



IRISH CATTLE BREEDING FEDERATION

ICBF Dairy & Beef Industry Meetings - Beef Session

*Killeshin Hotel, Portlaoise.
14th April 2011.*



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1

Beef traits & beef breeding programs (2 – 4.30 pm).

- Developments in beef breeding, incorporating GROW review preliminary report – *ICBF Team*.
- Female fertility evaluations – *Ross Evans*
- Maternal weaning evaluations – *Ross Evans*.
- Beef genomics research – *Donagh*.
- AOB.





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Developments in beef breeding, incorporating GROW review. Preliminary report.

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3

Starting point.

- GROW – launched in 2002.
- Reviewed in 2007. Major re-focus on weight data and on need to weigh/score animals in 150-300 day bracket and in contemporary groups of 5.
- High levels of success.
 - 14,611 records collected in 2010, 97% with weight data (14,496 records in 2007, 55% with weight records).
 - 37% of records now from commercial herds (GENE IRELAND).
 - Since 2007, useable data for genetic evaluations has increased from 12% to 80%.
- Positive outcomes but.....
 - Penetration is still low (~25% of pedigree animals).
 - Increasing focus on maternal milk – more data & 300 days?
 - Ongoing problems with CG size – especially for small herds.



Evolved to.....

- More accurate data recording (e.g., weight & linear score) – first component of genetic gain; (i) data, (ii) indexes, and breeding program.
- Genetic gain is currently ~€5/cow/year. Could be €20/cow/year.
- Where are the obstacles and how can we overcome them?
- Objective of this preliminary report.

5



(i) The data issues?

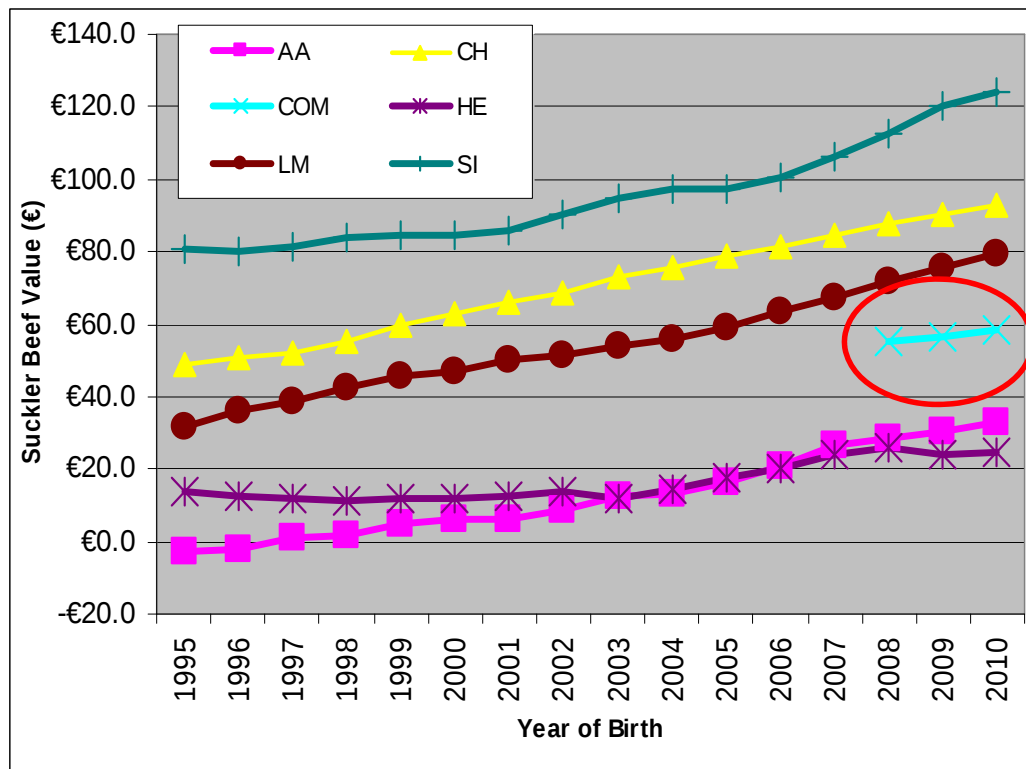
	calving ease	wean wt	linear	carcass	mat wean wt	calving interval
Angus	459,173	8,590	3,088	165,706	5,095	15,836
Aubrac	12,889	1,161	1,265	2,852	773	907
Belgian Blue	188,047	22,185	5,332	56,384	3,948	7,577
Blonde Aq	30,373	2,927	1,400	6,222	831	1,354
Charolais	876,213	120,265	43,833	202,587	24,501	19,232
Hereford	225,538	4,011	3,072	80,934	2,992	9,183
Limousine	821,819	84,153	56,035	179,407	27,785	31,403
Parthenaise	7,764	615	384	1,005	185	233
Piemontese	5,018	494	484	850	203	286
Romagnola	474	76	28	94	5	23
Saler	31,840	2,280	1,155	6,632	1,162	2,075
Shorthorn	30,022	1,895	500	4,723	1,793	3,875
Simmental	172,893	18,198	12,558	46,570	10,872	12,906
Overall	2,862,063	266,850	129,134	753,966	80,145	104,890

