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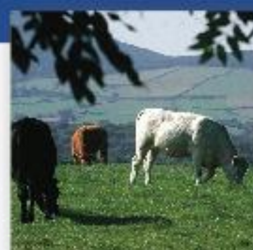
IRISH CATTLE BREEDING FEDERATION

ICBF Dairy & Beef Industry Meeting.



8th October 2013

NDP
National Development Plan
Transforming Ireland

Dairy; 9.30-12.00

- Test day models. John McCarthy, ICBF. *Decision required.*
- Base change. Francis Kearney, ICBF. *Decision required.*
- Mastitis & lameness. Ross Evans, ICBF. *Update*
- Economic values. Laurence Shalloo, Teagasc. *Decision required.*
- Roll-out plan. Andrew Cromie, ICBF. *Decision required.*

Dairy & Beef; 12.00 – 3.00

- AI codes, Pat Donnellan. *Decision required.*
- Health & disease traits. Donagh Berry, Teagasc & Jen McClure, ICBF – *Update.*
- Genomics & IDB19k. Donagh Berry, Teagasc & Matt McClure, ICBF. *Update.*
- Sexed semen. Andrew Cromie, ICBF. *Update.*

Beef; 3.00 – 4.00

- G€N€ IR€LAND Maternal Breeding Program. Stephen Conroy, ICBF. *Update.*
- Interbeef update. Thierry Pabiou, ICBF. *Update.*
- Meat eating quality. Andrew Cromie, *Update.*

IRISH CATTLE BREEDING FEDERATION

Test Day Model for Milk Production Traits

National Development Plan
Transforming Ireland

Background

- Currently calculate 305 day values for each lactation
- 305 day model uses one 305 day figure for Milk/Fat/Protein/Scc which summarises whole lactation
- Operated on contract by CRV Holland
- The 305d figures are calculated using “lactation curves” software – assume lactation curves just differ in level

What

- Change from 305 day model to test day model where all individual recordings are directly included in evaluation.
- Instead of calculating 305 day yield and then evaluating, evaluate actual individual test day yield
- Significantly more computation required
- Use new software
- Collaboration with Finnish research institute (MTT)

Why

- More accurate estimation of environmental effects from including the influence of particular days of recording
- Optimal use of information from all test days
- Better use of records in progress
- Model individual cow lactation curves
- Remove necessity of predicting 305d
  - will still be predicted for mgt purposes
- Persistency evaluation
- Method of choice for many dairy evaluations internationally (NZ,NLD,CAN,DFS,…)
- Existing 305d model has proved quite robust

Where are we

- Participated in Interbull test run Jan 2013 with initial model and HO/FR bulls for milk/fat/prot
  - Model passed that test
- Further changes made to model over summer
  - Correction for Heterogeneity of Variance
  - Inclusion of later parities (5-15)
  - Other breeds (Red/Jersey/Sim-Mont)
- Participated in Interbull test run Sep 2013 with updated model milk/fat/prot for HOFR/JER/Red/Sim-Mont evaluations
  - Model passed that test

What is a test day model

- Existing model evaluates a single trait i.e. 305 day milk yield
- Models each daily milk yield at each stage of the lactation
- Uses Random Regression
- Can think of it as
  - *evaluating milk yield separately for each day of lactation*
- Same for fat/prot
- As a bonus get persistency

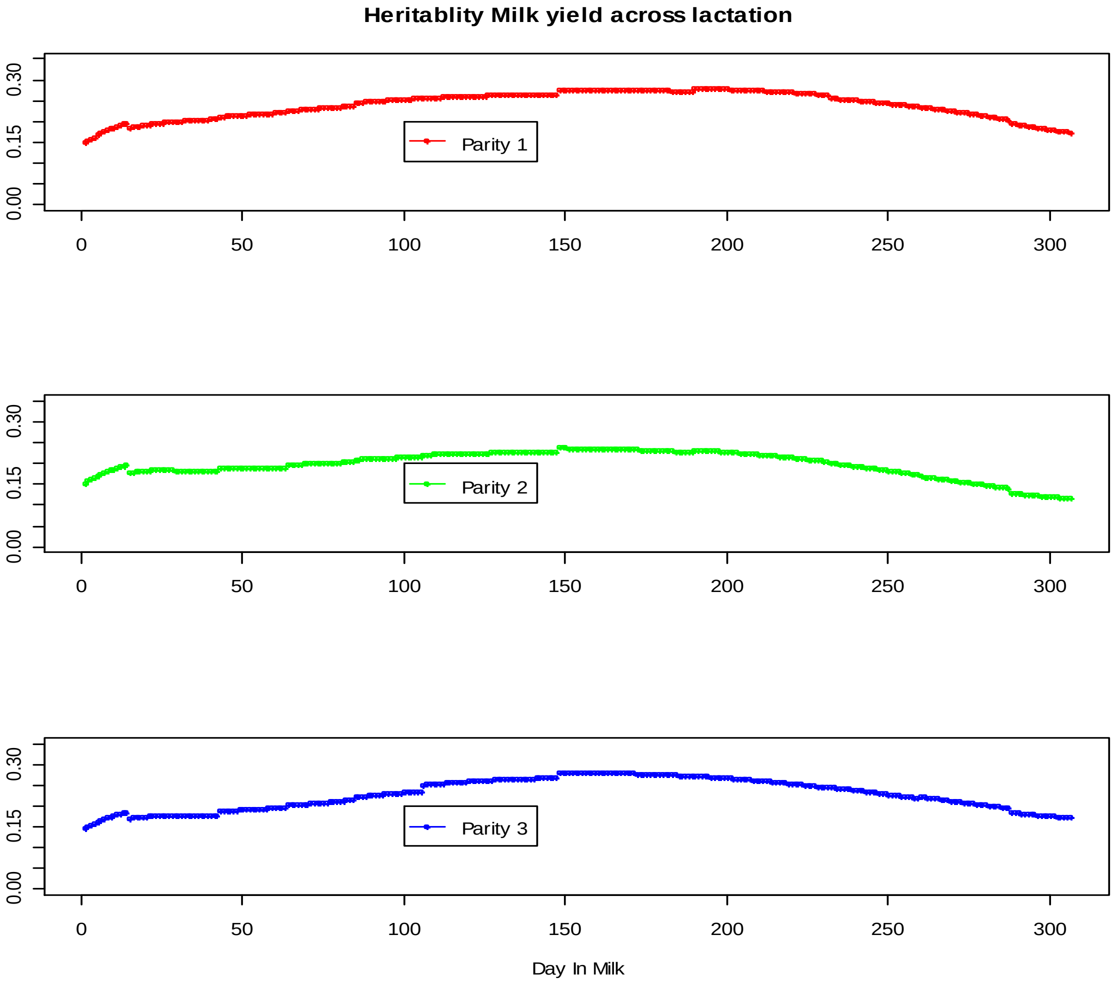
Genetic Parameters

- New genetic parameters estimated
- Parities 1/2/3 separate traits
- Parities 4/5 repeated records of parity 3
- Parities >5 genetically same as 5, correction for parity via fixed effect
- Recall existing parameters
  - 0.35 heritability Milk/Fat/Prot

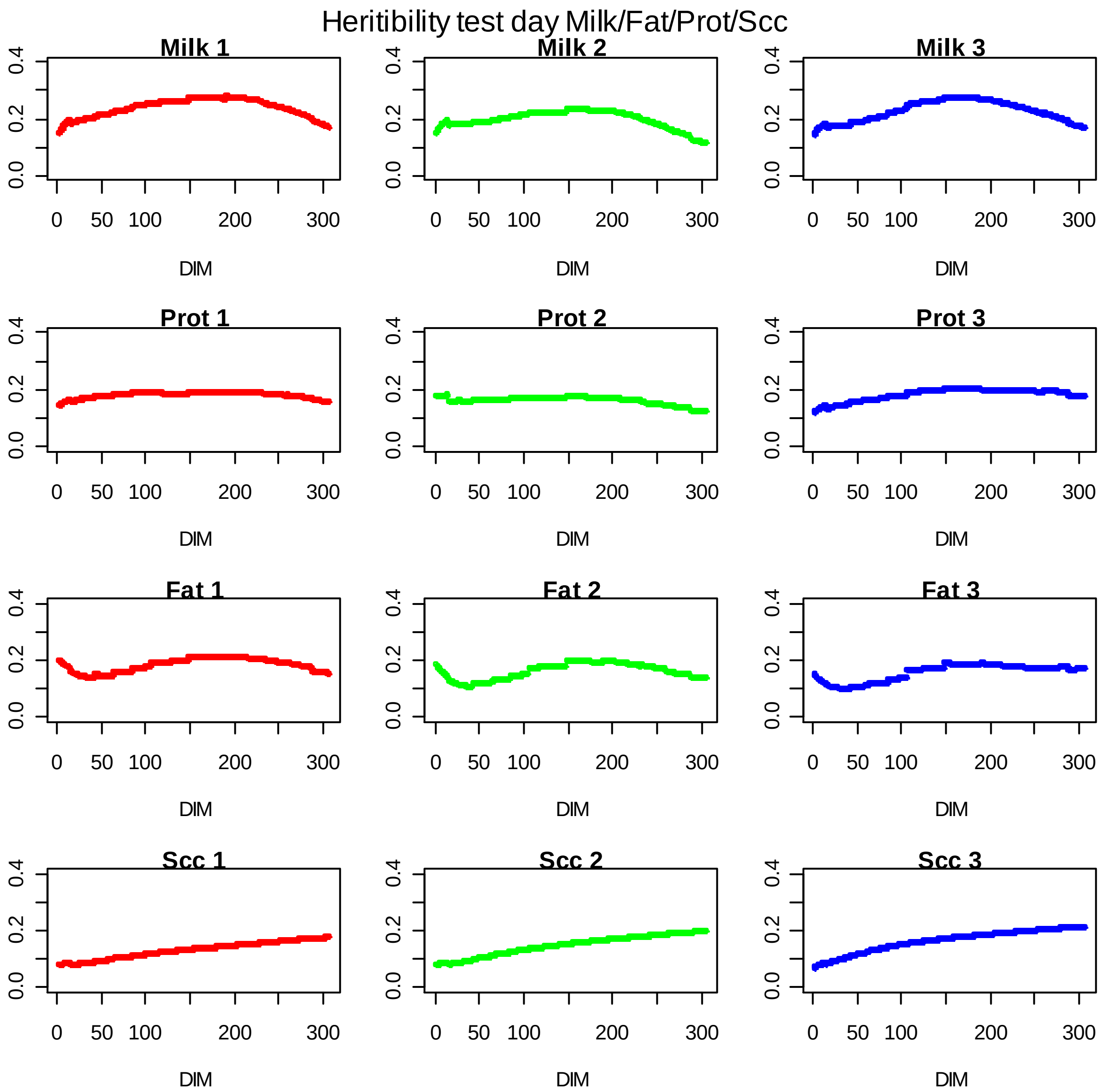
Model

- Age Calving (*fixed*)
- Days in calf *(fixed)*
- Herd/test day (*fixed*)
- Calving year*parity curve (*fixed*)
- Herd/Year curve (*random*)
- Permanent env curve (*random*)
- Animal genetic curve *(random)*

Heritability – Daily Milk Yield



- Heritability varies across lactation
- Also varies between lactations



Heritability(milk)

- Slightly higher parity 1
- Highest middle of lactation
- Range 0.12-0.28
- Similar other studies
- 305d equivalent 0.32

Genetic correlations within lactation

Milk 1							
DIM	5	55	105	155	205	255	305
5	1.00	0.85	0.69	0.55	0.44	0.39	0.38
55		1.00	0.96	0.87	0.78	0.69	0.59
105			1.00	0.97	0.92	0.84	0.70
155				1.00	0.98	0.93	0.79
205					1.00	0.98	0.87
255						1.00	0.95
305							1.00

Milk 3							
DIM	5	55	105	155	205	255	305
5	1.00	0.87	0.70	0.56	0.46	0.37	0.28
55		1.00	0.95	0.87	0.77	0.63	0.40
105			1.00	0.97	0.91	0.77	0.49
155				1.00	0.98	0.87	0.59
205					1.00	0.95	0.73
255						1.00	0.91
305							1.00

Milk at start of lactation is only moderately genetic correlated milk with end of lactation

Genetic correlations across lactation

	Milk 1 vs Milk 3							
	Milk 3							
	DIM	5	55	105	155	205	255	305
	5	0.77	0.67	0.53	0.40	0.31	0.25	0.18
Milk 1	55		0.86	0.81	0.73	0.64	0.52	0.33
	105			0.88	0.84	0.78	0.66	0.43
	155				0.88	0.84	0.74	0.51
	205					0.87	0.79	0.58
	255						0.82	0.66
	305							0.71

Milk is not identical trait across lactation, correlation of about 0.80 between same stage at parity 1 vs parity 3

Presentation

- Remember proofs generated for each day in milk, for each parity (1-3). How to present this as single breeding value?
- Assume daughters milk for 305 days – so sum ebv's across lactation day 5 to 305.
- Weighting across parity

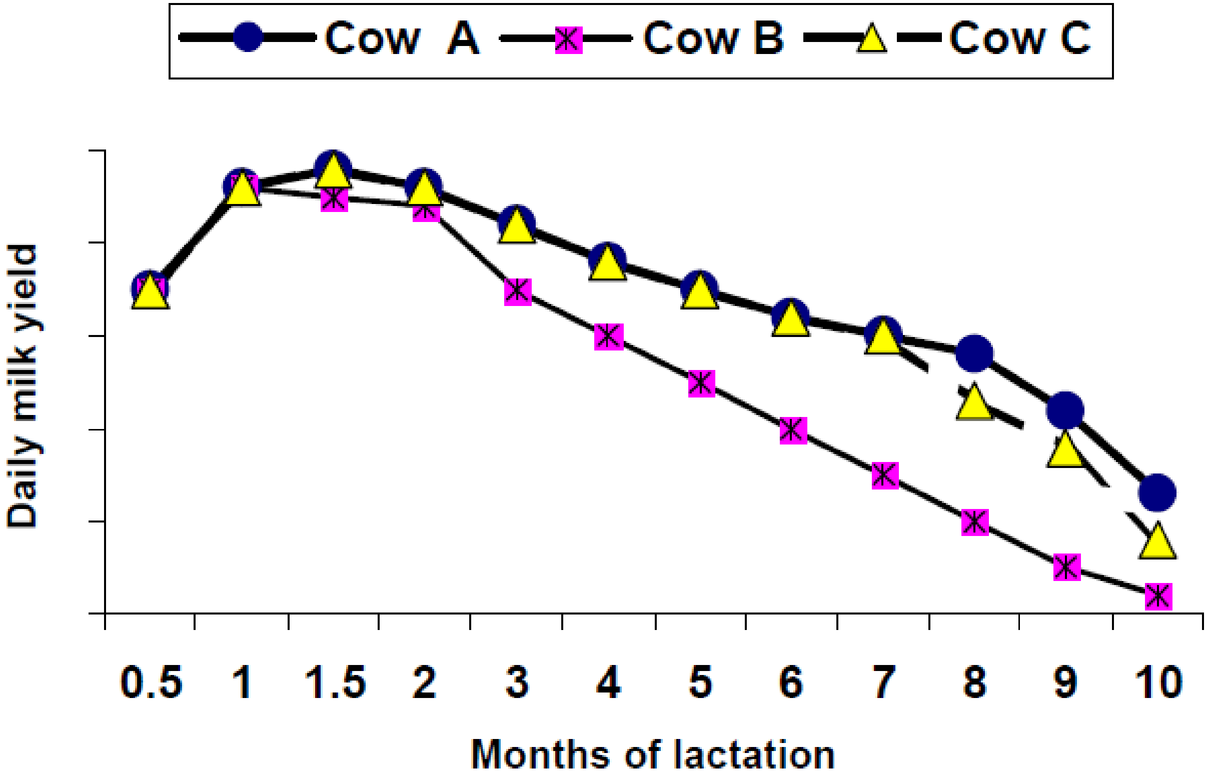
Published EBV=

$$\frac{1}{3}\,Parity_1 + \frac{1}{3}\,Parity_2 + \frac{1}{3}\,Parity_3$$

Persistency

- Bulls will have evaluation for milk yield, for each day in milk
- Allows calculation of persistency
  - Various definitions, measure of "flatness" of lactation curve
  - E.g. milk @ day 60 compared day 270
  - Relevant post-quota peak processing capacity issues
  - Need to consider most relevant measure in Irish context

Persistency

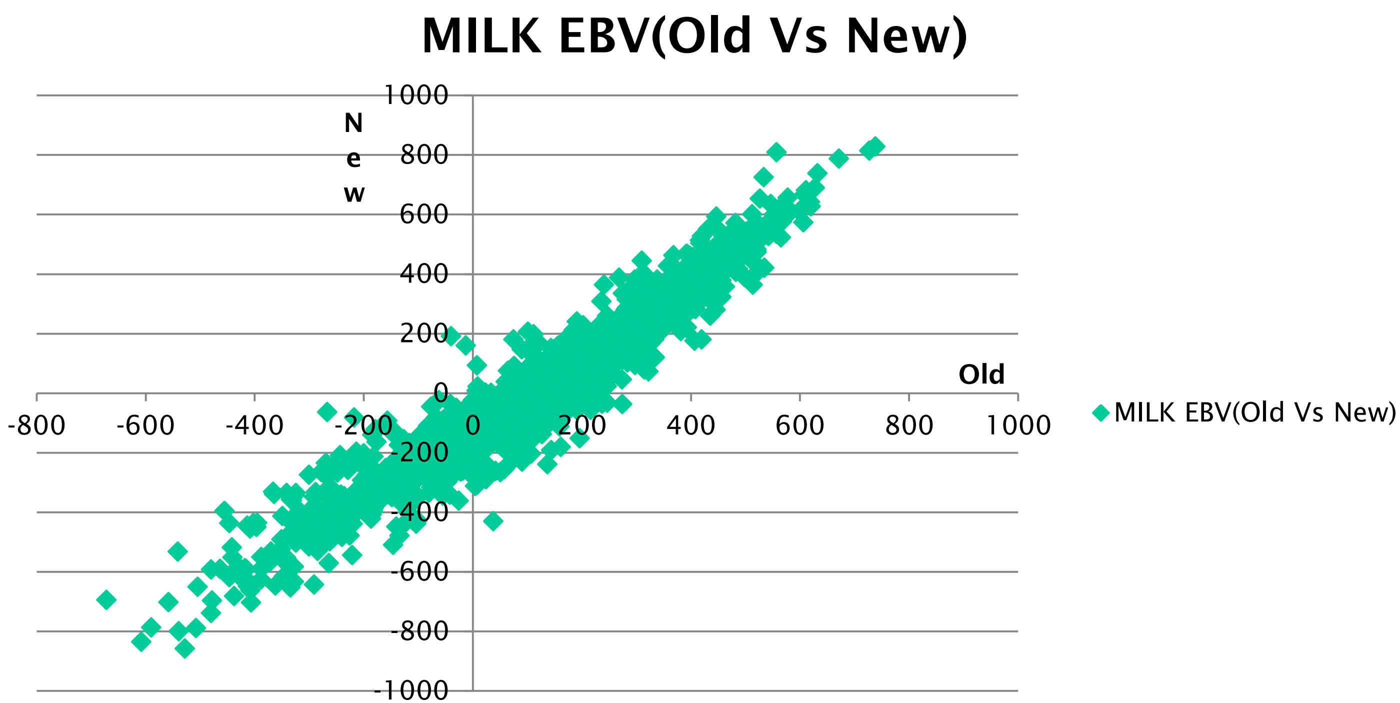


- Different cows have different shape lactation curves
- Can we select for “flatter” curves (blue/yellow curves)
- Ongoing research on optimum formulation
- Watch for correlation with milk

Results

- List of test proofs distributed
- Base change included also (Separate presentation by FK)
- Correlation bull proofs 0.97
  - i.e. little reranking bull proofs
- Correlation cow proofs 0.92
  - i.e. some reranking cow proofs

Results(bull proofs)



