IRISH CATTLE BREEDING FEDERATION

From One to Many: Re-defining calving evaluations to cater for divergent cow types



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Background

- Republic of Ireland: strong tradition of beef on dairy
  - ~ 656k beef sire x dairy dam calves in 2018 (45%)
  - ~ 147k were on first parity heifers (30 sire breeds)
- Dairy herd expanding:
  - ~ Compact spring calving, less labour time per cow
  - ~ Demand for a profit index to rank beef for dairy herd
- Single calving trait across breed PTA and reliability
  - ~ Reliability may be high BUT: Reliable on dairy cows? on heifers?

New approach

Dairy Heifer PTA

Dairy Cow PTA

Separate traits
4 traits
4 reliabilities

Relationship estimated between traits

+ 2 predictor traits

- **Birth size**
- **Birth weight**

Beef Heifer PTA

Beef Cow PTA

Data description

Calving Ease
n = 10m

Calving Ease			
1: Normal Calving	2: Some Assistance	3: Considerable Difficulty	4: Vet Assistance

Birth Size
n = 1.6m

Birth Size				
Extra Small	Small	Medium	Large	Very Large

Birth weight
20 - 115 kg
n = 260k

Actual

Or

Predicted

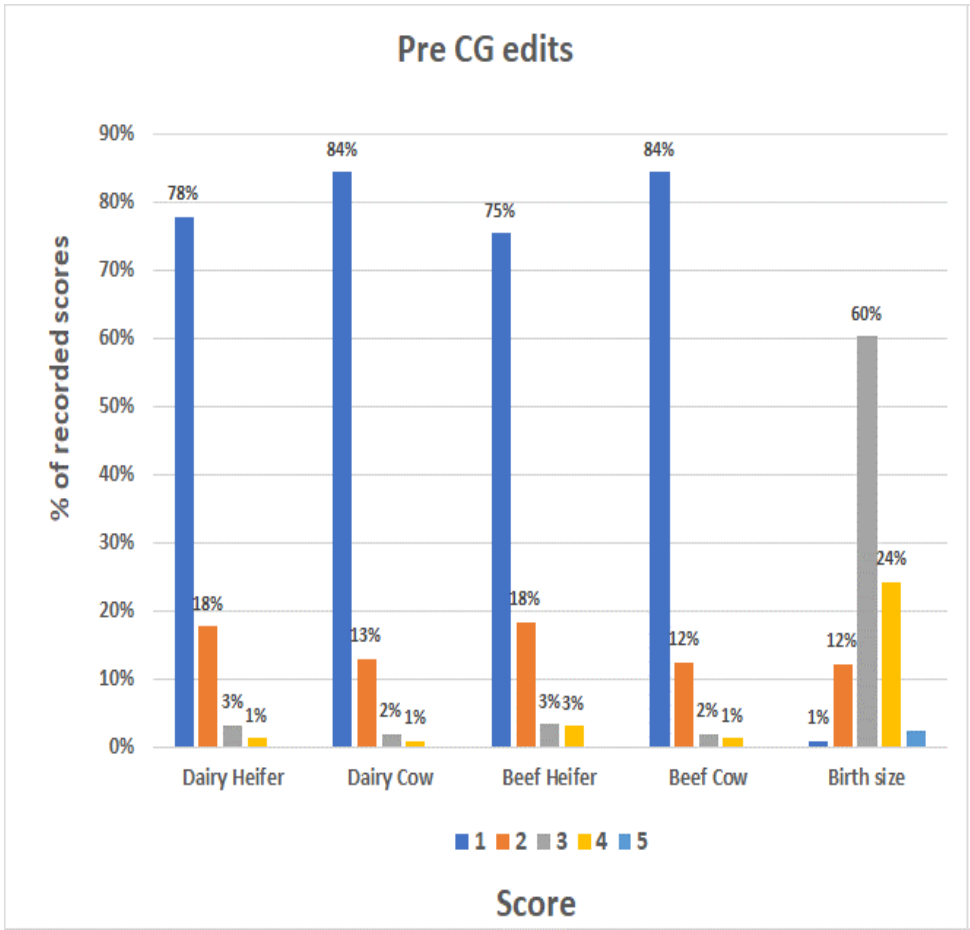
Data Edits

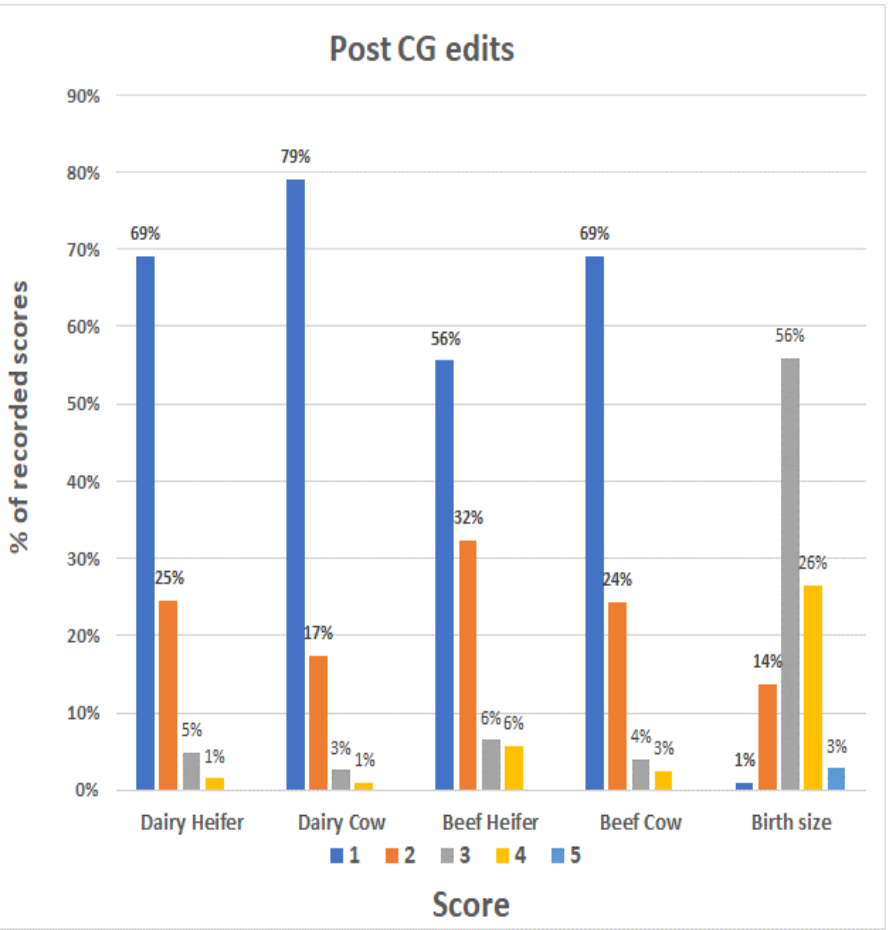
Initial Edits:

- Known sire, minimum CG size
- Parity 1 to 15
- ET births, Malpresentations, Twins (calving traits)

Trait	N	CG size (3 month window)	CG No variation	Post Edits
Dairy Heifer	1,544,480	18	38%	963,304
Dairy Cow	4,544,986	35	32%	3,071,396
Beef Heifer	798,101	4	66%	270,063
Beef Cow	2,722,852	8	61%	1,066,897
Birth size	985,803	14	22%	764,410
Birth weight	199,055	31	26%	146,580

