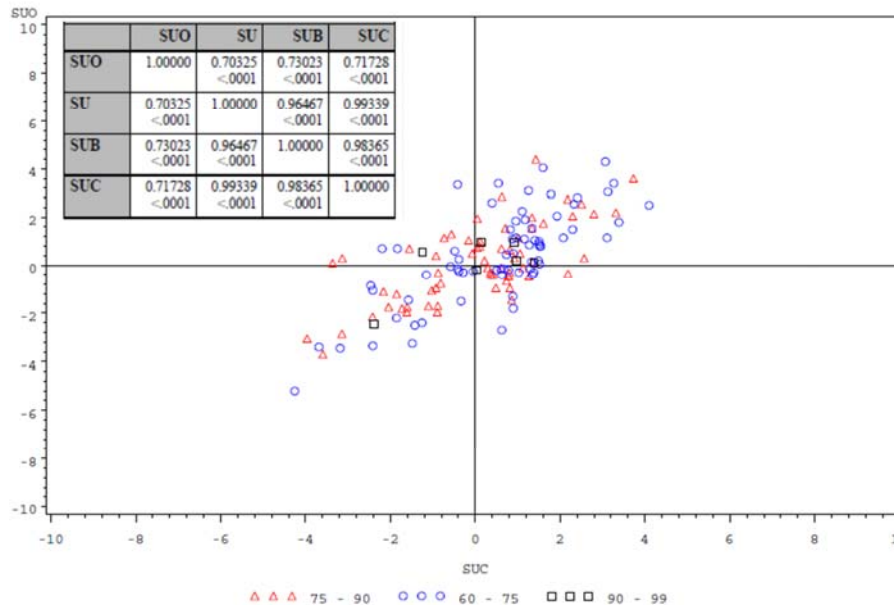
Beef Fertility evaluation

- Old evaluation
 - Done in PEST
 - Parity 1 CIV, SU and age at first calving
- New software: PEST to MIX99
- New genetic parameters
- New traits: parities 1-5, CFS 1-3, NS 1-3, AFC
- 18 traits in total, 4 in old evaluation
- Increase CIV cut-off limit 600 to 800 day

AI sires CIV old v new 1st 5 par wgt'd



AI sires SUV old v new 1st 5 par wgt



Summary of Beef evaluation

- Large increase in number of traits evaluated per animal
- More complete picture of animals fertility performance
- Looking at definition of age at first calving
 - Herd of birth v herd of calving
- File of AI sires to be sent out as soon as reliability program working

Calving Performance

- Propose to move to a model with calving traits in first and later parities separated
- To add in foreign breeding values where available
 - Added 35k records from 6 French breeds for direct and maternal calving
- Edit changes – no historical information and ET calves are left out

Calving Performance

- Test-runs are currently underway
- Proofs available within the next two weeks
- Publish combined breeding value – finalising the details of this. More weighting on first parity as this has most significant impact



IRISH CATTLE BREEDING FEDERATION

DNA Archive for all bulls used in AI - Proposal

16th November 2010
Brian Wickham



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Objectives

1. To increase the accuracy of genetic evaluations that incorporate genomic data.
2. To facilitate parentage and identification testing.
3. To facilitate the detection of major genes (both desirable and undesirable) controlling traits of importance to Irish farmers.
4. To improve quality control in genotyping and genetic evaluations using genomic data.

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Proposed Procedure

- A DNA sample (tissue, semen, blood) is supplied to ICBF by the organisation seeking AI approval for every bull entering AI in Ireland.
- Samples to be collected in batches of bulls at a convenient time.
- The sample supplied becomes the property of ICBF for the purpose of achieving the objectives (1 to 4 previous slide).
- ICBF will not use the sample for any other purpose.
- A copy of the results of any DNA testing conducted by ICBF will be provided to the bull owner.

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Feedback from AI Organisations

- Very supportive.
- Would like to receive a copy of any DNA testing conducted using the sample.
- Some concerns about bulls for which very small volumes or very high priced semen are imported.

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Recommendation

- That the outlined procedure be implemented forthwith.

Agenda 3. Beef Traits & Beef Breeding Programs.

- **Agenda 3 (2.30 – 5.00).**
- 2.30 Do Euro-Stars work? – Ross.
- 3.00 Developments in Euro-Star evaluations – Andrew.
- 3.30 Beef genomics research – Donagh.
- 4.00 GROW® Review – Brian.
- 4.30 GENE IRELAND® Update – Niall Kilrane
- AOB
- 5.00 Close of meeting.

Minutes of Meeting 21st July

- **Maternal weaning weight** – implemented as agreed.
- **Beef Specialist** – progress to be reported at a future meeting.
- Rest covered in agenda

€uro-Star SBV indexes

- Aims to be an objective assessment of genetic merit of animals after removing the effects of different management
- **BUT...** Differences in indexes between animals must be reflected on farm otherwise no value to using them
- Validation is important

Validation: Calving performance

AI sires with > 50 progeny recorded

Calving difficulty		
Across breed Star Rating	*	*****
Number of AI bulls	221	132
Average no. of progeny	861	888
Calving difficulty reliability	92	91
Calving difficulty index (%)	12	2
Actual calving difficulty %	9	4
Actual herdmate difficulty %	6	5
Gestation		
Across breed Star Rating	*	*****
Number of AI bulls	60	112
Average no. of progeny	355	89
Gestation reliability %	93	93
Gestation index (days)	5	0
Actual gestation (days)	291	284

5% less serious calving difficulty out on farm

1 week less gestation

Validation: Weanling performance

AI sires with > 10 progeny through marts

Across breed Star Rating	*	*****
Number of AI bulls	34	81
Average no. of progeny	63	259
Weanling Export Index	-€15	€90
Weanling reliability %	89	92
Average age at sale	227	228
Average weaning weight	269	319
Average herdmate weight	280	314
Average price per kg	€1.58	€1.89
Average herdmate pperkg	175	185