- Low levels of maternal weaning weight data
- Is 150-300 days the correct trait?

6



(ii) The genetic trends issues.



7



(iii) The breeding program issues?

	2007	2008	2009	2010	ALL
Number Bulls	6	11	17	9	43
Average SBV	€138	€109	€100	€120	€112
Within breed rank - SBV	97	71	71	80	76
Average Milk Sub Index	€8	€29	€31	-€4	€20
Within breed rank - Milk	57	54	64	55	59
Straws dispatched	2920	7956	12343	8860	8020
Herds	146	468	726	491	458
Straw/herd	20.0	17.0	17.0	18.0	17.5

- Primary objective of GENE IRELAND is to identify AI bulls for breeding stock bulls in pedigree herds.
 - RWB (AA), CF61, CF85, KLU (CH), CWI, AIZ (LM), DRU (SIM)
 - Only 60% of pedigree registrations are by AI sires.
- We need more bulls & of higher index.
 - Latest Tully intake. Only 1 secured for AI.

8



Developments in beef breeding, inc GROW - Key elements.

- GENE IRELAND.
 - Bull breeder herds.
 - Bulls for AI.
 - Progeny testing & research.
 - Tully performance test,
- Performance data.
 - Weight records.
 - Linear scoring
 - Feed intake data
- Accurate data for genetic evaluations.

(i) GENE IRELAND Bull Breeder Herds

- *Objective: to work with breeders whose goal is to produce high index, high health status bulls for natural service and AI.*
- Key elements.
 - Herds would “sign-up” to service (voluntary).
 - Adhere to principles of “best practice”.
 - Record multiple weights (~birth, ~200 days and ~400 day). DIY or through a service provider
 - Record key events, e.g., insemination, calving, weaning.

(i) GENE IRELAND Bull Breeder Herds

- Key elements (continued)..
 - Herd “data quality” index made available to herd-owner.
 - Timeliness, completeness & deviation from “norm”.
 - Receive a consultation visit from a “ICBF breeding advisor”.
 - Involved in a “local” beef breeding discussion group – linked with Teagasc.
 - Participate in AH1 approved herd health program.
- Herds (& animals) would be acknowledged, e.g., website & reports and would be priority herds for all new developments, e.g., genomics, bulls for AI etc.
- *Note: Direct communication and support has been key catalyst in increasing EBI with GENE IRELAND dairy program.*

11



(ii) GENE IRELAND Bull's for AI.