AI Code	Rank Old	Rank New	Name
EZA	1	1	ETAZON ADDISON
HRW	2	16	MILKBOARD HOWARD
JKB	3	2	JOCKO BESNE
VSR	4	6	VISSTAR REBUS ET
HSP	5	9	HOLSTEIN FOCUS PACIFIC
JAE	6	7	JALLABERT
EMO	7	5	ELITE MOUNTAIN DONOR ET
BWO	8	10	BELLWOOD BEREND ET
MSI	9	17	MARKO S MOUNTAIN
OJI	10	3	O-BEE MANFRED JUSTICE
IJL	11	4	IJLSTER TALISMAN
MRJ	12	14	MONAMORE EASY JET
JKO	13	11	JK EDER HARO
QUR	14	13	QG EUROPE ET
LRM	15	49	LYNBROOK FREEMONT
HZO	16	8	HAZAEL EMINENCE DANO
CMZ	17	12	CALBRETT HH CHAMPION
QGC	18	15	GALTEE QG CHRIS ET
KES	19	25	KELSTEIN E 164
QGD	20	37	IBANE Q G AALDERT

Top Milk Bulls Ranking

Current vs New

Results

- Euro change in bull proofs
  - Old Avg Milk Sub Index €16
  - New Avg Milk Sub Index €13
- Some very old bulls have lost data (no individual test days back in early 1990’s)

Across Country Genetic Correlations(Interbull)

	Aug (Official Run)				Sep (Test Run)		
	Milk	Fat	Protein		Milk	Fat	Protein
CAN	0.85	0.81	0.77		0.85	0.80	0.77
DEU	0.81	0.78	0.75		0.82	0.76	0.75
DFS	0.83	0.83	0.76		0.86	0.83	0.77
FRA	0.91	0.87	0.82		0.92	0.87	0.84
ITA	0.78	0.75	0.75		0.80	0.75	0.75
NLD	0.87	0.85	0.79		0.87	0.82	0.80
USA	0.83	0.79	0.75		0.84	0.77	0.78
CHE	0.87	0.83	0.79		0.88	0.83	0.82
GBR	0.83	0.78	0.80		0.82	0.78	0.78
NZL	0.85	0.85	0.85		0.85	0.85	0.85

Bull Type Correlations

Correlations Different Bull Type					
	Num Bulls	Milk	Fat	Prot	
Proven Bulls	777	0.97	0.97	0.95	HO 80 daus dob>1993
Highly Proven Bulls	193	0.97	0.98	0.97	HO 500 daus dob>1993
Young Bulls	69	0.96	0.97	0.97	HO 80 daus dob>2007

Bull Type Mean(Stddev)

	Milk(Old/New)	
Proven Bulls	122(204)	177(260)
Highly Proven Bulls	223(182)	286(236)
Young Bulls	220(191)	268(243)
	Fat(Old/New)	
Proven Bulls	11(7)	15(10)
Highly Proven Bulls	10(7)	14(11)
Young Bulls	9(6)	12(10)
	Protein(Old/New)	
Proven Bulls	8(6)	11(8)
Highly Proven Bulls	10(5)	12(7)
Young Bulls	9(5)	11(7)

Couple High Profile Bulls

	Milk		Fat		Prot	
	New	Current	New	Current	New	Current
UYC	149.6	128.0	28.8	18.0	16.0	12.5
TIH	-463.1	-324.0	-17.9	-6.0	-5.0	-1.5
RUU	152.3	139.5	15.0	10.5	5.2	4.5
NHS	44.9	104.0	14.4	13.0	12.3	12.0
MFX	143.5	185.0	8.0	8.5	14.4	13.0
MAU	123.4	175.0	11.8	10.5	11.3	10.5
LBO	364.4	323.0	17.7	13.5	11.8	10.0
JOS	149.8	170.5	8.4	8.0	13.5	11.5
GMI	161.0	173.5	12.0	10.5	11.0	10.0
RDU	304.2	322.5	17.9	17.0	8.9	9.0

Cow Proofs

Correlations Cows					
	Num Cows	Milk	Fat	Protein	
Cows (all)	528,888	0.94	0.92	0.91	Ebi Report
Parity 1	118,103	0.93	0.89	0.89	
Parity 2	109,127	0.94	0.93	0.91	
Parity 3	90,314	0.94	0.92	0.91	
Parity 4	66,916	0.93	0.91	0.90	
Parity 5+	144,428	0.94	0.93	0.93	
Bull Dams	302	0.94	0.91	0.91	Irish coded bulls dob > 2008

CowType Mean(Stddev)

Milk (Old/New)		
Bull Dams	152(193)	173(256)
Cows (all)	111(180)	133(218)
Fat(Old/New)		
Bull Dams	14(7)	18(11)
Cows (all)	7(6)	8(10)
Protein(Old/New)		
Bull Dams	11(6)	12(7)
Cows (all)	6(5)	7(6)

Reliabilities

- Reliabilities depend on amount data
- Cows with higher num tests have
- Example Two 3rd parity cows, same sire/mgs, A4 vs A8
- Cows on less records are slightly pulled back

Cow A	46%	57% prev
Cow B	52%	55% prev

Next Steps

- Complete full run i.e. include genomic evaluations, interbull proofs, new economic weights
- Circulate complete set test proofs
- Persistency proofs Spring 2014

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Base Change

8th October 2013

NDP
National Development Plan
Transforming Ireland

Base Change

A reference group of animals which all other animals can be compared against

Set their predicted transmitting ability (PTA) to 0 and adjust all other animals accordingly

Example:

	Un-adjusted	Base Adjusted
Cow A - born in 1995	0	-100
Cow B - born in 2005	100	0
Cow C - born in 2011	200	100

Base Change

Key to base is that the PTA of the base animals do not change from run to run

Pick a group of animals whose PTA are unlikely to change with the addition of more information

Most countries chose a fixed base which gets updated periodically – compare current animals with a more reflective group of animals

The amount a base changes by is a reflection of the genetic progress for that trait

Base Change

Currently separate base for production and fertility traits

- Production base is 1995 born cows milk recorded in 2000
- Fertility is sires born between 1988 and 1992 with 90% reliability

New base for production & fertility is 2005 born cows, calved and milk recorded in 2007, with at least 2 year out of 5 milk recorded

2005 born will have had the opportunity to contribute information to each lactation used in the evaluation

- e.g., we use the first 5 calving intervals for fertility so 2005 born cows would now have calved for the 6th time

Base Change

	Change	€ Change Overall
Milk	-114.5	
Fat	-5.4	
Protein	-6	-32
CI	2.8	
SUR	-0.96	-44
		-76

Parity	Num. Cows	Milk Kg	Fat Kg	Protein Kg	Fat %	Prot %	CIV
1	59,894	5540	216	188	3.90	3.39	399
2	53,871	6248	244	216	3.91	3.46	399
3	45,769	6587	258	227	3.92	3.45	397
4	36,331	7053	276	244	3.91	3.46	392
5	24,571	7026	277	243	3.94	3.46	381
1 - OLD	73,000	5194	197	171	3.79	3.30	404

Base Change

Introduction of new models (TDM), or Economic Values may cause re-ranking however a base change DOES NOT cause a change in bull **rankings**

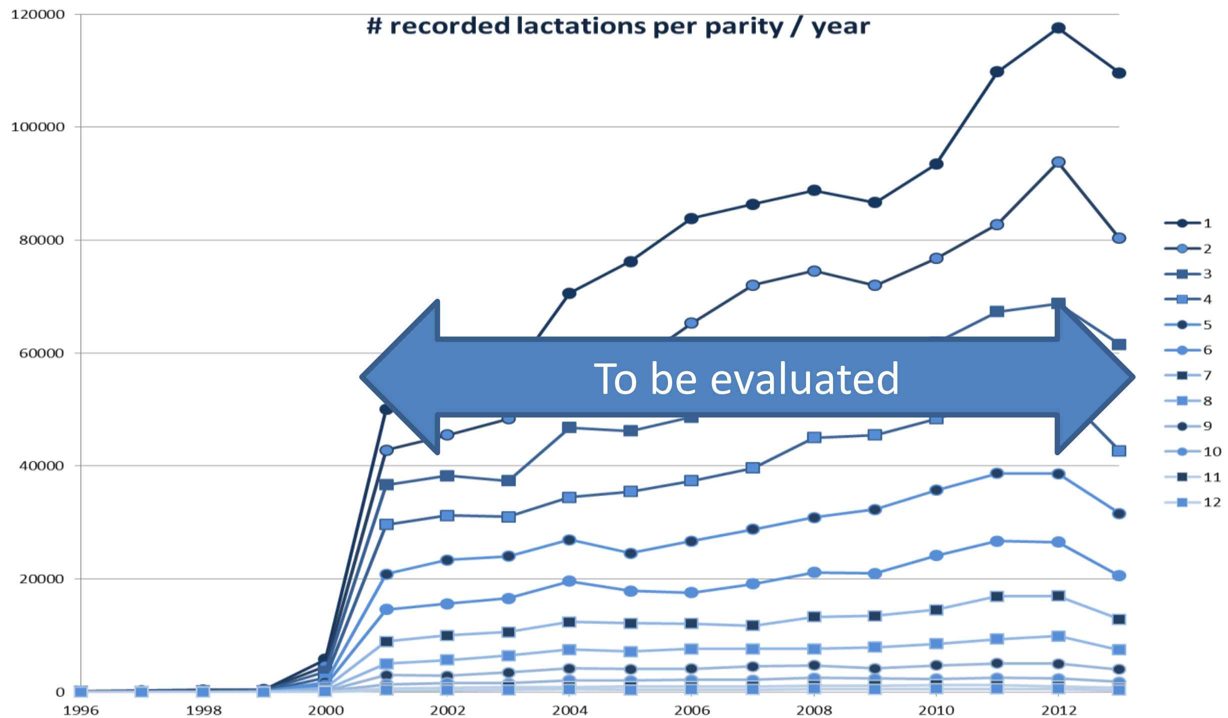
Each animal is affected equally

Necessary to ensure people can compare their animals to a relevant group of cows

Towards an udder health index

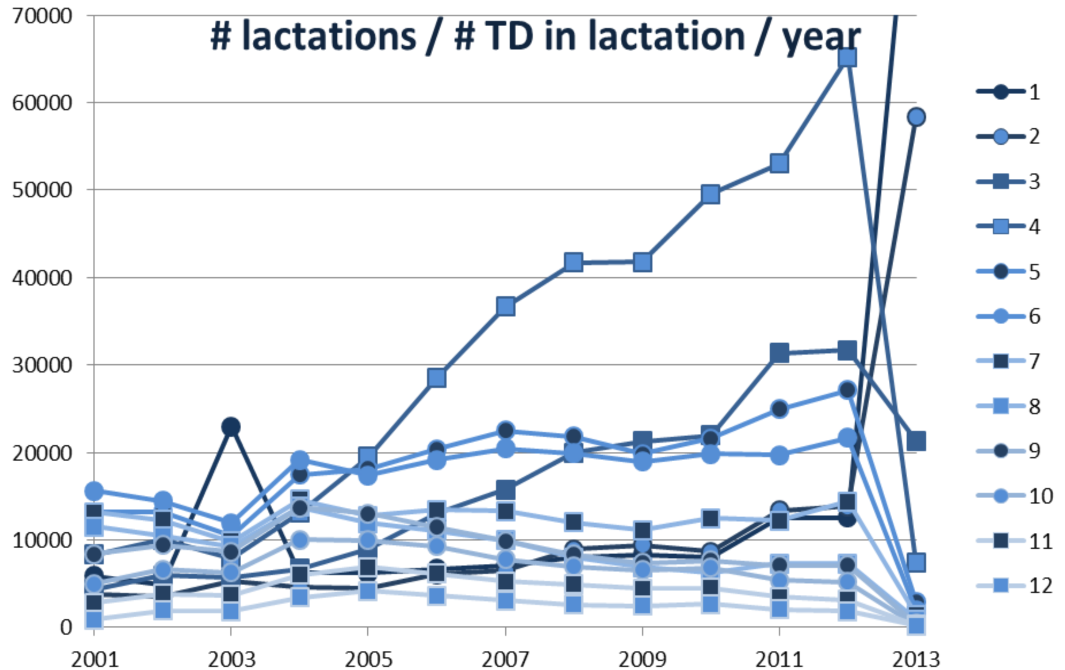
In cooperation with Wageningen UR

Data set



- Each year more lactations recorded
- 4 195 327 lactations recorded,
- on 1 506 173 cows -> on average 2.8 lactation per cow.
- on average 5.1 test days per lactation.

Variation in #TD recorded / lactation



- In Ireland bulk of lactations have 4 or 5 TD recorded per lactation (2 months intervals) but up to 12 or more
- Evaluation will have to cope with variation and incomplete lactations

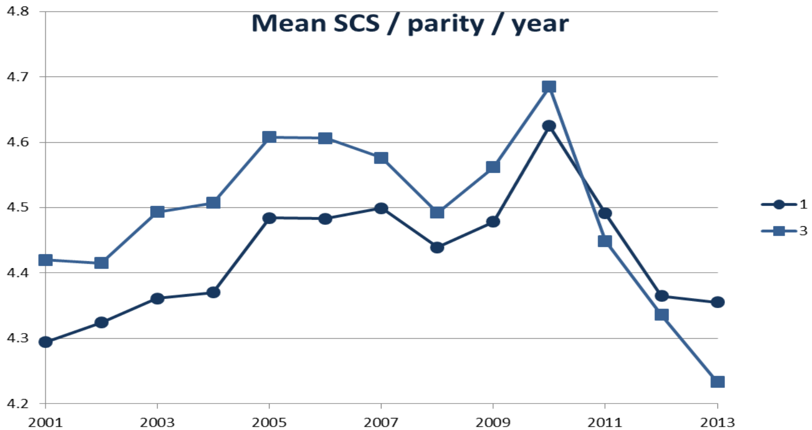
Traits to be evaluated

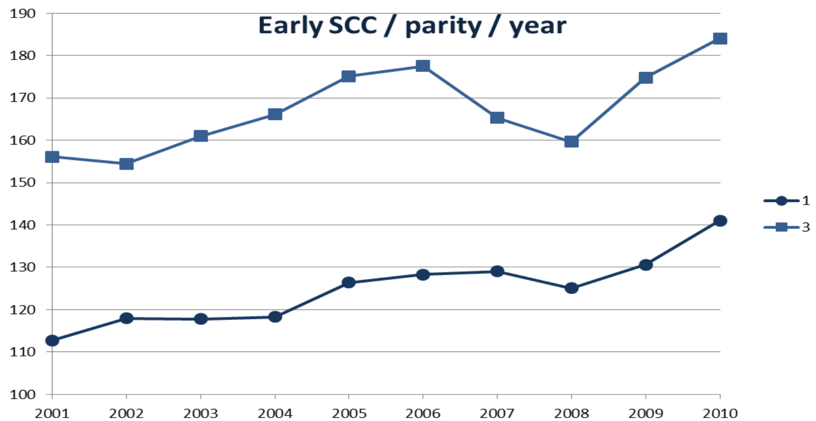
Trait	Description	# of testdays required
Mean SCS	Mean SCS of Test days in lactation	1
High SCC	1 if at least 1 TD with SCC > 150 000, otherwise 0	1
Extreme SCC	1 if at least 1 TD with SCC > 1 000 000, otherwise 0	1
Low SCC	1 if at least 1 TD with SCC < 80 000, otherwise 0	1
Early SCC	Mean SCC of TD before 150 days	1 before 150 d
Late SCC	Mean SCC of TD before 150 days	1 after 150 d
Proportion high SCC	#TD with SCC > 150 000/ total # TD	1
Standard deviation SCC	Standard deviation of SCC of Test days	6
Number SCC peaks	Peak = 1 TD > 150 000 after a TD < 150 000	6

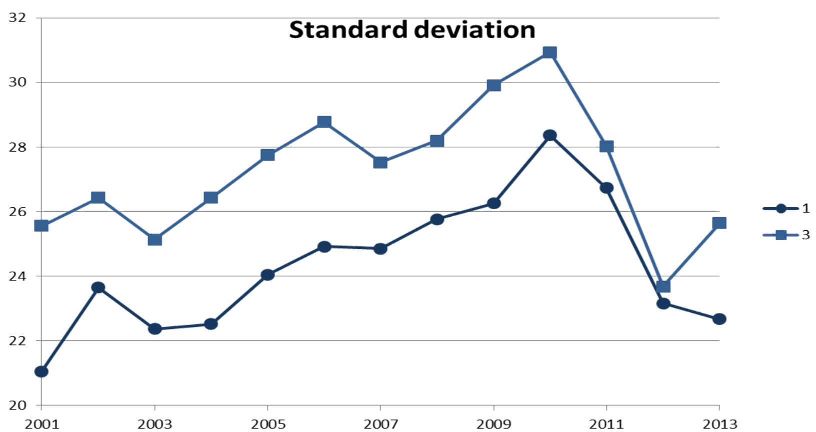
- Traits on lactation basis, derived from Testday SCC
- To capture variation in patterns of SCC over lactation
  - E.g. long lasting infections vs. Short intensive
- Based on Swedish, Dutch and Canadian research

Phenotypic variation

- Traits show different pattern over years and parities







Time schedule

Date to be completed	Action	
1 October	Select and compute SCC-based traits per lactation	√
15 October	Add Mastitis data from management recording systems	
1 November	Estimate genetic parameters (heritability, correlations etc.)	
15 November	Further selection of traits	
1 December	Breeding Value estimation	
15 December	Delivery of procedures and report	

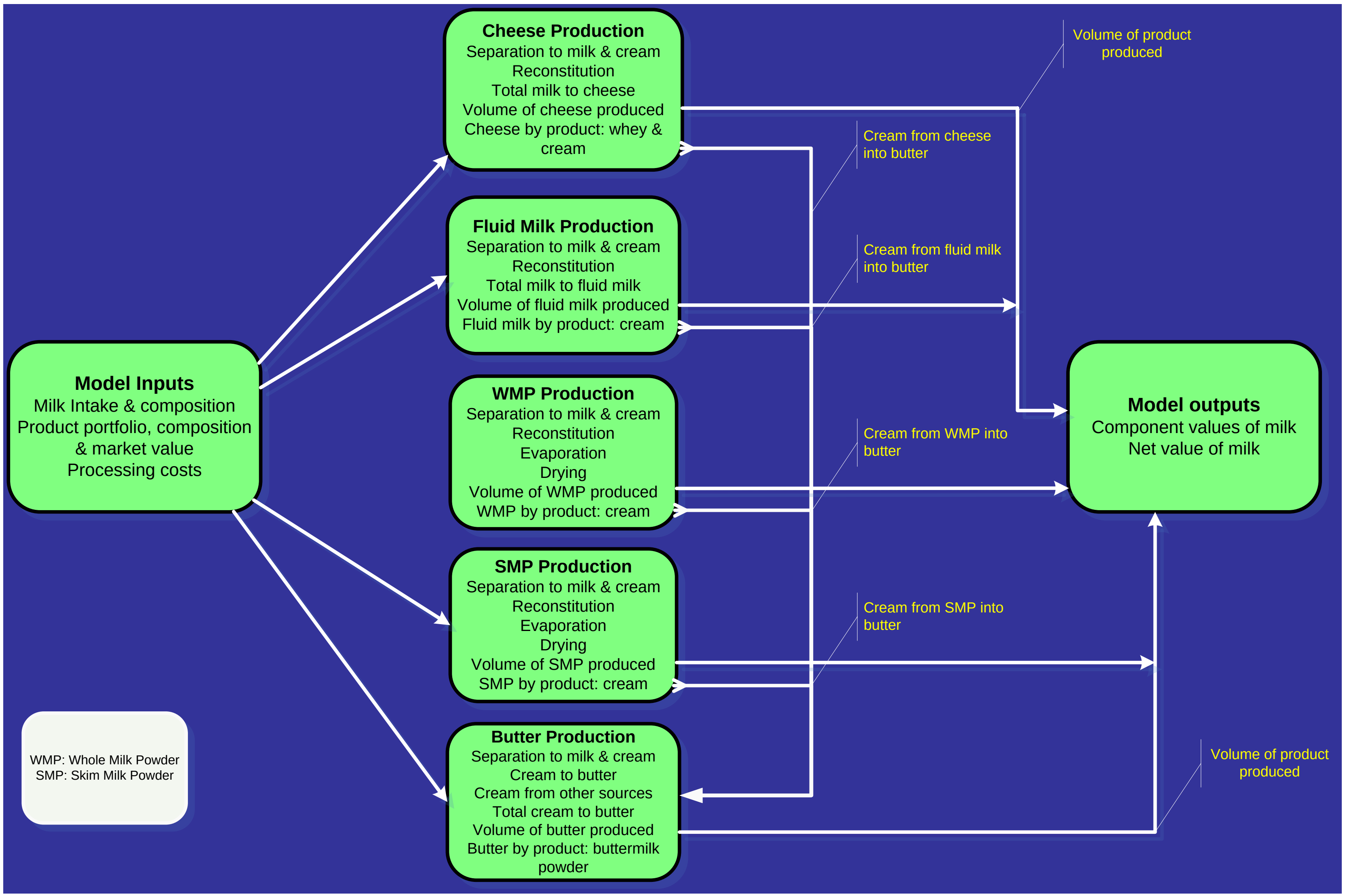
EBI Economic value update

Laurence Shalloo, Una Geary and Nicolas Lopez Villalobos

Processing sector model

- The processing sector model is a simulation model
- It is built with both an annual and a monthly time step model and can incorporate seasonal effects into the analysis
- The model is developed in Microsoft Excel and is solved using Visual Basic
- It is a mass balance model, accounting for all inputs and outputs