• 50 kg heavier at sale time

• 5kg heavier than herdmates

• Extra 31cents/kg

Validation: Carcass performance

AI sires with > 10 progeny slaughtered

Across breed Star Rating	*	*****
Number of AI bulls	25	91
Average no. of progeny	52	309
Beef Carcass Index	-€23	€139
Carcass reliability %	80	91
Average age at slaughter	724	693
Average carcass weight	322	391
Average herdmate weight	339	372
Average conformation	R-	R+
Average herdmate conf	R-	R+
Average fat	3+	3
No. of bulls with Tully sons	5	47
No of sons	18	332
pd feed intake	0.18	0.04

• 1 month younger but 69kg heavier

• 2 points better on EUROP scale

• High feed intake in Tully also hitting 1* bulls

Validation: Daughter Milk

AI sires with > 20 daughters with progeny weaning weights

Across breed Star Rating	*	*****
No. of AI Bulls	53	52
Daughter Milk Index	-€96	€131
Daughter Milk Reliability	70	67
Average no. of progeny mat wwt	104	68
Average no. of herdmates mat wwt	743	343
Av weight of grandprogeny (kgs)	317	325
AV. herdmate weaning weight (kgs)	320	317

8kg heavier than 1* sires

8kg heavier than their herdmates

Level of quality weaning weights recorded very low!!

Validation: Fertility performance

AI sires with > 10 daughters

Across breed Star Rating	*	*****
No. of AI Bulls	134	152
Fertility Index	-€65	€89
Average no. of progeny	176	103
age 1st Calving (days)	948	907
Maternal calving diff (%)	7	4
herdmate maternal cdiff (%)	6	4
Calving Interval (days)	408	389
herdmate calving interval	400	393
Survival (%)	81	87
herdmate survival (%)	82	83

- lower age 1st calving
- lower calving problems
- shorter calving interval
- Better survival

Beef Evaluation updates

- Ultrasonic Muscle incorporated as a new trait in the beef evaluation for Tully bulls (n = 1400)
 - Strong correlation with carcass conformation
 - Potential for recording on farm and subsequent evaluation
 - 300 – 600 days of age
- Preferential treatment potential to include as a fixed effect in beef evaluations
 - Nurse cow, bucket fed etc....
- Also correction for twin v single



IRISH CATTLE BREEDING FEDERATION

**Breeding for improved fertility
in the Irish beef herd & Updates
to the Suckler Beef Value.**

Andrew Cromie

Fertility – what do we want?

- A cow that can calve at 2 years of age, in a seasonal system (Spring or Autumn) and produce a live calve each year for many years?

Analysis based on data from the ICBF Database.

1. Herd Data; ICBF HerdPlus Calving Reports.

- 48,362 Suckler beef herds.
- 6,517 herds selected that had ≥ 20 calvings & 5 heifer replacements in 09/10.

2. Animal Data; Suckler beef females born in 2006 & with a subsequent calving.

- Known Beef Sire & Beef MGS.
- 4,400 replacement females.

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1. Herd Data – Fertility performance.

	24 mths	28 mths	30 mths	32 mths	36 mths	40 mths
Number Herds	267	429	543	593	319	63
Average cows	44	45	46	45	49	57
Average calvings (09/10)	42	41	41	40	41	43
Number heifer calvings	9	9	9	9	9	10
Average CI Days	385.0	395.8	400.6	400.6	413.8	444.0
% cows recalved in 390 days	61.0	53.1	50.0	50.8	45.1	34.9
Calves per cow per year	0.89	0.84	0.82	0.81	0.75	0.66

- Hypothesis: Herds that are able to calve heifers at 2 years, have better long term fertility performance?
- Yes – aim to calve heifers at 2 years.
- Ability to calve heifers at 2 years is an indicator of good herd management.

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2. National Data – Fertility Performance.

- Data selected from the ICBF database.
 - Known beef sire & beef MGS - $\frac{3}{4}$ bred beef.
 - Born in Spring 2006, with a calving date.
 - Range of ages, breeds & genotypes.
- Key questions.
 - What % calved at 2 years?
 - What % had a 2nd calving with 390 days of first?
 - What % have had 3 calves and are still alive?
 - Are there **breed & genotype** differences?

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(i) Age at 1st Calving = Good herd management.

	24mth	26 mths	30 mths	34 mths	38mths	ALL
Number animals	880	880	880	880	880	4400
% calved at ~24 mths	100%	73%	0%	0%	0%	35%
Average age at 1st calving	23.6	25.9	30.3	33.9	38.3	30.4
% with CI<390 days (1-2)	50%	50%	25%	32%	34%	38%
Average CI Days	403.4	412.4	445.3	411.1	388.0	413.6
% with 3 calves & alive	59%	51%	13%	1%	0%	25%
Average number calvings	2.42	2.33	1.95	1.83	1.57	2.02

- Results from animal data are consistent with herd data.
- Cows calving at 2 years have better long-term fertility performance.

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(ii) Breed Comparisons

	Traditional	Dual Purpose	Continental	Overall
Number animals	679	881	2840	4400
% calved at ~24 mths	41%	37%	33%	35%
Average age at calving	29.8	30.1	30.7	30.4
% with CI<390 days (1-2)	44%	43%	35%	38%
Average CI Days	403.7	411.7	416.6	413.6
% with 3 calves & alive	30%	27%	23%	25%
Average number of calvings	2.07	2.09	1.99	1.99

- Traditional breeds
 - Earlier maturing (~1 mth)
 - Have shorter CI days (~14 days)
 - More productive (0.12 calves).
- Differences are not as large as we would expect?