- *Objective: to ensure a steady stream of high quality bulls for the GENE IRELAND breeding program.*
- Key elements.
 - Partnership involving ICBF, bull breeders, AI companies, herdbooks.
 - Identify elite cows.
 - Suggest sire of sons.
 - Recommend matings.
 - Ensure resultant calves have opportunity to enter breeding program.
 - Proportion purchased by AI stations.
 - Bulls not purchased, but of interest to breeding program, AI stations contracted to collect semen for program.
 - *Again: Key catalyst in increasing EBI with GENE IRELAND dairy program.*

12



(iii) GENE IRELAND Progeny Test/Research

- *Objective: to ensure accurate proofs for all AI sires. Would apply to bulls sourced in Ireland (progeny test) and also foreign bulls.*
- Key elements.
 - Commercial suckler herds.
 - Record accurate and timely data. For example, insemination, calving, weanling, weights (~3 weights/year) & maternal data.
 - Involved in a “local” beef breeding discussion group – linked with Teagasc.
- Foreign bulls – can we ensure that some semen is allocated to GENE IRELAND program?
 - In place for dairy bulls (e.g., JE breed). Why not beef?
- Note: in long term as genomics comes on stream, these herds will fulfil a research & validation role.



(iv) Beef performance test centre – Tully.

- *Objective: to make the maximum use of Tully facility as a means to achieving genetic gain in our National beef herd.*
- Current role of Tully.
 - Collection of feed intake data.
 - Unbiased measure of growth & performance.
 - Identification and health screening of bulls for GENE IRELAND breeding program.
 - Focal point for genetic improvement.
- How important/relevant are each of these elements?
- Rem: Tully costs ~€450k/annum (~€250k of which is from ICBF budget). As an industry are we getting value for this money? Would this money be better spent elsewhere?



Options for collecting feed Intake data.

- What is the most efficient and effective way to collect feed intake data in the future?
 - Pedigree bulls in Tully – Current approach.
 - Commercial progeny of GENE IRELAND bulls through Tully.
 - Combination of above (e.g., separate intakes).
 - Contracted

15



Options for collecting feed Intake data.

	Positives	Negatives
Option 1 – Current.	All breeds. Bulls avail for AI. Bull owner contributes to cost.	Small sample size. High cost (esp health testing). Intensive feeding only.
Option 2 – GENE IRE progeny.	Facilities. High thruput (3 intakes * 150 animals – 30 sires). Different diets. Lower cost. Dissection & meat quality data.	Cost of acquiring cattle? Loss of “focus” re: elite cattle.
Option 3 – Combination.	As 1 & 2 above.	As above. Mixing cattle. Distinct intakes?
Option 4 – on farm recording	Throughput. Free’s up Tully, e.g., semen collection role.	Set-up costs. Need to identify suitable units. Focus?

16



(iv) Where next – Tully?

- Get discussion going re: best role for Tully.
 - “What are we trying to do.....?” Getting high health status bulls into the GENE IRELAND breeding program. Are we succeeding?
 - If we were to start again, would we do it this way?
 - Past focus: unbiased test & feed intake data.
 - Future focus: the breeding program.
- Undertake cost:benefit options for collecting feed intake data & role of Tully. Consider all elements.
 - Collection of feed intake data.
 - Unbiased measure of growth & performance.
 - Identification and health screening of bulls for GENE IRELAND breeding program.
 - Focal point for genetic improvement.

17



(v) HerdPlus Beef.

- *Objective: to provide a a high value low cost weight recording & reporting service for pedigree breeders and commercial farmers. To increase the number of farmers om weight recording.*
- Key elements.
 - Weight recording (3 times/year).
 - Birth, summer & closing.
 - Simple & low cost. Range of options. DIY, EDIY, Technician. Range of service providers, e.g., AI stations, FRS, Marts, herdbooks.....?
 - Valuable management reports.
 - Weight gain & prediction reports.
 - Pedigree & commercial cattle.
 - Post slaughter reports.

18



a. Data recording initiatives.

