



IRISH CATTLE BREEDING FEDERATION

ICBF Dairy & Beef Genetic Evaluations Meetings.

Wednesday 21st July 2010.
Maldron Hotel, Portlaoise.



Agenda 3. Beef Traits & Beef Breeding Programs.

- **Agenda 3 (3.00 – 5.30).**
- 3.00 Lessons from Grange research & BETTER farms programs – Pearce Kelly
- 3.20 Linking Tully & beef industry data - John Crowley.
- 3.40 Beef linear traits – Contemporary groups – Ross.
- 4.10 Maternal weaning weight – Ross.
- 4.30 Developments in Euro-Star evaluations – Tim Byrne.
- 4.50 Beef genomics research – Donagh.
- 5:00 Beef Specialist – Brian W
- 5.15 Close of meeting.

Teagasc Focus on Improving Suckler Herd Fertility Targets to Increase Profit



***Pearse Kelly, Teagasc Cattle
Specialist***

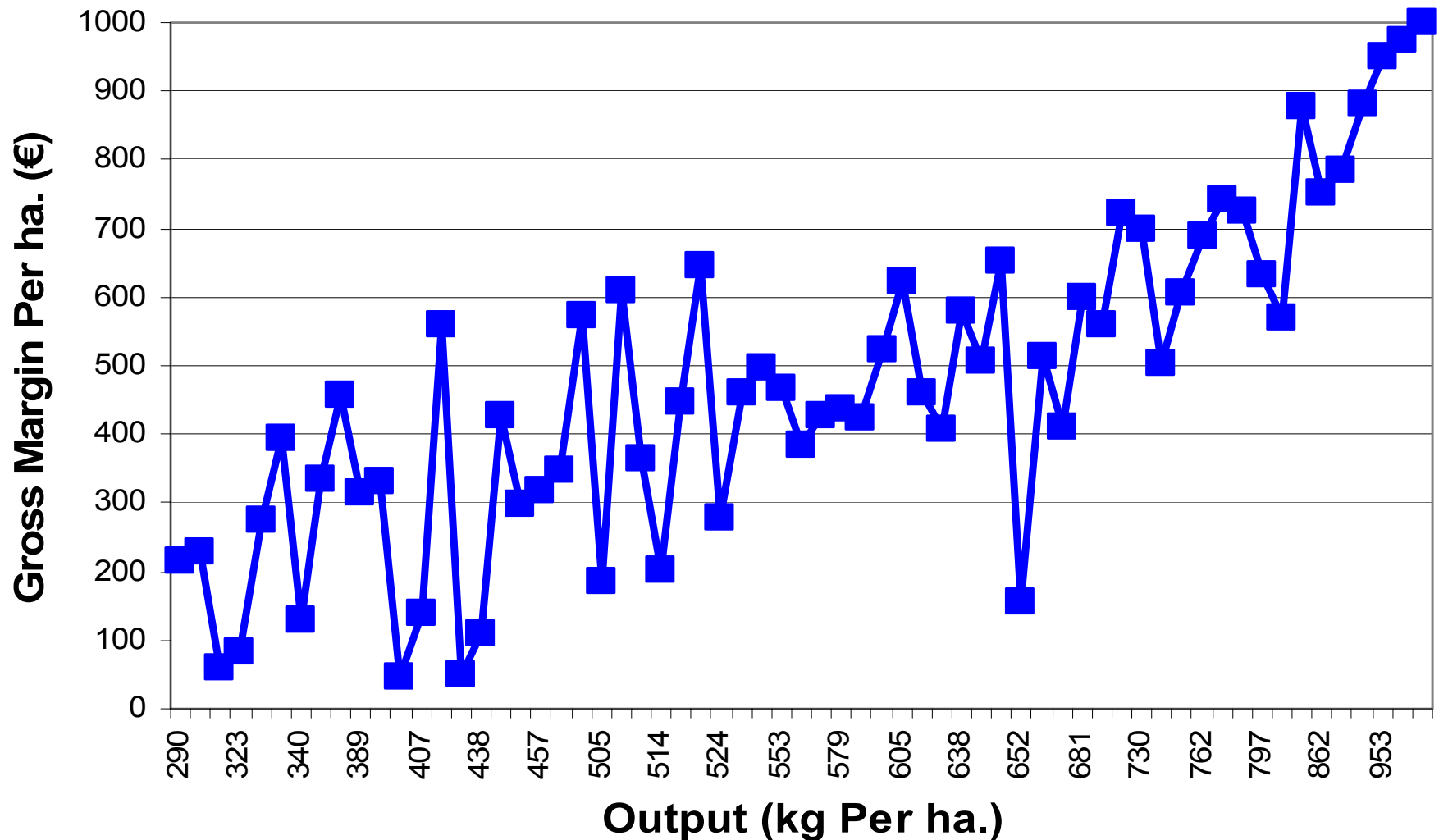


Advisory
For better farming

Outline

- What the profit monitors are telling us:
- relationship between breeding & profit
- Teagasc/IFJ BETTER farm programme:
- focus on breeding
- Grange 'Derrypatrick Herd' :
- breeding efficiency targets

Output (kg) vs. Gross Margin (€) per ha.



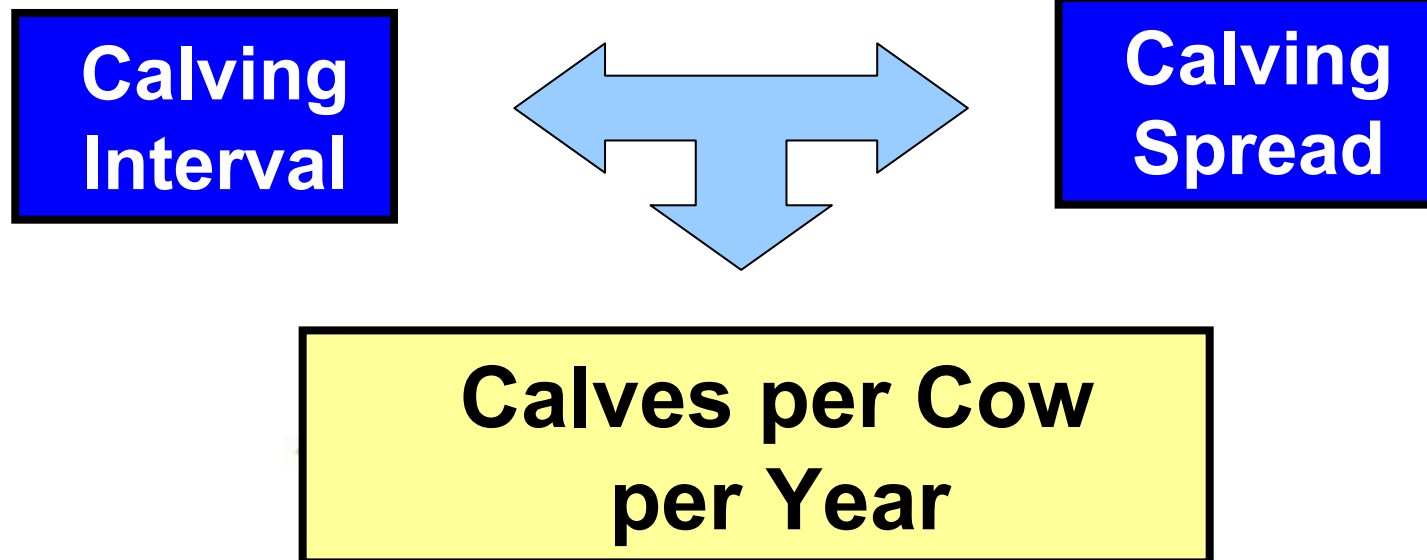
n = 63 (2008 Suckler ePM)

Output per ha. (kg) on Suckler Farms

(1) Stocking Rate

(2) Output per Lu.

- Liveweight gain per Lu farmed
- Suckler cow fertility



Calving Interval vs. Kg Produced

	Calving Interval	Kg LW / LU
Bottom 15%	411 days	265 kg
Top 15%	357 days	316 kg

- n = 63 Suckler Farms
- Ranked by Calving Interval (July '07 to June '08)
- Kg LW / LU from 2008 ePM

Calving Interval vs. Calves / Cow / Yr.