Processing sector model schematic



Updates

- Model
- Costs
- Prices

Model

- MPSM (Geary et al., 2010)
- Annual time step
- Products produced
  - Cheese
  - SMP
  - WMP
  - Casein
  - Butter

Model assumptions – Product Port folio

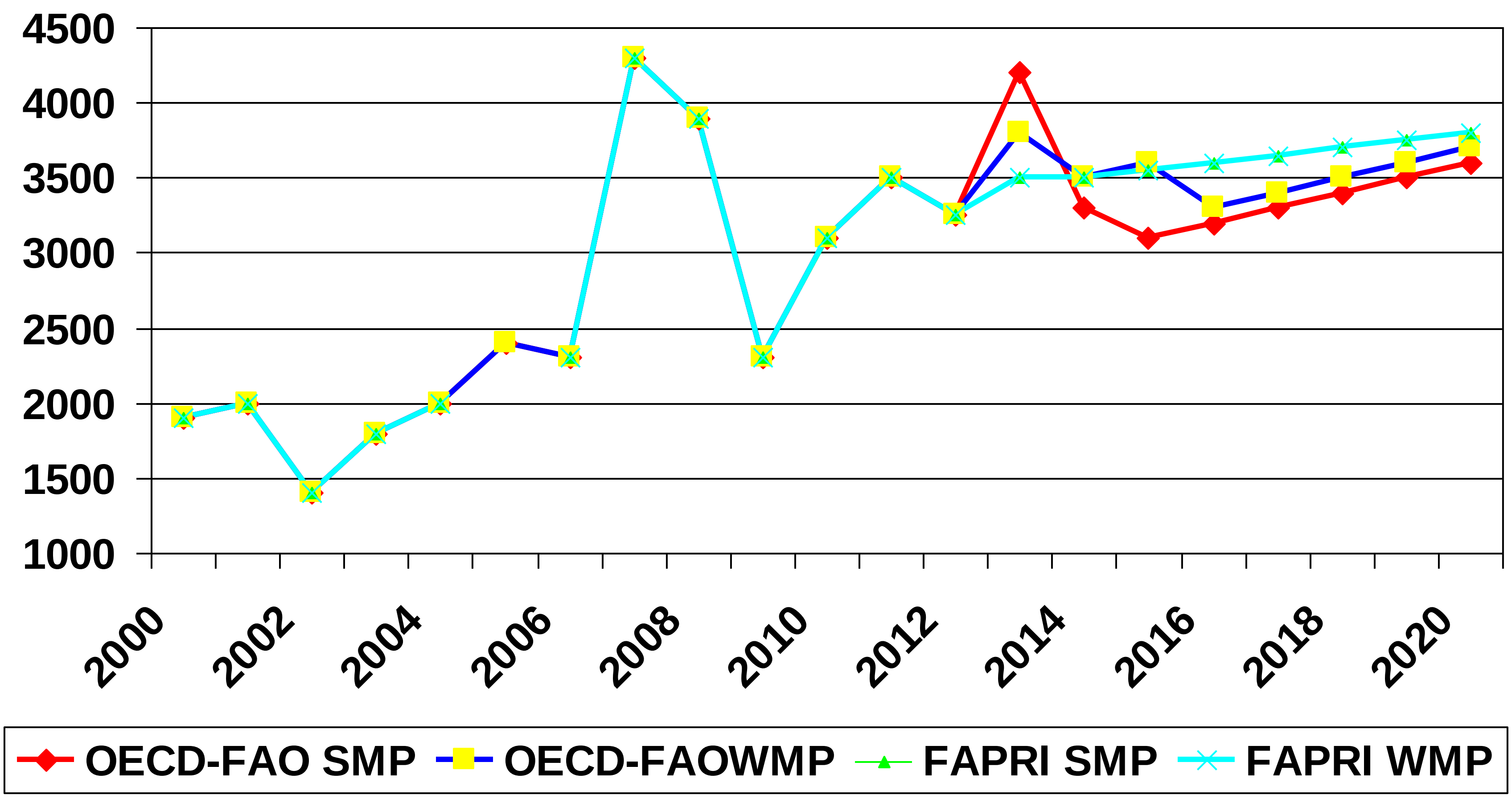
- 50% of additional milk goes into WMP
- 20% of the additional milk goes into cheese
- Increase in tonnage terms of all products produced
- Product port folio with increased milk output
  - 35% cheese, - 25% Butter, 30% WMP and 10% SMP

Model Assumptions Price

- OECD-FAO Agricultural Outlook 2011-2020
- FAPRI – ISU 2011 World Agricultural Outlook
- USDA Agricultural Projections to 2020

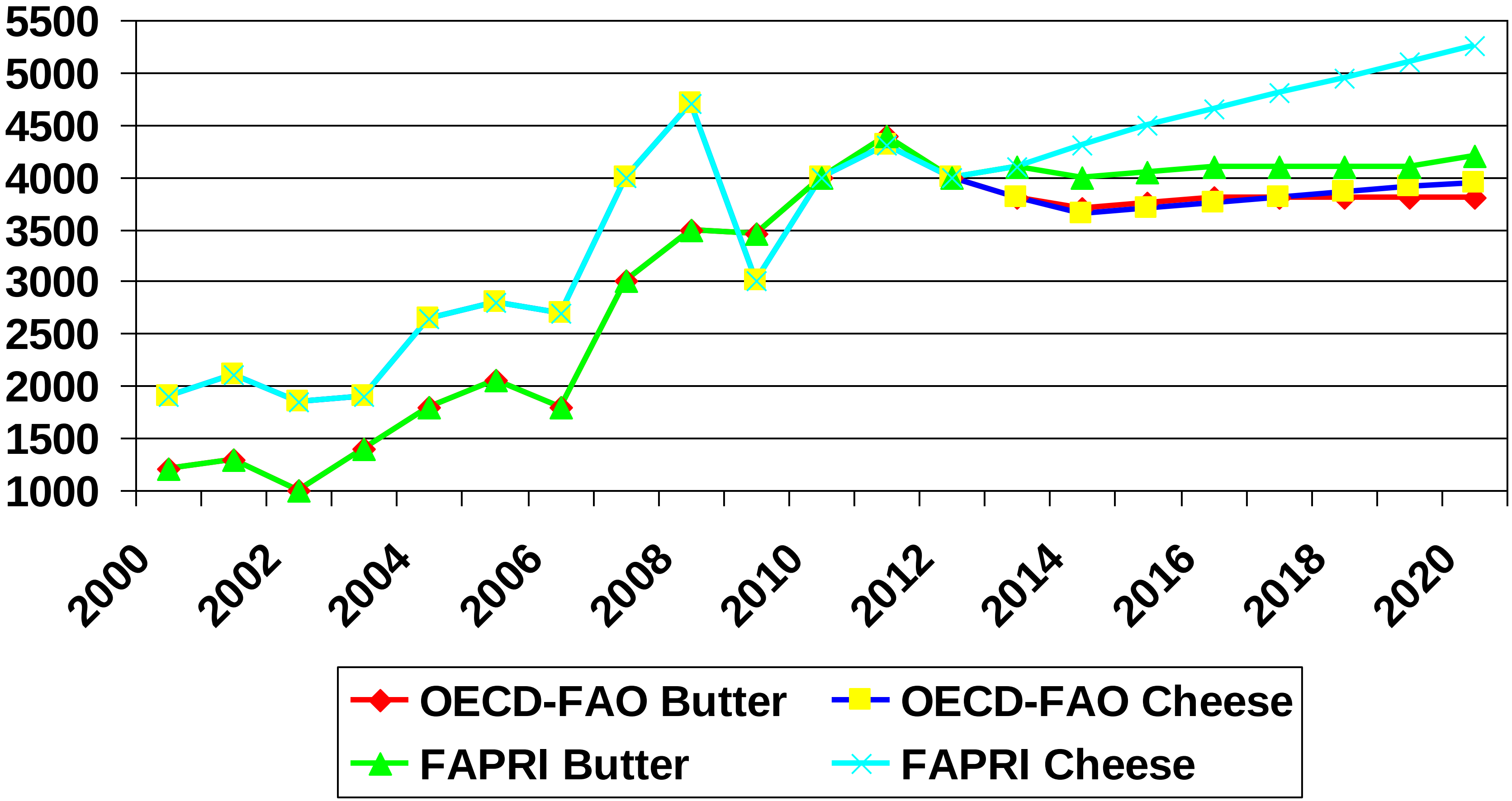
Price Projections - Powders

US $/ tonne



Price Projections – Cheese & Butter

US $/ tonne



Costs

- Costs in the MDSM updated
  - VAT
  - Replacement heifer costs
  - Concentrate
  - Fertiliser
  - Silage contracting

Category	Cost (€)
Concentrates	165
Fertilizer, Lime and Reseeding	155
Land Rental	200
Machinery Hire	15
Silage Making	90
Vet, AI and Medicine	128
Total Variable Costs	**753**
Car use, water and electricity	30
Labour	203
Machinery operation and Repair	20
Phone	10
Insurance, A/Cs, T'Port, Sundries	39
Interest repayments- term loan	86
Total Fixed Costs	**388**
Buildings	55
Machinery	22
Total Costs	**1,218**
Initial value of the calf	350
Sales of heifers failing to Conceive	-23
Net Cost of rearing a replacement heifer	**1,545**

Outputs

- MPSM
  - Milk Price 29.48 cpl
  - Ratio of protein to fat 2.56 : 1
  - Fat value €2.8532
  - Protein value €7.3042

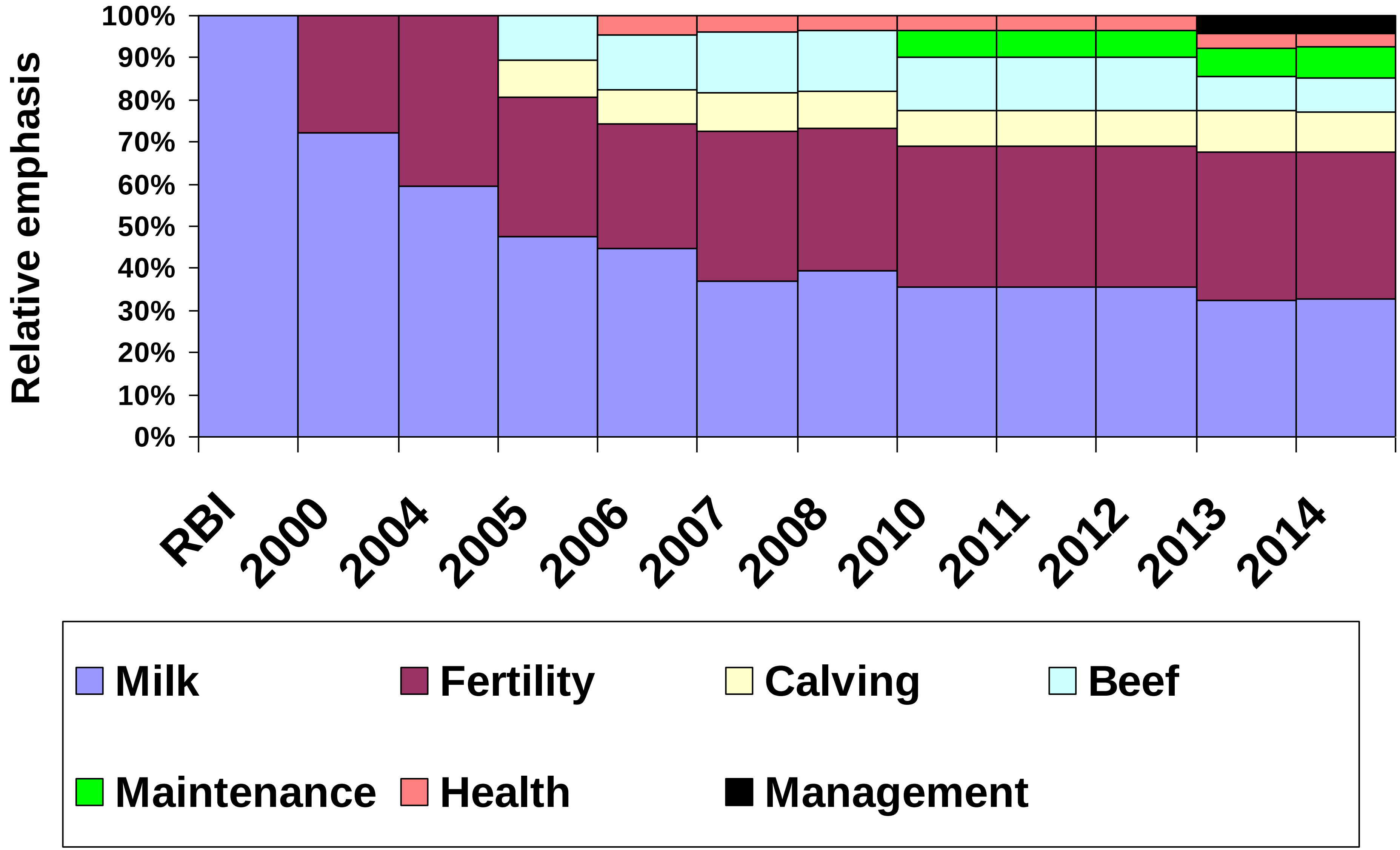
		2010
Yield	Protein	6.26
	Fat	1.01
	Milk	-0.09
Fertility	Survival	12.05
	Calving Interval	-11.89
Maintenance	Maternal	-1.49

		2010	2013
Yield	Protein	6.26	6.64
	Fat	1.01	1.04
	Milk	-0.09	-0.09
Fertility	Survival	12.78	12.01
	Calving Interval	-11.89	-12.43
Maintenance	Maternal	-1.49	-1.65

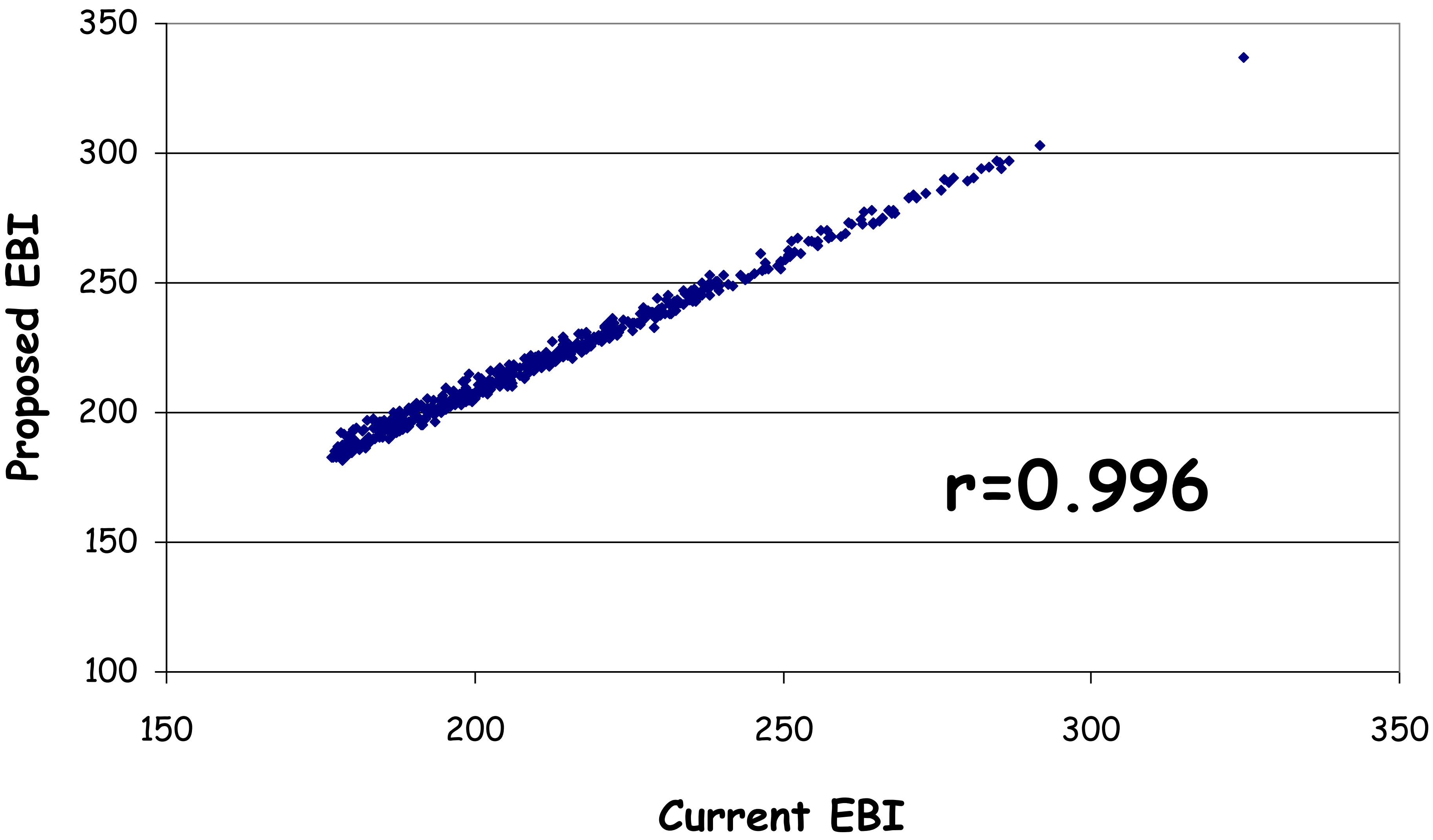
Current versus new

Sub-index	Trait	Old emphasis	New emphasis	New emphasis
Production	Milk	10.5%	10.6%	33%
	Fat	3.4%	3.4%	
	Protein	18.5%	18.9%	
Fertility	Calving interval	23.8%	24.0%	35%
	Survival	11.3%	10.9%	
Calving	Calving difficulty dir	3.0%	2.9%	9%
	Calving difficulty mat	1.4%	1.4%	
	Gestation	4.4%	4.2%	
	Calf mortality	1.1%	1.0%	
Maintenance	Cow	6.0%	7.3%	7%
Beef	Carcase weight	5.2%	5.2%	9%
	Carcase conform	1.9%	1.8%	
	Carcase fat	1.2%	1.2%	
	Cull cow	0.8%	0.8%	
Health	Lameness	0.6%	0.6%	3%
	Mastitis	0.8%	0.8%	
	SCC	2.0%	1.8%	
Management	Milking duration	2.2%	2.1%	4%
	Temperament	2.0%	2.0%	