- BETTER farms data recording system being moved to ICBF database.
 - Historic data now loaded (~5k weight records).
 - Moving BETTER farm technicians to using ICBF handheld for routine weight recording.
 - Investigating other weight recording options.
 - EID, DIY, EDIY. Roll-out options to other service providers.
- Developing various reports for BETTER farm partners.
 - Herd management reports for farmers.
 - Extracts & downloads for advisors.
- Systems being piloted and developed with BETTER farms program. Available to all herds in due course.

19



b. Predicting weights.

- Birth weights.
 - Data: 1980 to 2011. 75% 1997+
 - 17K records after edits.
 - Prediction accuracy = 0.60.
 - Farmers need to record birth weights.
- Live-weight at slaughter.
 - 330,341 records with liveweight & carcass data.
 - 4,568 had liveweight within 2 days of slaughter
 - Prediction accuracy = 0.96.
- Predicting forward weights.
 - Farm and mart weights, BETTER farms & Teagasc.
 - ~20k records. Prediction accuracy = 0.88 (with 2 prior weights).
 - Farmers need to record early weights to get high accuracy of prediction.

20



Example a: Slaughter Weight Prediction

- Example

Slaughter Report

Home Bred HEIFERS Details

(Slaughter Period: 01-Jan-2010 to 31-Dec-2010)

Animal Details							Factory performance							KPI		
IE Tag number	Breed Sire X Dam	Carcass Index (€)	€uro-Star Rating	Sire ID	Age (Months)	Days On Your Farm	Predicted Wt Live Wgt At Slaughter (KG)	Birth Wgt (KG)	Slaughter Date	Carcass Cold Wgt (KG)	Grade	Fat	Price Cents Per KG	Overall Price (€)	Predicted Avg Daily Gain (KG)	Lifetime Value Per Day (€)
3	CH X SI	€91	5 Star *****	I	17	517	415	44	07/09/10	215	R-	2=	€ 2.89	€ 620	0.72	€ 1.20

Carcass Cold Wgt (KG)

215

+

Grade

R-

+

Fat

2=

=

Live Wgt At Slaughter

415

- $R_{\text{actual,predicted}} = 0.96$
- Shrinkage = zero

21



Example b. 400d Weight prediction

- Valuable for pedigree herds targeting particular end points, e.g., sale date, age....
- Also relevant for commercial herds.
- Each herd and animal has a growth rate.
- Take prior growth rates (e.g., birth & 200 day) to predict forward for defined end-point.

$$\text{fixed effects} + a_{\text{herd}} + b_{\text{herd}} \cdot \text{age} + a_{\text{anim}} + b_{\text{anim}} \cdot \text{age} =$$

$$1.5 + 46 + (1.1 \times 400) - 3 - (0.06 \times 600) = 469 \text{ kg}$$

$$R_{\text{actual,predicted}} = 0.88$$

22



(vi) Linear Scoring

- *Objective: To support the continuation of a linear scoring service.*
- Issues:
 - Past value of linear scoring was as a predictor of weight and carcass traits. ICBF now has access to high volumes of quality weight and carcass data, including VIA images.
 - Note: farmer recorded and linear score recorded data have same “predictive ability” ($r_g = 0.50$).
 - Future: Carcass value will be predicted directly at birth based on genomics.
 - What is future value of linear score data?
 - Stock bull and female functionality.
 - How best to collect this data?
 - As an industry is this a service that we want to continue to provide. Value for money for farmers/breeders?
 - If so, who is best positioned to offer this service?

23



(vii) Genetic evaluations.

- *Objective: to ensure high levels of accuracy within our genetic evaluation system.*
- Key elements.
 - “Data quality” index for each herd. Means to improve on this key area.
 - Herds consistently below thresholds – opportunity to exclude from genetic evaluations.
 - Clear opportunity to review C Group issue through this approach. Small herds with multiple weights & visits would be considered.
 - Beef breeding advisors and discussion groups.
 - Voluntary but with some level of independent auditing?
 - We want to reward those breeders that are doing it right!



Summary.

