Update of Economic Breeding Index

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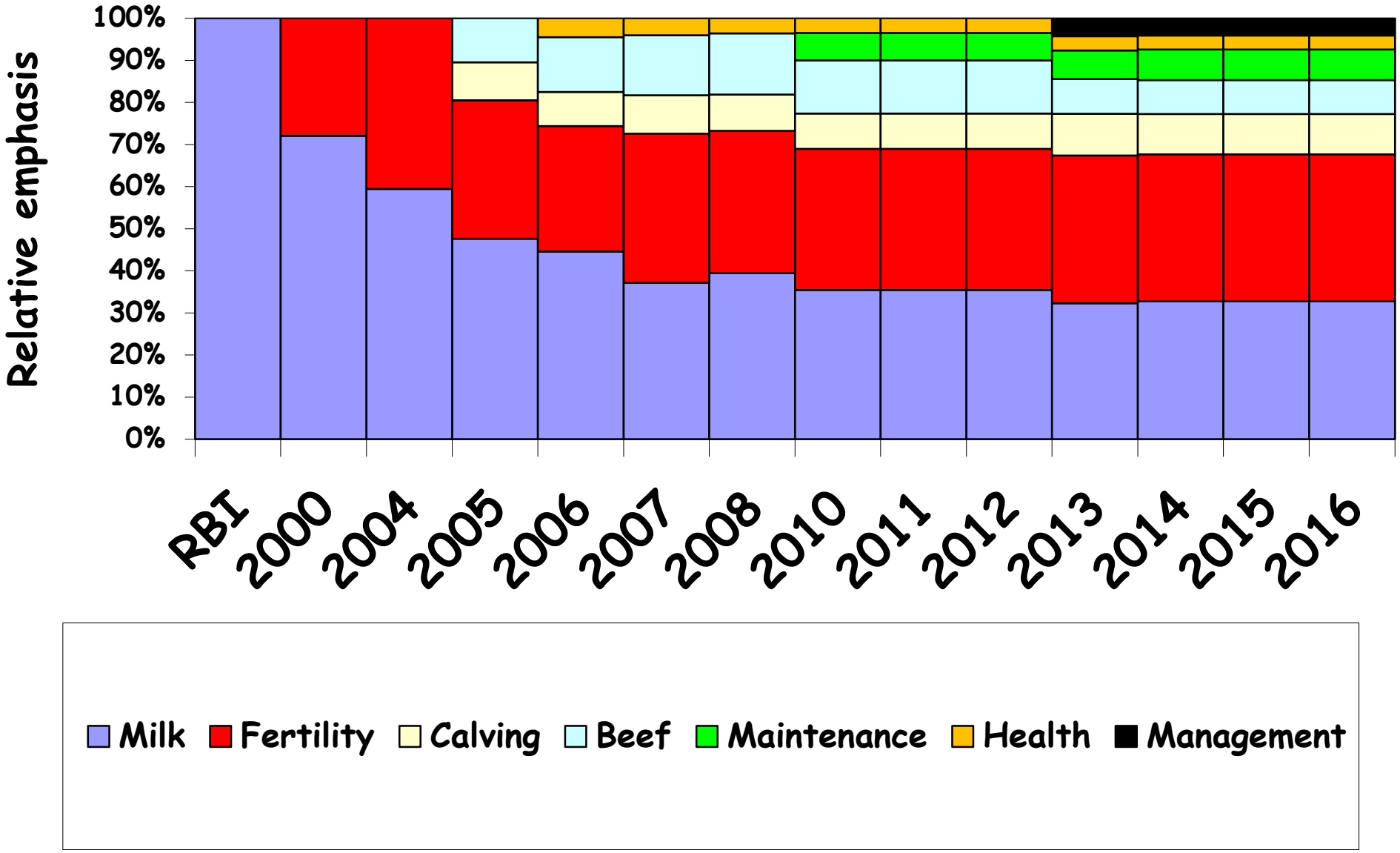
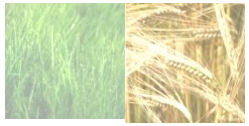
Evolution of the EBI