EBI evolution

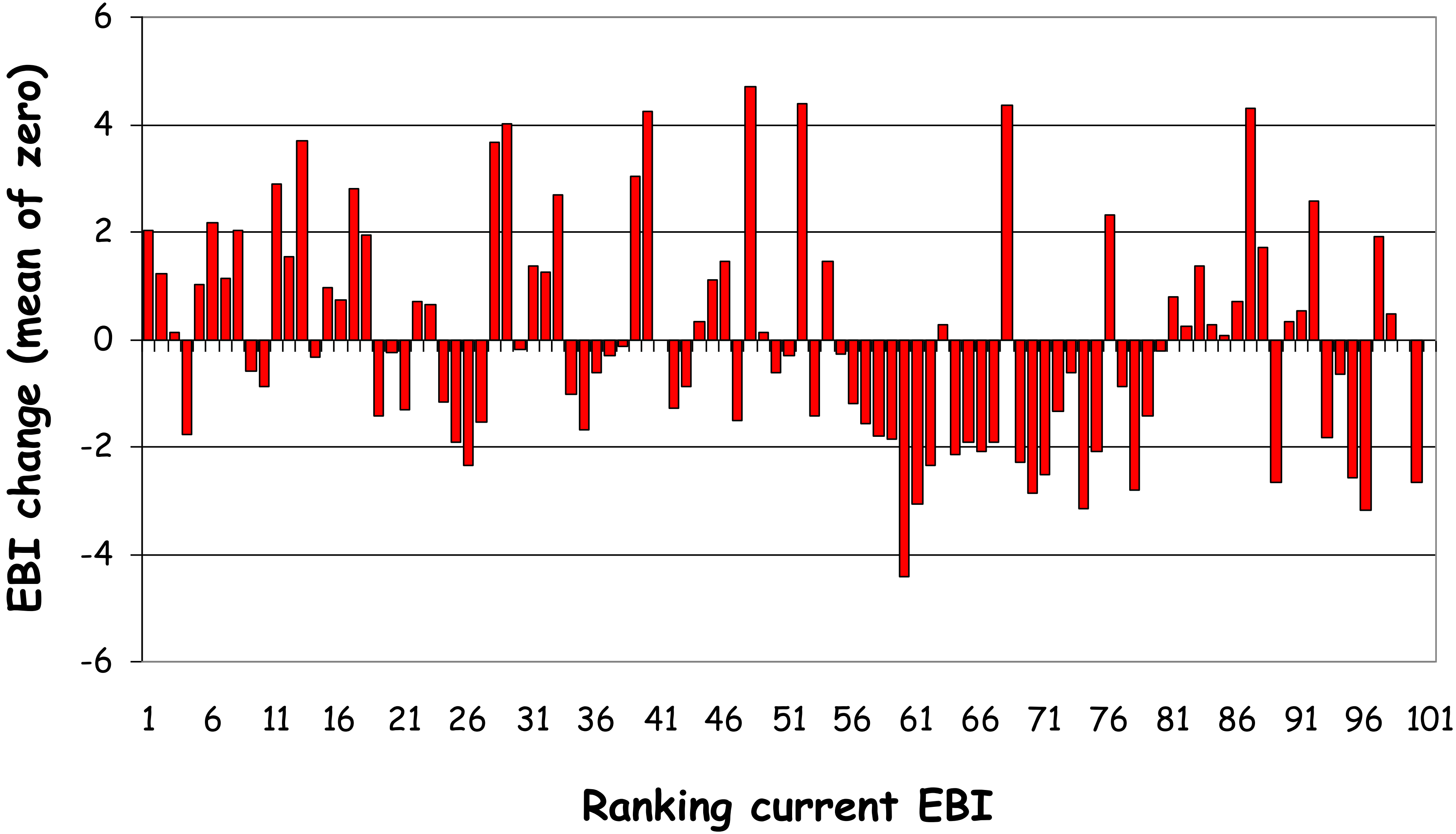


Top 500 bulls

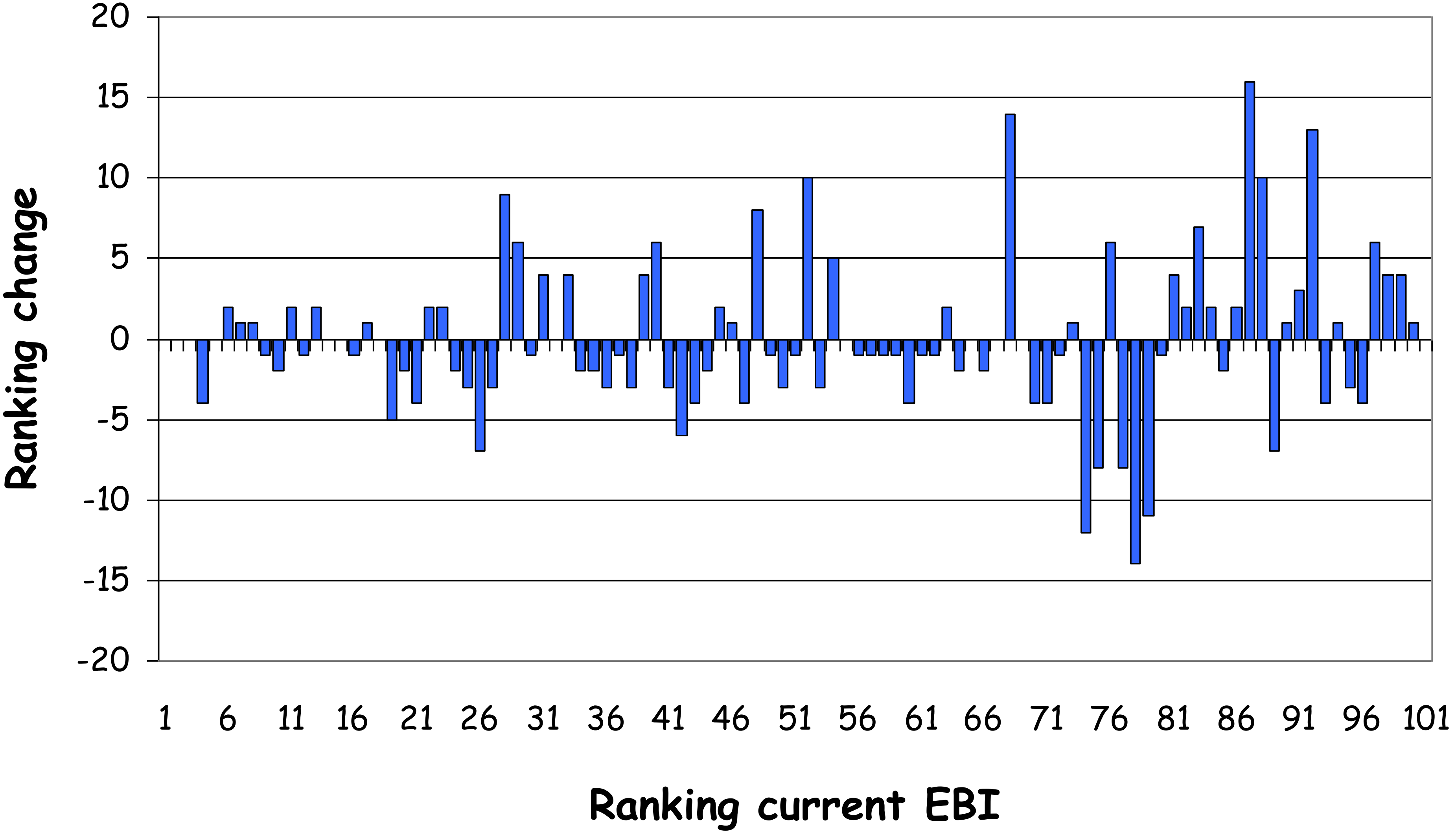


EBI increases by €9 on average

EBI changes in top 100 bulls



Ranking changes in top 100 bulls



IRISH CATTLE BREEDING FEDERATION

EBI Roll-out Plan.



Andrew Cromie

National Development Plan
Transforming Ireland

Roll-out of EBI changes

- Need for Industry wide Collaboration in Roll-out
  - ICBF
  - Teagasc
  - AI Organisations
  - IFJ/Independent/Examiner
  - ACA advisors
  - Dairy Co-ops
  - Others ???
- Organise 3-4 meetings to up-skill Teagasc Advisors & AI Sales Reps.
  - Ballyhaise, Kilkenny, Mallow, ??
  - 3-4 speakers: ICBF, Teagasc, AI Org, Others?
  - 2 hours

Roll-out of EBI changes

- Educational material to be compiled by ICBF/Teagasc
- Print Media Campaign
  - IFJ
  - Farming Independent/Examiner
  - Teagasc – Today's Farm
  - Farmers Monthly
  - Co-op publications e.g. Milk Matters
  - Others ???
- Online Media Campaign
  - Web site material to be developed by ICBF
  - Record Webinar and put online
  - Websites: ICBF, Teagasc, AI Orgs, IFJ, ??
  - Also promote Webinar on Facebook & Twitter

Roll-out of EBI changes

- Education material included with EBI report in January
- Teagasc Conference?
- Irish Grassland Conference?
- AI Company regional meetings?
- AI Technician Training?
- Others?

IRISH CATTLE BREEDING FEDERATION

AI Codes

National Development Plan

Transforming Ireland

Background

- **Three types of AI Codes exist:**

1. 3 letter codes ('Widespread' & 'Test Purposes')
   - E.g. 'SOK', 'DRU','NVI'
   - @150 Codes issued per annum
   - 50 Holstein,12 Friesian,6 Limousin,5 Charolais,3 Angus, 3 Simmental…
2. 'Special Breeding Purposes' (Small quantities/Ped Breeding)
   - E.g. 'S1623…………'
   - @140 Codes issued per annum
   - 57 Holstein, 19 Simmental, 9 Belgian Blues, 7 Limousins….
3. 'On-Farm' collected Bulls
   - E.g. 'F198………..'
   - @10 codes issued per annum

- **For 3 letter coded bulls - AI Code generally follows a Bull's name:**
  - Sunnybank Oman = 'SOK'
  - Derrough Samual = 'DRU',

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Background

- **However, we are now running out of 3 letter codes!**
  - In theory there are 17,576 codes.
  - 7,923 given out so far.
  - Current system lasted over 50 years.
  - However only 28 three letter combinations now exist that are more than one character away from an existing code.
  - AI Codes will increasingly not reflect the bull's name:
  - 'Bighill Tony' could get an AI Code 'XPZ'.

- **Longlasting solution required**
  - It must be alpha numeric (DAF).
  - It should be simple and catchy so as farmers will continue to use it.
  - It must have a set length that will not increase.
  - Length of code should be as short as possible so as not to disrupt too many screens/reports etc.
  - It must be longlasting so as the system does not have to be changed for a longtime.

Option 1

- ‘Alpha Numeric’ Code:
- 1 letter followed by max of 4 numbers
- When 4 numbers reached then move onto next letter etc
- E.g.A10……..A1000….B10……B1000 etc

- <u>Pros:</u>
- Set Length – will never be more than 5 characters in length
- Will be longlasting – 25,740 combinations = 170 years

- <u>Cons:</u>
- Not ‘catchy’
- Tells you nothing about the breed of the bull.

Option 2

- **Resurrect 'Original' Coding system:**
- **2 letters signifying breed and country of origin followed by max of 4 numbers**
- **E.g.CF75=French Charolais, IS12 =Irish Simmental etc**

- **Pros:**
- **Set Length – will never be more than 6 characters in length**
- **Is 'catchy' and farmers would be familiar with it e.g. CF52 etc**
- **Tells you something about the Bull – breed and country of origin.**

- **Cons:**
- **Could be confused with the breed code by farmers**
  - **'IH2321' is an Irish Holstein Bull with breed code 'HO'.**
  - **An Irish Hereford Bull should also be 'IH2321' but can't be etc.**
- **Multiple combinations of breed and country will get complicated**

Option 3

- ‘Number Plate’ Coding system:
- Year x Breed x Number
- E.g.13CH1075=Charolais Sire, 13LM1012= Limousin Sire etc

- Pros:
- Tells you something about the Bull’s – breed and year of first code
- Would be longlasting
- Cons:
- Is very long (8 characters) and will cause problems for bull lists, AI Catalogues etc
- Is not catchy for farmers remembering it. Danger that parts of it will be left out.

Option 4

- **Introduce a simple Breed x number Coding system:**
- **2 Breed letters followed by 4 numbers**
- **E.g.CH1075=Charolais Sire, LM1012= Limousin Sire etc**

- **Pros:**
- **Set Length – will never be more than 6 characters in length.**
- **Is ‘catchy’ and farmers would be familiar with it e.g. CF52 etc.**
- **Would be quick and easy to administer.**
- **Tells you something about the Bull’s – breed and age.**
- **Would be longlasting – 150 years before Holstein bulls would run out.**
- **Beef Breeds – 400 years before most beef breeds would run out.**

- **Cons:**
- **Only slight negative is that it is 6 characters long. Longest current AI Code is 5 characters long.**

Summary

- **Preference would be to go with 'Option 4'.**
  - **Breed x Number coding system i.e CH1075, CH1076 etc**

- **It is logical, has a set length and will be longlasting.**

- **Plan is to have a new system in place for January 1st 2014.**

- **Please think about it and come back before October 31st with any suggestions/ideas.**

IRISH CATTLE BREEDING FEDERATION

Active Beef Bull List

National Development Plan

Transforming Ireland

Backround

- **Active Beef Bull Lists have been produced since 2001.**
- **The content of the list & criteria for bulls to make the list has changed over this time.**
- **Would like to focus on the list for Autumn 2013 to address various issues that have been raised with it:**
- **Content**
  - **Too many fields included – information overload.**
- **Criteria**
  - **Who is the list for? (Ped or Commercial farmers or both).**
  - **Minimum reliability for bulls to make the list?**
  - **Price cutoffs for bulls on the list?**
  - **Availability information – are bulls really available?**

Content

Terminal Index - Active Beef Bull List (April 2013)

Terminal Index Active Bull List Criteria:Terminal Index Rel % >50%. Calving Difficulty Rel %> 50%. Carcass Weight Rel %>50%.

High Reliability Bulls are shaded in green. They have reliability % figures > 80% for Terminal Index, Calving Difficulty % & Carcass Weight

Angus

Bull Details				Terminal Index				Replacement Index				Calving Diff %		Docility				Carcass Weight (Kg)				Daughter Milk (Kg)				Daughter Calving Interval (Days)				Supplier Details			
Rank	Code	Name	Bd	€-val	Rel %	Stars Within	Stars Across	€-val	Rel %	Stars Within	Stars Across	PD	Rel %	PD	Rel %	Stars Within	Stars Across	PD	Rel %	Stars Within	Stars Across	PD	Rel %	Stars Within	Stars Across	PD	Rel %	Stars Within	Stars Across	Supplier	€	Avail	BTAP Approved
1	RZI	BALMACHIE RANNAI D005	AA	€77	66	5	2	€266	52	5	5	2.2	76	0	44	2.5	3	19	78	5	2	16.85	26	5	5	-7.15	37	5	5	NCBC	40	M	YES
2	CYI	CONEYISLAND LEGEND	AA	€60	87	5	2	€128	77	2	4	2.7	97	-0.03	93	2	2.5	15	97	5	1.5	-0.07	55	0.5	2.5	-4.96	62	2	4.5	Dovea	30	H	YES
3	RWB	RAWBURN LORD ROCKET F609	AA	€60	87	5	2	€265	72	5	5	5.1	96	0.18	95	5	5	23	97	5	3	16.1	39	5	5	-4.85	54	2	4.5	Dovea	10	L	YES
4	GGL	GEIS GAMBLER 21'90	AA	€59	58	5	2	€95	53	1	3	3.2	74	0.07	55	4	4	19	66	5	2	5.51	70	1.5	4	-3	32	0.5	4	NCBC	20	L	YES
5	LFG	LUDDENMORE FIONN G441	AA	€58	87	5	2	€197	68	5	5	3.1	98	0.01	97	3	3	13	95	5	1.5	5.93	23	1.5	4	-5.59	46	3	5	Dovea	10	L	YES
6	AYR	AYNHO ROSSITER ERIC B125	AA	€58	80	5	2	€336	70	5	5	2.2	93	0.06	84	4	4	23	82	5	3	26.1	72	5	5	-5.69	49	3	5	NCBC	45	H	YES
7	WAO	WOODVALE TOTAL G616	AA	€58	64	5	2	€170	47	4	4.5	2.3	96	-0.08	82	1	1.5	11	61	4.5	1.5	8.72	4	3.5	4.5	-4.63	27	1.5	4.5	Eurogene	10	M	YES
8	LWS	LAWSONS ROMEO C938	AA	€58	62	5	2	€233	43	5	5	0.7	60	0.08	46	4.5	4.5	8	81	3.5	1	6.32	4	2	4	-7.33	24	5	5	Dovea	10	H	YES
9	DXB	DARIMA BOND	AA	€57	56	5	2	€180	50	4.5	5	1	76	0.16	51	5	5	7	58	3	1	6.55	38	2	4	-7.08	38	4.5	5	Eurogene	11	M	YES
10	LZE	LANIGAN RED BLAZE ET	AA	€54	87	5	1.5	€65	77	0.5	2.5	6.6	97	0.1	97	4.5	4.5	20	98	5	2.5	1.46	62	0.5	3	-3.1	63	0.5	4	NCBC	12	H	YES
11	KDU	KILKELLY DUKE	AA	€54	86	5	1.5	€180	69	4.5	5	3.1	96	-0.06	93	1.5	2	14	97	5	1.5	7.01	22	2.5	4.5	-5.08	53	2.5	4.5	NCBC	10	H	YES

Key Profit Traits

- **Information Overload???**

Content

- **Currently 2 lists produced - a 'Terminal' & a 'Replacement Index' list.**
- **34 Fields currently included in Active Bull Lists:**

- **Bull Details:** Rank, Code, Name & Breed — 4 Columns
- **Terminal Index:** € val, Rel %, Stars Within, Stars Across — 4 Columns
- **Replacement Index:** € val, Rel %, Stars Within, Stars Across — 4 Columns
- **Key Profit Traits:**
  - **Calving Diff %:** PD, Rel %
  - **Docility:** PD, Rel %, Stars Within, Stars Across
  - **Carcass Weight:** PD, Rel %, Stars Within, Stars Across
  - **Daughter Milk:** PD, Rel %, Stars Within, Stars Across
  - **Daughter Calving Interval:** PD, Rel %, Stars Within, Stars Across

  18 Columns
- **Supplier Details:** Supplier, Price, Avail, BTAP Approved — 4 Columns
- **(Dairy Beef Index still has to be included)** — 4 Columns

Content

Terminal Index - Active Beef Bull List (April 2013)

Terminal Index Active Bull List Criteria:Terminal Index Rel % >50%. Calving Difficulty Rel %> 50%. Carcass Weight Rel %>50%.