- Opportunity to become “world best”.
- Database, indexes & GEN€ IRELAND in place.
- Working with bull breeder herds & bulls for AI is key.
 - Experience from dairy EBI.
- Calf weights “on cow” another important focus area.
- To be “world best” we must be prepared to think outside the box!

25

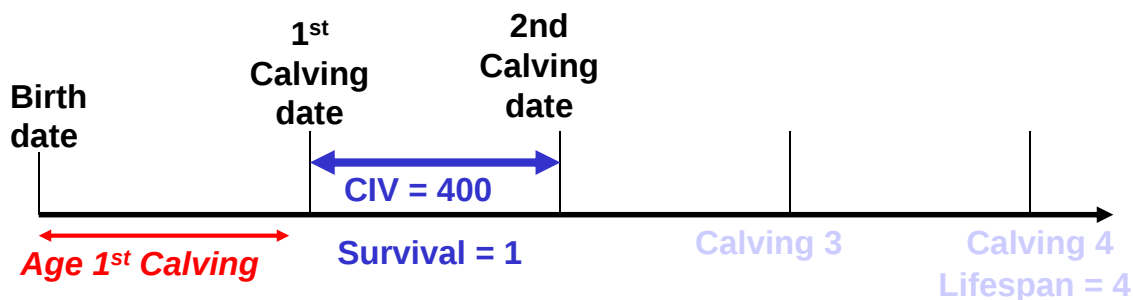


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New Beef Fertility Evaluations.