	Calving Interval	Calves/Cow/Yr.
Bottom 15%	411 days	0.75
Top 15%	357 days	0.98

- n = 63 Suckler Farms
- Ranked by Calving Interval (July '07 to June '08)

Calving Spread

Calving in a 12 month Period

4 Months or less	16%
5 to 8 Months	62%
9 to 12 Months	22%

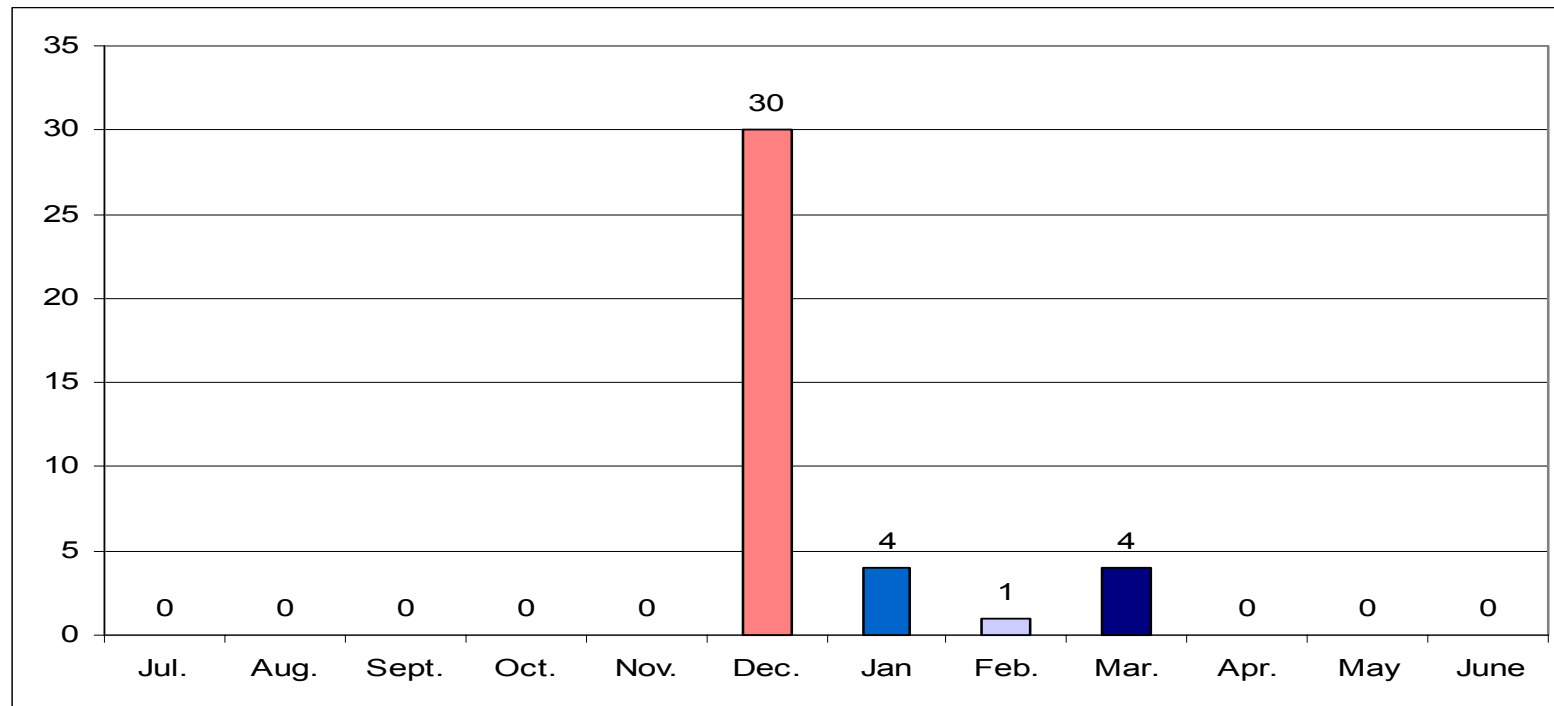
n = 63 Suckler Farms, Calving July '07 to June '08

Calving Spread vs. Output

	Calving Spread	Kg LW / LU	Gross Output/ LU (€)
Top 16%	4 Months or Less	360 Kg	€619
Other 84%	5 to 12 Months	299 Kg	€539
Difference	-	61 Kg	€80

- n = 63 Suckler Farms
- Kg LW / LU & Gross Output per LU from 2008 ePM

Discussion Group Member 1



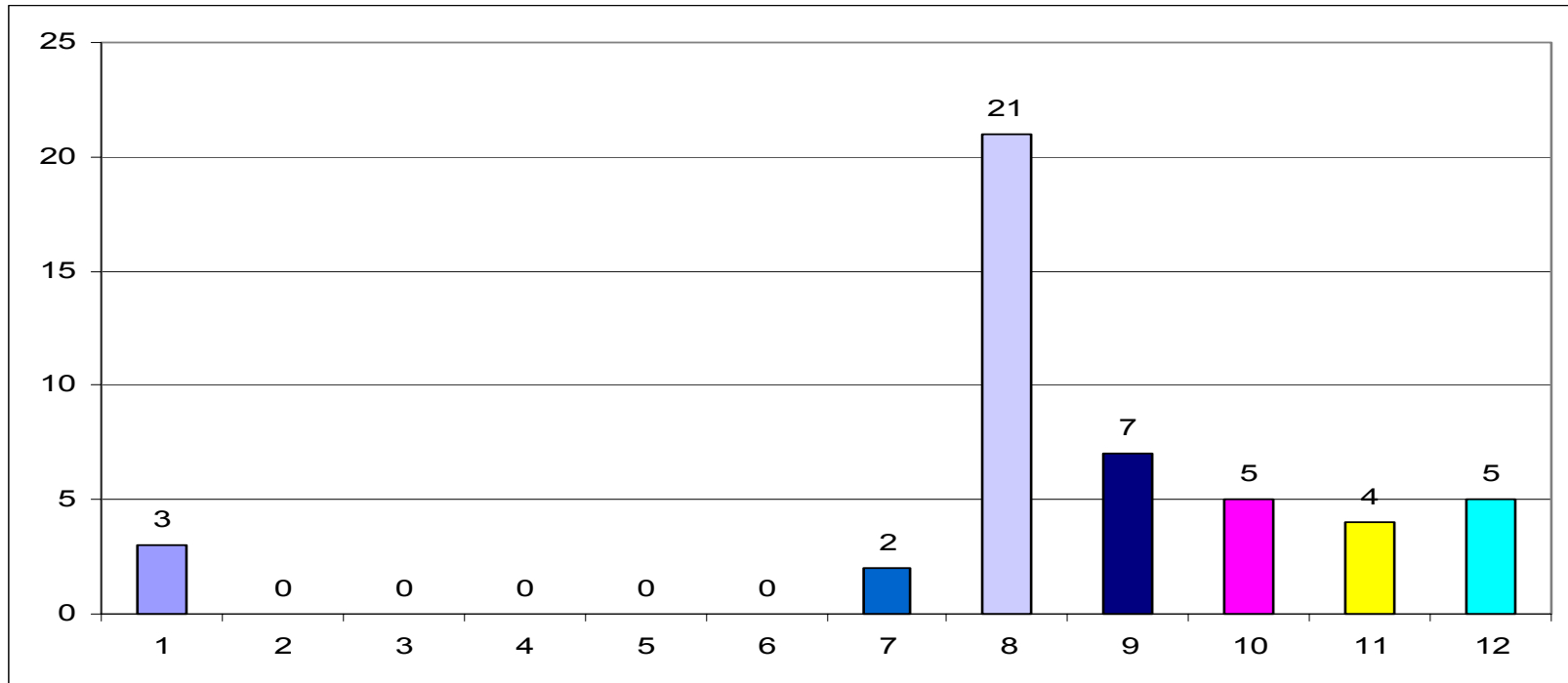
Calving Interval = 366 days

Calves/ Cow / Year = 1.00

Output / LU (kg) = 362 kg

Gross Output / LU = €583

Discussion Group Member 2



Calving Interval = 390 days
Calves/ Cow / Year = 0.75

Output / LU (kg) = 207 kg - 155 kg
Gross Output / LU = €351 - €232

Fertility Targets for Suckler Herds

- One calving season
- 365 days average calving interval
- 60% of cows calved in first month
- 80% calved in first two months
- All calved within 12 weeks
- 0.95 Calves per cow per year

Teagasc/IFJ BETTER Farms



- Programme established in 2009
- 15 farms through-out the country and 2 agricultural colleges
- 3 year farm plans being implemented
- Output, grassland management and *breeding and fertility* -3 key areas for improvement
- *Breeding/fertility* has huge effect on management of other areas in plan