Sub-index	Trait	Weight	Emphasis	Emphasis
	Milk (kg)	-0.09	11%	
Production	Fat (kg)	1.04	3%	33%
	Protein (kg)	6.64	19%	
Fertility	Calving interval (d)	-12.43	24%	35%
	Survival (%)	12.01	11%	
	Calving difficulty dir (%)	-3.52	3%	
Calving	Calving difficulty mat (%)	-1.73	1%	9%
	Gestation (d)	-7.50	4%	
	Calf mortality (%)	-2.58	1%	
Maintenance	Cow (kg)	-1.65	7%	7%
	Carcase weight (kg)	1.38	5%	
Beef				9%

Breeding objectives

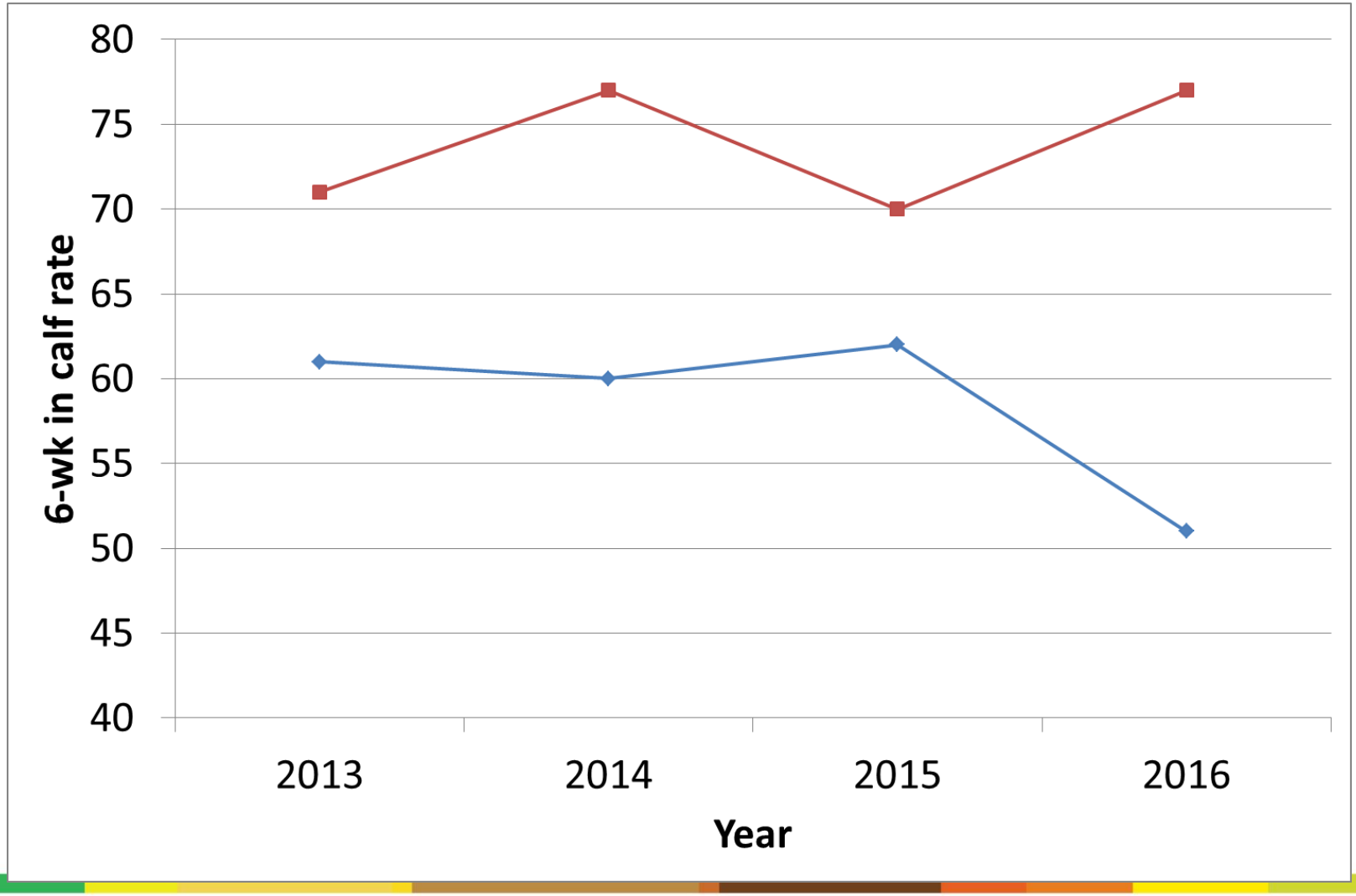
	CAN	USA	NLD	UK	AUS	NZL
USA	0.84					
NLD	0.87	0.87				
UK	0.85	0.85	0.82			
AUS	0.74	0.64	0.69	0.75		
NZL	0.49	0.44	0.44	0.54	0.78	