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(iii) Cows ranked on SBV

	5 Stars	4 Stars	3 Stars	2 Stars	1 stars	ALL
Number animals	880	880	880	880	880	4400
Average SBV	€113	€88	€72	€55	€28	€71
% calved at ~24 mths	39%	33%	32%	33%	36%	35%
Average age at calving	29.8	30.5	30.8	30.6	30.5	30.4
% with CI<390 days (1-2)	44%	38%	38%	34%	38%	38%
Average CI Days	407.6	414.8	415.7	418.9	411.3	413.6
% with 3 calves & alive	31%	24%	22%	24%	23%	25%
Average number of calvings	2.12	2.03	2.00	1.99	1.97	2.02

- 5 star cows are;
 - Mainly continental animals.
 - Earlier maturing (0.7 mths)
 - Have shorter CI days (~4 days)
 - More productive (0.15 calves).
- Again, differences are not as large as we would expect?

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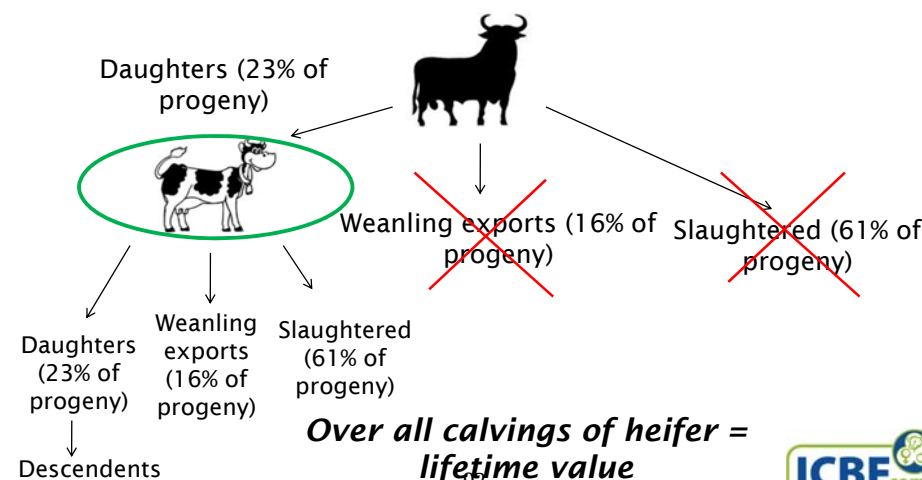
Understanding the SBV

- Suckler Beef Value is an overall index for selecting beef bulls.
 - 0.61 animals slaughtered.
 - 0.16 animals exported.
 - 0.22 animals retained as replacements.
- Limited weighting on fertility traits.
- Growing evidence that we must increase weighting on fertility traits. How?
 - Farm economic model – full cost of fertility.
 - Work underway with Teagasc (models & Derrypatrick herd).
 - A new index for selecting commercial replacements – *work underway*.

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SCBV – heifer selection



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SCBV

- Suckler Cow Beef Value = the expected value of the potential replacement over her lifetime and the lifetime of her descendents, with 23% of heifers' progeny become replacements.
 - Index is in the units of the value of the heifer over her lifetime & lifetime of her descendents
 - Direct descendants of bull (those sold live and slaughtered) not relevant.

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(iv) Cows ranked on new SCBV

	5 Stars	4 Stars	3 Stars	2 Stars	1 stars	ALL
Number animals	880	880	880	880	880	4400
Average SCBV	€545	€393	€312	€237	€117	€321
% calved at ~24 mths	43%	36%	34%	31%	29%	35%
Average age at calving	29.2	30.2	30.5	30.9	31.3	30.4
% with CI<390 days (1-2)	47%	42%	39%	33%	30%	38%
Average CI Days	404.6	408.7	412.6	420.1	424.4	413.6
% with 3 calves & alive	35%	28%	24%	21%	17%	25%
Average number of calvings	2.19	2.10	2.04	1.92	1.85	1.99

- 5 star cows are;
 - Mainly dual purpose & traditional animals - see full sheet.
 - Earlier maturing (2.1 mths)
 - Have shorter CI days (~20 days)
 - More productive (0.4 calves).
- Can we go further on fertility?

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		5 Stars	4 Stars	3 Stars	2 Stars	1 stars	ALL
Continental	Number animals	277	521	584	691	767	2840
	Average SCBV	€506	€390	€311	€236	€113	€273
	% calved at ~24 mths	44%	37%	33%	29%	28%	33%
	Average age at calving	29.2	29.9	30.6	31.0	31.4	30.7
	% with CI<390 days (1-2)	47%	41%	37%	31%	30%	35%
	Average CI Days	403.8	407.3	413.7	423.9	425.4	416.6
	% with 3 calves & alive	34%	30%	24%	20%	15%	23%
	Average number of calvings	2.19	2.10	2.04	1.92	1.85	1.99
Dual Purpose	Number animals	522	192	109	37	21	881
	Average SCBV	€571	€402	€317	€248	€149	€479
	% calved at ~24 mths	41%	30%	30%	27%	38%	37%
	Average age at calving	29.4	30.9	31.5	32.5	30.9	30.1
	% with CI<390 days (1-2)	47%	39%	39%	27%	24%	43%
	Average CI Days	406.9	424.6	406.6	413.4	448.0	411.7
	% with 3 calves & alive	34%	19%	16%	11%	19%	27%
	Average number of calvings	2.20	1.97	1.93	1.81	1.95	2.09
Traditional	Number animals	81	167	186	152	93	679
	Average SCBV	€507	€389	€312	€239	€142	€315
	% calved at ~24 mths	52%	38%	41%	39%	38%	41%
	Average age at calving	28.5	30.1	29.3	30.2	30.4	29.8
	% with CI<390 days (1-2)	47%	51%	44%	41%	39%	44%
	Average CI Days	391.1	395.0	412.6	405.0	411.1	403.7
	% with 3 calves & alive	38%	33%	28%	26%	28%	30%
	Average number of calvings	2.16	2.11	2.07	2.01	2.02	2.07
Overall	Number animals	880	880	880	880	880	4400
	Average SCBV	€545	€393	€312	€237	€117	€321
	% calved at ~24 mths	43%	36%	34%	31%	29%	35%
	Average age at calving	29.2	30.2	30.5	30.9	31.3	30.4
	% with CI<390 days (1-2)	47%	42%	39%	33%	30%	38%
	Average CI Days	404.6	408.7	412.6	420.1	424.4	413.6
	% with 3 calves & alive	35%	28%	24%	21%	17%	25%
	Average number of calvings	2.19	2.10	2.04	1.92	1.85	1.99



