IRISH CATTLE BREEDING FEDERATION

Fundamentals of the Eurostar evaluations

National Development Plan
Transforming Ireland

Agenda

1. Traits evaluated, heritability and rec levels
2. Genetic relationships between traits
3. Consequence of the focus on output traits
4. Reliability and movement in indexes
5. Relationship between skeletal and calving
6. Replacement index relative emphasis
7. Comparing Milk weighting across countries
8. Maternal weaning weight and cow milk score
9. Calving difficulty EV and differences in sires
10. Replacements from dairy v suckler herds
11. Summary

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1. Traits evaluated, heritability and recording levels

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Traits evaluated and nature of inheritance

	Trait	records	heritability
Birth	Calving difficulty	8,675,435	0.09
	Gestation length	2,732,100	0.36
	2 calf mortality traits	12,615,329	0.04
Growth and efficiency	9 live-weight traits	3,218,046	0.32 – 0.5
	Farmer scored quality	1,124,875	0.25
	Farmer scored docility	1,390,158	0.35
	3 auction price traits	1,454,007	0.3 – 0.49
	16 linear classification traits	210,210	0.08 – 0.39
	Feed intake	4,528	0.43
Slaughter	7 carcass traits	4,669,459	0.21 – 0.39
	3 cow carcass traits	1,115,898	0.17 – 0.29
Maternal	Cow age 1st calving	734,908	0.31
	Maternal weaning weight	221,024	0.25
	Calving interval	1,991,001	0.02
	Maternal calving difficulty	1,742,091	0.02
	Cow survival	2,515,318	0.02

2. Genetic relationships between traits

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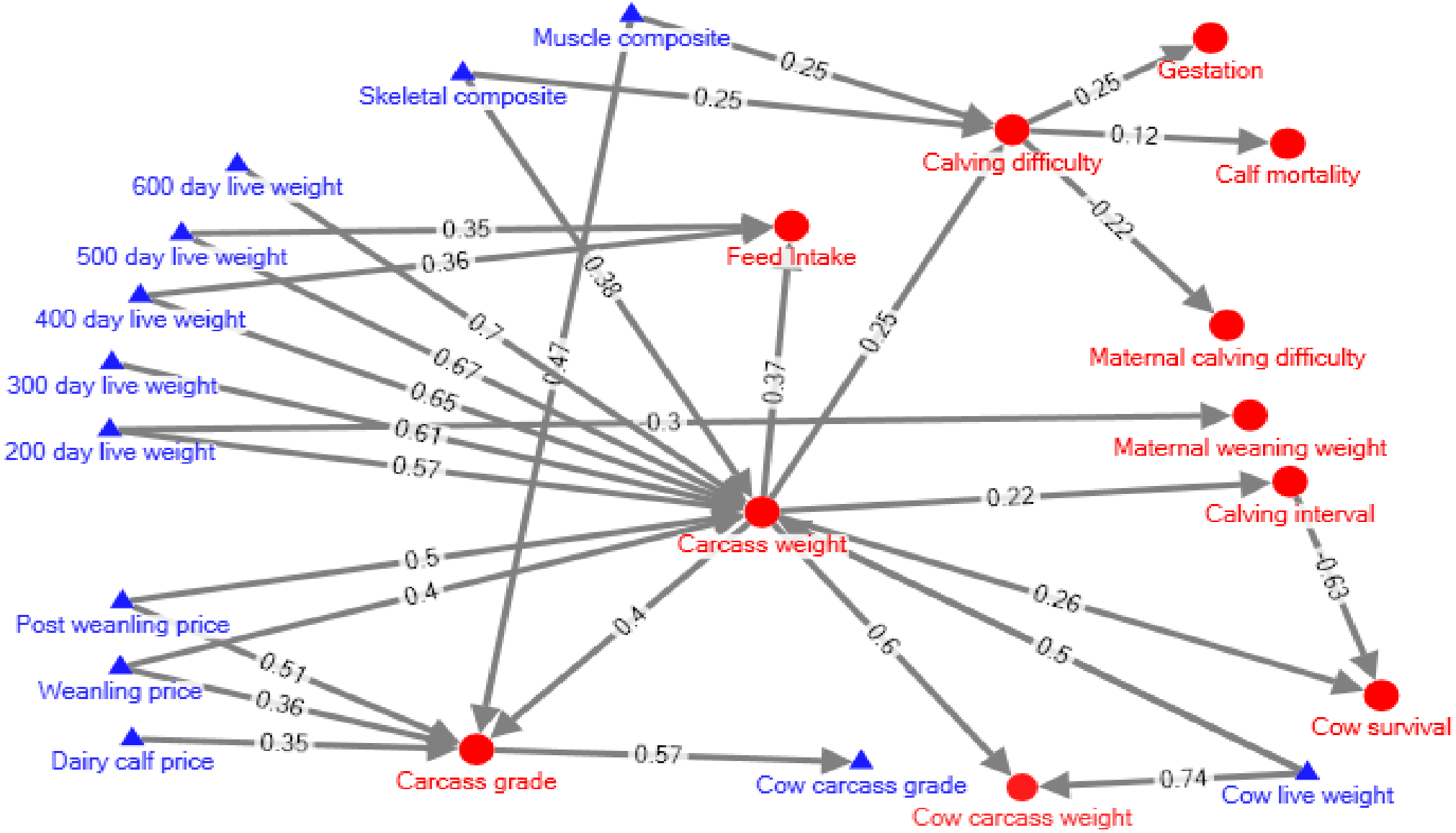
Genetic relationship between traits



3. Consequence of the focus on output traits

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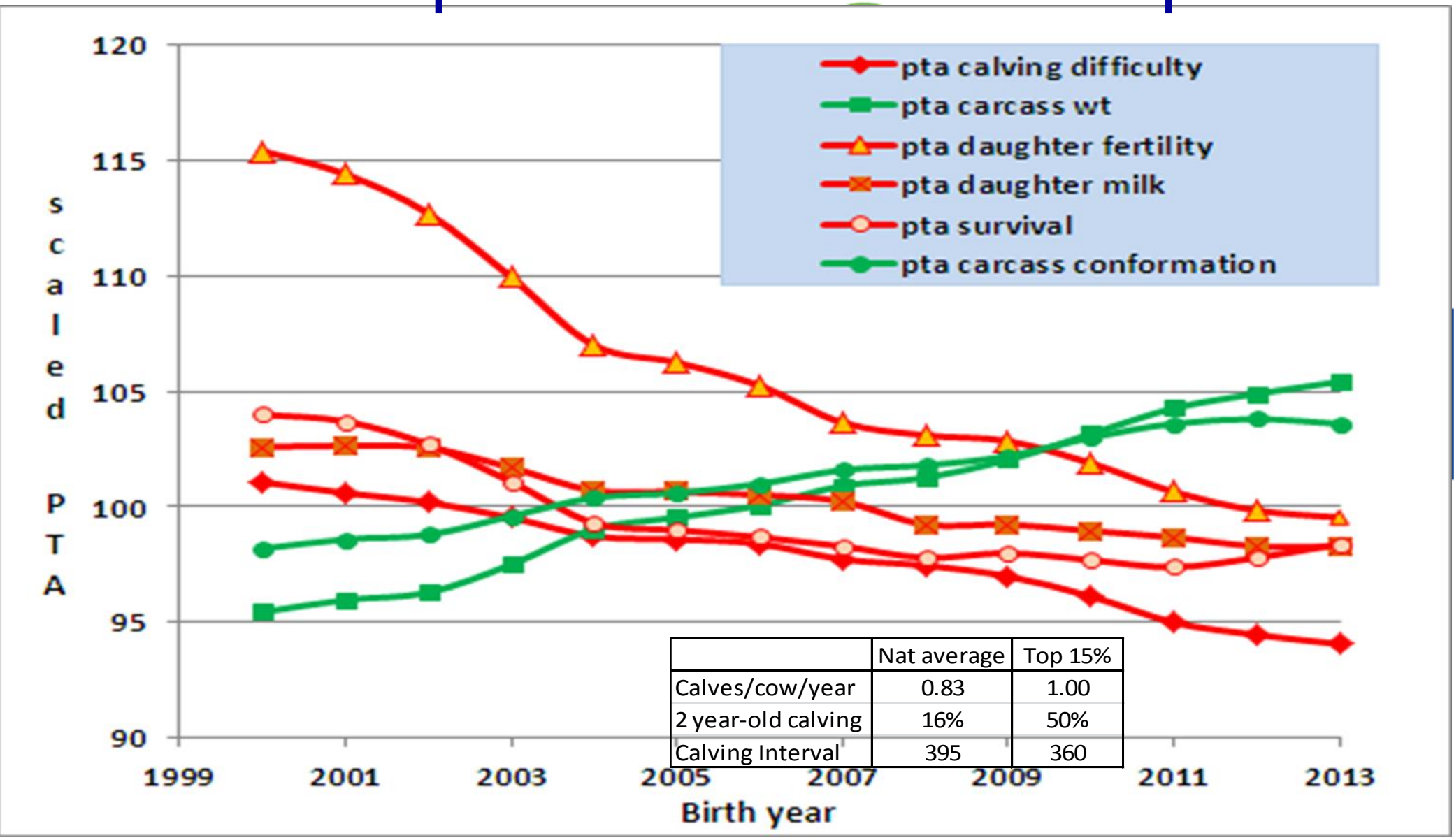
Consequence of focus on output