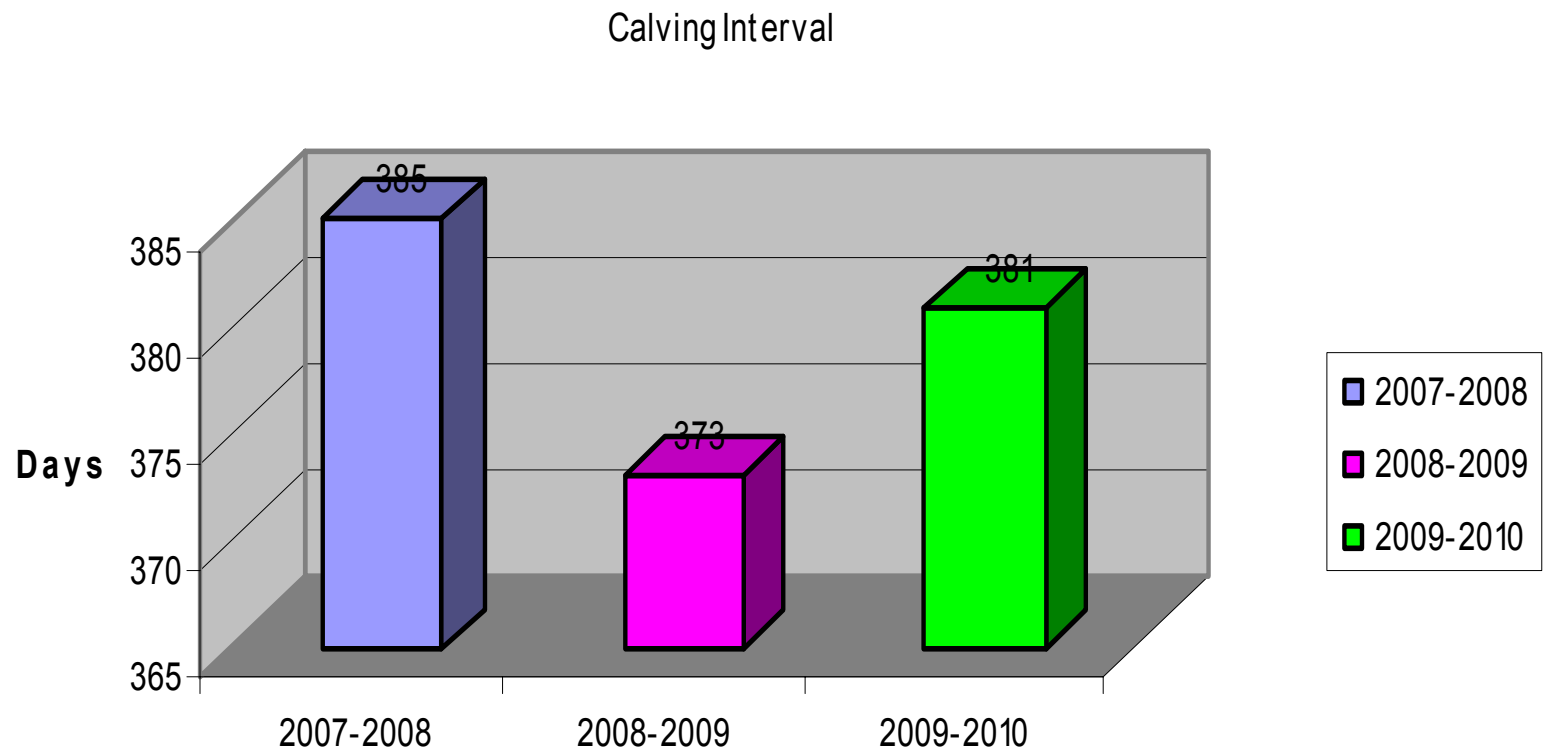
Breeding



- **Big emphasis in 2009 on;**
 - Reducing Calving Interval (385 v 373 days)
 - Calves/cow/year (0.87 v 0.92)
 - Culling of Inferior Cows
 - Tightening of Calving Spread
 - Defining the Replacement policy
 - Health Screening/Mortality (5.6% v 4.6%)



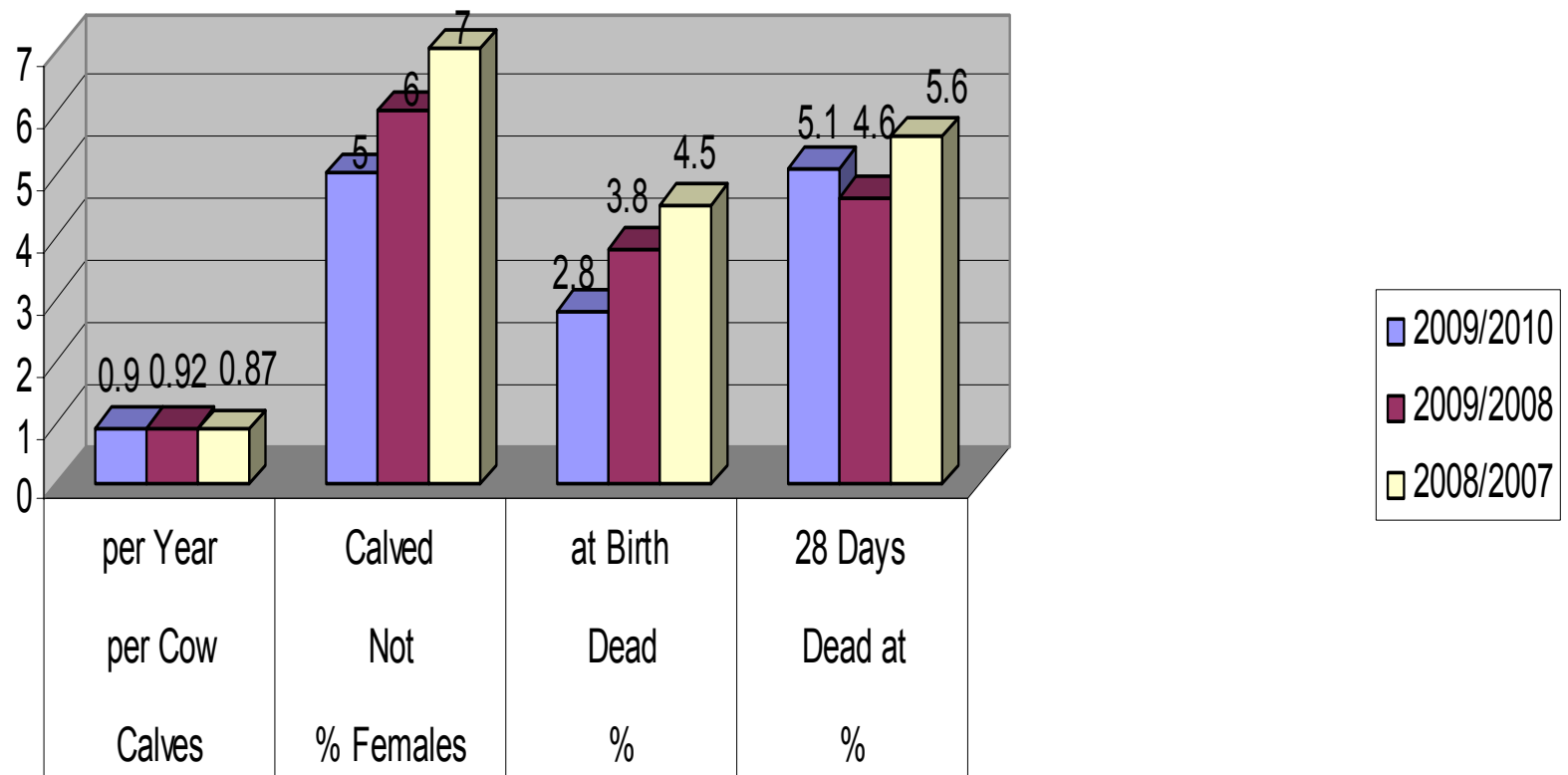
Calving Interval



Breeding Indicators



Breeding Indicators



GRANGE 'Derrypatrick' Herd

Breeding Season 2010

- 11 week calving period with mean calving date of March 12th to meet magic day ~April 1st.
- The 2010 breeding season began on Monday April 26th
- All cows were tail painted and had tails trimmed prior to breeding
Vasectomised (teaser) bulls were added to the herd (removed June 16th)
- Chin balls (paint) were attached to each bull as a heat detection aid in conjunction with tail paint
- 88% of the herd were artificially inseminated (AI)
- AI was used up to 16th June, followed by BB stock bulls to mop up
- It was planned to remove the stock bulls by ~July 15th.

GRANGE 'Derrypatrick' Herd

- 50% of LS, CL and CS → maternal sires (replacements)
- Remaining ~50% + all of LF → terminal sires (BB)
- Maternal Bulls
 - Selected first for reliability (80%+)
 - Next for carcass traits
- Bulls Used 2010
 - LMxSI and CHxSI = KFY and HCJ
 - LMxCH = ORO
 - 100% of LMxFR and remaining 50% of other genotypes = AVD (BB)

Tully bulls; Their feed efficiency and performance of their relatives in commercial herds



Why performance test?