(v) Cows ranked on Fertility Index

	5 Stars	4 Stars	3 Stars	2 Stars	1 stars	ALL
Number animals	880	880	880	880	880	4400
Average SBV	€78	€45	€25	€4	-€28	€25
% calved at ~24 mths	48%	39%	34%	29%	23%	35%
Average age at calving	28.8	29.7	30.3	31.3	31.9	30.4
% with CI<390 days (1-2)	51%	43%	39%	32%	26%	38%
Average CI Days	397.7	404.3	414.5	422.0	435.1	413.6
% with 3 calves & alive	42%	28%	25%	19%	11%	25%
Average number of calvings	2.27	2.09	2.06	1.92	1.77	2.02

- 5 star cows are;
 - Earlier maturing (3.1 mths)
 - Have shorter CI days (~38 days)
 - More productive (0.5 calves).
- Indexes the most accurate guide - better than breeds.

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(vi) Good genetics & good herd management performance.

	24 m	26 m	28 m	34 m	38 m	ALL
Number animals	254	219	158	124	124	880
% calved at ~24 mths	100%	74%	0%	0%	0%	47%
Average age at 1st calving	23.5	25.9	30.3	33.9	38.7	28.9
% with CI<390days (1-2)	59%	61%	37%	41%	45%	51%
Average of CI 1st to 2nd	384.7	396.6	428.3	405.3	371.5	397.7
% alive & with 3 calves	72%	66%	23%	1%	0%	41%
Average number calvings	2.61	2.56	2.11	1.89	1.61	2.26

- It is possible to achieve excellent fertility performance in our beef herd – despite declining trends & perceived issues.
- Combination of high genetic index & good fertility management.
- Difference apparent for all breeds.

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What next?

- Work was undertaken to assist with the re-stocking of the Grange Derrypatrick herd.
- ICBF/Teagasc are currently reviewing weight for maternal traits (especially fertility) in SBV.
 - Updated Suckler Beef Value – new economic weights.
 - Separate terminal and maternal indexes?
- Actively considering the establishment of a new index for commercial females (Suckler Cow Beef Value).
- As an industry we need to develop a coherent National Suckler replacement policy.
 - Maternal lines & crossing with terminal sires?



Beef genomics for 2011

Donagh Berry

Teagasc, Moorepark

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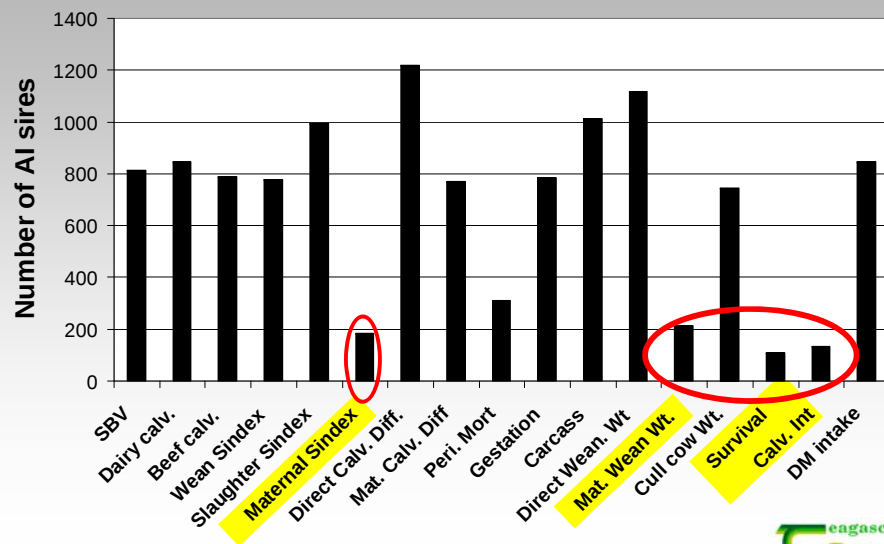
Genomic selection

- The success of genomic selection is determined by the number of genotyped animals
- Preferably high reliability animals