	Nat average	Top 15%
Calves/cow/year	0.83	1.00
2 year-old calving	16%	50%
Calving Interval	395	360

Consequence of focus on output

Genetic evaluation run December 2014						
Breed	Index/trait	records	50 pc	60pc	70pc	80pc
			3 star	3.5 star	4 star	4.5 star
All Pedigrees	Replacement	177,204	€115	€133	€151	€169
Commercial cows		279,777	€119	€131	€144	€159
All Pedigrees	Terminal	177,253	€109	€116	€122	€128
Commercial cows		279,924	€76	€83	€89	€97

Commercial cow herd has higher maternal genetics than the young pedigree animals

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4. Reliability and movement in indexes

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Effect of reliability on movement of Calving difficulty PTAs for AI sires

Reliability Dec 13	no of AI sires	PTA Dec 13	PTA Dec 14	avg change in PTA	std of change x3) (99% fell fall within this range)	maximum reduction in PTA	maximum increase in PTA	avg progeny recs Dec 13	avg extra recs in Dec 14
>98%	100	7.51	7.47	-0.04	0.47	-0.6	0.5	7383	745
90-98%	282	7.39	7.37	-0.02	1.22	-2.5	2.0	838	245
80-90%	176	7.56	7.62	0.06	1.55	-1.9	1.8	162	80
60-80%	296	6.68	6.76	0.08	2.15	-3.3	2.9	61	40
40-60%	335	6.09	6.22	0.13	2.41	-3.8	5.4	15	14
20-40%	249	6.18	6.34	0.16	4.45	-7.4	6.5	6	23
<20%	143	5.37	5.77	0.40	6.01	-6.2	10.7	2	12

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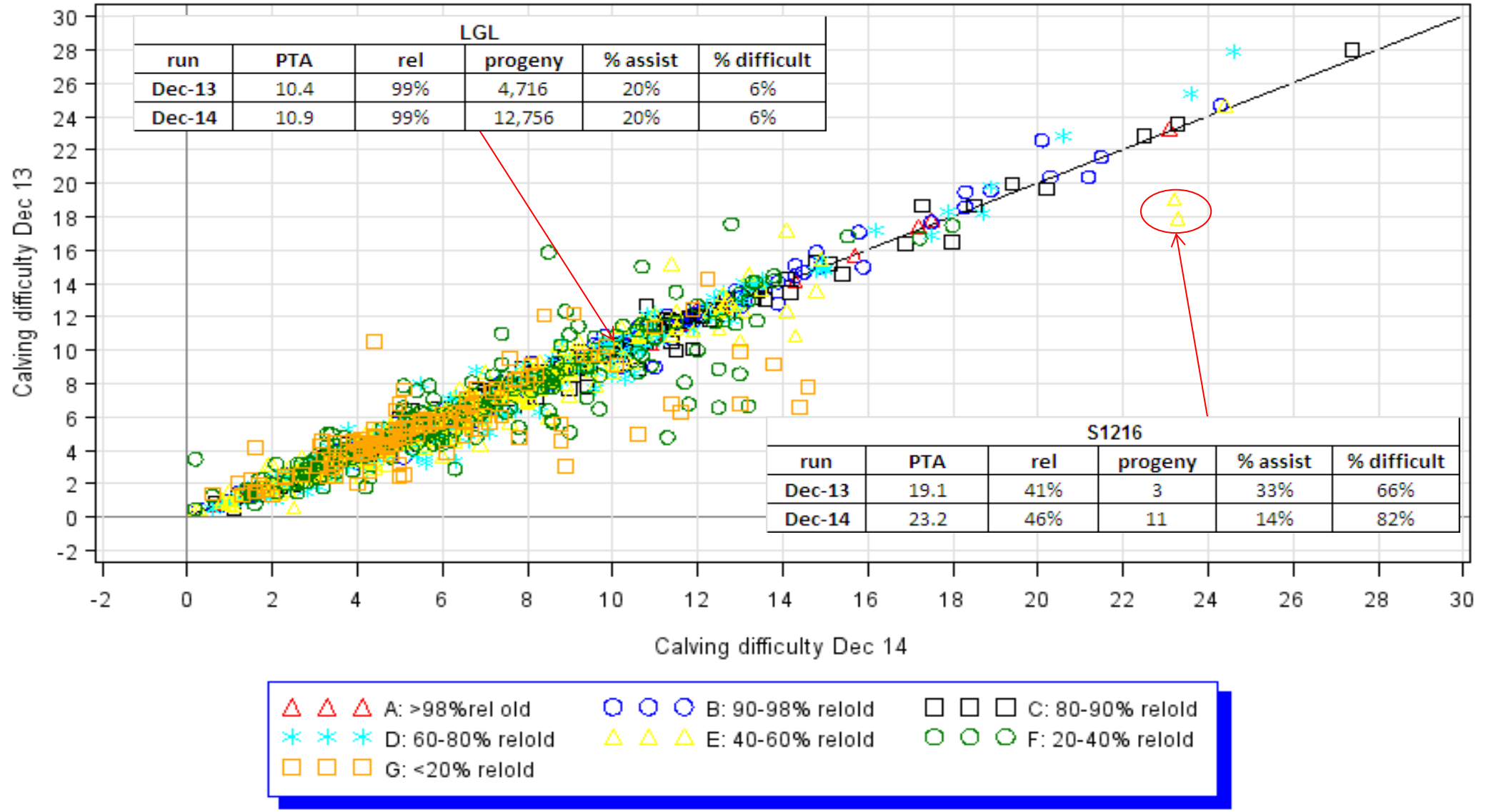
AI sires compare calving Dec 13 with Dec 14