Impact of CG variation edit





Genetic parameters

Trait	Dairy Heifer direct	Dairy cow Direct	Beef Heifer direct	Beef Cow direct	Birth size direct	Birth wt direct	Dairy Heifer maternal	Dairy Cow maternal	Beef Heifer maternal	Beef Cow maternal	Birth size maternal	Birth weight maternal
Dairy Heifer (d)	0.16											
Dairy Cow (d)	0.91	0.08										
Beef Heifer (d)	0.80	0.78	0.17									
Beef Cow (d)	0.62	0.59	0.94	0.15								
Birth size (d)	0.82	0.74	0.88	0.85	0.24							
Birth wt (d)	0.63	0.64	0.64	0.62	0.52	0.41						
Dairy Heifer (m)	-0.07	-0.22	-0.02	-0.29	-0.43	-0.16	0.04					
Dairy Cow (m)	0.24	-0.07	-0.38	-0.41	-0.15	-0.16	0.76	0.02				
Beef Heifer (m)	-0.62	-0.21	-0.26	-0.23	-0.25	-0.25	0.39	0.75	0.09			
Beef Cow (m)	0.27	-0.36	-0.04	0.01	-0.76	-0.12	0.57	0.73	0.97	0.08		
Birth size (m)	-0.38	-0.52	-0.49	-0.64	-0.39	-0.31	0.34	0.82	0.66	0.81	0.05	
Birth wt (m)	-0.06	-0.42	-0.16	-0.40	-0.31	-0.48	0.61	0.67	0.56	0.38	0.54	0.09