100



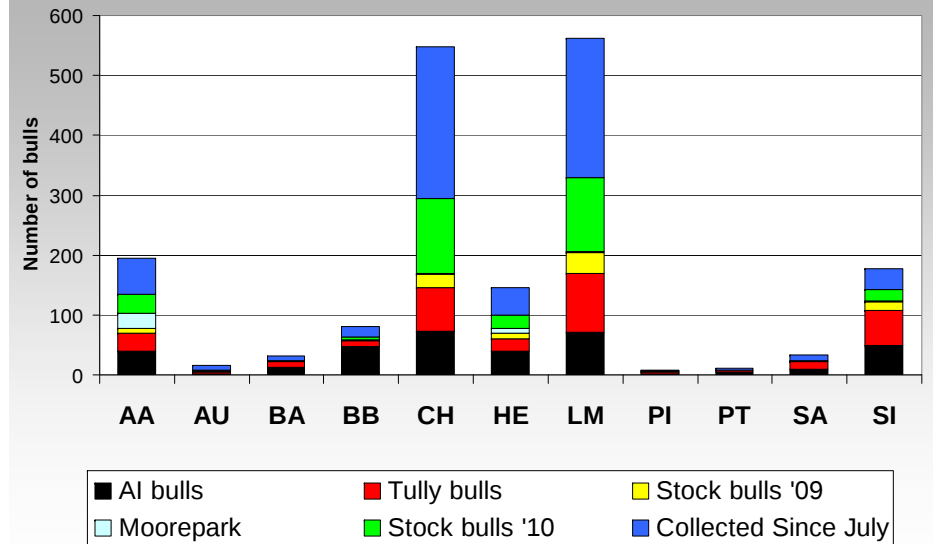
The dilemma – Number of AI sires >50% reliability



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Where we stand



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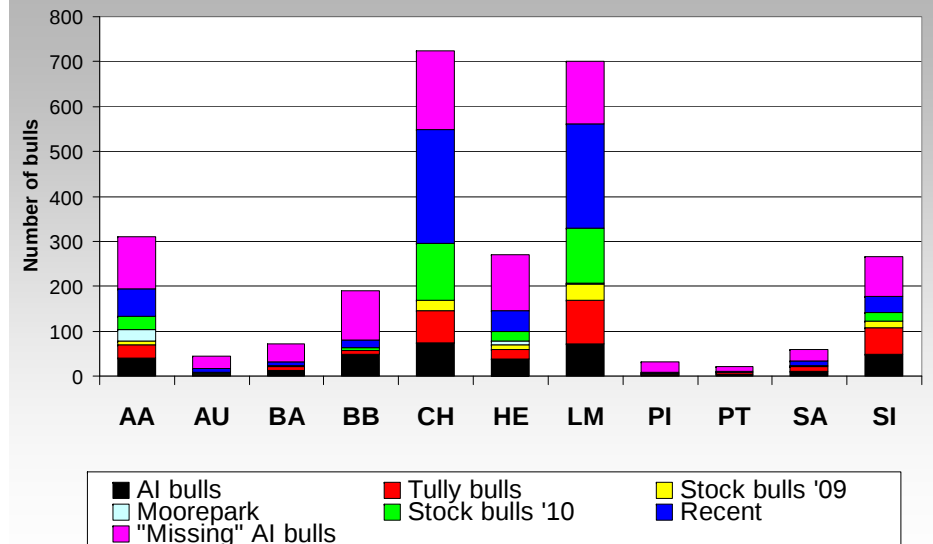
Animals genotyped

Breed	Number
AA	39
BB	38
CH	117
HE	40
LM	128
SI	58
Total	420

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Where we stand



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Points to note

- Greatest benefit is when back pedigree are also genotyped
 - Especially for imputation (lessons from dairying)
- Foreign back pedigree is very important
- 80% (and increasing) of the Irish training population for dairying is from swapping with other countries
 - International collaboration on sharing of genotypes is key for a world-class genomic selection program

Conclusions

Still need more DNA!