*Ross Evans.
14th April 2011.*

Current Beef Fertility evaluation



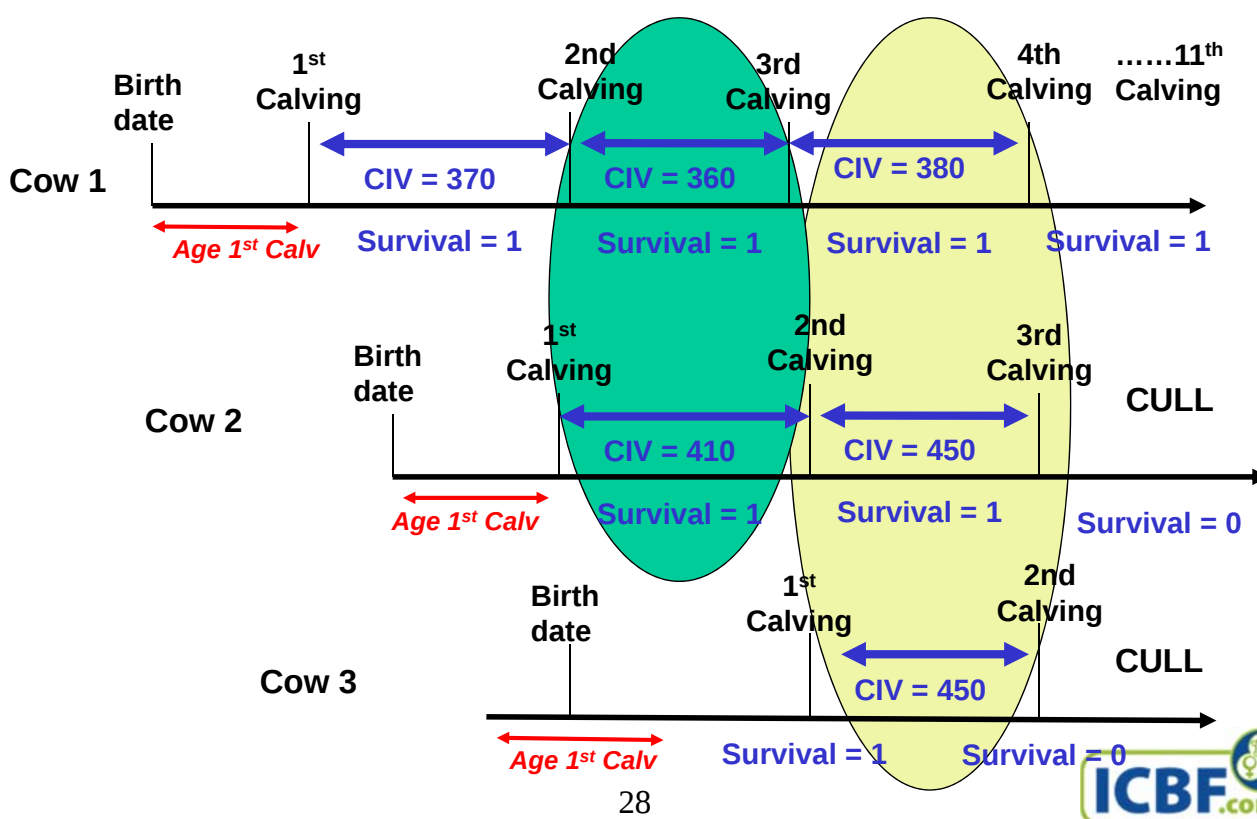
Limitations

- Calving interval and Survival on 1st lact only
- Small contemporary groups
- Low heritability traits so need many daughters

27



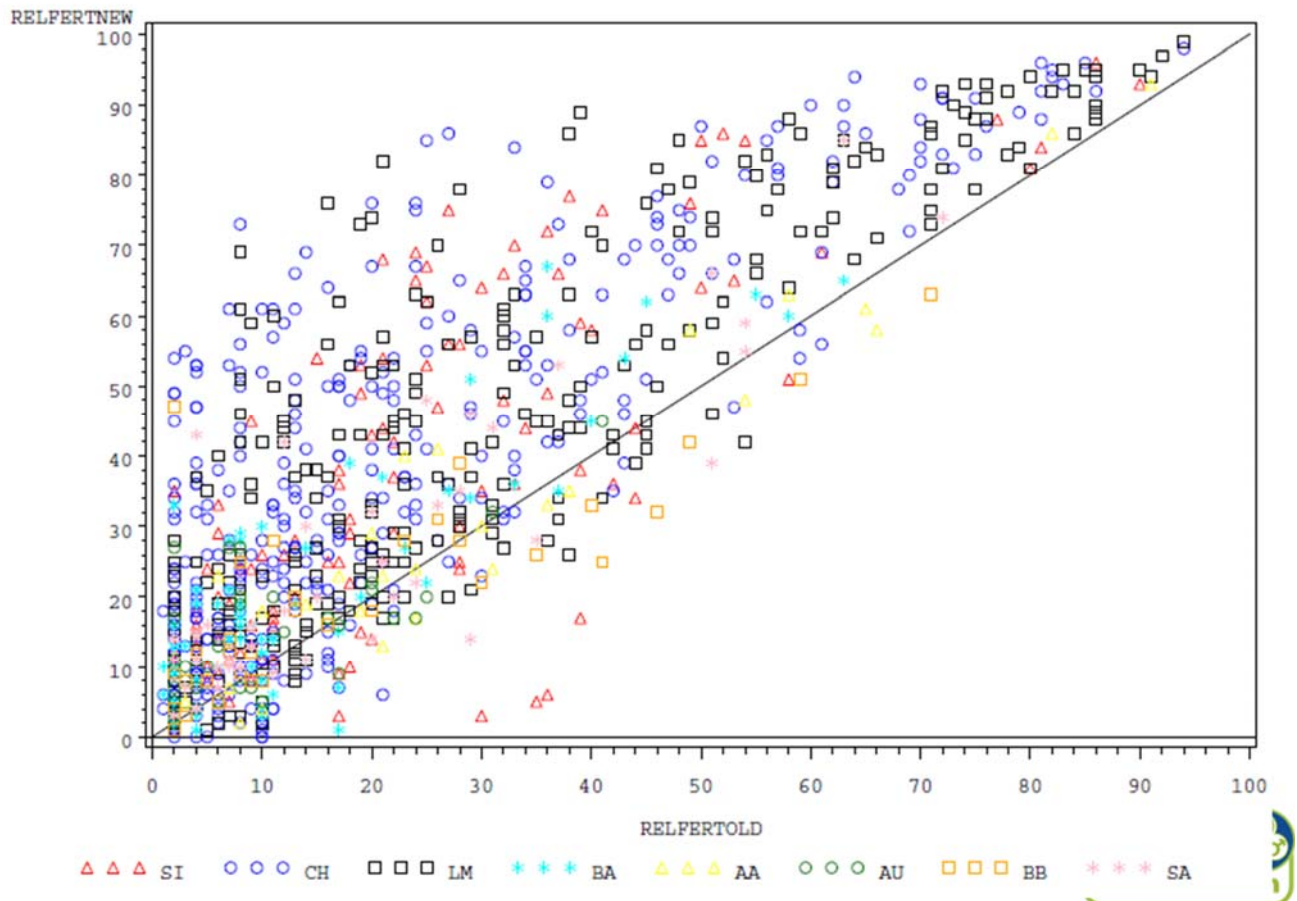
New Beef Fertility evaluation: Repeatability model & early predictor traits