No of bulls 1581 correlation r = 0.965

Dec 13 mean = 6.63 {stdev = 3.85}

Dec 14 mean = 6.74 {stdev = 3.78}



Effect of reliability on movement of Carcass difficulty PTAs for AI sires

Reliability Dec 13	no of AI sires	PTA Dec 13	PTA Dec 14	avg change in PTA	std of change x3) (99% fell fall within this range)	maximum reduction in PTA	maximum increase in PTA	avg progeny recs Dec 13	avg extra recs in Dec 14
>98%	152	23	23	-0.5	1.9	-2	2	3679	477
90-98%	239	23	22	-0.3	4.0	-5	5	292	95
80-90%	184	25	25	-0.2	5.7	-4	7	67	33
60-80%	276	26	26	-0.1	8.2	-8	12	26	15
40-60%	246	23	23	0.2	9.2	-13	14	10	8
20-40%	285	22	23	1.0	10.9	-10	13	2	2
<20%	176	17	19	2.1	12.0	-7	13	1	0

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5. Relationship between skeletal and calving

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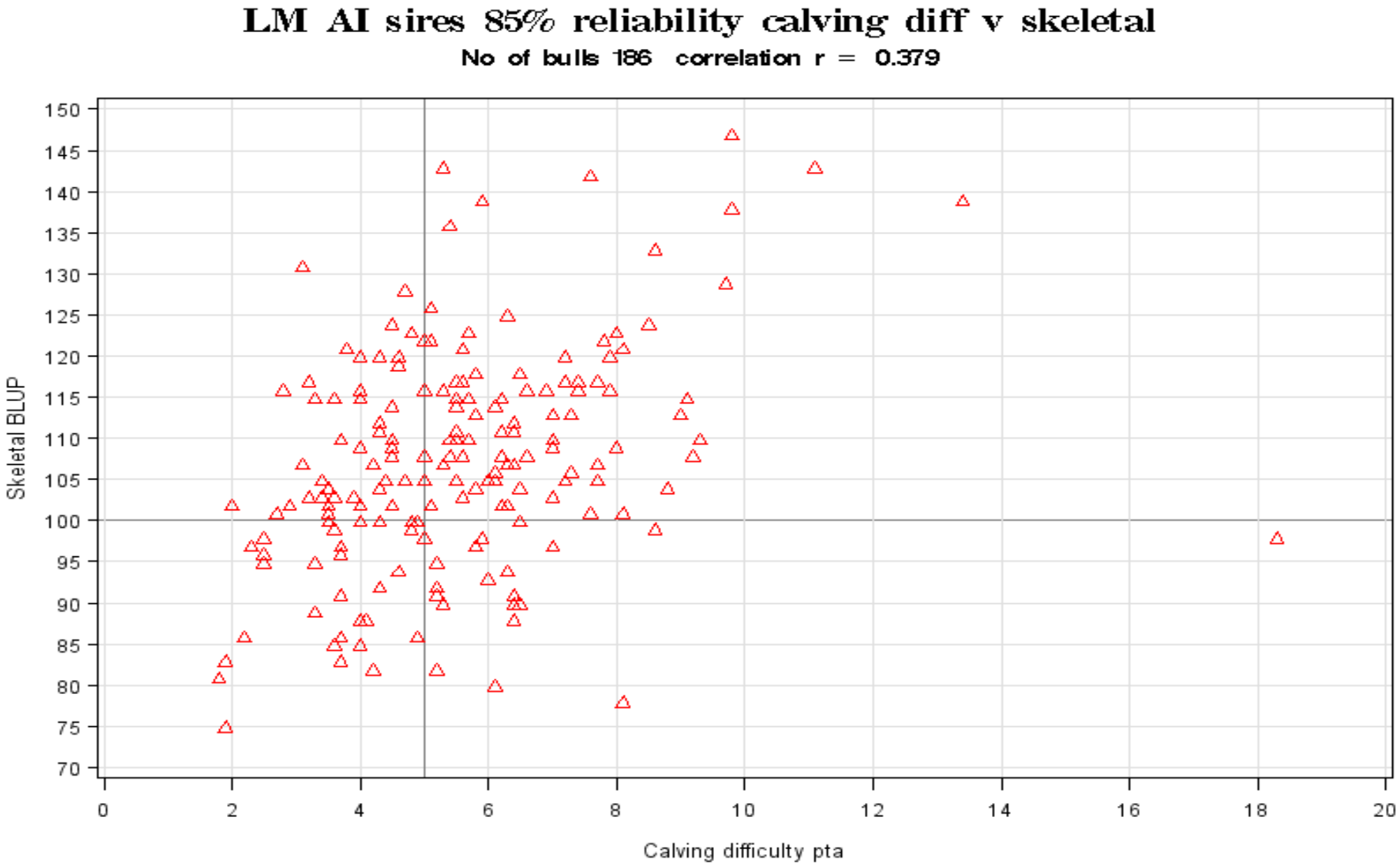
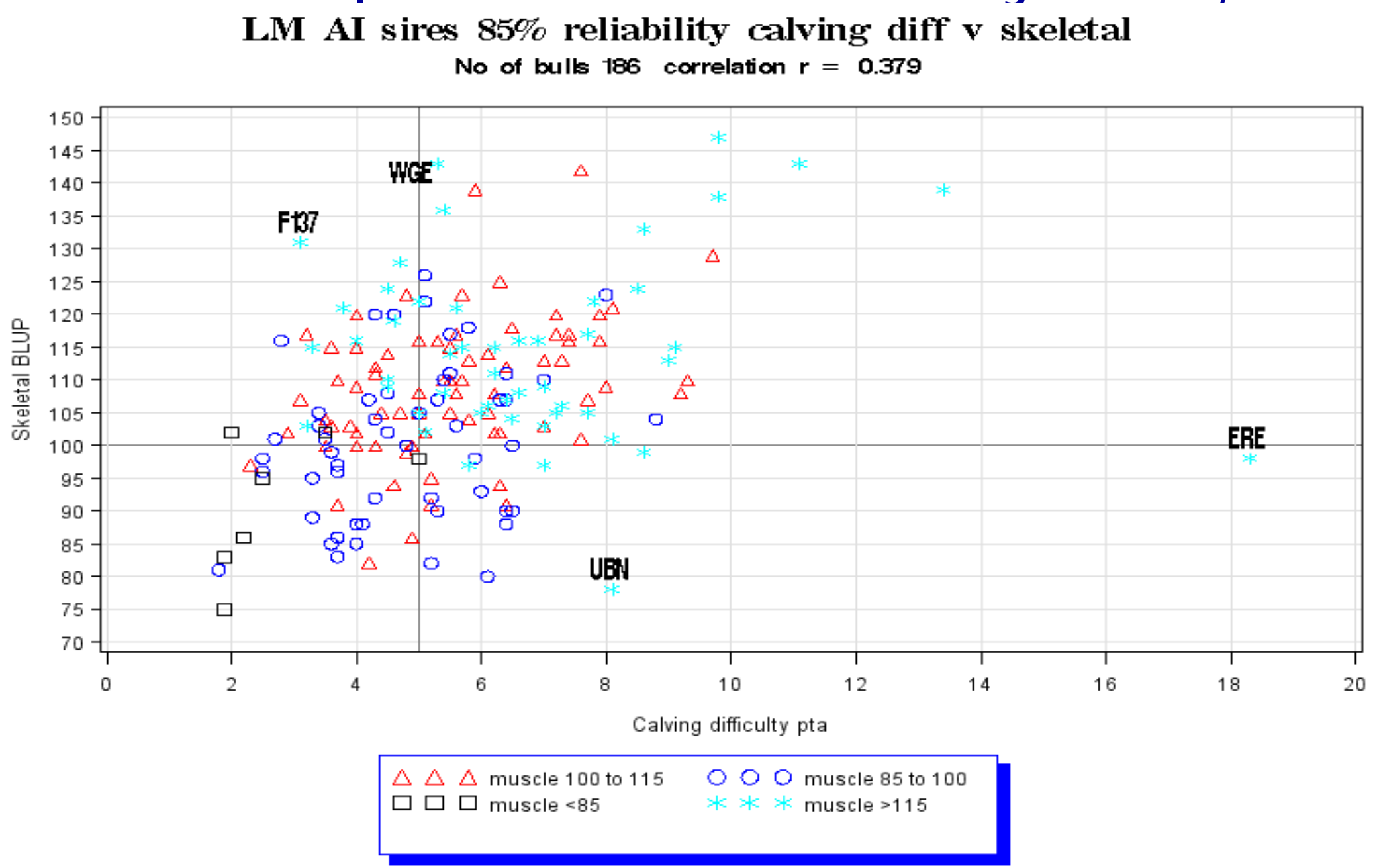
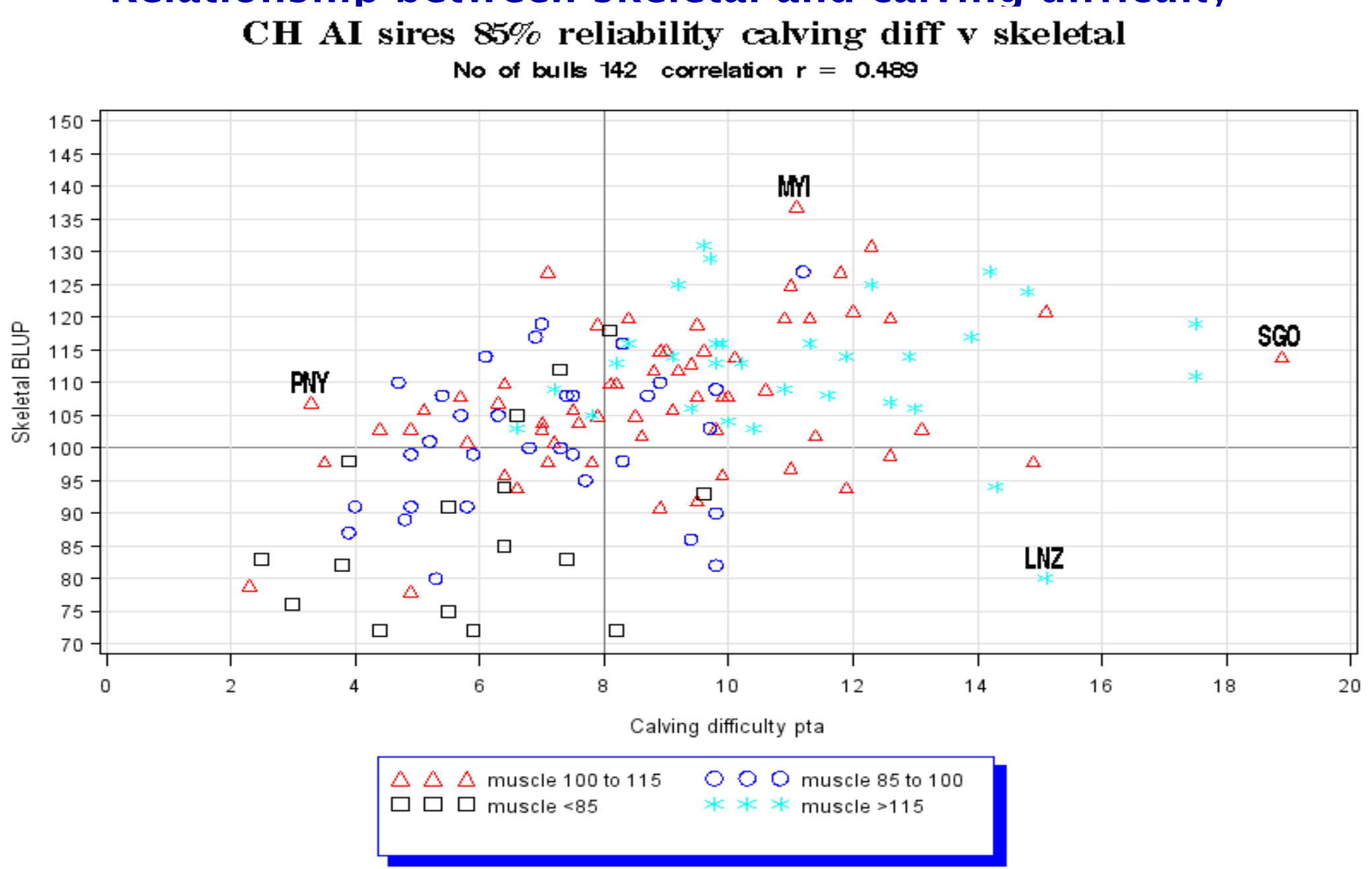
Relationship between skeletal and calving difficulty