GROW® REVIEW DRAFT

Brian Wickham
16th November 2010

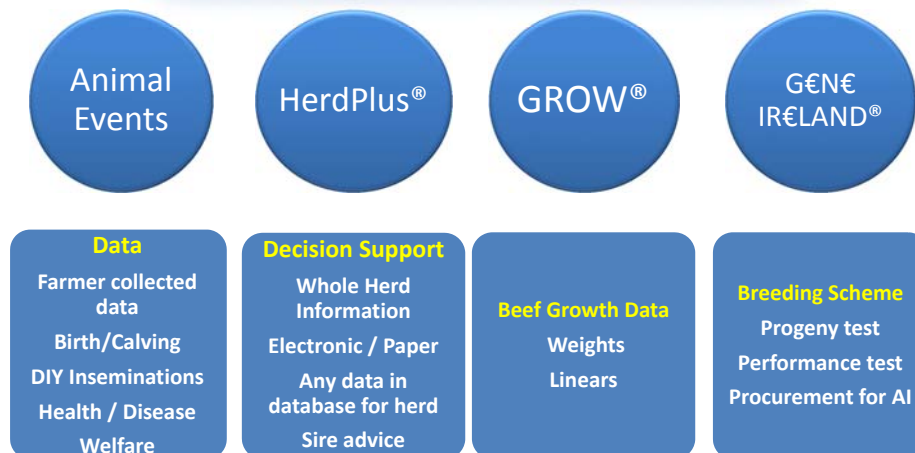
109

Objectives – Call for Submissions

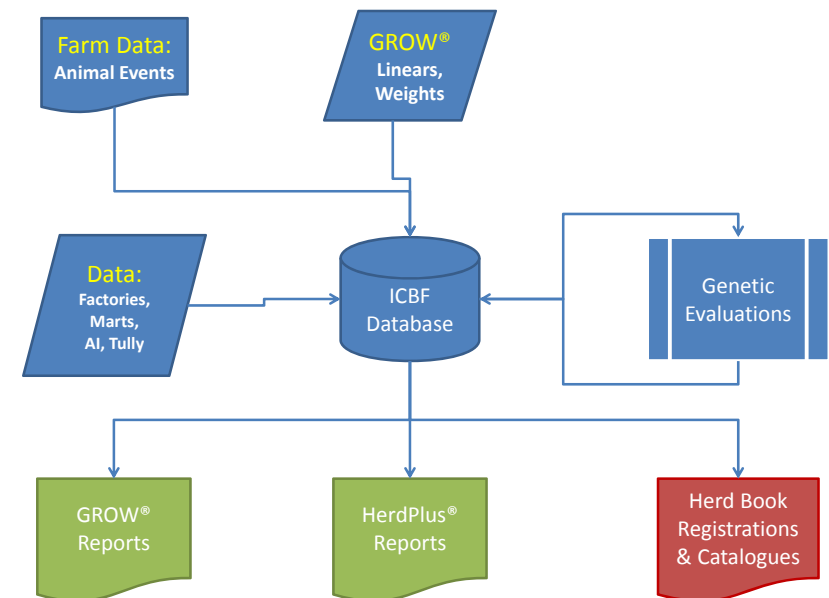
- **Weight recording:** To establish a service for recording the growth (weights, dates, condition scores) of pedigree and commercial cattle. This service to be financially attractive to any farmer who is focused on profitable beef production.
- **Linear scoring:** To review the traits included in the beef linear scoring service, the ages at which animals are scored and means by which the service is provided. Our goal is to ensure the service provides information that is valued by bull breeders and bull buyers.
- **Farm practice:** To review and identify strategies for ensuring the data recorded in bull breeding and commercial herds can be reliably used in genetic evaluations which are valued by bull buyers.

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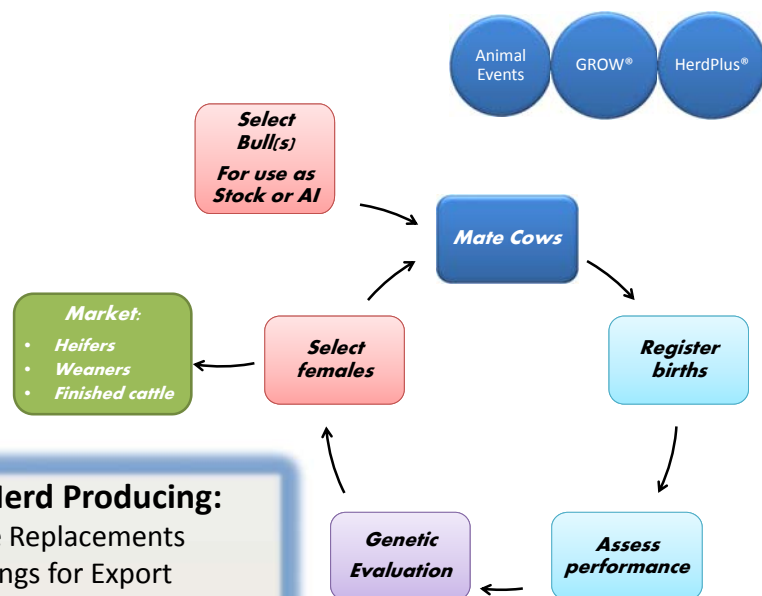
ICBF Services for Beef Farmers and Beef Breeders



111



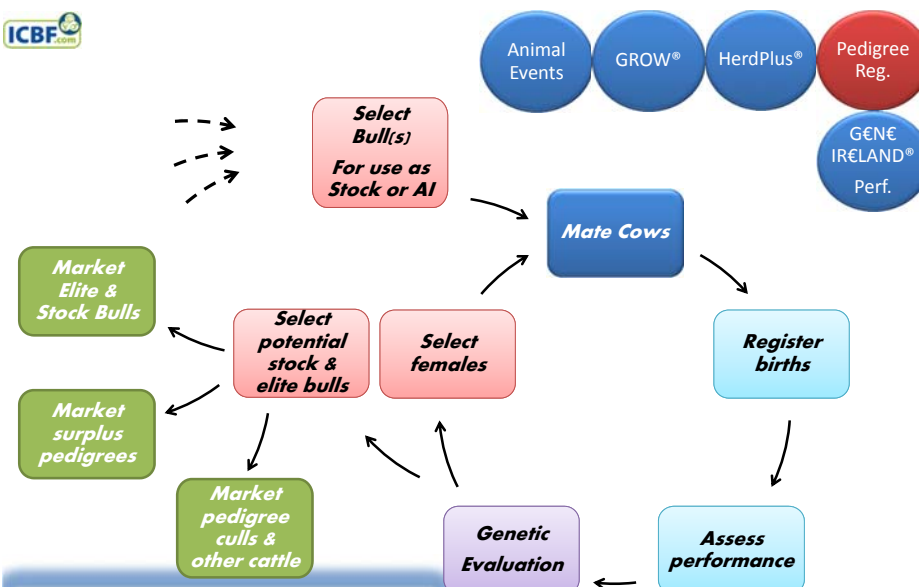
112



Suckler Herd Producing:

- Female Replacements
- Weanlings for Export
- Weanlings for Finishing & Slaughter in Ireland

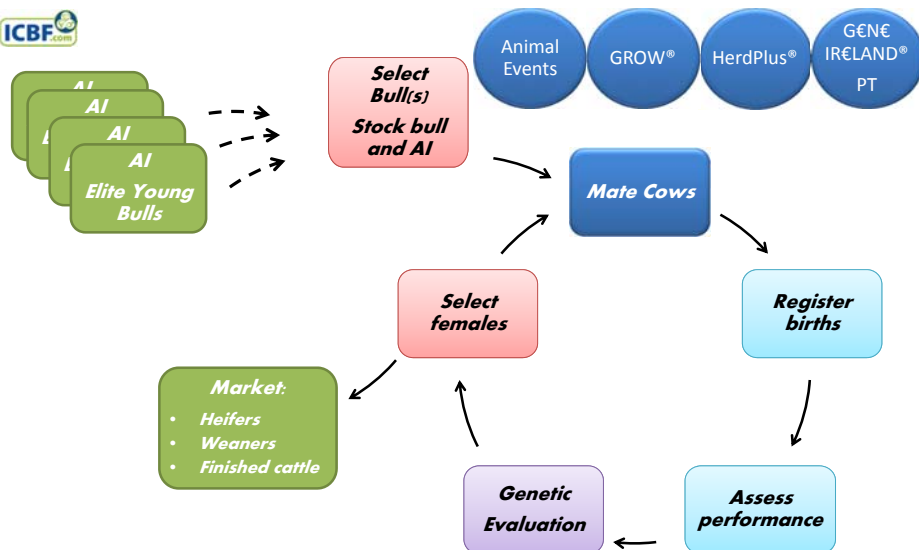
113



Pedigree Herd Producing:

- Stock Bulls
- Elite Bulls (sires of stock bulls)

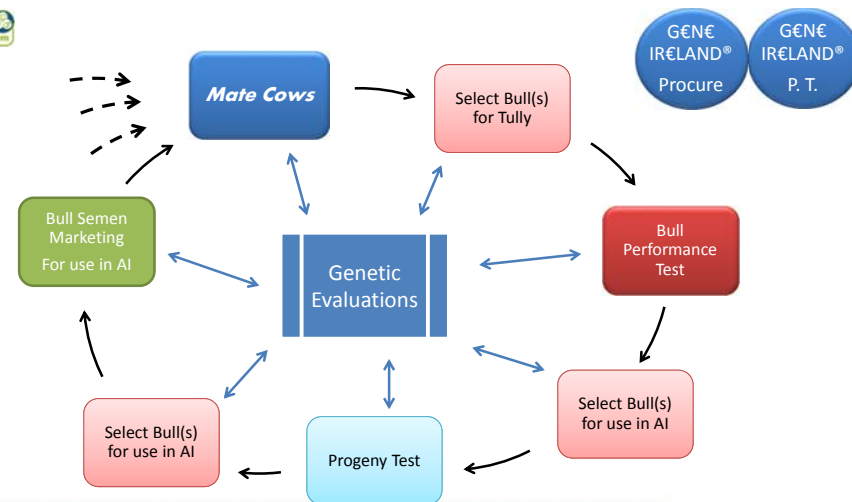
114



Suckler GENE IRELAND® Herd Producing:

- Female Replacements
- Weanling males for Finishing & Slaughter in Ireland

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AI Company providing:

- Beef semen for mating dairy cows
- Beef semen for breeding suckler female replacements
- Beef semen for terminal sire matings of suckler cows
- Beef semen for breeding stock bulls

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Key Points from Submissions & Consultations – so far!

- **Benefits of Weight Recording:**
 - **Birth:** for ease of birth, growth, and validation of D.O.B in pedigree herds
 - **Prior to weaning:** for growth, maternal milk.
 - **Post weaning to slaughter:** for growth to finish.
 - **Breeding cows:** for predicting feed costs and, in conjunction with condition scoring, to manage suckler cow nutrition.
- **Better Farms:** weights are essential information in achieving maximum profits from beef production.

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Key Points – Weight Recording

- **Weight Recording Service:**
 - Must be readily available (a phone call away or DIY), low cost, with skilled operator and national coverage.
 - Needs facilities on-farm suitable for scales with easy access to cattle.
 - Must have report at end of weighing & detailed analysis within 24 hours – linked to other details in database (age, previous weights, sex, management group, ...).
 - EID would make weighing easier (lower cost) and less hassle.
 - Consider use of weigh bands (chest and or cannon bone)
 - Timing (weaning, housing, turnout) is important to minimise hassle.
 - A number of organisations have indicated interest in providing a field service in association with ICBF providing systems, database and reporting facilities.

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Key Points - Weight Recording

- **Potential market for weight recording is large:**
 - Bull breeding herds for calves, and cows
 - Commercial suckler herds for calves, replacement females and cows
 - Finishing and feedlots from entry to slaughter
 - Dairy replacements & cows
- **Barriers to uptake:**
 - Farmers think it will be more difficult than it is
 - Farmers think it will be less value and than it is
 - Service infrastructure not established

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Key Points - Weight Recording

- **Possible development model for weight recording service:**
 - Start with Better Farms – ensure system is effective, low cost, low hassle and technology for data capture and loading to database is proven
 - Move out to Discussion Groups associated with Better Farms to refine information service, establish viability and future demand
 - RFP for field service providers & licence successful applicants

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Key Points – Linear Scoring

- **Benefits of Linear Scoring:**
 - Weanling pedigree bulls as indicator of carcass traits
 - For bull breeders to understand where their animals are relative to other herds for range of appearance traits

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Key Points – Linear Scoring

- **Linear Scoring Service**
 - Excellent reports being produced
 - Should be separated from weighing
 - Consider alternative field service provider
 - Consider scoring of first lactation suckler cows

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Key Points – Linear Scoring

- **Linear Scoring Uptake**
 - Limited to bull breeding & GENE IRELAND® herds
 - Value to cost ratio limits uptake
 - Genetic evaluations subject of questions

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Key Points – Farm Practice

1. False data and preferential treatment seriously impacts on credibility of genetic evaluations.
2. Weighing at or near time of birth by independent inspector might reduce incidence of false birth dates.
3. Greater use should be made of mating dates to validate birth dates. Not all DIY or technician inseminations are recorded.
4. Greater transparency of herd recording would help give buyers more confidence in buying bulls from specific herds.
5. Data from selective recording should not be used in genetic evaluations.

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Key points – Farm Practice

6. Data from animals preferentially treated should not be used in genetic evaluations.
7. Herds providing false data should be excluded from genetic evaluations.
8. Need clear “rules” which are understood and supported by farmers, herd books, field service providers and ICBF.
9. Lot of honest breeders but there are a minority not providing accurate data.
10. Condition score is possible indicator of “preferential treatment”.