High Reliability Bulls are shaded in green. They have reliability % figures > 80% for Terminal Index, Calving Difficulty % & Carcass Weight

Angus

Bull Details				Terminal Index				Replacement Index				Key Profit Traits: Calving Diff %		Docility				Carcass Weight (Kg)				Daughter Milk (Kg)				Daughter Calving Interval (Days)				Supplier Details			
Rank	Code	Name	Bd	€-val	Rel %	Stars Within	Stars Across	€-val	Rel %	Stars Within	Stars Across	PD	Rel %	PD	Rel %	Stars Within	Stars Across	PD	Rel %	Stars Within	Stars Across	PD	Rel %	Stars Within	Stars Across	PD	Rel %	Stars Within	Stars Across	Supplier	€	Avail	BTAP Approved
1	RZI	BALMACHIE RANNAI D005	AA	€77	66	5	2	€266	52	5	5	2.2	76	0	44	2.5	3	19	78	5	2	16.85	26	5	5	-7.15	37	5	5	NCBC	40	M	YES
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3	RWB	RAWBURN LORD ROCKET F609	AA	€60	87	5	2	€265	72	5	5	5.1	96	0.18	95	5	5	23	97	5	3	16.1	39	5	5	-4.85	54	2	4.5	Dovea	10	L	YES
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9	DXB	DARIMA BOND	AA	€57	56	5	2	€180	50	4.5	5	1	76	0.16	51	5	5	7	58	3	1	6.55	38	2	4	-7.08	38	4.5	5	Eurogene	11	M	YES
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- **How can we reduce the 'data overload'?**
- **Remove the 'Key Profit Traits' section?**
- **Farmer can access further details on a bull online.**

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Criteria

- **Current Criteria for inclusion on the lists:**

- **Terminal List:**
  - **Terminal Index Reliability >50%**
  - **Calving Difficulty Reliability >50%**
  - **Carcass Weight Reliability >50%**
  - **No ‘S’ or ‘F’ coded bulls included.**

- **Replacement List:**
  - **Replacement Index Reliability >50%**
  - **Calving Difficulty Reliability >50%**
  - **Carcass Weight Reliability >50%**
  - **Daughter Calving Interval >50%**
  - **No ‘S’ or ‘F’ coded bulls included.**

Criteria

- **Questions for discussion:**
- **Who are the lists for?**
  - **Pedigree & Commercial farmers**
  - **Just commercial farmers**
- **Are the current reliability cut-offs appropriate?**
- **Straw price of bulls on the list?**
- **'Availability' details of bulls on the list?**

Genomics for parentage verification



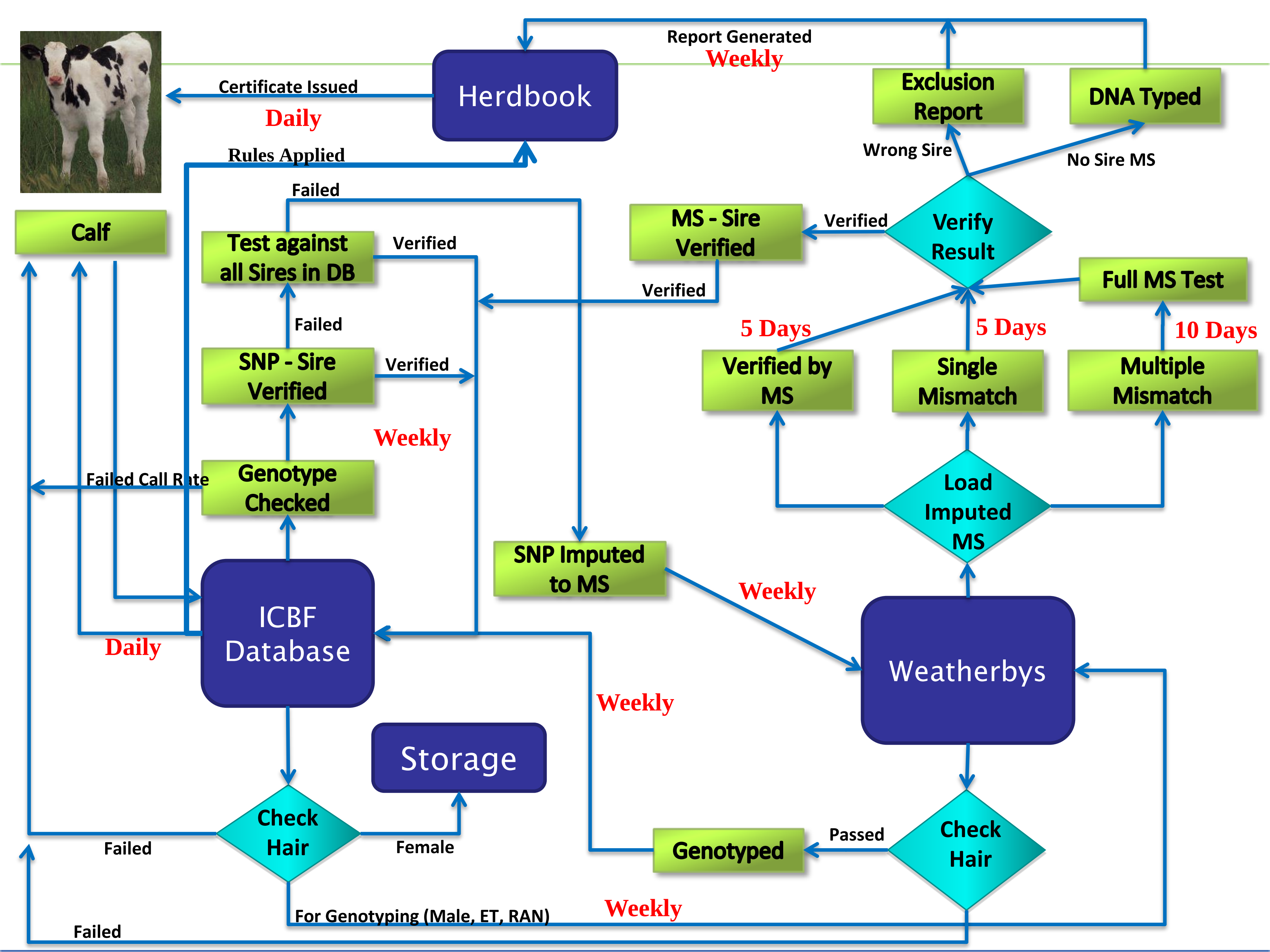
7th October 2013

IRISH CATTLE BREEDING FEDERATION

National Development Plan
Transforming Ireland

Genotyping - Background

- New process in 2013 for Pedigree Beef Male Calves
  - €10 Farmer – refunded if part of DAFM BDP scheme
  - €10 Society/Farmer
  - €10 Teagasc
  - €10 ICBF
- Using New technology – IDB19 & SNP Sire Verification
- Technical issues resulted in unforeseen delays and caused significant issues for the breed societies involved.
- Considerable resources invested in past few months to rectify.
- Continue to work through new issues as they arise – learning experience for all involved.


Report Generated
Weekly
Herdbook
Certificate Issued
Daily
Rules Applied
Exclusion Report
DNA Typed
Wrong Sire
No Sire MS
Calf
Failed
Test against all Sires in DB
Verified
MS - Sire Verified
Verified
Verify Result
Verified
Full MS Test
Failed
5 Days
5 Days
10 Days
SNP - Sire Verified
Verified
Verified by MS
Single Mismatch
Multiple Mismatch
Weekly
Failed Call Rate
Genotype Checked
Load Imputed MS
SNP Imputed to MS
Weekly
ICBF Database
Daily
Weatherbys
Weekly
Storage
Check Hair
Failed
Female
Genotyped
Passed
Check Hair
For Genotyping (Male, ET, RAN)
Weekly
Failed

Genotyping – Current status

- 33,000~ sample kits sent out (incl. males & females)
  - 18,000~ Beef Animals & 15,000~ Dairy Animals
- 20,700~ samples back
  - 9,800~ Beef Animals
- 16,200~ samples – all dispatched to Weatherbys
  - 5,600~ Beef Animals
- 14,800~ genotypes received
  - 750~ Failed Call Rate

Genotyping – Current status

- Beef
  - Male Cards Issued – Between 95% & 55%
  - Male Cards Returned – Between 62% & 13%
  - Male Low Call Rates – Between 2% & 5%
- Sire Verification
  - Sire Verified by SNP - Between 48% & 10%
  - Sire Verified by Microsatellite – Between 60% & 20%
- Other Categories
  - Excluded, MS Typed Only, Failed, Under Investigation
- Outstanding Animals
  - Continue to work through these with Weatherbys & to building detailed reporting system to allow Herdbooks to manage.

Additional Processing

- For ET calves typically a genotype does not exist for the dam. An imputed MS is generated and sent to Weatherbys for dam and sire verification by means of MS.
- For calves that don't have a sire genotyped the calf must get an imputed MS and then be verified by Weatherbys
- For animals that have poor quality hair samples, resampling must take place
- For animals that are genotyped with poor call rates, resampling must take place

- Hair cards are slowly returning – Text message reminders are actively being sent out.

Herdbook Screens

Date Requested	Herd	Owner	Animal Number	Sex	Breed	Sample	Org	Sent to Farm	ICBF Received	Sent to Lab	Chip	Genotype Received	Status	Date of Status	Cert Printed
29-JUL-13	IE241		30442	M	HO	HAIR	IH	29-JUL-13	09-AUG-13	14-AUG-13	IDB 19K	23-AUG-13	SIRE VERIFIED	03-OCT-13	06-OCT-13
29-JUL-13	IE241		30441	M	HO	HAIR	IH	29-JUL-13	09-AUG-13	14-AUG-13	IDB 19K	23-AUG-13	GENOTYPE PUBLISHED	26-SEP-13	29-SEP-13
29-JUL-13	IE141		32532	M	HO	BVD	IH	29-JUL-13	31-JUL-13	31-JUL-13	IDB 19K	16-AUG-13	CLOSED due to LOW CALL RATE	16-AUG-13	
29-JUL-13	IE241		30453	M	HO	HAIR	IH	29-JUL-13	09-AUG-13	14-AUG-13	IDB 19K	23-AUG-13	GENOTYPE PUBLISHED	26-SEP-13	
29-JUL-13	IE121		30075	M	HE	HAIR	HE	29-JUL-13	20-AUG-13	21-AUG-13	IDB 19K	30-AUG-13	SIRE VERIFIED	13-SEP-13	13-SEP-13
29-JUL-13	IE151		50240	F	HE	HAIR	HE	29-JUL-13			IDB 19K		AWAITING return of sample from farm	29-JUL-13	
29-JUL-13	IE151		70379	M	HE	HAIR	HE	29-JUL-13	26-AUG-13	28-AUG-13	IDB 19K	06-SEP-13	SIRE VERIFIED	23-SEP-13	04-OCT-13
29-JUL-13	IE121		30557	M	HE	HAIR	HE	29-JUL-13			IDB 19K		AWAITING return of sample from farm	29-JUL-13	
29-JUL-13	IE131		50781	M	HE	HAIR	HE	29-JUL-13	07-AUG-13	07-AUG-13	IDB 19K		SAMPLE IN LAB	07-AUG-13	
29-JUL-13	IE121		40904	M	HE	HAIR	HE	29-JUL-13			IDB 19K		AWAITING return of sample from farm	29-JUL-13	
29-JUL-13	IE121		40887	F	HE	HAIR	HE	29-JUL-13			IDB 19K		AWAITING return of sample from farm	29-JUL-13	
29-JUL-13	IE141		30511	M	HE	HAIR	HE	29-JUL-13	02-AUG-13	07-AUG-13	IDB 19K	16-AUG-13	SIRE VERIFIED	20-AUG-13	21-AUG-13
29-JUL-13	IE231		50620	F	HE	HAIR	HE	29-JUL-13	16-AUG-13		IDB 19K		SAMPLE IN STORAGE	16-AUG-13	16-AUG-13
29-JUL-13	IE121		30315	M	HE	HAIR	HE	29-JUL-13	01-OCT-13	02-OCT-13	IDB 19K		SAMPLE IN LAB	02-OCT-13	
29-JUL-13	IE121		30560	F	HE	HAIR	HE	29-JUL-13			IDB 19K		AWAITING return of sample from farm	29-JUL-13	

Beef Genomics

Have identified ~600 bulls with good reliability for calving and maternal weaning weight or have a calf born in 2013 or have an insemination in 2013

~300 of these with samples in Weatherbys – HD genotyped in the next couple of months.

Target remaining 300 to get DNA over the next couple of months – we have some in stock but will be in touch with AIs and societies in the next couple of weeks

Significantly reduce the amount of animals requiring MS imputation => reduce turnaround time by at least a week

Genomics

Maternal Grand Sire verification & prediction

Program developed by Van Kaam (2013) to verify the MGS of a genotyped animal without genotyping the dam (assumes MGS is genotyped)

Can also suggest potential MGS where the MGS is incorrect

Program is highly accurate (>98%)

Working to have it in place for Spring 2014

Genomics – Ear Tag trial

Currently most sampling done using hair cards

- To date very successful but can lead to some mis-sampling, and may require re-sampling if not enough hair follicles. Also labour intensive. 2% re-test rate (call rate <90%) once genotyped

Ear tissue samples that have gone through BVD testing have been used for genotyping but 15% samples <90% call rate therefore require re-sampling (using hair cards) and re-genotyping at full cost

Trailing a tag which can do BVD testing without damaging the ear tissue which can then be used for genotyping

- Tissue get stored in a tube with solution rather than a dry tube

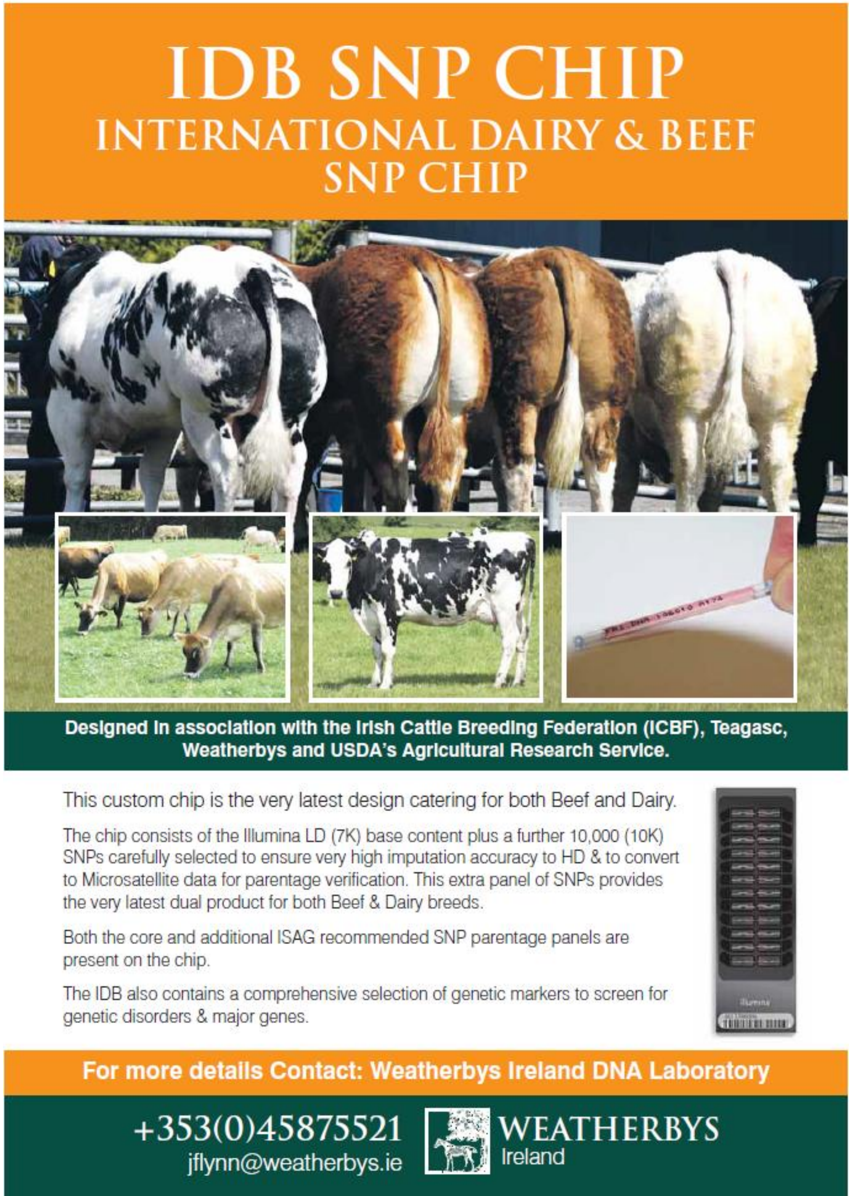
Genomics – Ear Tag trial

2 Herds – dairy and beef
Tagging animals as normal and do normal BVD
Taking an extra punch with new tag and doing BVD test and genotyping
Assess the results of both
All flex doing an EU wide trial to validate solution
Potential to use it in place of current tag once BVD scheme ends

Genomics Update-IDBv2, Breed Composition, Harelip

8th October 2013

IDB.v1



Parent Verification
- SNP
- Microsatellite

Sire Identification

Genomic Selection

Genetic Disease Status

Major Genes

Imputation to Higher SNP Density

IDB.v1 versus IDB.v2

Lethal recessives
1 CVM*-Complex Vertebral malformation
2 DUMPS
3 Brachyspina*
4 BLAD

Congenital disorders
1 Arthrogryposis (Curly Calf)*
2 Fawn Calf Syndrome or Contractural Arachnodactyly*
3 Hypotrichosis_PMel17
4 Hypotrichosis in Belted Galloway, HEPHL1 SNP
5 Hypotrichosis_KRT71*
6 Spiderleg- MOCS1 gene- Simmental
7 Spiderleg- SOUX gene- Brown Swiss
8 Polledness
9 Mule Foot
10 Tibial Hemimelia (TH)*
11 Black/Red Coat Color/Red Factor
12 Red Recessive coat colour (Different to red factor)
13 Silver Color Dilutor
14 Dun Color
15 RNF11 (affects growth and stature)
16 Osteopetrosis (Marble Bone Disease)
17 Pink Eye (Infectious Bovine Keratoconjunctivitis)
18 Protoporphyria Ferrochelatase Gene (Photosensitization)
19 SMA- Spinal muscular atrophy
20 Beta Lactoglobulin
21 Beta Mannosidosis
22 Alpha Mannosidosis
23 Citrullinemia
24 CMDI: Congenital muscular dystonia I
25 CMDII: Congenital muscular dystonia II
26 Crooked Tail Syndrome*
27 Factor XI
28 Heterochromia Irides (White Eye)
29 SDM- Spinal dysmyelination-SPAST Gene
30 Idiopathic Epilepsy*
31 Pulmonary Hypoplasia*
32 Weaver
33 Neuropathic hydrocephalus* (water head syndrome)

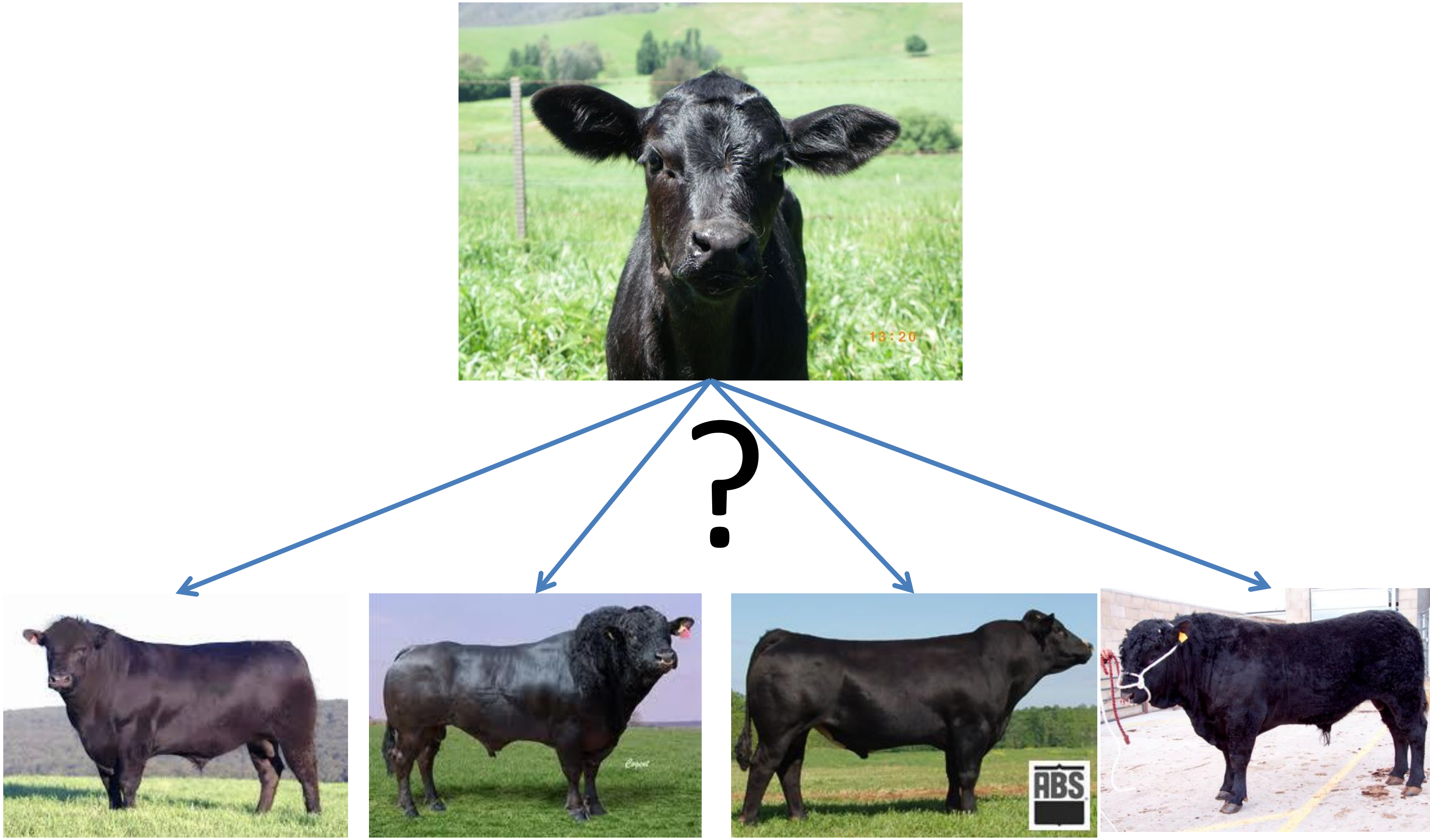
Major genes
1 DGAT1
2 MSTN (GDF8) Double Muscling*
3 A1/A2 beta casein + *
4 Fertility Haplotypes (HH1, HH2, HH3, JH1)
5 Kappa Casein I
6 Kappa Casein II
7 ABCG2
8 GH2141 and GH2291 (Marbling,growth rate)*
9 IGF1-AF017143
10 STAT1*
11 STAT3*
12 STAT5*
13 Calpain (Tenderness) loci