- Identify genetically superior bulls
- Obtain EBVs
- Allows breed comparisons
- Accurately calculate feed efficiency

Performance test data

- Irish bull performance testing station, Tully, Co. Kildare
- Liveweight (LWT) and feed intake (FI)
- 2,605 bulls between 1983 and 2007

Feed efficiency traits

Residual feed intake (RFI)

The difference between expected and actual feed intake

Residual Gain (RG)

The difference between expected and actual daily gain

Feed conversion ratio (FCR)

ADG : Average FI

Breed comparisons

Rank	ADG	FCR	RFI	RG
1.	CH (1.74)	LM (6.47)	LM (- 0.40)	CH (0.07)
2.	SI (1.70)	CH (6.57)	CH (- 0.35)	LM (0.004)
3.	HE (1.69)	HE (6.86)	SI (0.54)	HE (-0.02)
4.	AA (1.60)	SI (7.22)	HE (0.90)	SI (-0.05)
5.	LI (1.56)	AA (7.44)	AA (1.48)	AA (-0.14)

Number of records: AA=78; CH=533; HE=117; LM=853; SI=548

Heritability estimates

	Across Breed		
	μ	SD	h^2 (se)
FCR	6.75	0.05	0.26 (0.05)
RFI (kg/day)	0.00	0.11	0.46 (0.06)
RG (kg/day)	0.00	0.01	0.28 (0.06)

- Significant variance and heritability
- Selection for these traits would be effective

How does performance stack up on the ground

- Commercial data (progeny and relatives of the Tully bulls)
 - Animal value
 - Carcass
 - Fertility and calving performance
 - Cow size

Genetic correlations – carcass traits

	ADG ▲	FCR ▼	RFI ▼	RG ▲
Carcass conform.	0.15	-0.33	-0.19	0.28
Carcass fat	-0.01	0.02	0.32	-0.17
Carcass weight	0.22	-0.29	-0.27	0.25

▲ = Indicates where a (more) positive value for this trait is desirable
(i.e., greater RG are more efficient)

▼ = Indicates where a lesser value for this trait is desirable

Genetic correlations – cow fertility

	ADG▲	FCR▼	RFI ▼	RG▲
Age at first calving	0.21	-0.55	-0.29	0.36
Calving interval	0.08	0.07	0.01	-0.01
Calving to first service	-0.22	0.21	-0.03	-0.15

▲ = Indicates where a (more) positive value for this trait is desirable
(i.e., greater RG are more efficient)

▼ = Indicates where a lesser value for this trait is desirable

Genetic correlations – animal price and cow LWT

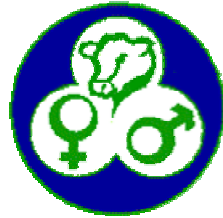
	ADG ▲	FCR ▼	RFI ▼	RG ▲
Weanling price	-0.07	0.25	-0.01	-0.06
Post-weanling price	0.45	-0.49	-0.45	0.56
Mature cow weight	0.63	-0.62	-0.23	0.67

▲ = Indicates where a (more) positive value for this trait is desirable
(i.e., greater RG are more efficient)

▼ = Indicates where a lesser value for this trait is desirable

Conclusion

- Selection for increased ADG in Tully animals will increase animal value but also increases mature cow weight
- Selection for improved feed efficiency will:
 - Result in higher animal value and larger, leaner carcasses with better conformation
 - No antagonistic effect on fertility in cows but possibly a delay in the onset of puberty
- Current breeding strategies indirectly select for improved feed efficiency



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Linear Type & Contemporary Groups.

Ross Evans

Contemporary group size

- **Changed as of 1st January 2010: group of 5**
 - **Old BLUP system: small contemporary groups merged into “super herds”**
- **New system: keeps integrity of individual herd in the system**
- **Correction for hys, sex, age, parity of dam, scorer**
 - **Each is a fixed effect to be adjusted**
 - **Need enough animals in each hys to adjust for all the variables**

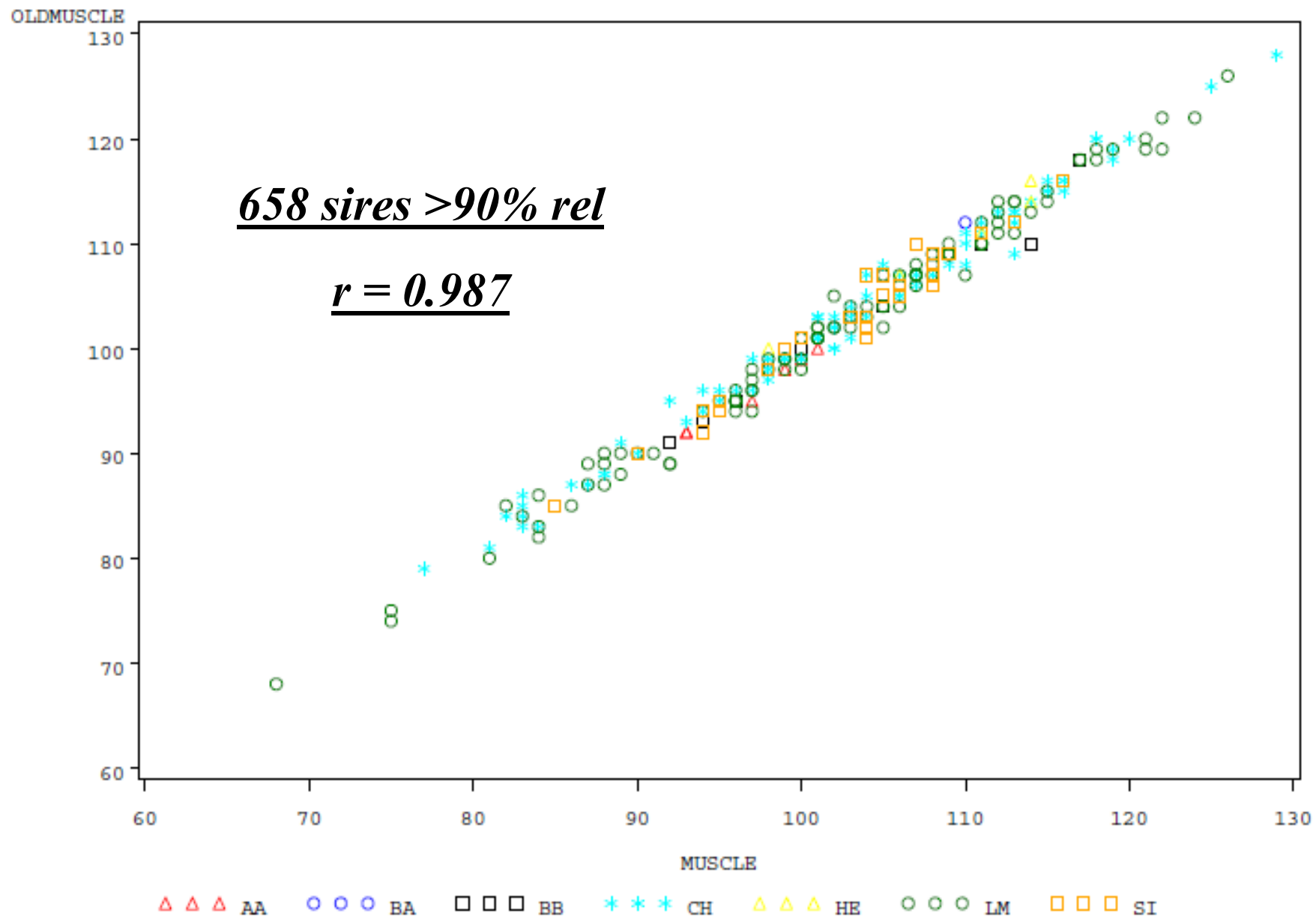
Contemporary group size

- Old data currently under same restrictions as new data as regards group of 5
- Many calls regarding inclusion of the old data prior to 2010 in the evaluation
- Less stringent age restriction i.e. 150-600 days accepted prior to 1/1/2010
- Smaller Breeders felt application of new rules to the old data penalised animals in smaller herds more in terms of loss rate
- Look at ways to include smaller herd historic data³³