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Key Points – Farm Practice

11. Policing is the job of the Herd Books.
12. Our aim should be to get all herds from which data is used in genetic evaluations to:
 - Promptly and accurately record all data.
 - Identify all animals that have received significantly different treatment from their contemporaries.
13. Make available, for those herds that wish it, a “public transparency” facility.

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Summary

- Development of a weight recording infrastructure (weighing, data capture & reports) has commenced.
- Review of Linear Scoring is on-going.
- Options for ensuring best farm practice currently under consideration.

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IRISH CATTLE BREEDING FEDERATION

G€N€ IR€LAND Update.

Niall Kilrane.

GENE IRELAND - Breeders

- GENE IRELAND is a focused breeding program
- Best bulls selected for GENE IRE progeny test.
 - Purchased by AI stations/breeders.
- Nationwide across breed progeny test programme.
- Bulls selected for a combination of maternal and beef traits
- 700 straws per bull. Aim to get 100 daughters per bull
- Bull fully maternally tested in 3 years

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EXAMPLE OF GENE IRELAND BULL

Lot 1 Kilbline 1 Cupidon (ET)		Breed: Charolais																									
KLU		DOB: 10-Feb-2007																									
Owner: National Cattle Breeding Cntr - Kilcorney Enfield Co. Meath		Male																									
Breeder: Ireland - Highfield House Bandon																											
Sire:	Nevers RJ (NR5)	SBV: € 98 (87%)	Rank: 1																								
	Aghafad Liscroate	SBV: € 102 (88%)	Rank: 2																								
Dam:	Kilbline Utica (ET)	SBV: € 103 (89%)	Rank: 3																								
	Nevers (Imp. 99)	SBV: € 102 (88%)	Rank: 4																								
SE211306260338	SBV: € 181 (84%)	Rank: 5	Donovan 808810810																								
Euro-Star Indexes																											
No. of stars	Star Rating (within breed)	Produce & Frame	Carry-Over																								
97%	★★★★★	Suckler Best Value (SBV)	€ 142																								
98%	★★★★★	Weaning Export	€ 112																								
98%	★★★★★	Beef Carcass	€ 160																								
92%	★★★★★	Daughter Fertility	€ 24																								
41%	★★★★★	Daughter Milk	€ 29																								
Other Key Traits																											
5%	★	Calving Difficulty	13.5%																								
4%	★	Dissection Length	93%																								
79%	★★★★★	Density	93%																								
GROW Linear Score Evaluation (Within-Breed Percentiles)																											
Sound scores, linear scores and scoring outliers in evaluations																											
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- BORN FEB 2007
- TULLY NOVEMBER 2007
- IN AI SUMMER 2008
- TESTED ON GI SPRING 2009
- 671 BIRTHS ALREADY
- 114 W. WTS ON DATABASE

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SUMMARY OF 37 BULLS TESTED

	# BULLS TESTED	AVG SBV	AVG INSEMS	AVG BIRTHS	AVG W. WTS.	AVG DAUGHTERS CALVED
AA	1	89	1334	408	33	0
BA	1	12	341	135	22	0
BB	4	55	470	129	28	0
CH	10	123	1200	751	71	6
LM	12	110	943	489	68	6
PT	1	68	446	138	9	0
SH	1	71	690	424	5	0
SI	7	174	1278	833	102	10
TOTALS	34	89 (4 STAR)	838	413	40	3

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GENE IRELAND REVIEW 2010

- PROGRAM BEGAN IN SPRING 2007
- 726 HERDS TOOK PART IN 2009
- COST OF TESTING WAS AN ISSUE
- NEW LOW COST MODEL DESIGNED: €2000 vs €5000
- 255 HERDS SIGNED UP
 - REMOVAL OF PAYMENT IS NOT AN ISSUE
- 2011 PANEL NEEDS TO BE IDENTIFIED

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2010 AUTUMN PANEL

CODE	NAME	BREED	SBV	SBV STARS	MILK STARS
MLJ	MOGEELY JOE	AA	56	5	5
KCE	KILMONEY BRUCE	BA	92	5	3
KYR	KUBITUS DE BRAY	BB	€90	2	3
STQ	SULTAN	BB	N/A	N/A	N/A
GHX	GOLDSTAR ECHO	CH	126	5	3
CXY	CLOVERFIELD EXCELLENT	CH	150	5	5
GCT	GOULDINGPOLL CAPTAIN	HE	110	5	5
NHL	NETHERHALL EPIC	LM	114	5	3
CZH	CARMORN DAUPHIN	LM	85	3	5
CBQ	CAMBRIDGE	PT	54	2	5
BHU	BALLYMACKEOGH HUGH	SA	121	5	5
LYJ	LISSEY JUMBO	SH	71	5	5

DEZ AND ADX ARE ALREADY TESTED (HIGHEST INDEX BULLS WITHIN BREED)

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GENE IRELAND – What next?

- In general, good progress.
- But: Need to test more bulls and of higher index.
- Target is to test 100 high index beef bulls per annum. Currently achieving 15 bulls.
- This will allow us achieve genetic gain but also create a resource for genomics research.
- With low levels of AI in beef (especially for maternal traits), this is challenging.
- Working with AI centres to overcome these constraints, e.g., funds for semen collection & distribution.

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Work-plan & recommendations.

- Outcomes from to-day – comments & feedback. Recommendations to ICBF board.
 - Test runs of relevant traits.
 - Comments & feedback.
- Next ICBF Board Meeting
 - 2nd December 2010.
- Interbull official evaluations.
 - 13th December 2010.

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