* Royalty fees may apply

>40 new diseases/major genes

RVC, fertility haplotype
AH1, fertility haplotype
HH5, fertility haplotype
BH2, fertility haplotype
HH3, abortion
HH1, abortion
BY, abortion
HH4, Abortion
MH1, Abortion
MH2 Abortion
JH1 Abortion
Anhidrotic ectodermal dysplasia
Axonopathy
Cardiomyopathy-woolly haircoat
Cardiomyopathy, dilated
Chediak-Higashi syndrome
Chondrodysplasia
CMDI
CMDII / Startle Disease
Coat colour, albinism
Coat colour, dilution
Dominant white/Bilateral deafness
Dwarfism, Angus
Dwarfism, BD1 Dexter
Dwarfism, BD2 Dexter
Dwarfism, growth-hormone
Epidermolysis bullosa,
Forelimb-girdle muscular anomaly
Goitre, familial
Haemophilia A
Ichthyosis congenita
Lethal multi-organ dysplasia
Marfan syndrome
Mucopolysaccharidosis IIIB
Multiple ocular defects
Myasthenic syndrome, congenital
Myoclonus
Neuronal ceroid lipofuscinosis, 5
Perinatal weak calf syndrome
Pseudomyotonia, congenital
Scurs, type 2
Spherocytosis
Thrombopathia
Trimethylaminuria , fishy flavor
Xanthinuria, type II
Yellow fat

Breed Composition Identification

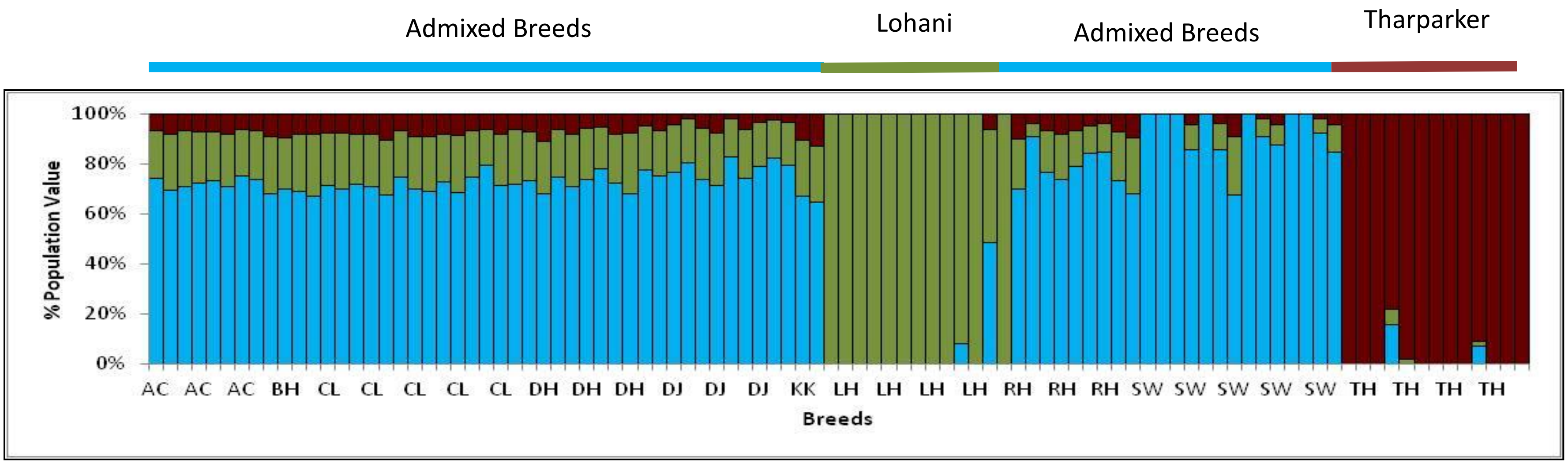


Angus Limousin Simmental Saler

Breed Composition by Pedigree

id	br1	fract1	br2	fract2	br3	fract3	br4	fract4	br5	fract5	br6	fract6	br7	fract7
UMC550707649	AAN	20	SIM	8	SIM	4	?	?	?	?	?	?	?	?
UMC550707749	AAN	20	SIM	8	SIM	4	?	?	?	?	?	?	?	?
UMC550707809	AAN	20	SIM	8	SIM	4	?	?	?	?	?	?	?	?
UMC550707859	AAN	20	SIM	8	SIM	4	?	?	?	?	?	?	?	?
UMC550708059	AAN	12	MX	8	SIM	8	RGU	4	?	?	?	?	?	?
UMC550709919	AAN	12	MX	8	SIM	8	RGU	4	?	?	?	?	?	?
UMC550707709	MX	12	AAN	8	SIM	8	RGU	4	?	?	?	?	?	?
UMC550709929	MX	12	AAN	8	SIM	8	RGU	4	?	?	?	?	?	?
UMC550709809	SIM	8	RGU	8	SIM	8	MX	8	?	?	?	?	?	?
UMC550710529	SIM	8	RGU	8	SIM	8	MX	8	?	?	?	?	?	?
966780803	IRM	8	BBL	7	HER	4	MSH	4	HOL	3	LIM	3	?	0
1062333858	IRM	8	BBL	7	HER	4	MSH	4	HOL	3	LIM	3	?	0
801102442	CHA	7	IRM	7	MSH	7	BBL	4	HER	3	?	0	?	0
966772724	HOL	7	IRM	7	BBL	7	HER	4	LIM	3	?	0	?	0
1054575523	HOL	7	IRM	7	BBL	7	HER	4	LIM	3	?	0	?	0
966772725	MSH	7	BBL	7	HOL	5	HER	4	IRM	2	BRF	2	LIM	2
975493594	MSH	7	BBL	7	HOL	5	CHA	4	HER	4	BRF	2	?	0
1063263346	MSH	7	BBL	7	HOL	5	HER	4	IRM	2	?	0	?	0
1060498017	IRM	7	BBL	7	HER	4	HOL	3	LIM	3	MSH	3	?	0
901978118	LIM	7	BBL	7	HER	4	IRM	4	MSH	4	HOL	3	?	0
1054575524	LIM	7	BBL	7	HER	4	IRM	4	MSH	4	HOL	3	?	0
901979455	MSH	7	BBL	7	HER	4	IRM	4	HOL	3	LIM	3	?	0
971256868	BBL	7	HOL	5	MSH	5	HER	4	LIM	4	CHA	2	BRF	2
1063263345	BBL	7	HOL	5	MSH	5	HER	4	CHA	2	IRM	2	BRF	2
975493591	BBL	7	CHA	4	HER	4	IRM	4	HOL	3	LIM	3	MSH	3
1060498016	BBL	7	CHA	4	HER	4	IRM	4	HOL	3	LIM	3	MSH	3

Breed Composition – Genomic Identification



Research Setup

Reference:

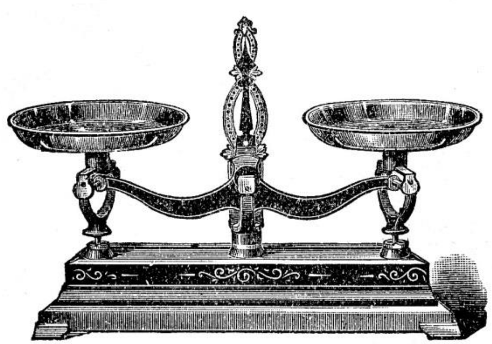
12,700 animals

35 pure breeds

Test:

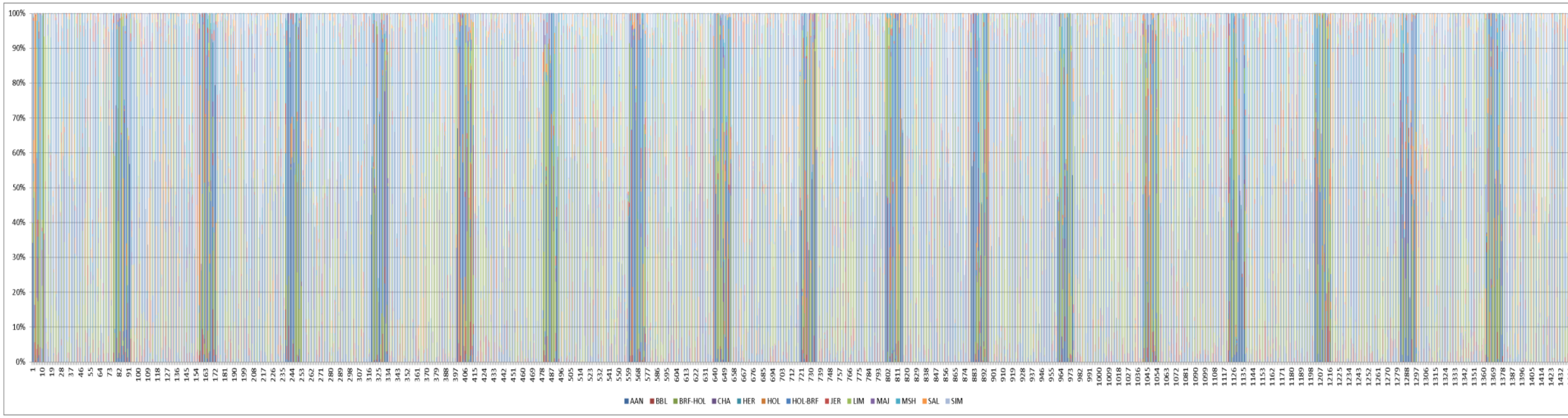
1,443 cross bred animals

Varying # of breeds, animals, SNP

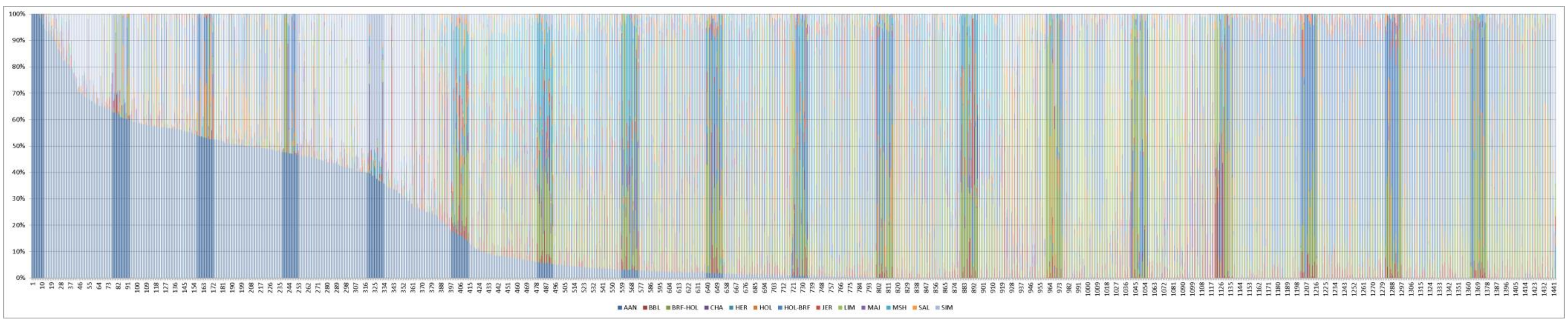


breed	HD	50K	IDB	LD
AAN	465	.	41	.
AYS	3	.	.	.
BAQ	3	5	.	.
BBL	297	.	10	.
BGA	.	4	.	.
BRF	39	.	13	.
BSW	.	42	.	.
CHA	1021	.	1834	.
CIA	2	6	.	.
DEV	.	3	.	.
DNR	1	.	.	.
DXT	.	4	.	.
GLW	.	4	.	.
GUE	.	21	.	.
HER	309	.	486	.
HLA	.	8	.	.
HOL	2732	.	298	25
JER	76	29	.	.
KER	.	3	.	.
LIM	1026	.	1622	1
MAJ	.	333	.	.
MAR	.	2	.	.
MGR	.	4	.	.
MON	33	35	.	.
MRY	5	.	.	.
MSH	137	168	.	.
NMD	.	31	.	.
PAR	2	.	.	.
PIE	.	29	.	.
RBT	1	.	.	.
RDC	9	21	.	.
ROM	.	29	.	.
SAL	2	104	.	.
SIM	610	434	280	.
SWR	5	.	.	.

Breed Composition – Genomic Identification



AAN BBL BRF-HOL CHA HER HOL HOL-BRF JER LIM MAJ MSH SAL SIM



Breed Composition – Genomic Identification

- IDB SNPs + Large Reference Population
  - Powerful tool to identify animal's breed composition

- Genomic breed composition
  – Additional layer of traceability and assurance to consumer and processors

- Next on going steps:
  – Identify minimal SNP needed
  – Validation
  – Round out Reference Population

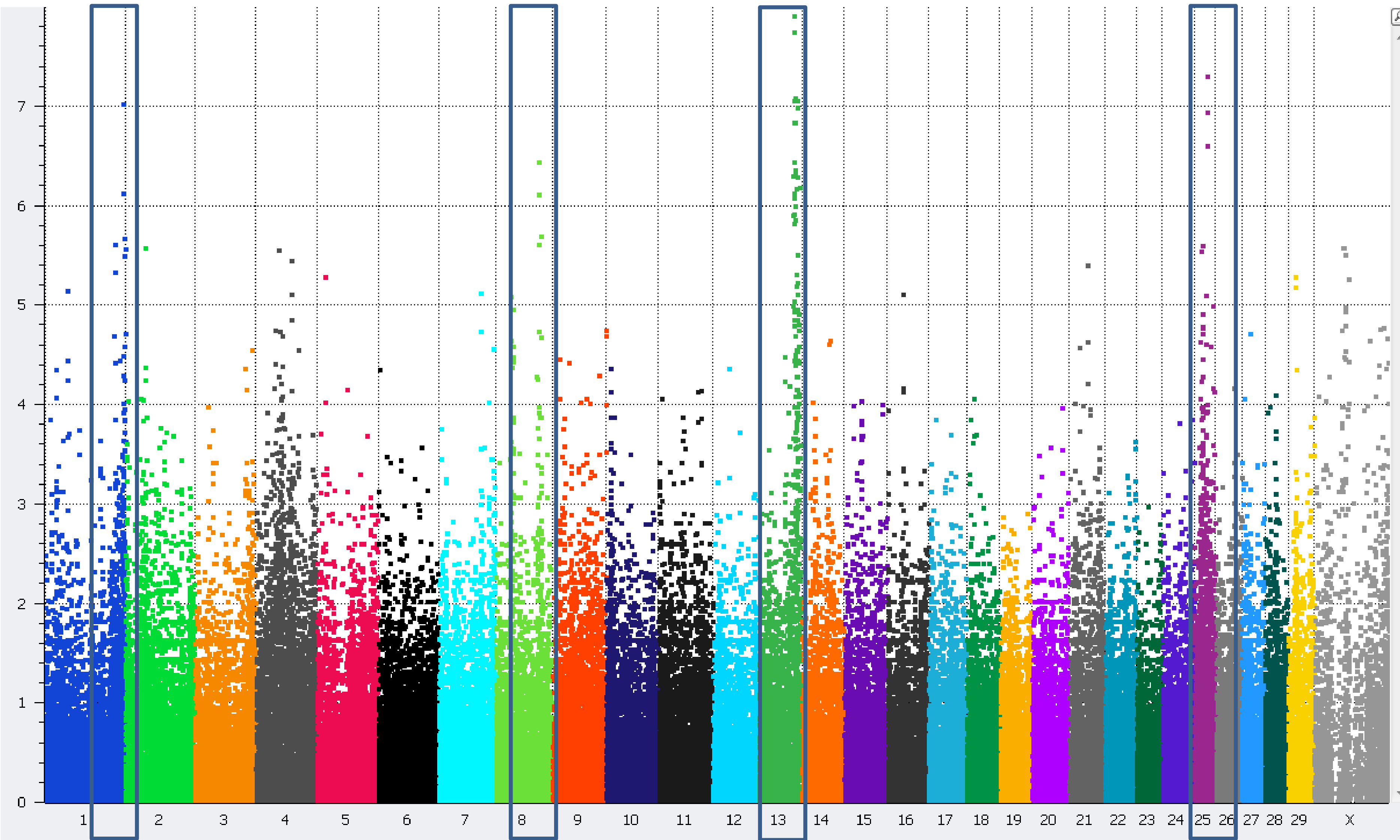
Dexter

Kerry

Harelip update

- HDSNP genotyped animals
  - 25 affected halfsibs
  - 49 non-affected halfsibs
  - 11 non-affected animals

Harelip update



Harelip update

- HDSNP genotyped animals
- Adding in ~7,600 Holsteins with 50K data
  - Try to identify diagnostic haplotype
  - Identify genomic region

IRISH CATTLE BREEDING FEDERATION

Genetics of Health & Disease.

3rd October 2013.

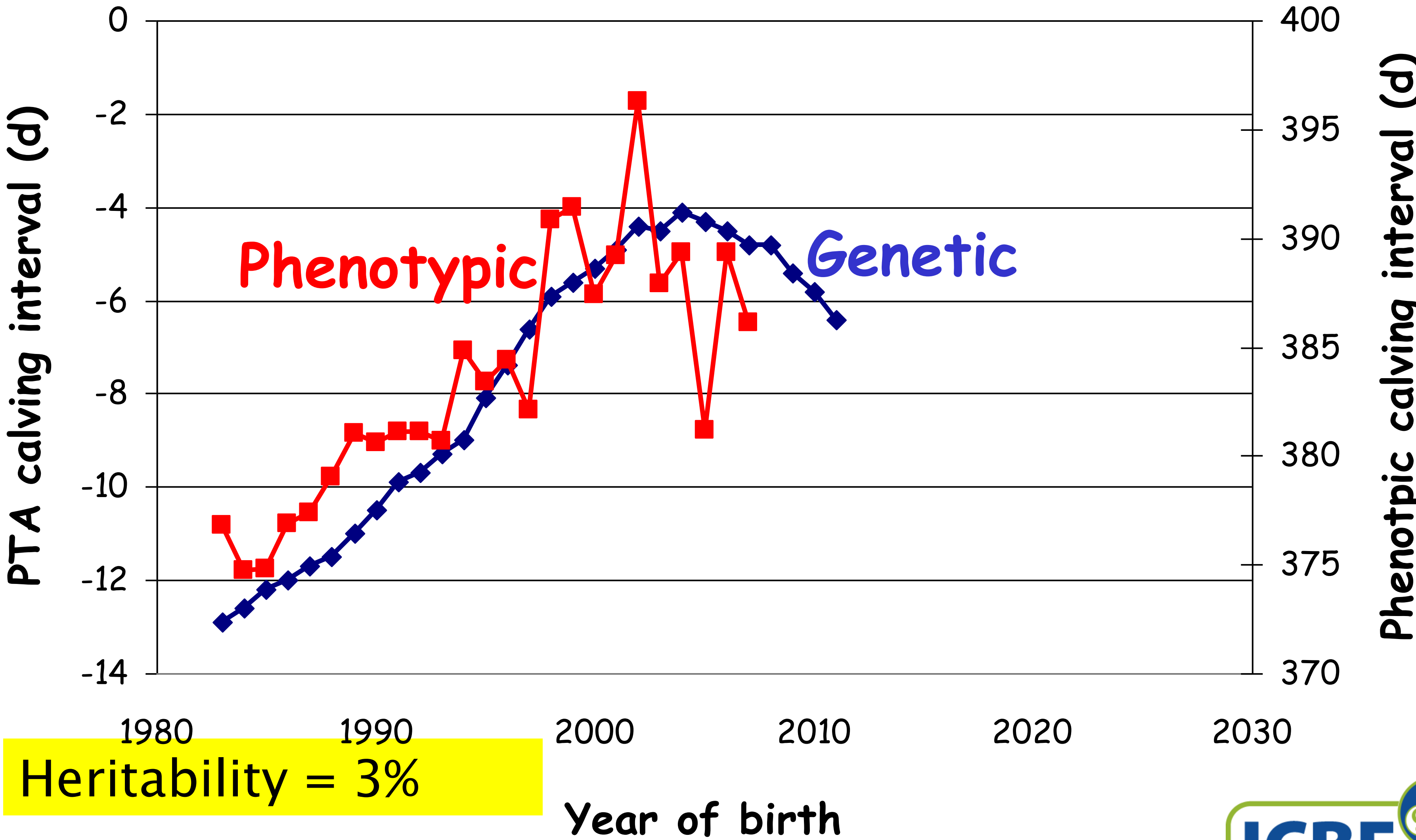
National Development Plan

Transforming Ireland

Why are we interested?