Relationship between skeletal and calving difficulty



Relationship between skeletal and calving difficulty



6. Replacement index relative emphasis

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The Replacement index

Bull A

50% males

Generation 1: Progeny for sale/slaughter. Key traits: Calving, feed intake & beef merit.

50% females

Generation 1: Replacement females. Traits: Milk, fertility, survival, cow maintenance costs & cull cow value.

Generation 2: Progeny for slaughter. Males & surplus females. Traits: Calving, feed intake & beef merit.

Generation 2: Replacement females. Selected females only. Traits: Milk, fertility & cull cow value.

- - - - - - - Terminal Index

——————— Replacement Index

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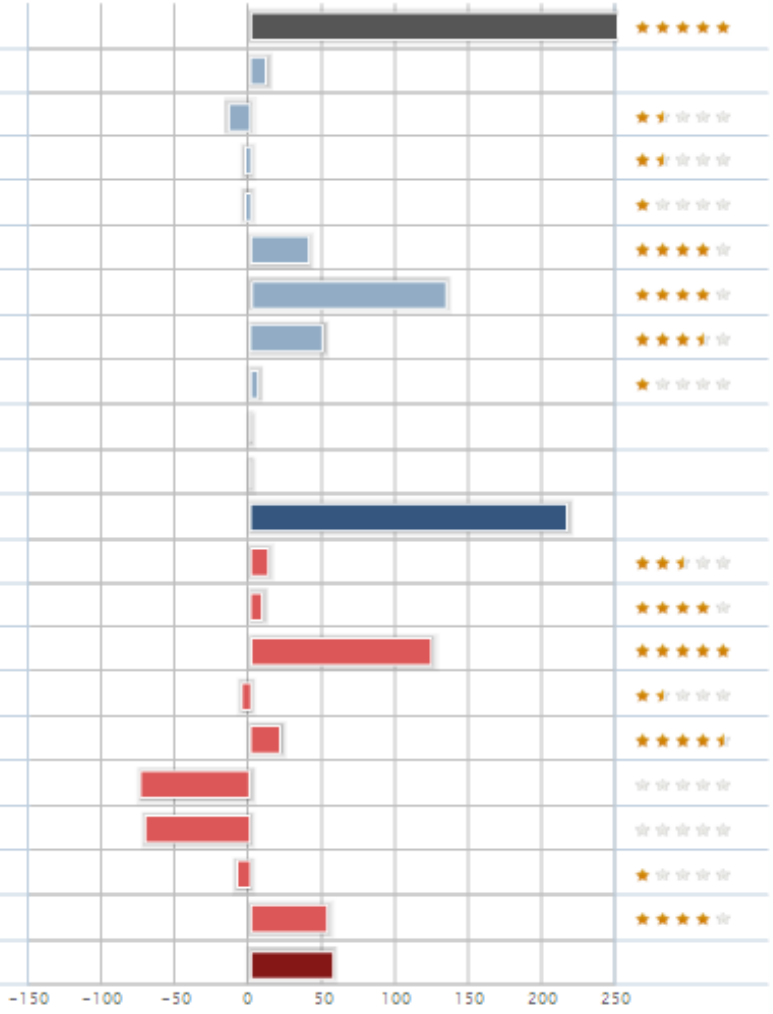
ICBF Bull Search - Internet Explorer, optimized for Bing and MSN