NextGen results - 2016

	National Average	Elite
Days in milk	150	153
Milk solids to date (kg)	277	293
Fat %	4.12	4.41
Protein %	3.41	3.57
Live-weight	534	514
BCS	2.81	2.95
Submission 3 weeks (%)	91	96
6 wk in-calf rate (%)	51	77
9 wk in-calf rate (%)	69	91

NextGen results - 2016



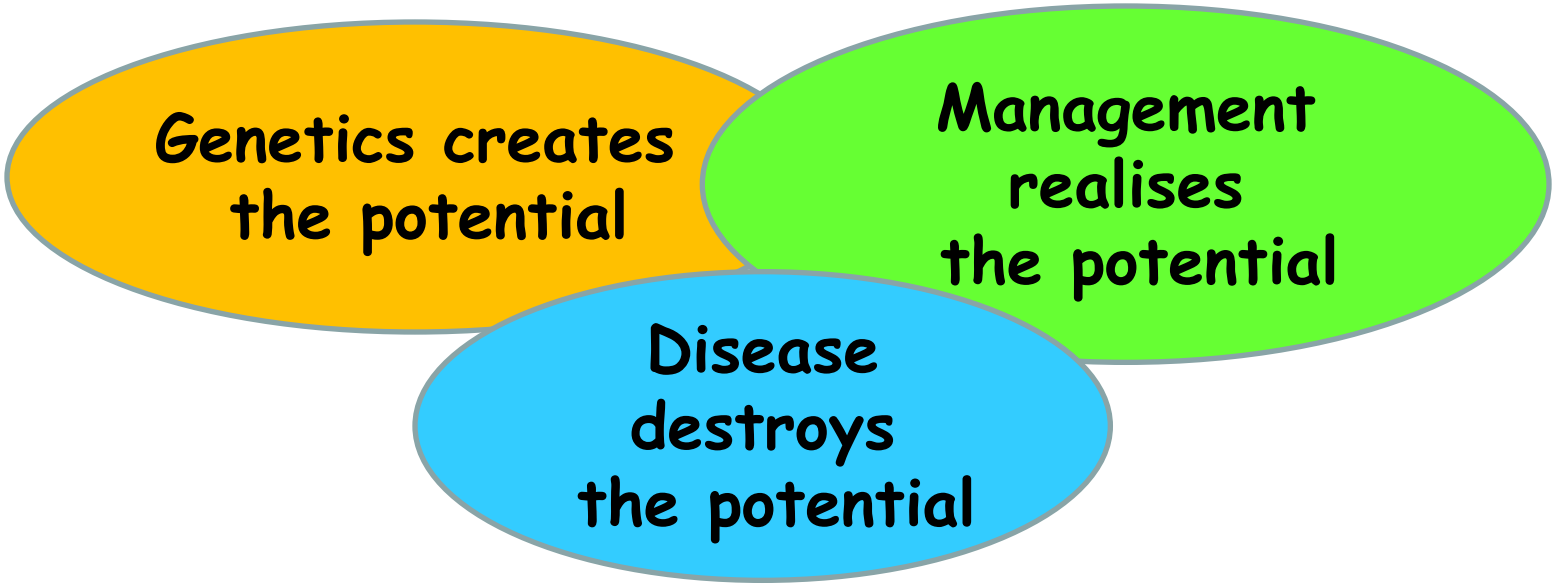
Economic values

- Milk price (29.5 c/l)
  - International projections (e.g., RaboBank) does not suggest otherwise
- Feed prices (€250/t)
  - No reason to change
- Farmer feedback
  - Live-weight