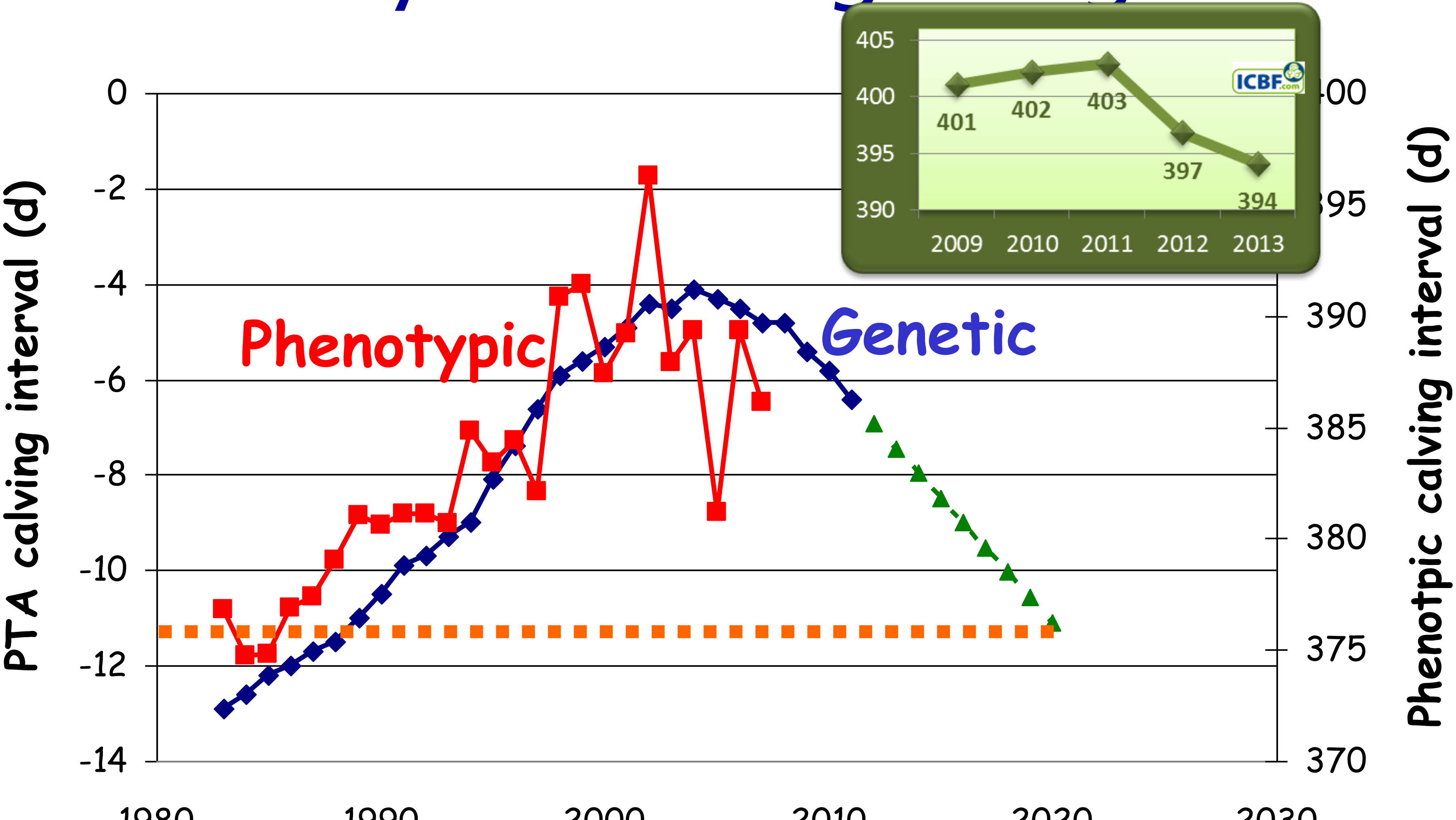
- Health & disease costs money.
- Impact of these traits will increase in future.
  - Costs of production will rise more rapidly than value of output.
- Each of these traits has a genetic basis. Need to first understand level and then exploit differences.
- Genetics – permanent, cumulative & highly cost-effective.

Genetic change is possible even with low heritability



Heritability = 3%

Crystal-ball gazing.



Heritability = 3%

Year of birth

Proposal

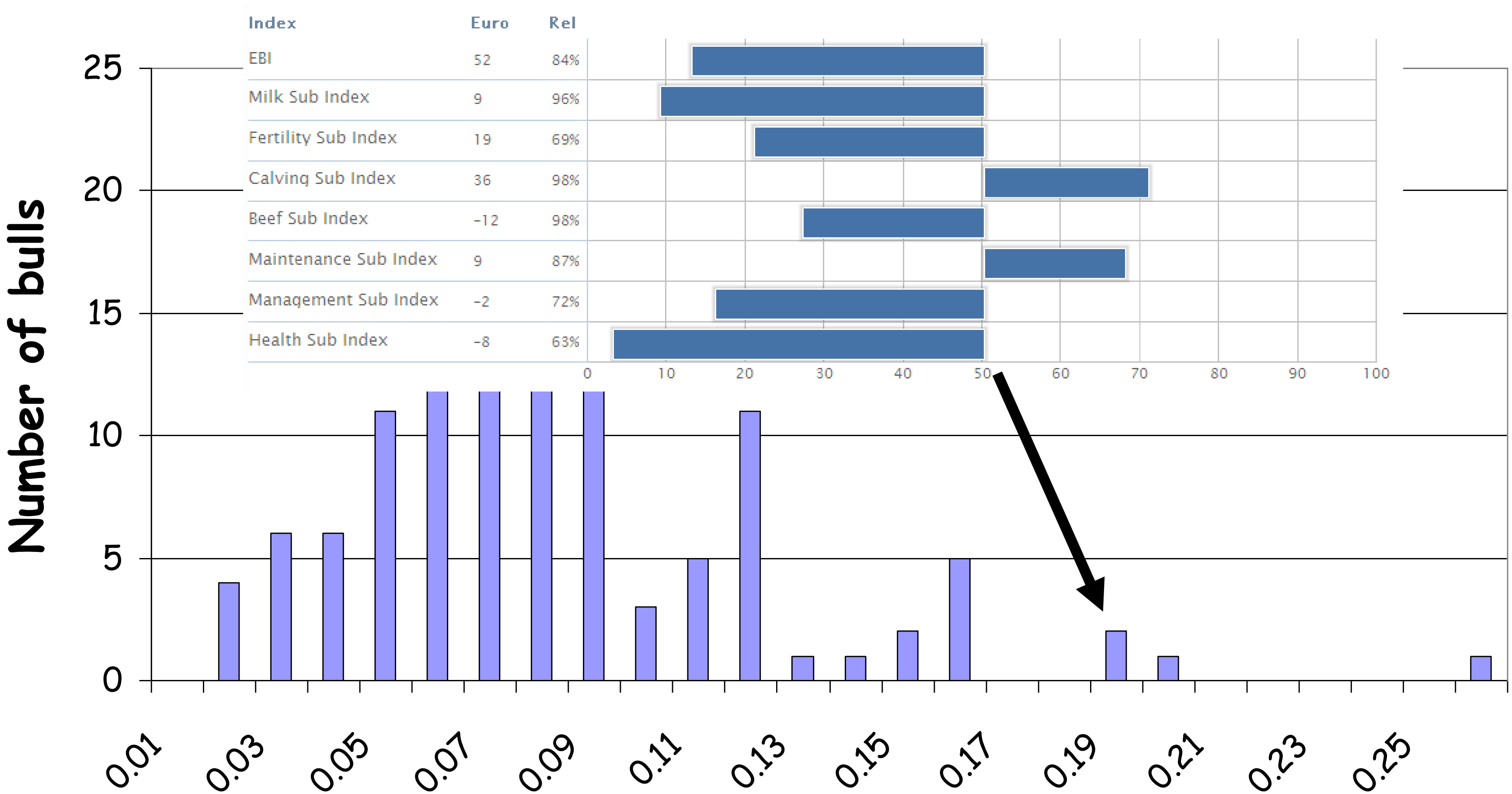
- Collate all health data available
- Estimate genetic parameters
- Quantify inter-relationships between traits
- Establish a robustness index covering the main diseases.
- Include in future versions of EBI and Beef €uro-Stars.

Weighting on robustness

- Establish expert group
  - DAFM, Teagasc, breeding industry
- Allocate relative (economic) value to the entire dairy or beef sector
- Weight each disease accordingly in a robustness index
- Weight on robustness index will be dictated by change in genetic gain in other traits in the breeding goal

Results to-date

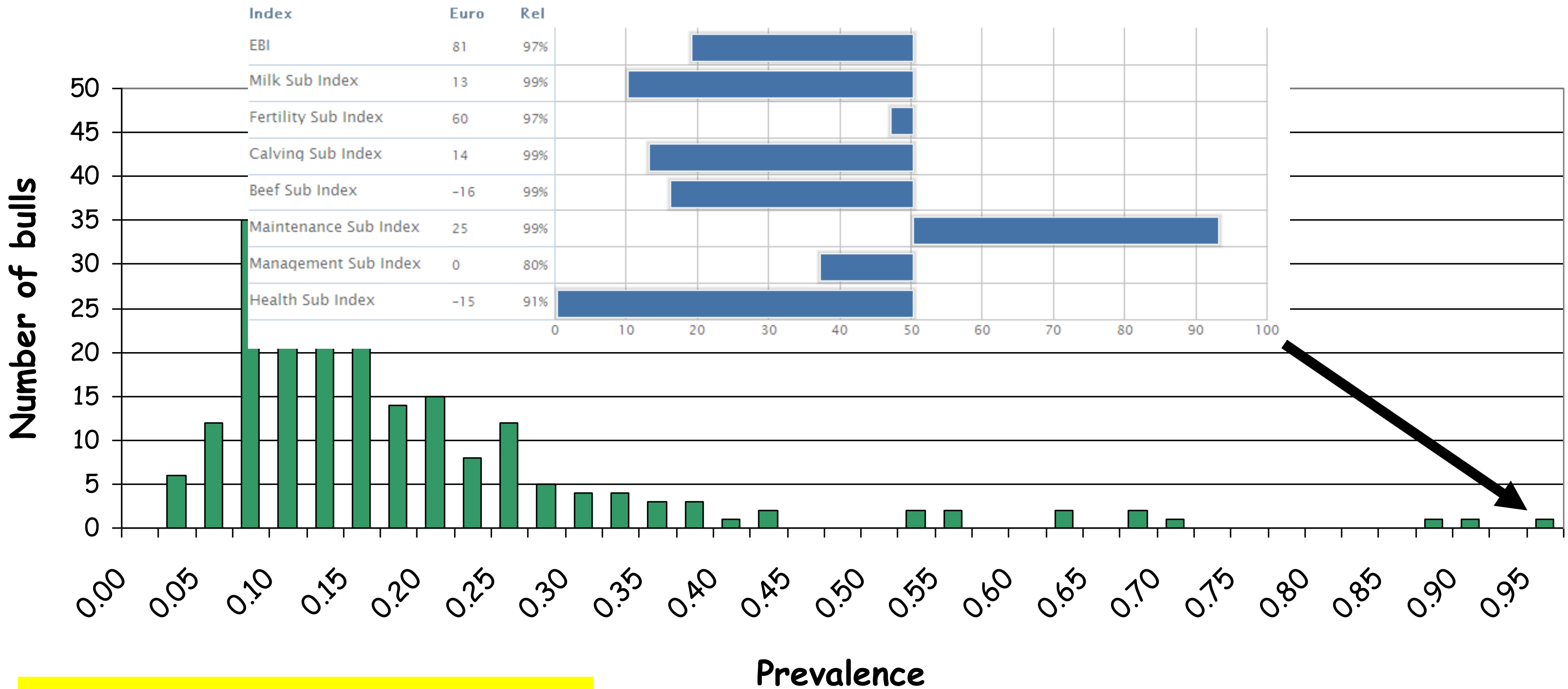
BVD – sire prevalence



Heritability = 10%

Prevalence

TB – sire prevalence

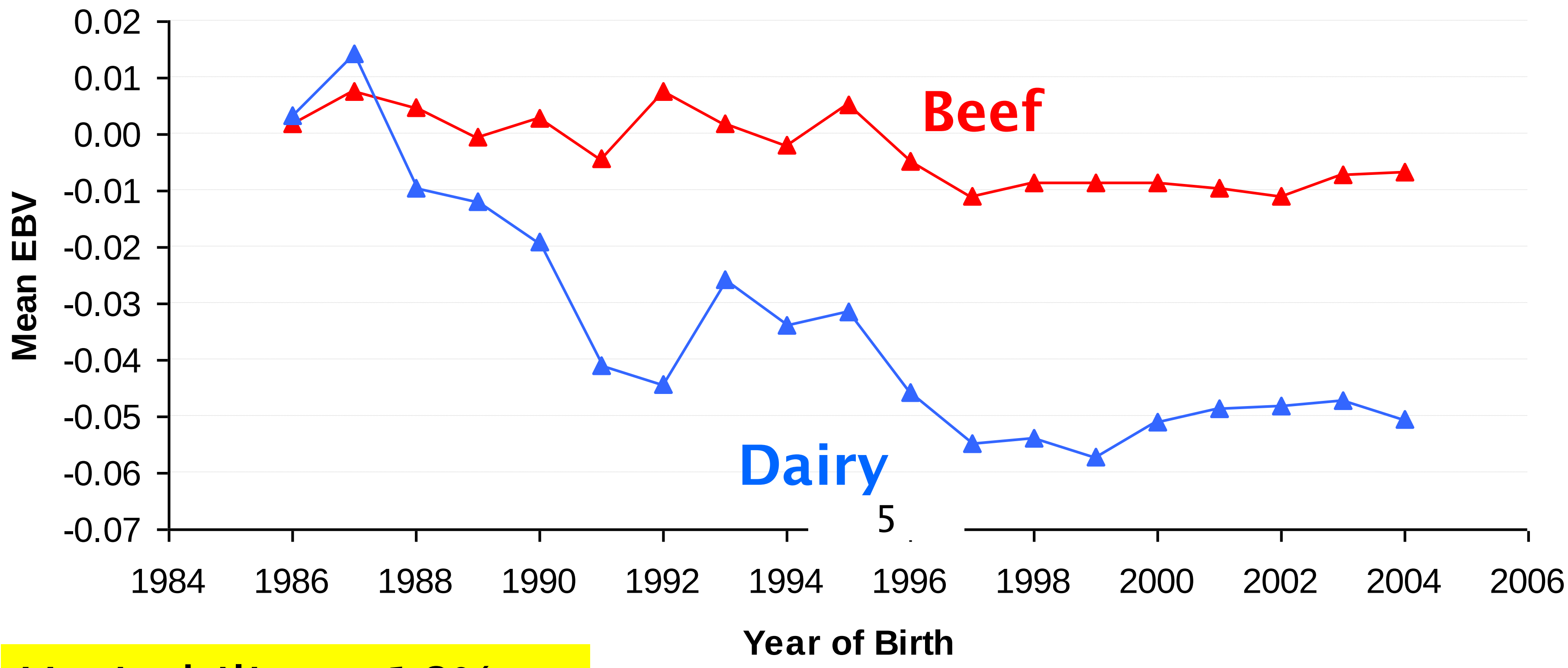


Index	Euro	Rel
EBI	81	97%
Milk Sub Index	13	99%
Fertility Sub Index	60	97%
Calving Sub Index	14	99%
Beef Sub Index	-16	99%
Maintenance Sub Index	25	99%
Management Sub Index	0	80%
Health Sub Index	-15	91%

Heritability = 18%

Ian Richardson

TB - genetic trends



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Heritability = 18%

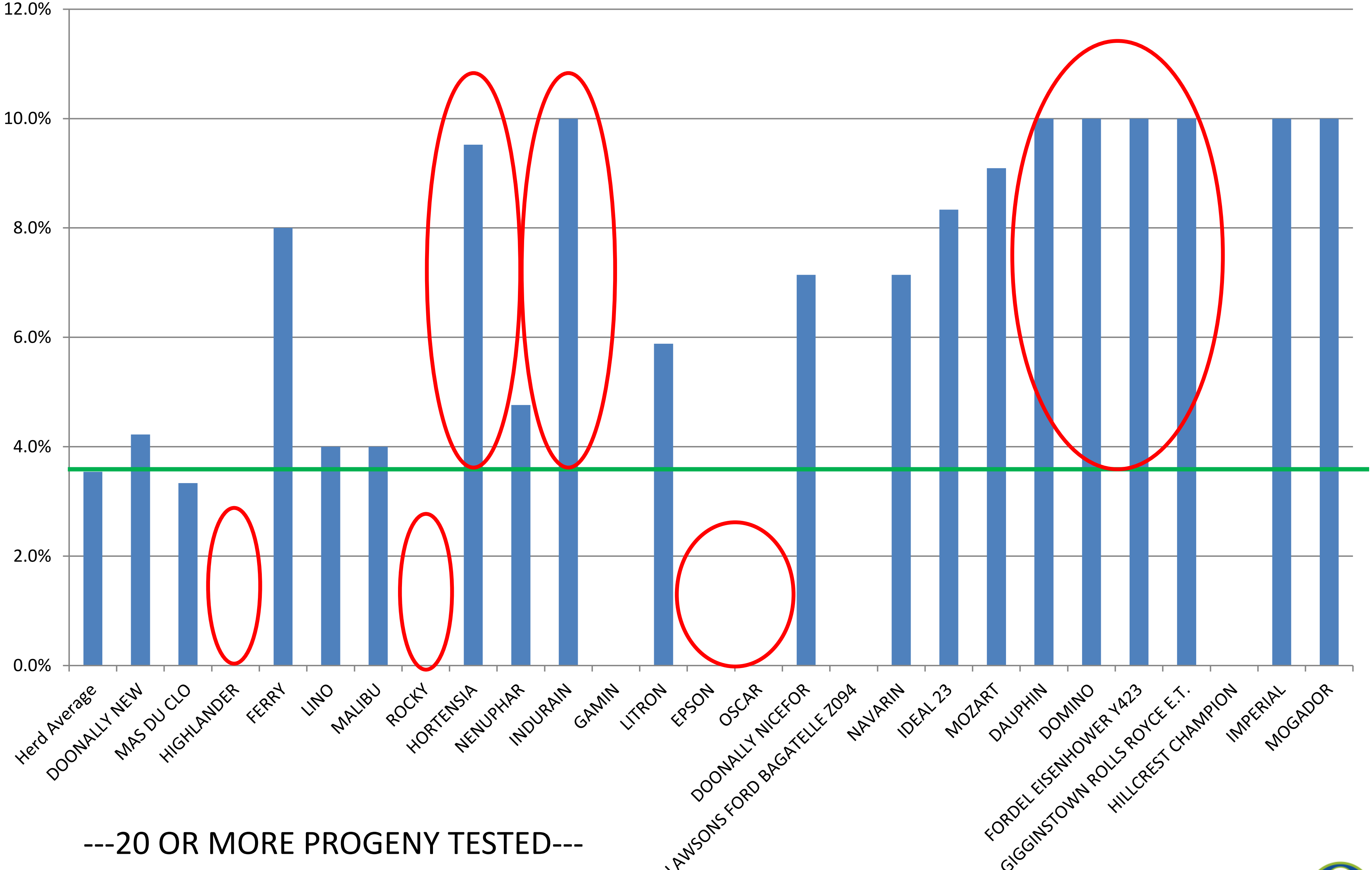
Ian Richardson

Johne's data from Tully & Contemporaries:

- Johne's samples: 2795
  - 99 positive animals (3.54%) from 74 known and 15 unknown sires
  - 293 total herds
    - Avg. 9.6 records/herd

  - Too small to get heritabilility estimates from this data but found **<u>8.8% heritability</u>** in dairy herds across dairy data set
    - Likely similar in beef herds