Relative emphasis in the Replacement Index

Favorites | Suggested Sites | Free Hotmail | Web Slice Gallery
ICBF Bull Search
Page | Safety | Tools

Replacement Index Contributions

Within breed star rating	Trait	Index €	Rel %	Across breed star rating
★★★★★	**Replacement index €**	272	84	★★★★★
	(a) Calving difficulty	11	96	
★★★½☆	(b) Gestation	-15	95	★★½☆☆
★★½☆☆	(c) Mortality	-4	92	★★½☆☆
★★☆☆☆	(e) Docility	-4	88	★☆☆☆☆
★★☆☆☆	(f) Feed intake	40	56	★★★★☆
★★★★½	(g) Carcass weight	133	96	★★★★☆
★★½☆☆	(h) Conformation	50	96	★★★½☆
★★☆☆☆	(i) Carcass fat	5	95	★☆☆☆☆
	(j) Meat Quality	0		
	(k) Polliness	0		
	Calf contribution (sum of a to k)	216	89	
★★★☆☆	(l) Age 1st Calving	13	87	★★½☆☆
★★½☆☆	(m) Maternal calving	8	76	★★★★☆
★★★★★	(n) Milk	124	86	★★★★★
★★★☆☆	(o) Calving interval	-6	56	★★½☆☆
★★★★½	(p) Survival	21	72	★★★★½
☆☆☆☆☆	(q) Heifer feed intake	-75	56	☆☆☆☆☆
☆☆☆☆☆	(r) Cow feed intake	-72	56	☆☆☆☆☆
★★☆☆☆	(s) Cow docility	-9	86	★☆☆☆☆
★★★★½	(t) Cull cow weight	53	73	★★★★☆
	Cow contribution (sum of l to t)	56	79	



19 traits
10 of the calf
9 of the cow

Relative emphasis in the Replacement Index

Relative emphasis
Calculated from two key pieces of info on each traits

1. Genetic variation in that trait
2. Economic value for that trait

Only relevant at an overall breeding program level
The relative emphasis of each trait to the overall index is different for every trait because their genetic merit is different

trait	Emphasis based on all sires >60% rel
calving difficulty	11%
gestation	2%
mortality	2%
docility	4%
carcass weight	14%
carcass conformation	4%
carcass fat	2%
feed intake	8%
Age 1st Calving	5%
Maternal cdiff	5%
milk	13%
Calving interval	6%
daughter survival	6%
heifer intake	7%
cow intake	7%
cull cow weight	5%

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Relative emphasis in the Replacement Index

Emphasis based on all sires >60% rel	category	Btm 20% Repl index	Top 20% Repl index	Btm 20% Milk pta	Top 20% Milk pta
11%	calving			-€30	€12
2%	gestation	-€10	-€5	-€12	-€4
2%	mortality	-€5	€2	-€3	-€1
4%	docility	€6	€3	€2	€7
14%	carcass weight			€130	€74
4%	conformation	€52	€39	€51	€31
2%	carcass fat	€5	-€1	€4	-€4
8%	feed intake	€25	€8	€22	-€5
5%	age 1st calving	€14	€23	€16	€15
5%	maternal calving	-€6	€2	€3	-€2
13%	milk				
6%	calving interval	-€16	€14	-€10	€13
6%	survival	-€18	€19	-€4	€8
7%	heifer intake	-€73	-€47	-€74	-€38
7%	cow intake	-€69	-€45	-€71	-€36
5%	cull cow weight	€51	€33	€52	€27
	maternal index	-€10	€217	€21	€167
	pta milk	-4.5	6.7	-8.8	9.8

Diff of €77

Diff of €31

Diff of €74

Diff of €121

7. Comparing milk weighting across countries

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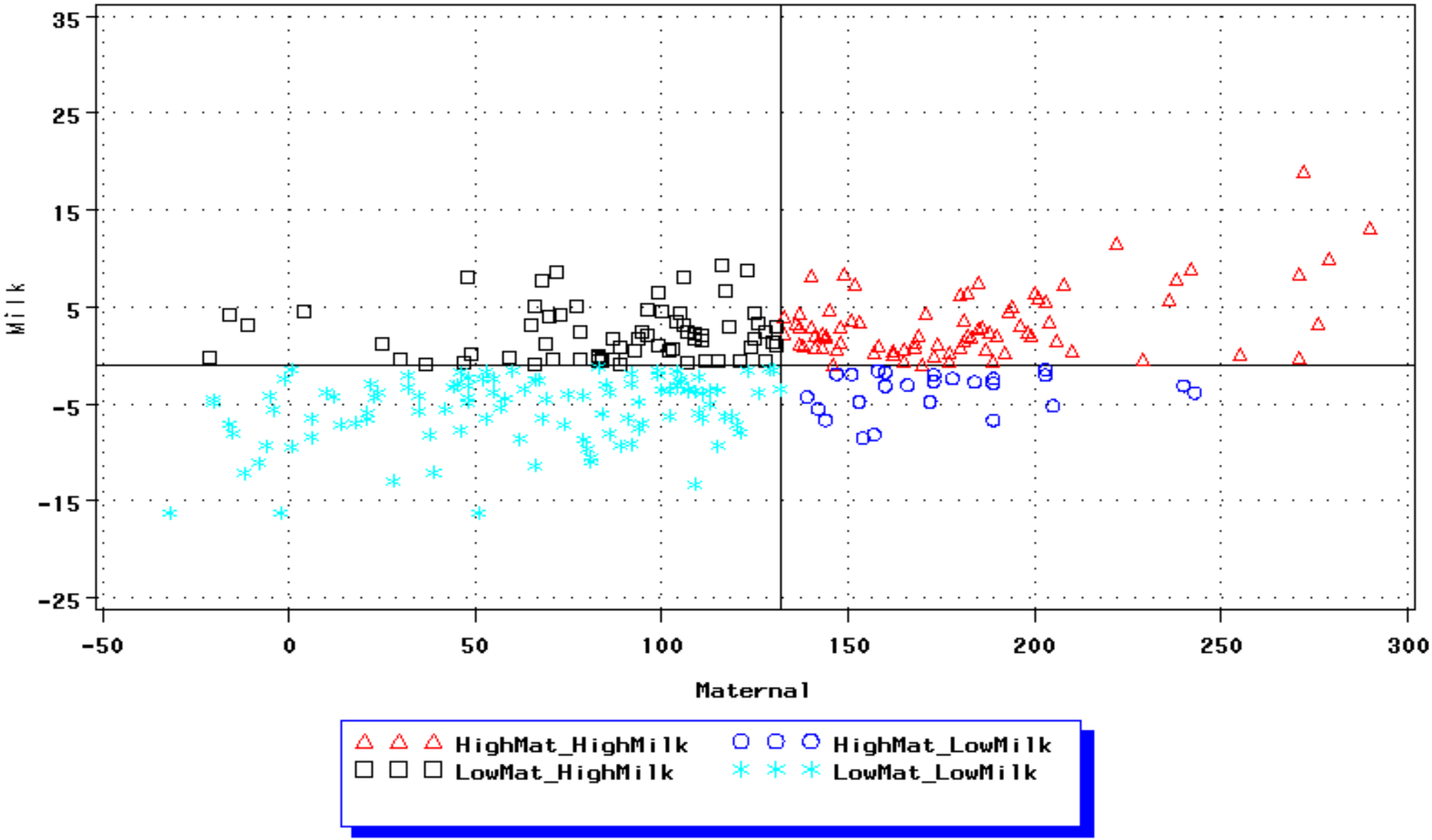
Irish Lim indexes Maternal v Milk > 60 rel