28



Change in reliability



Early Predictor traits

- Progeny
 - calving difficulty
 - Mart data
 - Linear type data
 - Suckler scheme calf quality and docility
 - Carcass data
- Cow herself
 - Cow survey docility and milkability
 - Both showing heritability in the 30-40% region
 - Associations with fertility yet to be analysed

Predictor traits with medium to high heritabilities will help to improve accuracy and reliability of lowly heritable fertility traits quicker

Summary of Beef fertility

- Genetic parameters for new repeatability model finished and ebvs and reliabilities working
- Predictor trait correlations close to finishing
 - Best predictor traits will be used to get early prediction
 - Autumn target for implementation
 - Test proofs out sooner

31



IRISH CATTLE BREEDING FEDERATION

New Maternal Milk Evaluations.

*Ross Evans.
14th April 2011.*

Milkability evaluation

- Review of current milkability evaluation
- Current age 150-300 days: is 300 too old for milk?
- Is farmer scored milk surveys a good predictor

100000446

Optional Cow Survey

Herd owner: JOE BLOGGS
Herd No: IE1234567
Print Date: 21/01/2011

Please give your best estimate of your cows as they were in the period from 'Calving to 3 months calved' for docility/temperament and from 'Calving to 3 months calved' for the milk score.

Cow Jumbo	Tag number	Date of Birth	Breed	Cow Docility score VG = Very Good G = Good A = Average P = Poor/Nervous VP = Very Poor/ Aggressive (Ensure a value is circled)					Cow Milk score VG = Very Good G = Good A = Average P = Poor VP = Very Poor (Ensure a value is circled)				
032	IE123456750032	10/03/2000	HE (44%),HO (41%)	VG	G	A	P	VP	VG	G	A	P	VP
51	IE123456770051	10/07/2007	LM (44%),HE (22%)	VG	G	A	P	VP	VG	G	A	P	VP
069	IE123456770069	15/03/2004	LM (66%),HE (13%)	VG	G	A	P	VP	VG	G	A	P	VP
092	IE123456760092	27/12/2006	BB (50%),SI (22%)	VG	G	A	P	VP	VG	G	A	P	VP
095	IE123456790095	05/06/2007	LM (63%),SI (25%)	VG	G	A	P	VP	VG	G	A	P	VP

33



Milkability evaluation

- Initial results:
- Cow milkability survey
 - Analysis of 21,880 records: heritability of 0.4
 - Correction for CG, parity, age, heterosis, recombination
- Milk survey score and maternal weaning wt (21,345 recs).
 - 150 - 300 days: gencorr = 0.54, h^2 mwwt = 0.19
 - 150 - 250 days: gencorr = 0.69, h^2 mwwt = 0.192

34



Milkability evaluation

Cow milkability survey

- 6,000 surveys returned on 124,369 cows
 - 44,052 with sires recorded
 - Useful and early addition to prediction of milkability if recorded on a yearly basis
- Recording of weights to predict milkability
 - Early results indicating that post 250 days is too old to capture milk weight
 - Focus on getting weights of calves when they are on cows (data from SCWS – weaning & meal feeding).