Heritability on diagonals, Cells in red: Estimate not significant based on estimate > 2 * s.e., yellow cells: not significant

- Different heritability across new traits (current is 0.09)
- Strong heifer cow correlation dairy and beef
- Correlations not as strong across dairy and beef
- Birth size and birth weight useful predictor traits

Validation

Animal level

- 2018 born animals: Phenotype omitted and PA calculated
- YDs used as validation phenotype

Trait	N	correlation r(ŷ,y)		Slope b(ŷ,y)	
		Current	New	Current	New
DairyHeifer	175,369	0.17	0.21	1.54	0.87
Dairy Cow	613,648	0.20	0.22	1.18	0.92
Beef Heifer	53,723	0.21	0.22	1.68	0.94
Beef cow	274,374	0.19	0.21	1.07	0.83

Sire level

- 2015 + phenotypes omitted
- Sires with no records in validation but with 70% reliability in Full dataset
- DYDs used as validation phenotype

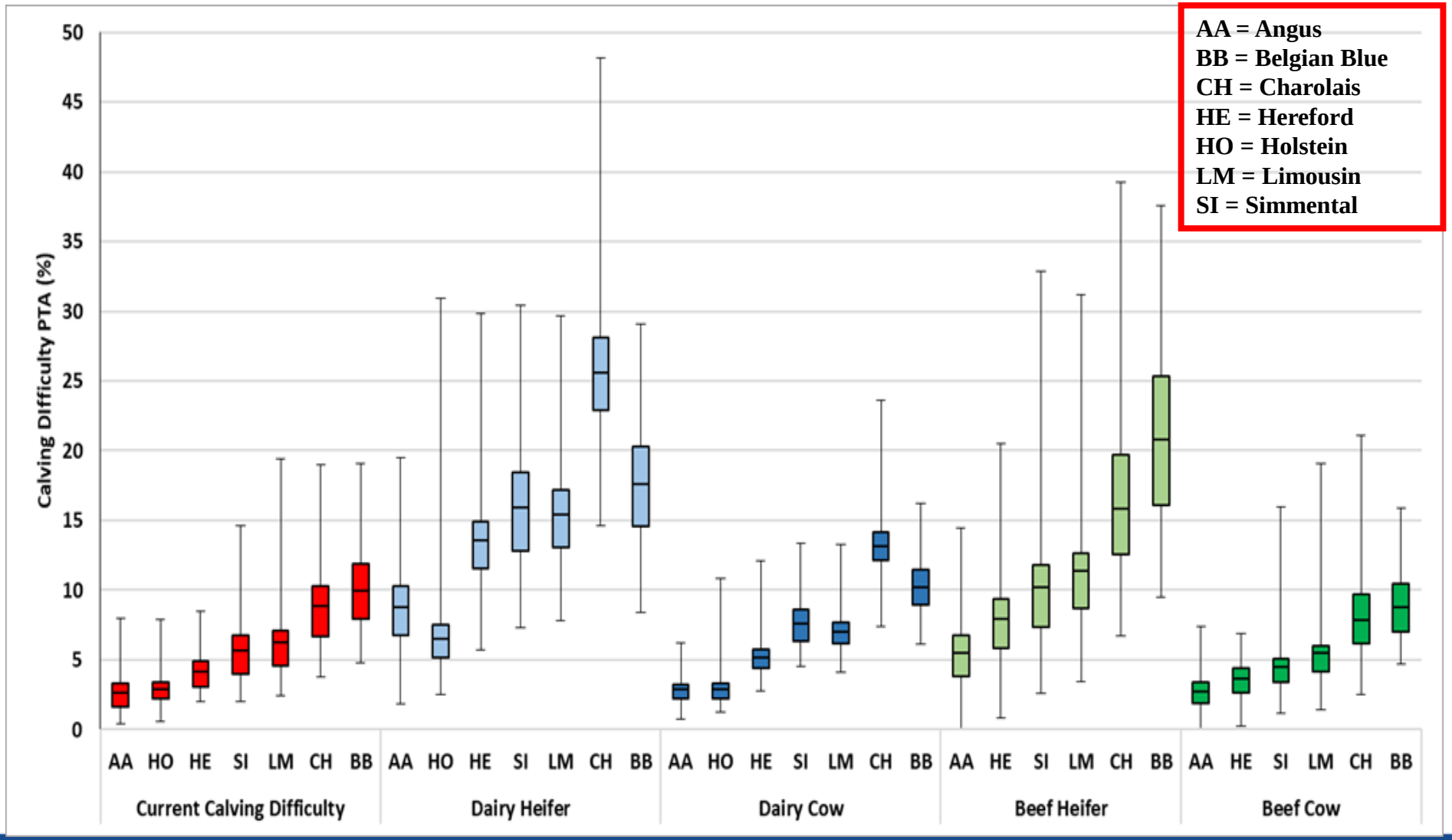
Trait	N	correlation r(ŷ,y)	Slope b(ŷ,y)
Dairy Heifer	905	0.47	0.96
Dairy Cow	1015	0.68	0.94
Beef Heifer	297	0.23	0.61
Beef Cow	1265	0.38	0.6
Birth weight	461	0.73	1.22