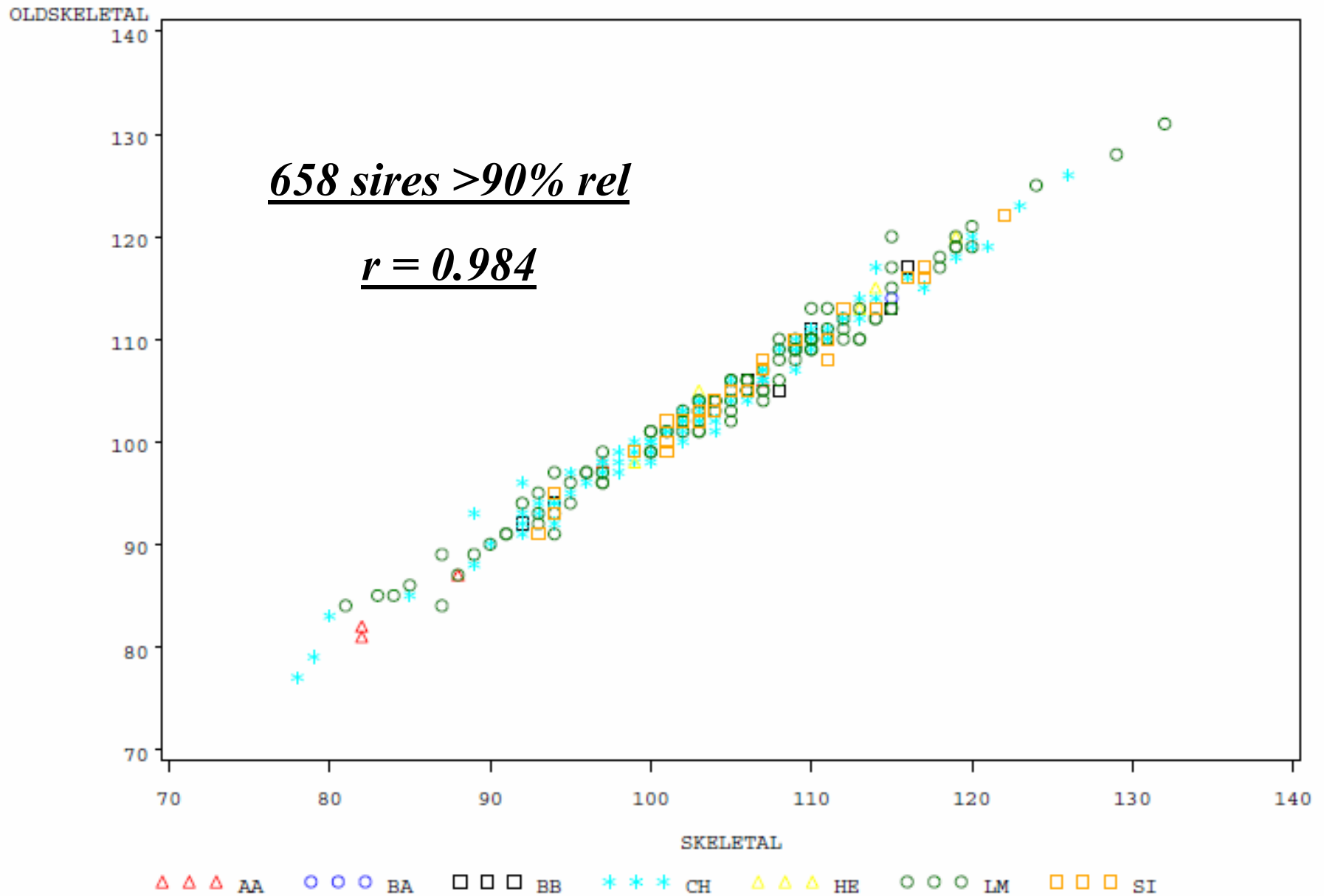
Test runs

- **Investigate the effect of incorporating the old data
Groups of 3, groups of 1**
- **Impact on AI sires with 90% reliability on current
new system (group of 5)**

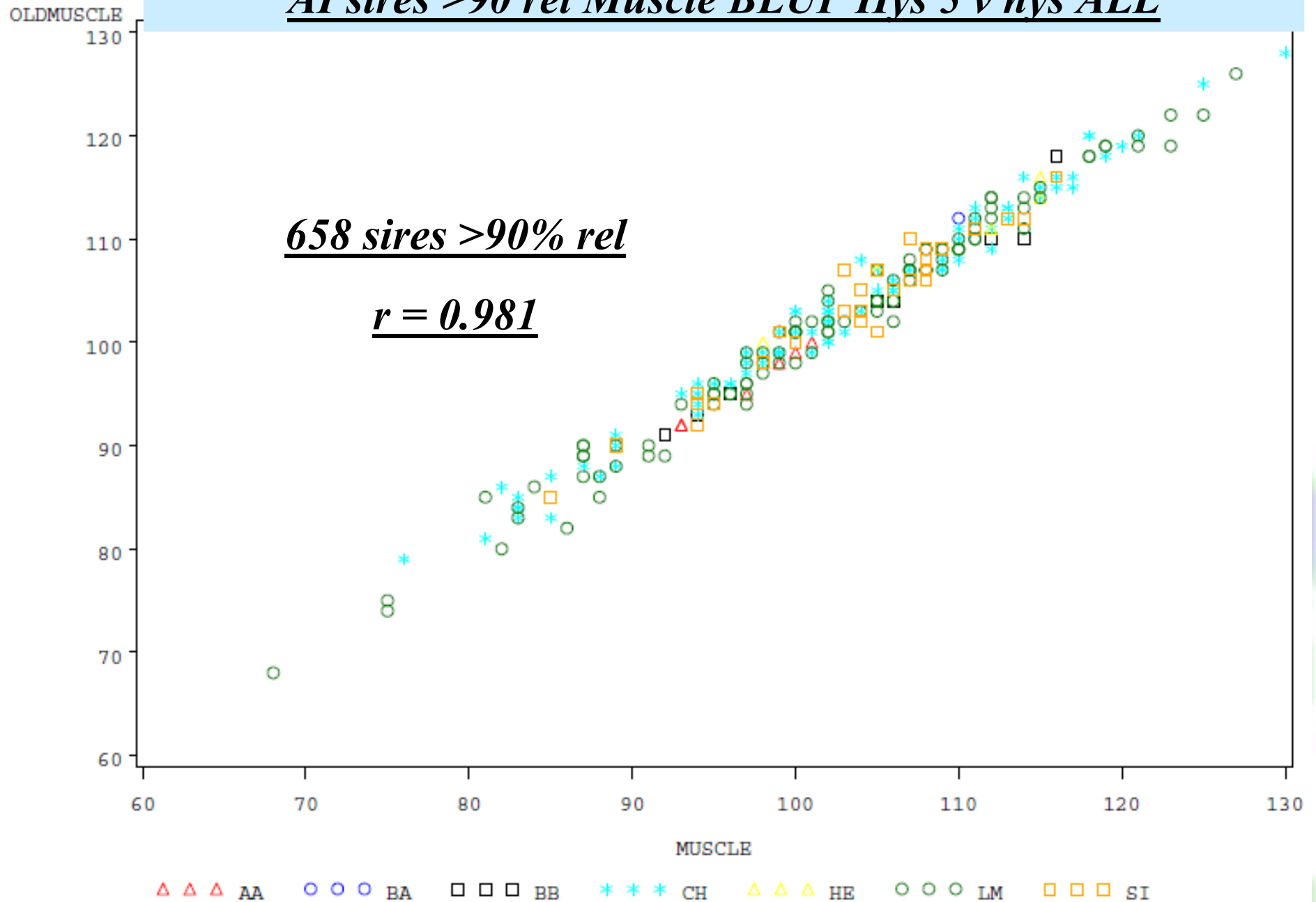
AI sires >90 rel Muscle BLUP Hys 5 v hys 3