Raw data: % of progeny infected with Johne's



---20 OR MORE PROGENY TESTED---

-----------------------------------10 OR MORE PROGENY TESTED----------------------------------

Johne's dairy data

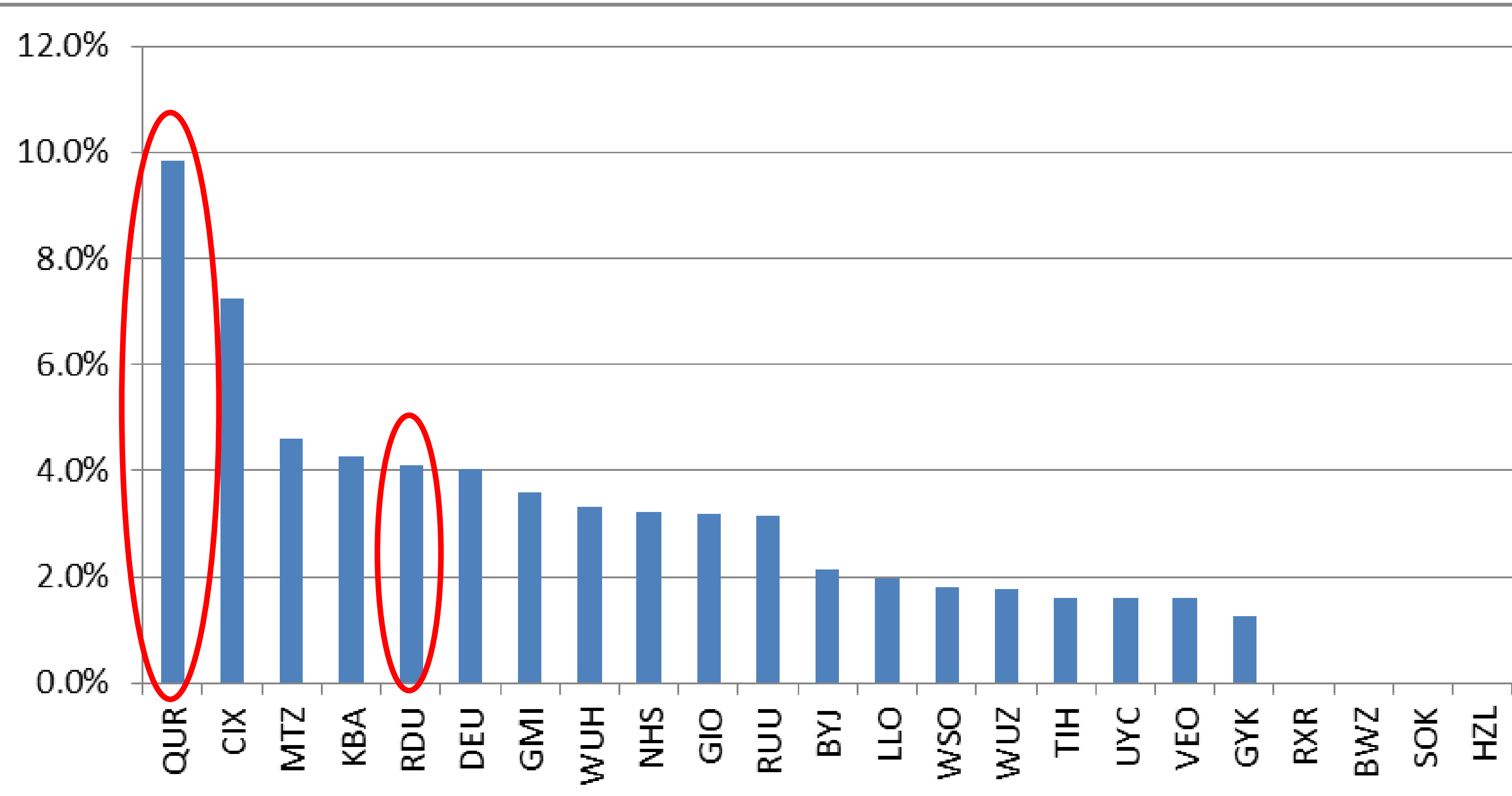
- Data acquired as part of milk recording service
  - Collection –1/month-4/year

- Started with 59k records
- Applied constraints
  - "True positives," vaccination, exposure, age, parentage, origin, movement
- Finished with 6864 uninfected and 222 infected animals
  - 98 herds in 7 counties
  - 348 unique sires (max=195 min=5)

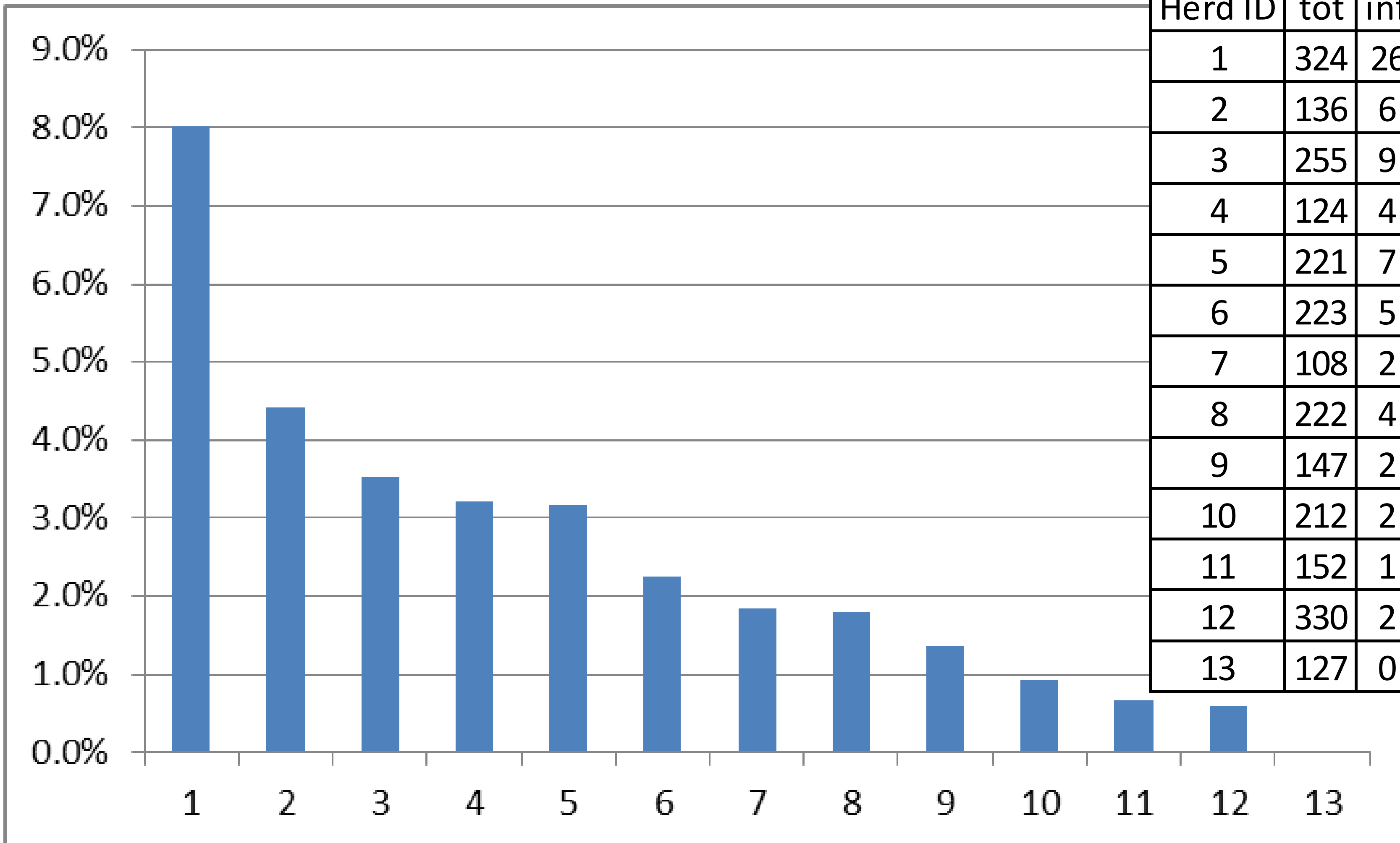
Raw data:Sire results

- According to this data- 8.8% Heritable

SIRE	Tot	inf	% inf
QUR	61	6	9.8%
CIX	69	5	7.2%
MTZ	65	3	4.6%
KBA	94	4	4.3%
RDU	195	8	4.1%
DEU	149	6	4.0%
GMI	139	5	3.6%
WUH	90	3	3.3%
NHS	156	5	3.2%
GIO	63	2	3.2%
RUU	191	6	3.1%
BYJ	188	4	2.1%
LLO	51	1	2.0%
WSO	55	1	1.8%
WUZ	113	2	1.8%
TIH	62	1	1.6%
UYC	62	1	1.6%
VEO	126	2	1.6%
GYK	79	1	1.3%
RXR	93	0	0.0%
BWZ	90	0	0.0%
SOK	84	0	0.0%
HZL	63	0	0.0%
MJS	61	0	0.0%
BMU	56	0	0.0%
AAP	50	0	0.0%
UPH	50	0	0.0%



Raw Data: Herds Collaboration is key



Herd ID	tot	inf	% inf
1	324	26	8.0%
2	136	6	4.4%
3	255	9	3.5%
4	124	4	3.2%
5	221	7	3.2%
6	223	5	2.2%
7	108	2	1.9%
8	222	4	1.8%
9	147	2	1.4%
10	212	2	0.9%
11	152	1	0.7%
12	330	2	0.6%
13	127	0	0.0%

Where next – More data!

Trait	h2	Current data providers*
Category 1 - Research largely complete		
- BVD	10%	AHI
- TB	18%	DAFM
- Female fertility	3%	ICBF
Category 2 - Research underway		
- Johnne's	10%	DAFM, milk processors & Teagasc
- Mastitits/lameness	5%	ICBF
- IBR	28%	DAFM, milk processors & Teagasc
Category 3 - Research not started		
- Fluke	?	Meat processors
- Pneumonia	?	DAFM, Teagasc, ICBF
- Scour	?	DAFM, Teagasc, ICBF

On-farm data collection

- Some of the traits require improved on-farm data collection systems.
  - Calf diseases, mastitis, lameness….
- Working with stakeholders to develop an "Animal Events" type system for health & disease recording.
- Simple, remove duplication & electronic.
- Pilot on initial group of farms, rolled to all farms in the future.

Summary.

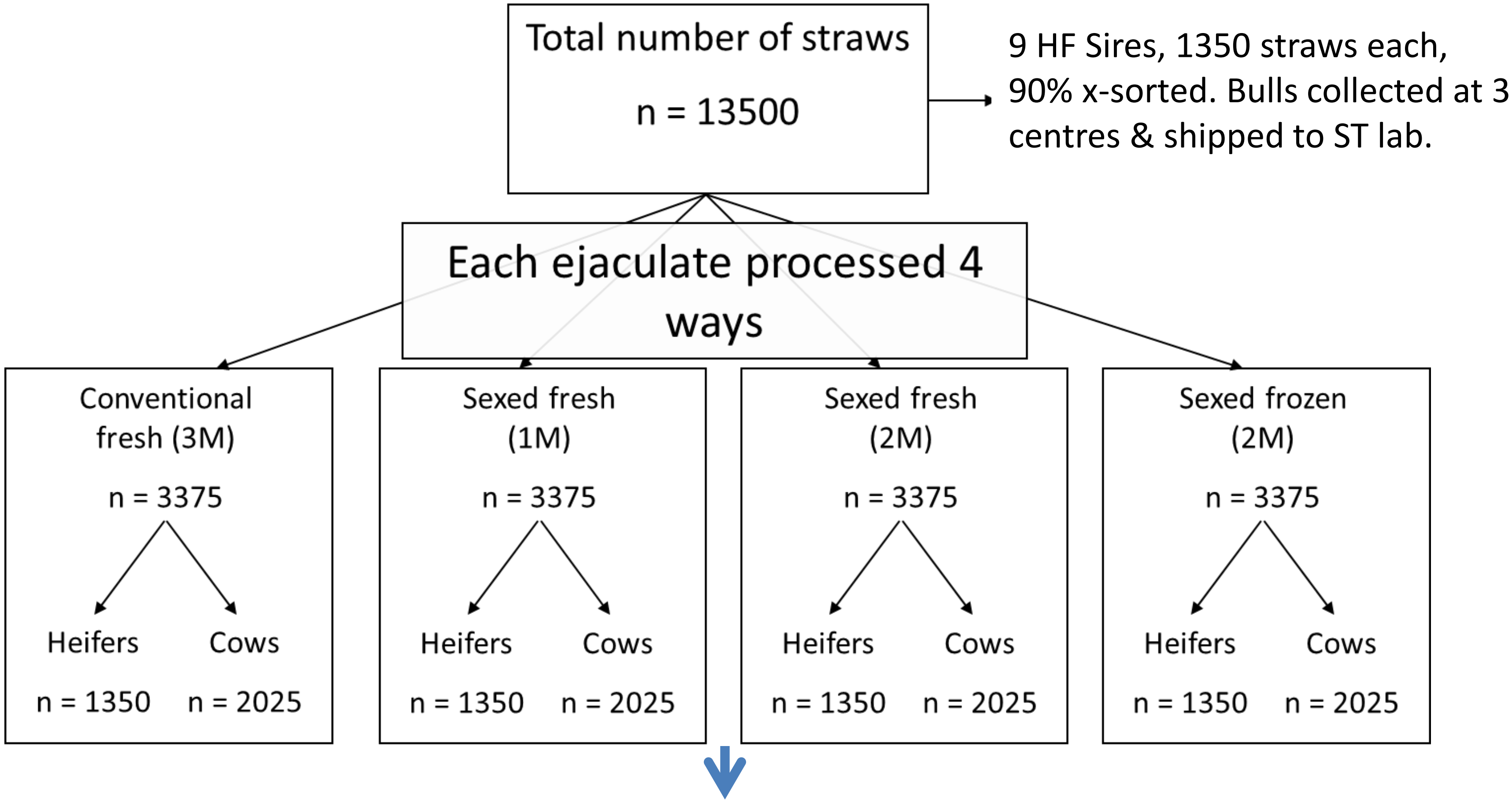
- Animal health will be the next biggest factor impacting farm profit
- Genetics has a role to play
- Need to establish a common platform for sharing and utilising health & disease data.
  - Genetics, surveillance, management….

Cost:Benefits of Sexed Semen for Irish dairy and beef industries.

Why the interest?

- To achieve a desire gender outcome.
  - Sexed female dairy, then beef AI.
- Additional value to industry.
  - Significant industry support -> FH2020.
- But reduced conception rates.
  - Heifers 50% -> 35% preg rate, cows – don't use!
- Recent developments in technology.
- "International" field trial in Ireland to establish potential cost:benefits.

Holstein Friesian - Study Design



100 technicians, 400 herds, 1st inseminations only = 14,700 females (109% of target).

Actual	1614	2536	1572	2177	1434	2288	1490	1924
% Target	120%	125%	116%	108%	106%	113%	110%	95%

Sexed Semen Research Partners

Effect of sexing on conception rate

Heifers (P = 0.02)		
Treatment	**CR1**	**% of Conventional**
Conventional 3m	0.53	100%
Sexed Fresh 2m	0.46	87%
Sexed Fresh 1m	0.39	75%
Sexed Frozen	**0.46**	**87%**

Cows (P < 0.001)		
Treatment	**CR1**	**% of Conventional**
Conventional 3m	0.49	100%
Sexed Frozen 2m	0.37	76%
Sexed Fresh 1m	0.32	64%
Sexed Frozen	**0.42**	**85%**

The Value Proposition – 100 cows.

Option	Profit	% Inc
Current; 13 week breeding, 6 weeks AI.	€48,964	
Option 1; Dairy heifers only	+€1,028	+2.1%
Option 2; Dairy heifers & cows, beef AI and beef NM	+€3,677	+7.5%
Option 3; Dairy heifers & cows, dairy heifer premium (€500).	+6,265	+12.8%
Option 4; Dairy heifers & cows, dairy heifer premium, lower cost & better fertility.	+€10,735	+21.9%

- Sexed semen -> more profit. Expect significant industry uptake.

Industry Cost:Benefit (100k insems)

Sites	Description	Benefit (€)	Sub-total (€)	Total (€)
On-Farm	Maximizing dairy heifers from cows and heifers	172,805	2,901,306	9,333,568
	Maximizing dairy heifers from heifers only	30,715		
	AI beef bull and NM beef bull	2,697,786		
Meat companies	Saved losses on dairy bulls	2,357,382	2,357,382	
Milk processor	Increased cows supplying milk	4,073,880	4,073,880	

- Not just farmers benefit. Need a model that reflects shared costs/benefit's across industry.

Sexed Semen Research Partners

Where to now?

- Excellent results from trial.
- Suckler trial underway.
- Move entire AI industry to sexed semen
  - Target 500k doses/yr in 5 years (80% market).
  - Extra ~€50m/annum for industry.
- Long term contractual commitment required to get access to technology.
- Currently working with industry stakeholders to make this happen.

IRISH CATTLE BREEDING FEDERATION

G€N€ IR€LAND Maternal breeding program

National Development Plan
Transforming Ireland

Objectives of G€N€ IR€LAND MBBP

1. Identify the top maternal bulls across all the breeds and subsequent progeny testing to identify the best bulls

2. Reward herds that consistently provide high quality data for genetic evaluations – Herd Data Quality Index (HDQI)

Herds signed up-to-date

- 200 herds
- Breakdown by breed of pedigree females in the program (n = 6320)

Breed	AA	AU	BB	SA	CH	HE	LM	PT	BA	SH	SI
Pedigree females	1174	177	71	394	978	516	1973	170	120	121	625

- Data collection visit
  - Weight, docility & functionality data
  - 120 herds visited to date
  - 5 scorers now allocated to visit these herds
- ICBF herds visits
  - Overview of program, benefits & how to record information online etc.
  - 90 herds visited to date (was 45 last time)
  - Carried out by ICBF staff

ICBF.com

Committee meetings to date

- Focus is on:
  - Identifying bulls for mating advice
    - Must have adequate semen available
    - Autumn 2013
  - Identifying bulls for progeny testing
    - Each breed has different criteria i.e. calving difficulty etc
    - Available for Spring 2014 G€N€ IR€LAND program
  - Promoting the program
    - Weekly piece in IFJ

Purchasing bulls

- Purchased 14 bulls recently
  - 4 Charolais
  - 2 Simmental
  - 2 Salers
  - 2 Parthenaise
  - 4 Limousin

- 1000 doses of semen collected
  - 500 doses for progeny test
  - 500 doses retained for elite mating's
    - GI herds have access to this semen

Purchasing criteria

- €5000 - €6000 is paid pending health testing
  - 50 doses of semen
- Bonus of €5000
  - Bull achieves 4.5 stars on replacement index
    - 70% reliability for maternal cow traits
    - 30 maternal weaning weights
- Selling bulls (options)
  - AI company have first option
    - Any difference in price will go to the breeder of the bull
  - Bull owner has second option
    - Must pay the original price paid
    - Bull is still eligible for the bonus
  - Bull is tendered to farmers (third option)
    - Reserve is put on the bull
  - Bull is slaughtered if no interest is express or reserve price is not met

Purchasing criteria & mating advice

- Bull are being health tested at present
  - Health testing protocol has being sent to each breeder
- Other breeds
  - Blonde d'Aquitaine, Angus & Belgian Blue.
    - Bull inspections start next week
  - Hereford, Aubrac & Shorthorn
    - Require another meeting
    - SH – established committee recently
- Mating suggestions
  - Available in next week
    - CH, LM, PT, SA & SI breeds
  - Currently underway:
    - All other breeds (different stages of development) – Spring 2014

G€N€ IR€LAND open day

Tully, Co. Kildare – 12th Oct (10.00am – 1.00pm)

Key features on display:

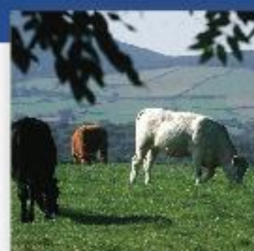
- Overview of the G€N€ IR€LAND Maternal program
- Profitability using €uro-Star Indexes
- G€N€ IR€LAND progeny test at Tully
  - 46 bulls - completed 90 day test
  - 54 Steers – currently on test (Started: 1st Aug)
  - 30 bulls – currently on test (Started: 28th Aug)
  - 87 bulls - due to commence test (15th Oct)

- Information Area:
  - HerdPlus & GROW services
  - G€N€ IR€LAND sign-up area
  - ICBF weight recording service
  - Industry stands (Herdbooks, AI companies)

ICBF.com

IRISH CATTLE BREEDING FEDERATION

Meat Eating Quality.



Andrew Cromie

NDP
National Development Plan
Transforming Ireland