No of bulls 281 correlation r = 0.519

Milk mean = 1.05 {stdev = 5.23}

Maternal mean = 110.14 {stdev = 68.57}

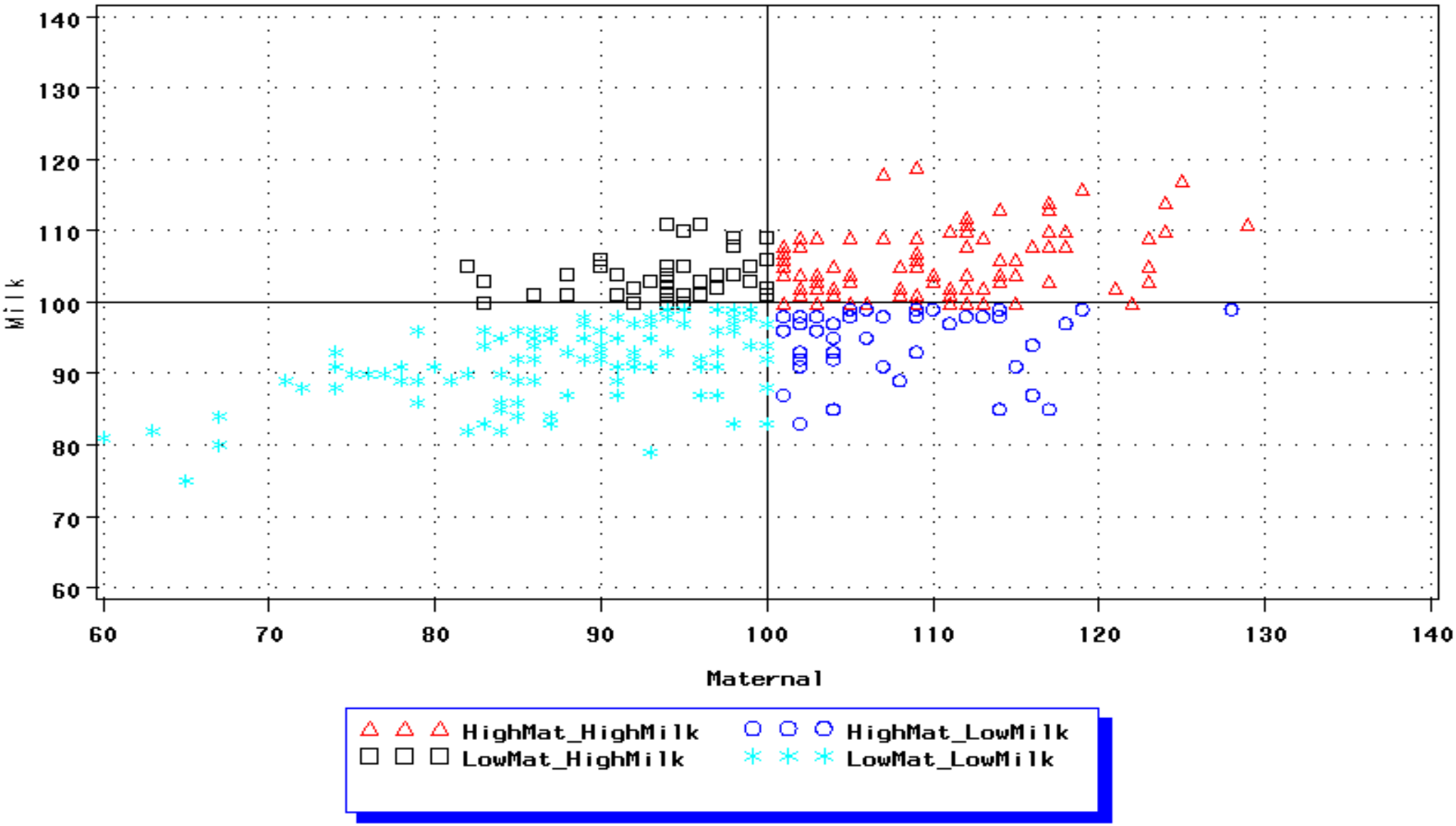


French Lim indexes Maternal v Milk

No of bulls 297 correlation r = 0.6

Milk mean = 98.33 {stdev = 7.85}

Maternal mean = 98.76 {stdev = 12.57}



8. Maternal weaning weight and cow milk score

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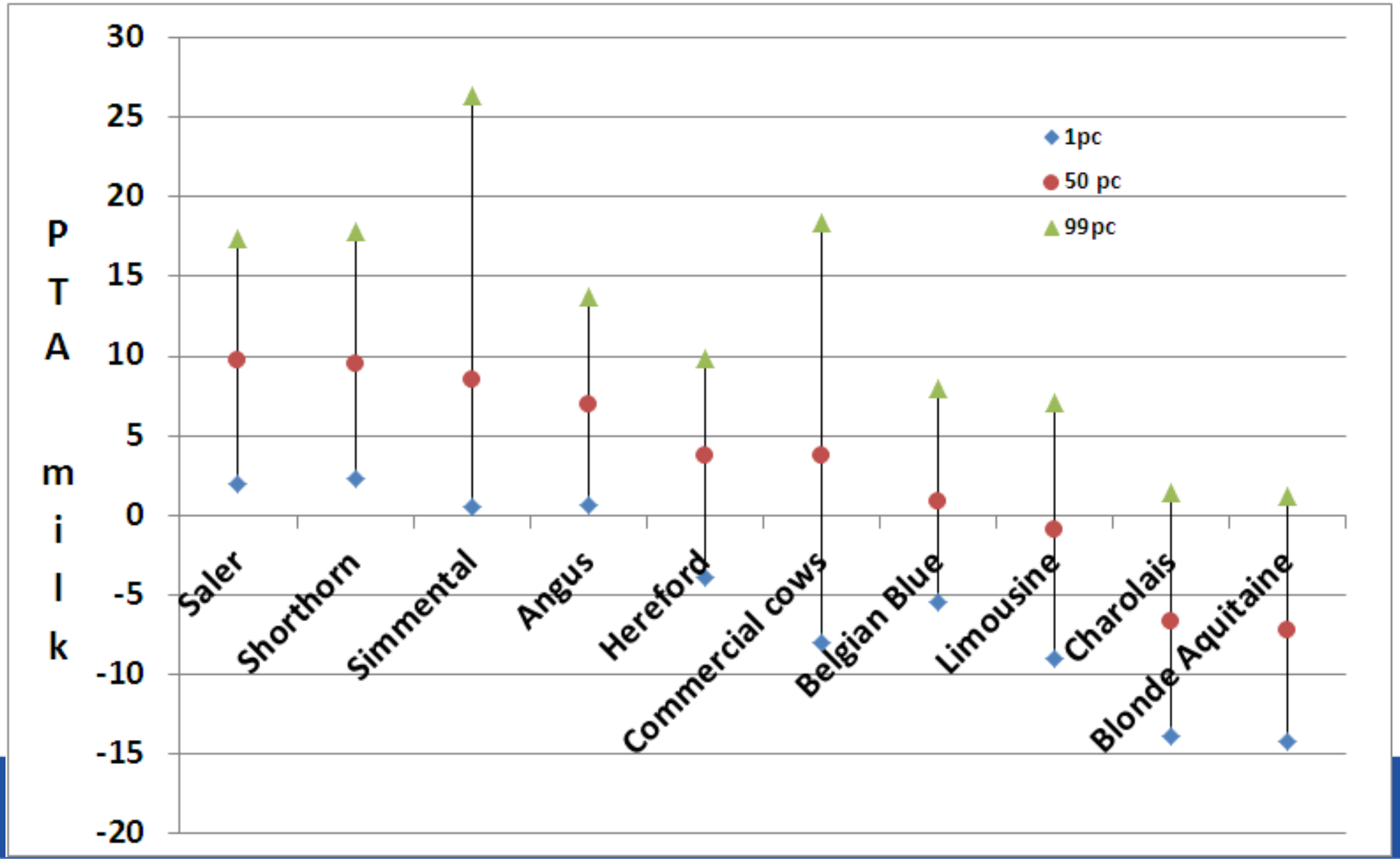
Maternal weaning variation by breed