Missing suites of traits

- Product quality
  - Fatty acid content, protein profile, processing ability
  - BreedQuality
- Environmental load (incl. feed intake)
  - Methane, nitrogen, feed intake
  - RapidFeed
- Health (incl. disease) and welfare
  - Production diseases
  - HealthyGenes

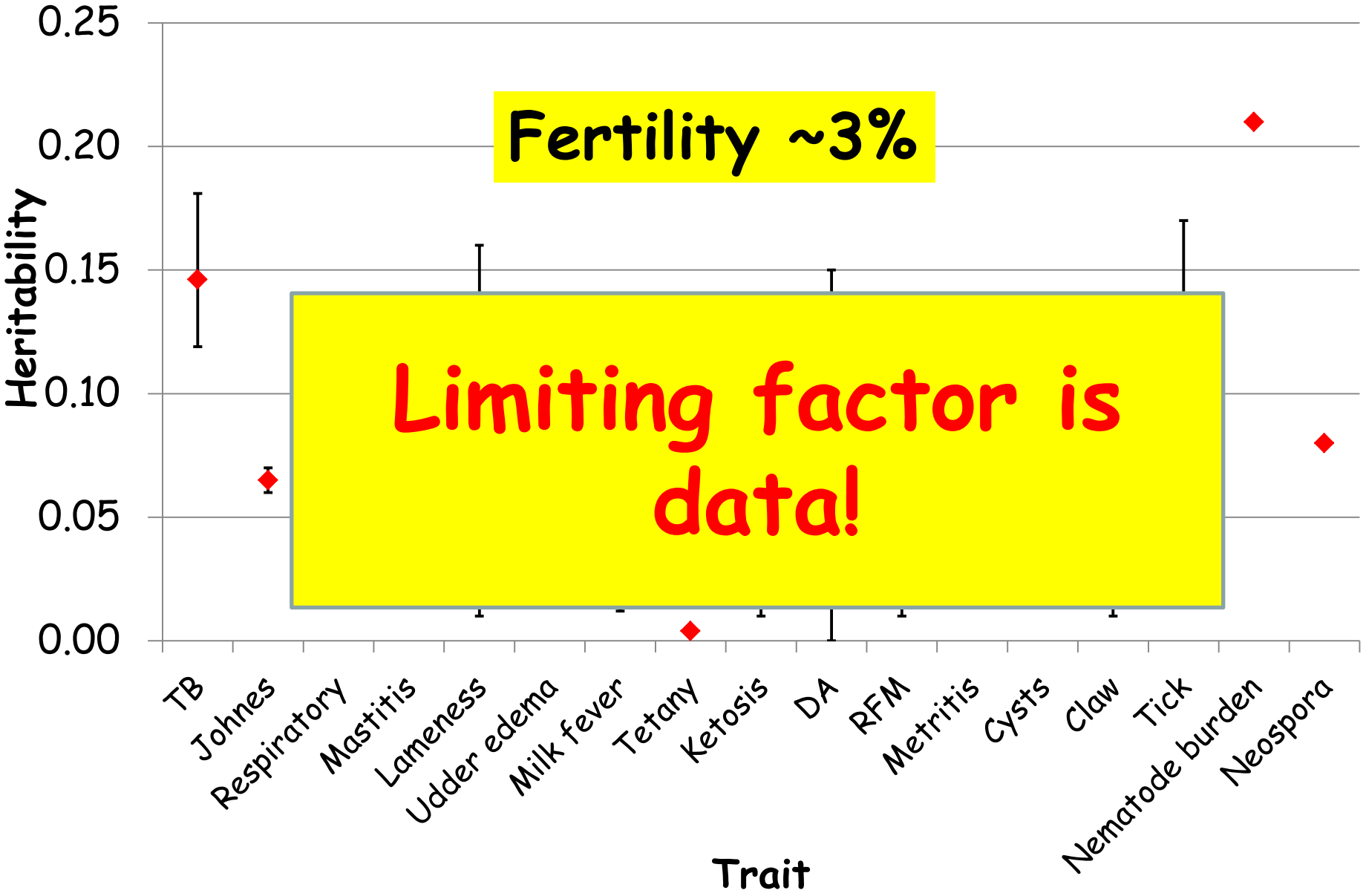
Animal health



Animal health is the "new fertility"