January Interbull test run

- Most countries submit a multiple parity trait (GE forms)
- Dairy Cow trait submitted from IRL to test run
- Improved correlation for 13 out of 16 countries

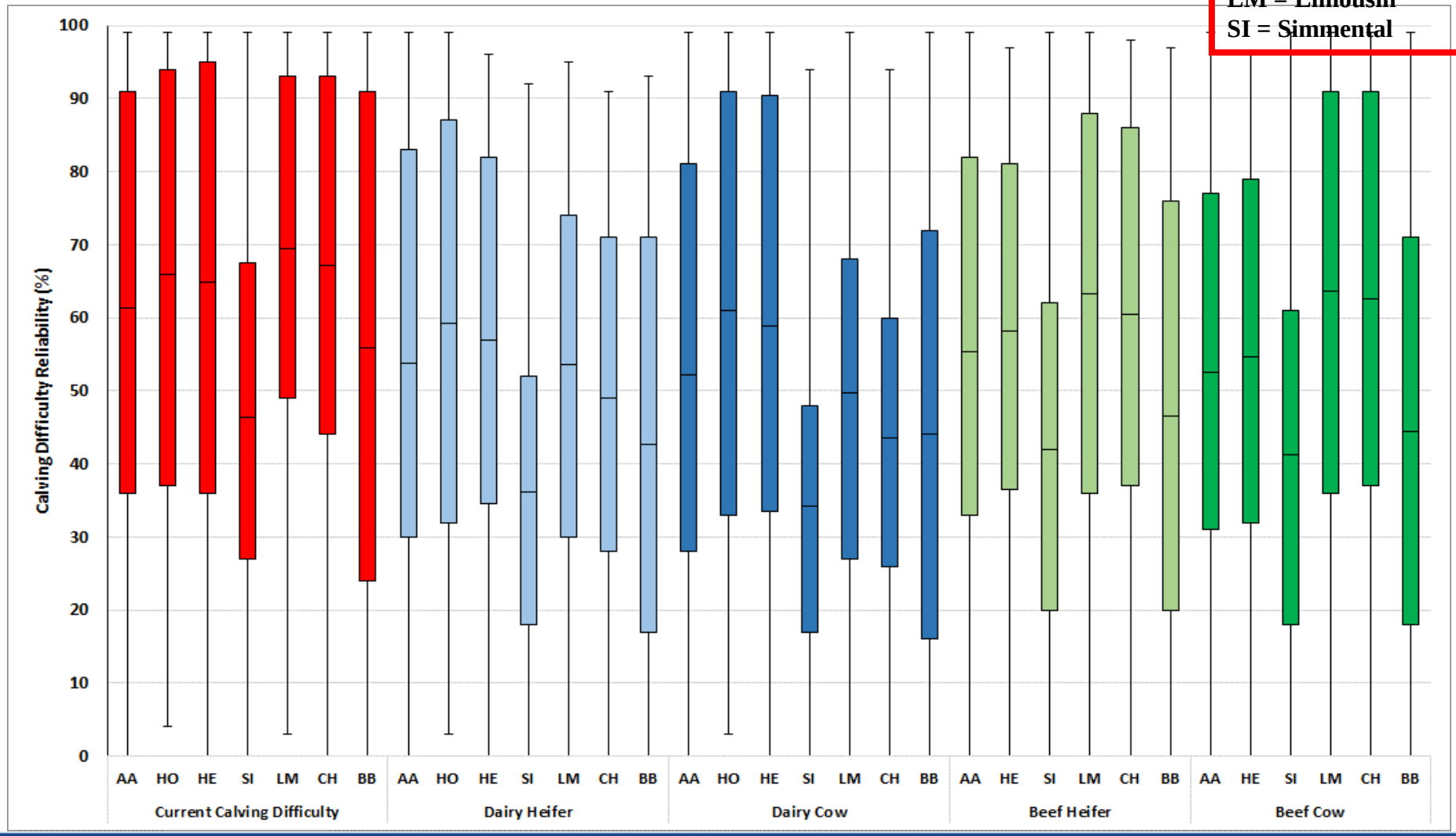
Country	Expression of trait	Scale evaluated	Old	New	Difference
AUS	2+	4	0.69	0.76	0.07
CAN	All	4	0.86	0.92	0.06
CHE	All	4	0.82	0.93	0.11
DFS	1	3	0.83	0.89	0.06
FRA	1 to 9	3	0.83	0.93	0.10
ISR	1	4	0.90	0.91	0.01
ITA	All	5	0.73	0.77	0.04
NLD	All	4	0.85	0.94	0.09
USA	All	5	0.77	0.84	0.07
GBR	1 to 10	4	0.74	0.77	0.03
HUN	All	5	0.74	0.77	0.03
DEU	1 to 3	4	0.77	0.86	0.09
BEL	1 to 5	4	0.74	0.77	0.03
NZL	1	binary	0.82	0.75	-0.07
SVK	N/A	N/A	0.79	0.78	-0.01
ESP	N/A	N/A	0.77	0.77	0.00
Average			0.79	0.84	0.04

PTAs by breed (% difficult scale)