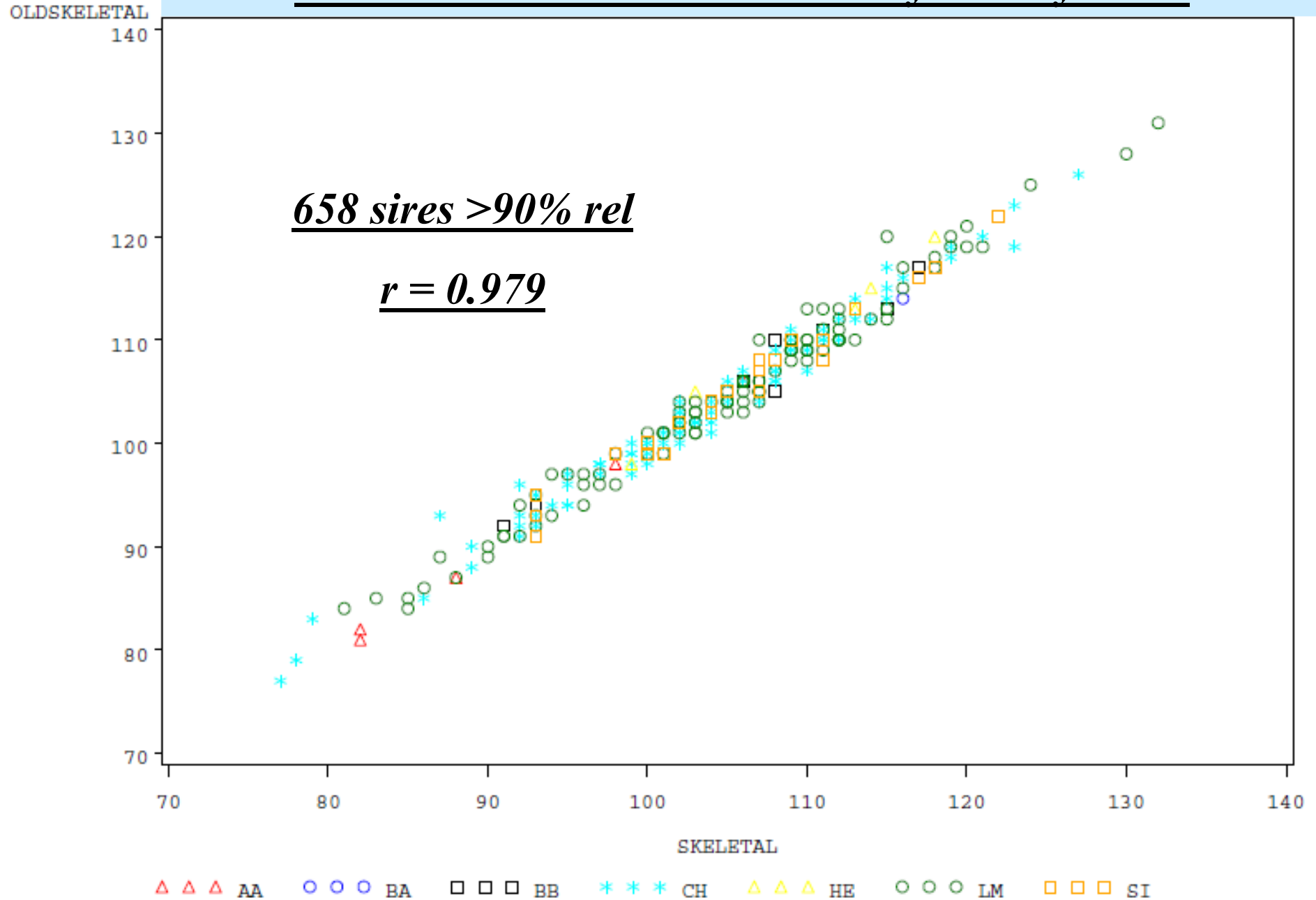
AI sires >90 rel Skeletal BLUP Hys 5 v hys 3



AI sires >90 rel Muscle BLUP Hys 5 v hys ALL



AI sires >90 rel Skeletal BLUP Hys 5 v Hys ALL

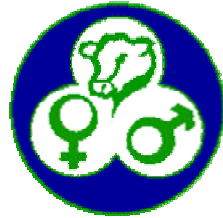


French group size rules

- **Contact with French evaluation centre**
 - **Decision for 2010 evaluation to split up contemp groups with males and females into unisex groups**
 - **Dropped sex from model.**
 - **As a result min group size was dropped from 5 to 2**
 - **If group of 3 scored with one male and 2 females then male not included in evaluation and v versa**
 - **French evaluation adjusts for 4 fixed effects**
 - **Contemporary group, parity of dam, season and individual situation**
- Contemporary group containing sex, scorer and herdyear**

Conclusions

- **Small levels of re-ranking for sires which have high reliability based on existing information from contemporary groups of 5 or more**
- **Will have large impact on individual cows and young sires which gain information from the smaller contemporary groups either own performance or progeny performance.**
- **Concern – Accuracy of evaluations will be compromised.**



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Maternal Weaning Weight

Ross Evans

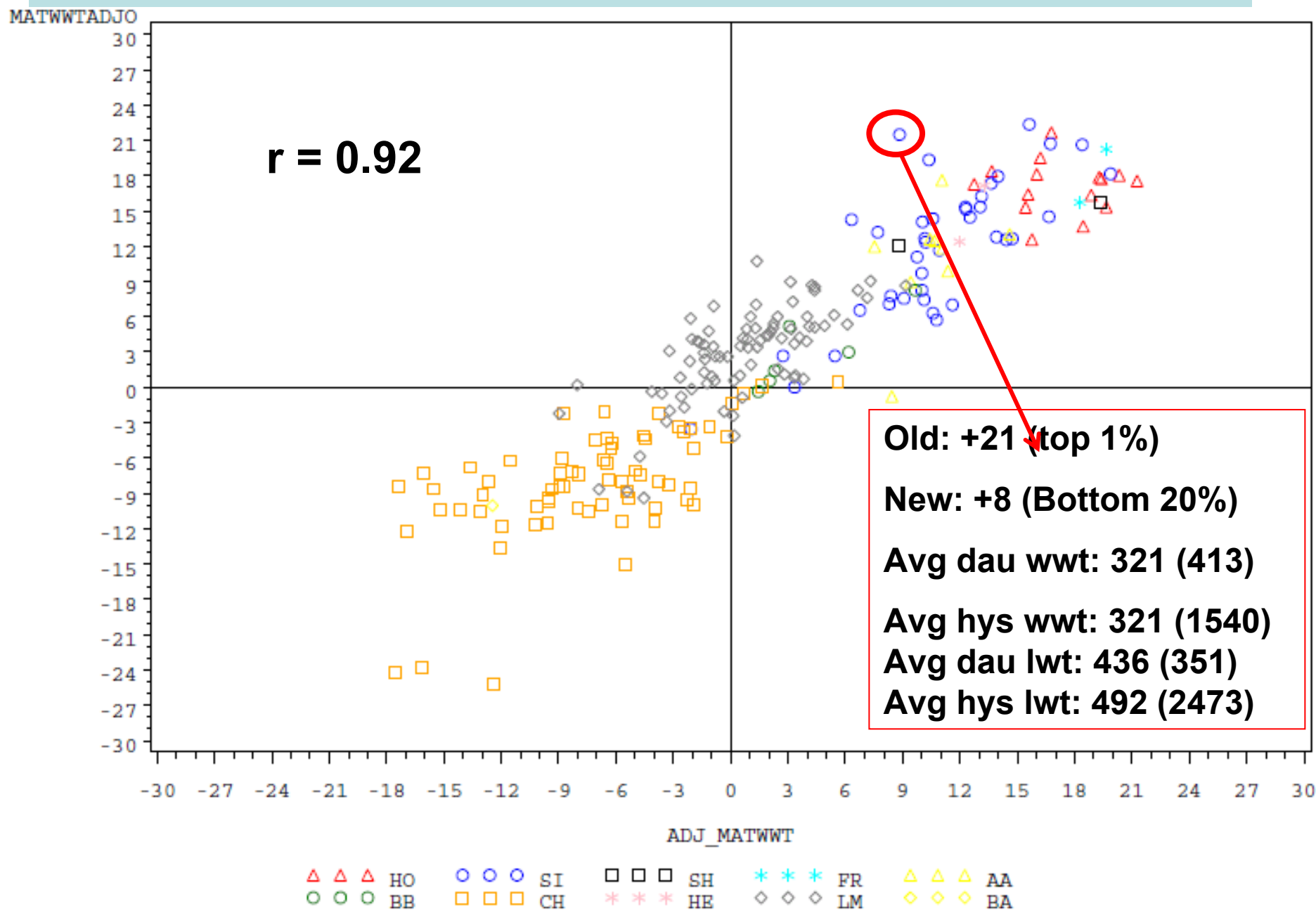
Maternal weaning weight

- **Currently estimated as part of main beef performance evaluation**
- **Problem cases identified: index not reflecting on farm performance**
- **Major review of evaluation**
 - **Re-estimation of genetic parameters (was 6% now 9% heritable)**
 - **Omitting of dairy herd weaning weight data**

Maternal weaning weight

- **Major review of evaluation**
 - **Investigating maternal component to liveweight (300-600 days) to use as an extra predictor trait: heritability of 4%, genetic correlation of 0.77 with maternal weaning weight, lots of data, particularly pedigree data**
 - **Dairy herd milk yield as a predictor to correct more accurately for dairy genes in suckler cows with some dairy background (10-15%) correlation of 0.67**
 - **Will be a separate evaluation to the beef performance evaluation due to data edits**

Old versus new proofs for sires with reliability of 70% on old



Maternal weaning weight

- **Summary changes to new evaluation**
 - **Dairy herd weaning weight and live-weight data omitted (for both dairy and beef sires)**
 - **New genetic parameters for maternal weaning weight (9% heritability)**
 - **Permanent environmental effect of dam incorporated**
 - **Maternal liveweight (300-600 days) as an extra predictor trait: heritability of 4%, genetic correlation of 0.77**

Maternal weaning weight

- **Summary changes to new evaluation**
 - **Dairy herd milk yield as a predictor for cows with dairy genes: heritability of 25%: correlation of 0.67**
 - **Will be a separate evaluation to the beef performance evaluation due to data edits**
 - **Circulate proofs next week for feedback**

Update on breeding objectives

Tim Byrne & Paul Crossan
Abacus Bio NZ, Teagasc.