Maternal weaning wt – a problem trait

- Need 2 generations of ancestry
- Spread out calving interval results in not all animals in eligible age range
- Confounding issues: Early meal feeding, grass intake, double suckling, foster mothers (pedigree), calf ill health all lead to inaccuracies
- Very low level of on farm recording (<10%) and unlikely to change!
- Is there an alternative or predictor??

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Milkability predictor trait

- Milkability score has been recorded since 2012 on a voluntary basis (~40,000) heritability of 0.3, correlation of 0.65 with maternal weaning weight
- Now a key requirement for payment under the BDP program
- Multiple records across years on cows
- New analysis h2 = 0.3, repeatability = 0.14 correlation of 0.83 with maternal wean wt
- 500,000 records Dec 14, 1million + April 15

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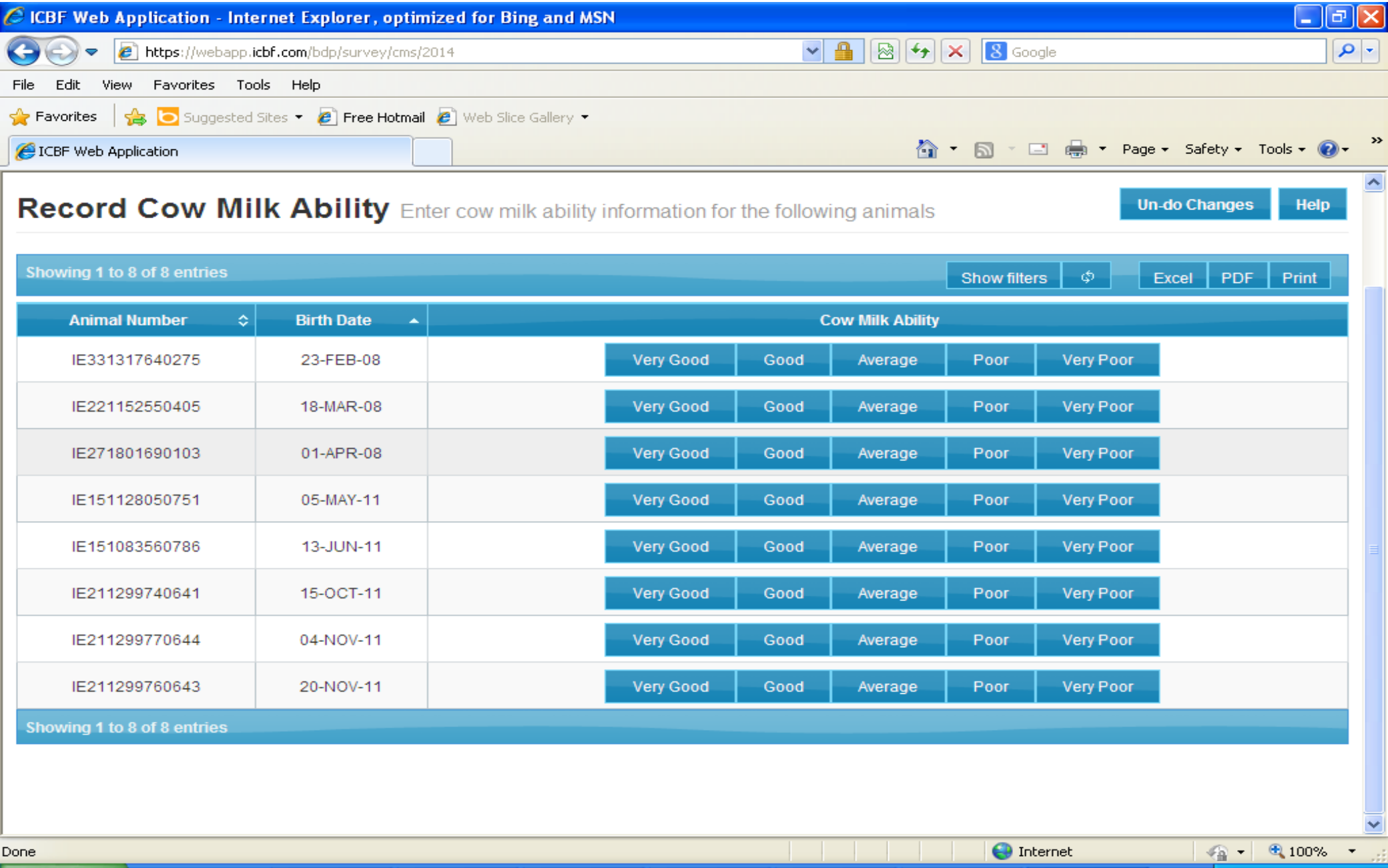
Trait definition



Milkability Stats on AI sires

	Category of milk PTA				
	Top 20%	Top 40%	Average	Btm 40%	Btm 20%
No of AI sires	829	865	547	423	507
PTA materal wean wt	11	5	0	-3	-10
reliability	47	40	55	57	64
no of maternal wean wt records	60	59	103	68	72
no of herdmates	202	209	352	238	253
Maternal ADG	1.22	1.18	1.17	1.16	1.16
Herdmate maternal ADG	1.19	1.18	1.18	1.18	1.20
Daughters with milk scores	54	58	98	68	80
Daughter milk score records	84	87	151	100	118
herdmate records	1128	1134	2078	1230	1246
Average Milk score	4.1	3.9	3.8	3.7	3.5
% good/very good	80%	71%	64%	57%	52%
% herdmates good/very good	70%	69%	66%	67%	66%
% poor/very poor	2%	3%	7%	7%	10%
% herdmates poor/very poor	4%	4%	5%	5%	5%

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9. Calving difficulty EV and differences in sires

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Economic value of calving difficulty

Table 3. Description of the direct calving difficulty trait.