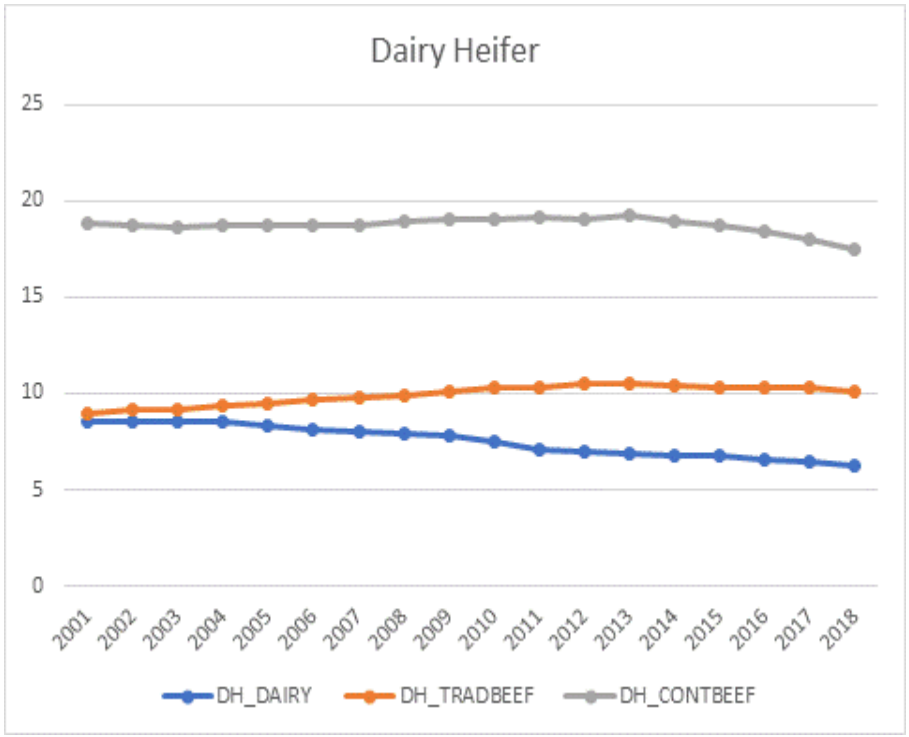


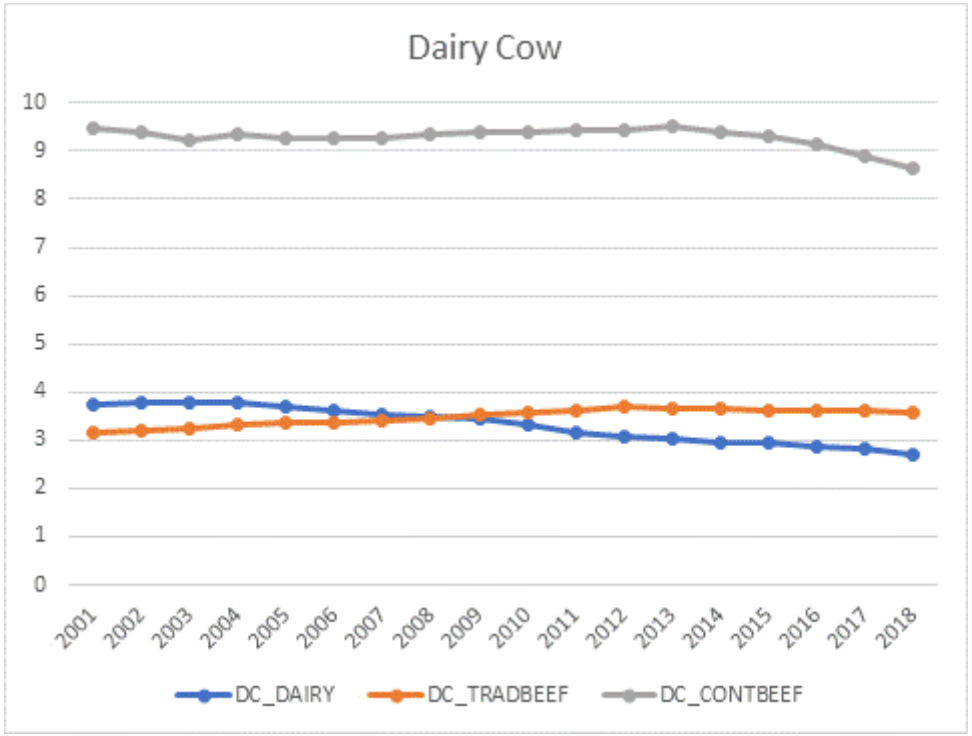
Reliability by breed (AI sires)

AA = Angus
BB = Belgian Blue
CH = Charolais
HE = Hereford
HO = Holstein
LM = Limousin
SI = Simmental



Genetic Trends: Dairy traits





- More selection pressure on calving difficulty in dairy sires: impact of EBI
- Beef breeds stagnant but some progress in recent years in response to the market

Conclusions

- Targeted dam specific PTAs more accurate than single all encompassing trait
- Dairy cow Holstein PTA better aligned with most other countries in MACE eval
- Calf birth size a useful predictor trait
- New evaluations suitable for Dairy Beef Index
- Remaining work:

  - Integration of MACE, INTERBEEF & foreign beef ebvs
  - Genomics
  - Education & rollout

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