Outline

- Key input changes
 - Concentrate costs
 - Cost of replacement
- Traits affected and how
- Other issues addressed
- What next

Key input changes

- Concentrate costs €300 now €250
- Cost of replacement for cull cow
 - €374 now €345.50
 - Reflect removal of cost associated with expected longer calving interval for replacement in subsequent season

Key input changes

- Cost of replacement if cow dies
 - €1065 now €1186
- Cost of replacement if cow barren
 - €317 now €377
- Reflect buy in-calf heifer cost rather than opportunity cost of slaughter heifer that has to be kept

Calving difficulty

- Increase in likelihood of cow death with caesarean
- Increase in veterinary cost for veterinary assisted calving
- EV -€2.45 now -€2.95

Gestation length

- Increase gestation length increases likelihood of being barren
- Cost of replacement if cow barren
 - €317 now €377
- Increase gestation length increases feed costs of calf
 - €300 now €250
- EV -€2.36 now -€2.12

Survival

- Cost of replacement for cull cow
 - €374 now €345.50
- EV -€3.02 now -€2.95

Weaning weight

- Reduction in concentrate feed costs
- Both maternal and direct weaning weight affected
- EV €1.80 now €1.50

Carcase conformation & fat

- Analysis done to check if current cut-based system reflects new QPS
- Current EVs (Petits data):
 - CC €14.38 CF -€8.32
- New QPS system
 - CC €17.13 CF -€3.44
- New cut data from Teagasc
 - CC €23.18 CF -€11.83

Carcase conformation & fat

- Combination of cut data (Petits and Teagasc)
 - CC €18.93 CF -€10.08
- Close to EVs for CC as new QPS
- Still disparity between cuts method and QPS for fat
- Basing EVs on cut data future proofs the index for better grading systems

Issues addressed

- Potential dry matter intake EV changes
- Green House Gas (GHG) emissions from various finishing systems

Dry matter intake

- Looked at implications of higher proportions of animals in earlier finishing system
- No effect on EV as higher feed costs accounted for by:
 - Higher efficiency of growth
 - Lower overall intake

GHG emissions

- Looked at emissions from various finishing systems
- Faster finishing systems had less GHG emissions per head and per kg product
- In line with Teagasc work
- Future trait incorporation

What next

- Hold on changes to economic values pending completion of work on maternal traits.
- Teagasc working to develop whole farm models to more accurately calculate costs of maternal traits (calving interval and gestation length) across years

What next

- A review of index structure to reflect increasing importance of maternal traits
- Peter Amer (AbacusBio Ltd) at ICBF in September to discuss options
- Report back to next industry meeting

Beef genomics for 2011

Donagh Berry¹, Andrew Cromie², Dawn Howard³,
Michael Mullen³, Sinead Waters³, Niall Kilrane²,
& Martin Burke²