Item	Caesarean	Vet assist	Severe assist	Slight assist	Herd cost
Stockman hours	6.00	4.00	4.00	1.00	
Stockman cost (€) per hour	20.18	20.18	20.18	20.18	
Stockman cost (€)	121.10	80.73	80.73	20.18	
Veterinary costs (€)	306.25	80.00	0.00	0.00	
Probability of a dead cow	0.08	0.03	0.03	0.00	
Cost of a dead cow (€)	150.98	50.33	50.33	0.00	
Reduced reproductive success	0.25	0.10	0.05	0.00	
Barren cow cost (€)	489.81	195.92	97.96	0.00	
Calving cost relative to no assistance	1068.13	406.98	229.02	20.18	
6% incidence of severe or worse calvings	1.02	2.50	2.48	20.29	30.84
7% incidence of severe or worse calvings	1.25	2.92	2.83	22.00	36.16
Economic effect (€) per cow of 1% change					**-5.31**

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Calving: Relationship between PTA and performance on the ground

Bull Calving difficulty PTA	Percentage of HEIFERS		Percentage of COWS	
	Needing SOME ASSISTANCE (Score 2)	Needing SEVERE ASSISTANCE (Scores 3+4)	Needing SOME ASSISTANCE (Score 2)	Needing SEVERE ASSISTANCE (Scores 3+4)
1%	14%	3.2%	7%	1.2%
2%	16%	4.4%	8%	1.7%
3%	17%	5.5%	10%	2.2%
4%	19%	6.7%	11%	2.8%
5%	20%	7.9%	12%	3.3%
10%	28%	13.7%	20%	6.0%
15%	36%	19.6%	27%	8.6%
20%	44%	25.4%	34%	11.3%

Calving difficulty is predicted based on use ~ 20% heifers

10. Replacements from dairy versus suckler herds?

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First cross dairy or breed from suckler herd?

	Origin of suckler cow	
	beef herd	dairy herd
cows with progeny wean weight	65,329	22,755
Total progeny (incl no wts)	394,336	136,061
progeny with weights	135,447	44,020
ADG	1.20	1.26
weaning weight	299	311
age at weight	209	210
PTA milk	4.8	11.4
prog with carcass	81,609	27,939
adg carcass	0.46	0.47
carcass weight	378	373
carcass conformation	9.36	8.88
age at slaughter	742	715
calving interval	391	391
Replacement index	**€128**	**€146**
cow contribution	**€17**	**€67**
calf contribution	**€111**	**€80**

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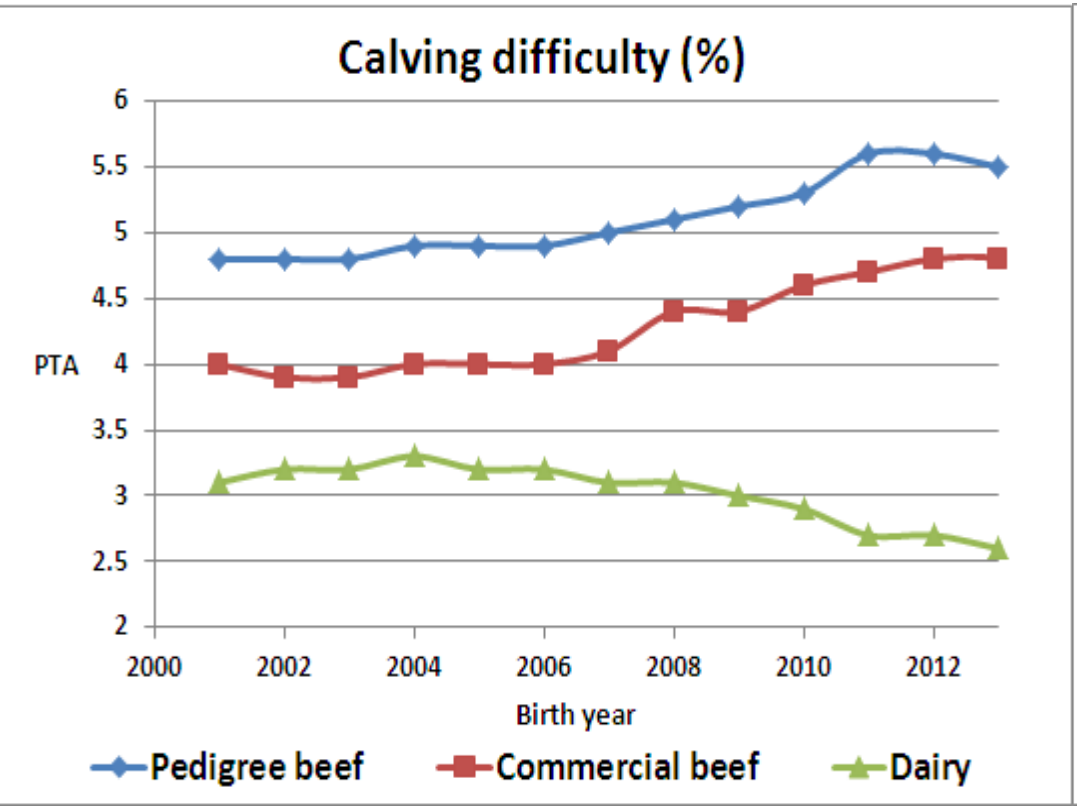
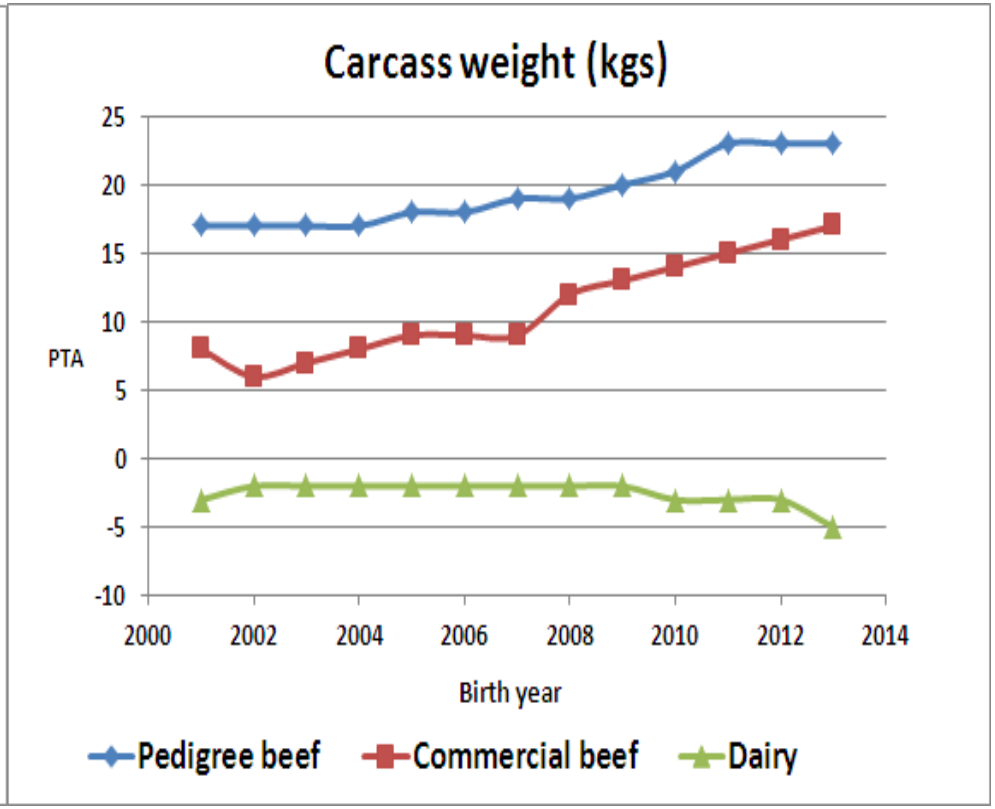
First cross dairy or breed from suckler herd?





Calving merit of dairy herd is improving
Beef merit of dairy herd is declining

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Summary

- Plenty of genetic variation in all traits to select from but going in wrong direction.
- Replacement Index is a compromise across all traits affecting profitability, if a trait is needed more then concentrate on that trait in tandem with higher indexes
- Cow milkability score is a real alternative for the industry in terms of evaluating milk merit
- Indexes reflecting strengths and weaknesses of dairy herd v beef herd replacements

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