35



Beef genomics

Donagh Berry

Requirements for genomic selection

Genetic evaluation system, breeding objective, breeding program

Genotypes for many thousand moderate to high reliability bulls in Ireland

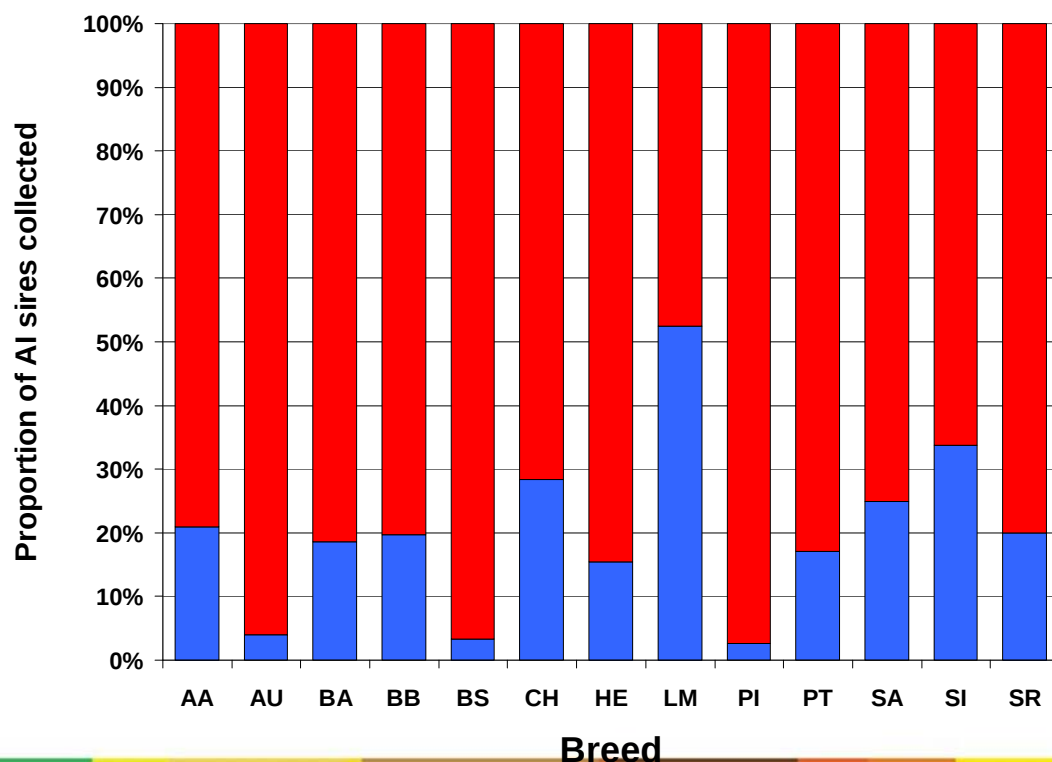
Computing skills and resources

Dissemination



The Irish Agriculture and Food Development Authority

AI semen straws collected



The Irish Agriculture and Food Development Authority

AI bulls

Breed	DNA available	Genotyped
AA	75	38
AU	2	0
BA	19	0
BB	69	36
BS	2	0
CH	140	75
HE	72	31
LM	182	77
PI	2	1
PT	6	4
SA	13	2
SI	89	41
SR	2	0
Total	671	305

International efforts

Generation of international list of bulls with semen/DNA/genotype available

- INTERBEEF or equivalent IDs

Successful Genomes Canada funding application

- Access to sequences and genotypes of many animals

Need international collaboration!

Future plans

Identify and collect more semen

Lobby industry for funding to genotype

Test across-breed genomic selection software (including dairy – carcass/calving)

Industry consultation on implementation

Genetic evaluations, breeding objectives & breeding programs.....



The Irish Agriculture and Food Development Authority