¹ *Teagasc, Moorepark*

² *Irish Cattle Breeding Federation*

³ *Teagasc, Athenry*

donagh.berry@teagasc.ie

Present approach



$1/2$

$1/2$



30% reliability
 $\pm \text{€}71$ SBV



Present approach



$1/2$

$1/2$



60% reliability
 $\pm \text{€}53$ SBV



New approach

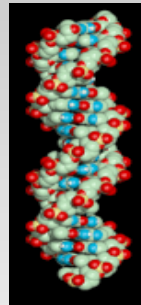


$1/2$

$1/2$



30% reliability
 $\pm \text{€}71$ SBV



54% reliability
 $\pm \text{€}57$ SBV

New approach

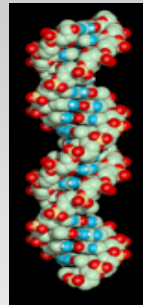


$1/2$

$1/2$



30% reliability
 $\pm \text{€}71 \text{ SBV}$



54% reliability
 $\pm \text{€}57 \text{ SBV}$



New approach

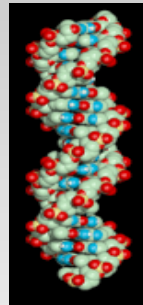


1/2

1/2



30% reliability
 $\pm \text{€}71 \text{ SBV}$



99% reliability
 $\pm \text{€}8 \text{ SBV}$

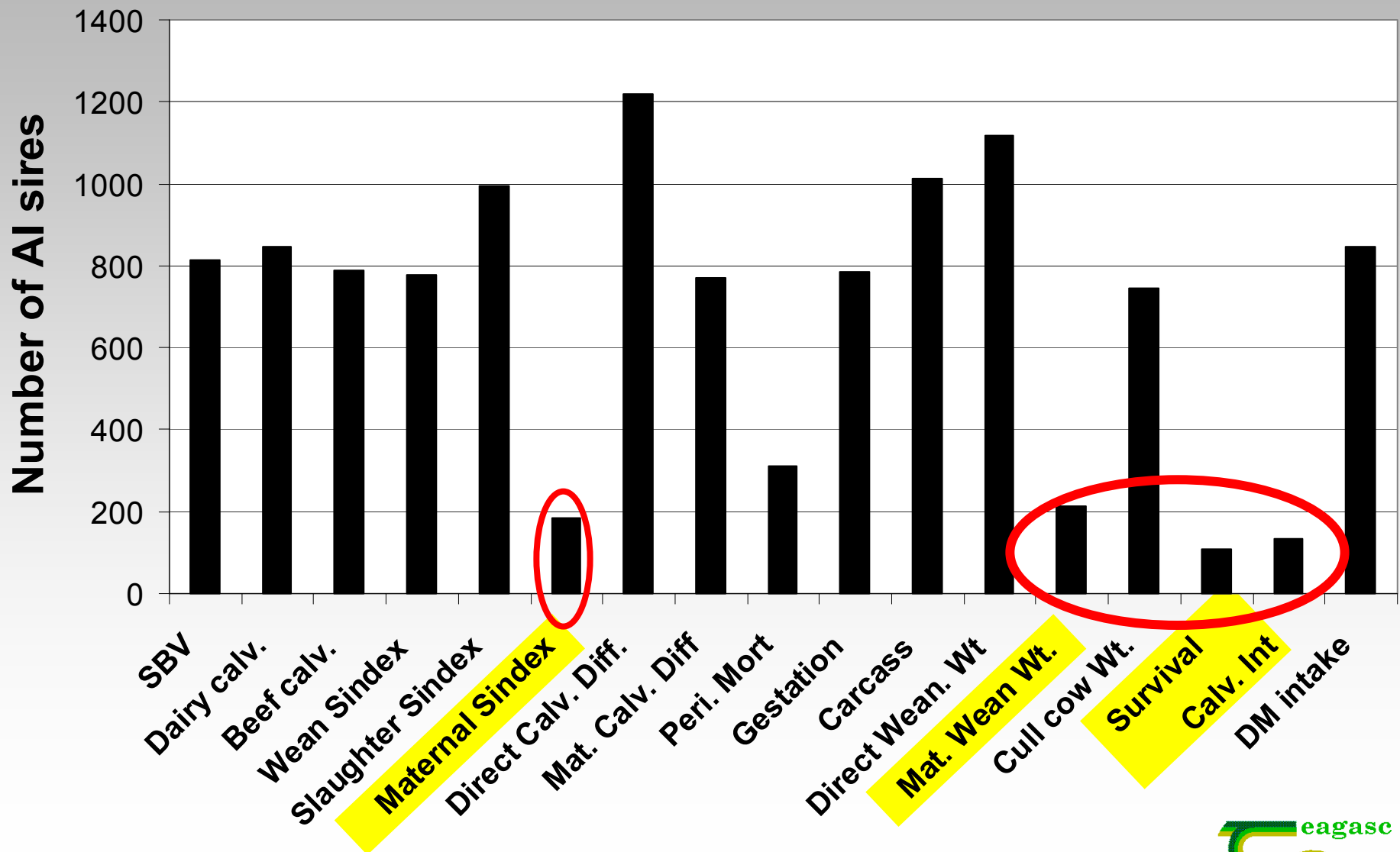


Genomic selection

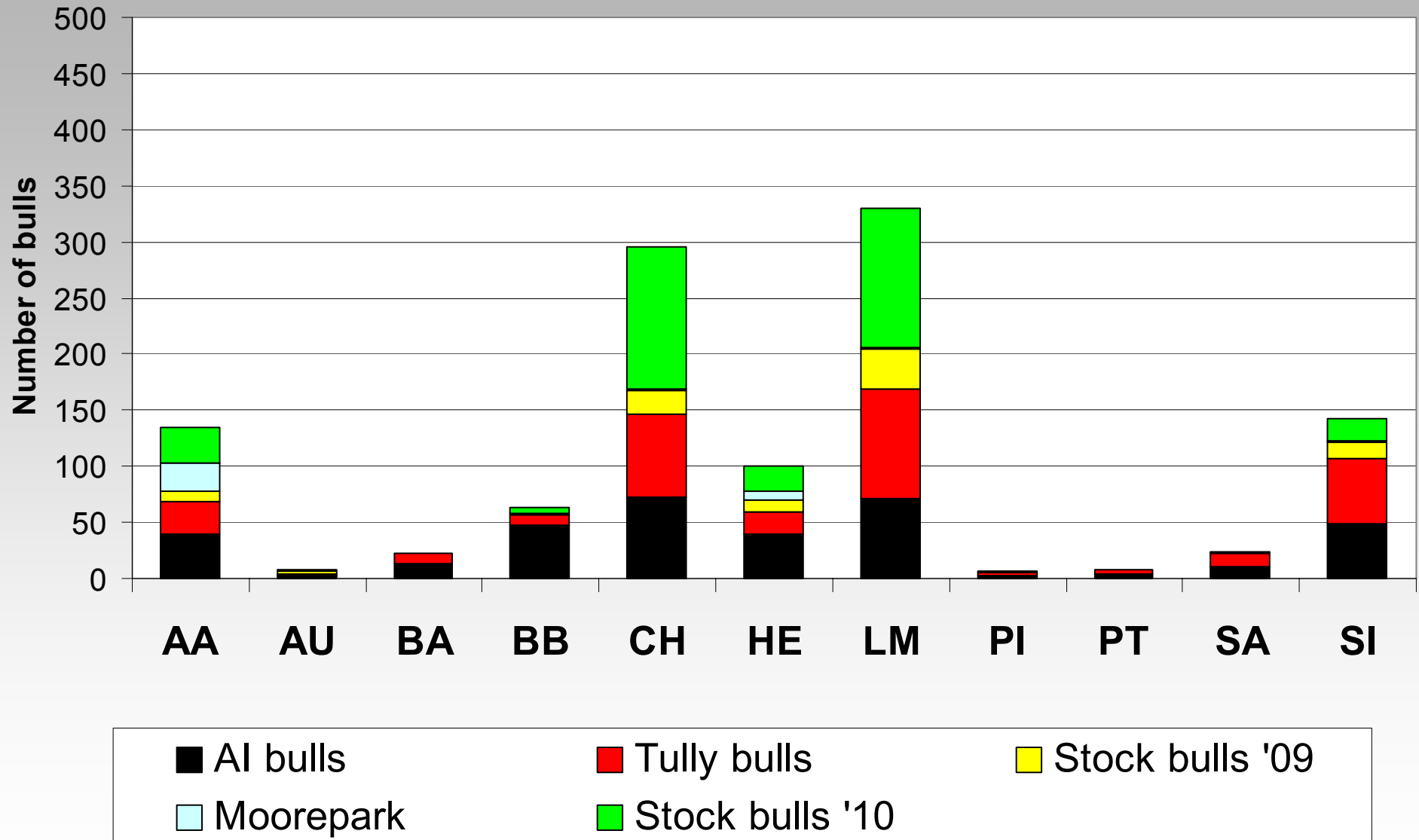
1. Determine the best *DNA signature* for the production system under investigation
 - Require the DNA signatures and accurate estimates of genetic merit for many thousands of animals
2. Take a hair/blood/tissue sample a young animal
3. Send off to a laboratory to determine its DNA signature
4. Compare the DNA signature of the animal to the *best* DNA signature for Ireland

The dilemma –

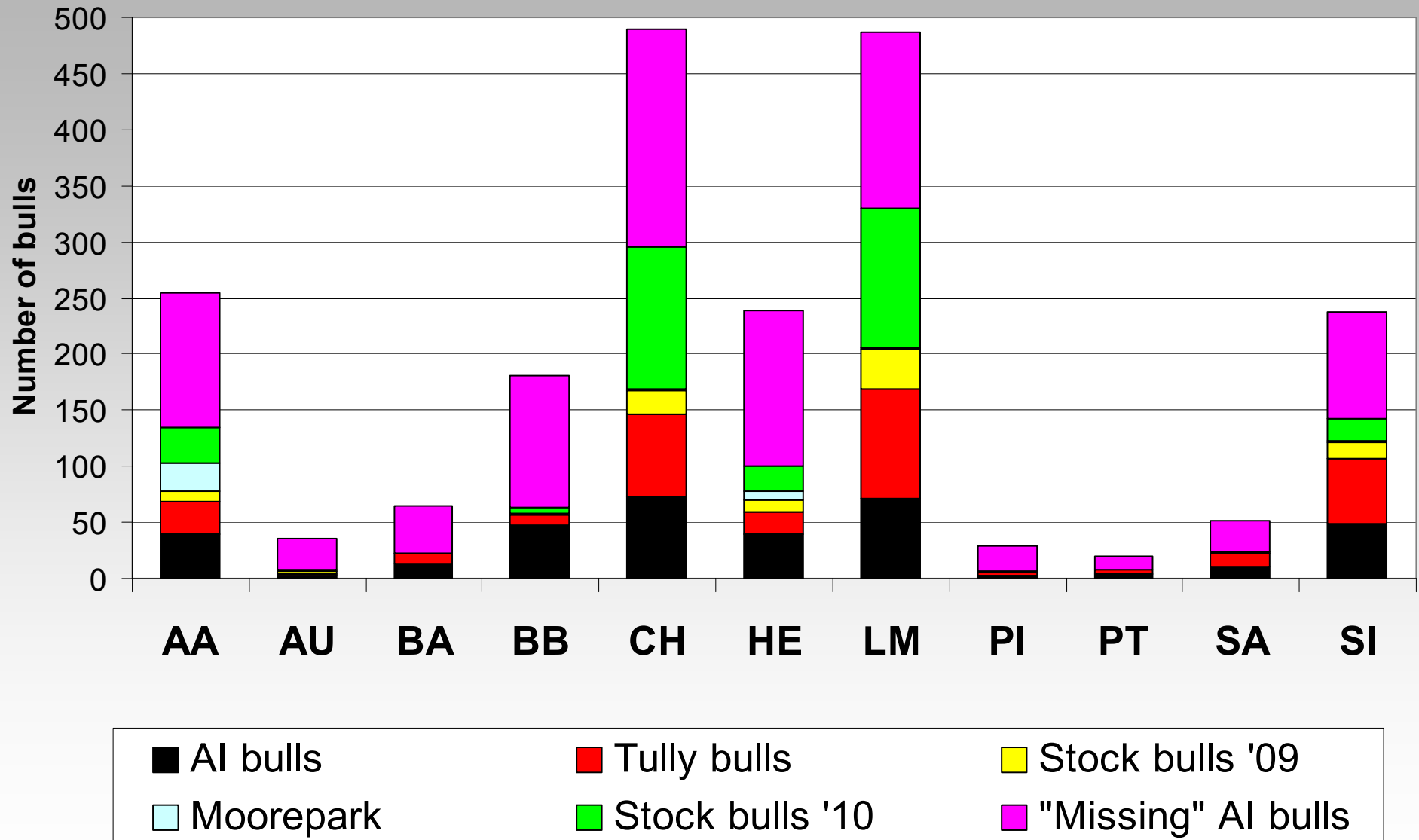
Number of AI sires >50% reliability



Where we stand



Where we stand



Where we stand

BREED	AI bulls	Tully bulls	Stock bulls '09	Moorepark	Stock bulls '10	TOTAL	Missing AI bulls	Potential
AA	40	29	9	25	31	134	121	255
AU	2	2	3		1	8	28	36
BA	13	9			1	23	42	65
BB	48	9	1		5	63	118	181
CH	73	73	22	1	126	295	194	489
HE	39	21	10	8	22	100	139	239
LM	71	98	36	1	124	330	157	487
PI	2	3	1			6	23	29
PT	4	4				8	12	20
SA	10	12			2	24	27	51
SI	49	58	15	1	19	142	96	238
TOTAL	351	318	97	36	331	1133	957	2090

Holsteins: Calving performance (n=1,424) and carcass traits (n=1,023)





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Genomic Selection - Beef

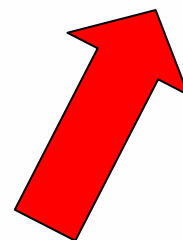
In order to benefit from the increased reliability of proofs that can be gained from using DNA profiles of animals we first need a large reference population of bulls with reliable genetic indexes. In order to increase this reference population we are looking for semen from these AI bulls which will then be genotyped. If you have any semen for these bulls that you would be willing to put forward for the purpose of beef genomics research please contact ICBF at aeu@icbf.com.

Genomic Selection

- [Beef](#)
- [Dairy](#)

Beef Bulls Wanted

Download Bull List: [excel](#)



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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
- 70% (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 on target to have genomic selection by Spring 2011
- Tools are now available
- All that's missing is DNA!