…and breeding has a role in its control

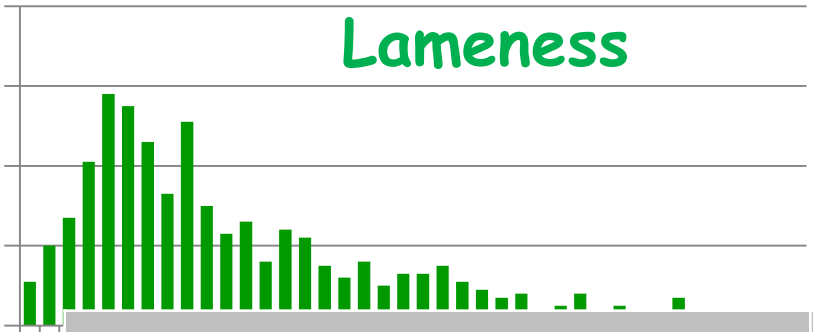
Breeding possible??

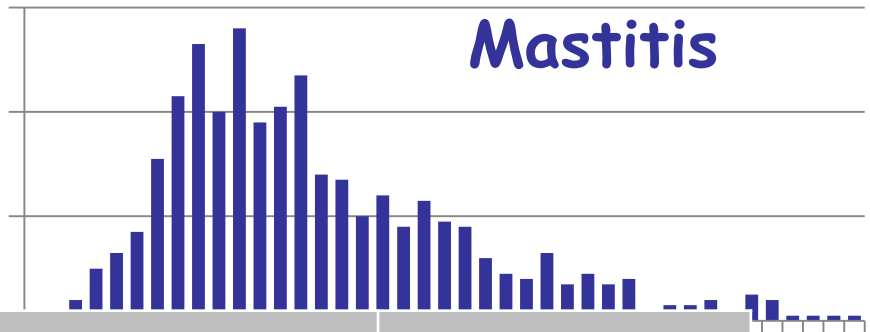


Categories of traits

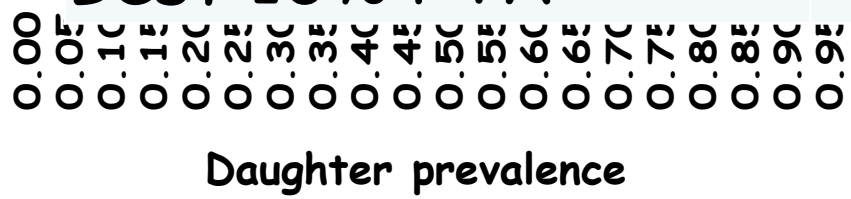
- Close to implementation
  - TB, cystic ovaries
- Data available but no genetic parameters
  - Johnes, IBR, cow health traits, calf health traits, claw health
- Data not available and no genetic parameters
  - Liver-fluke, pneumonia, neospora, salmonella,

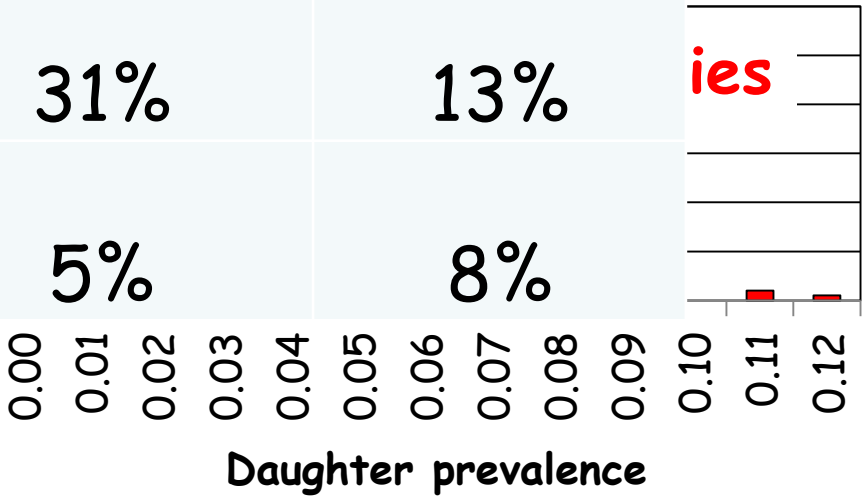
Animal Health



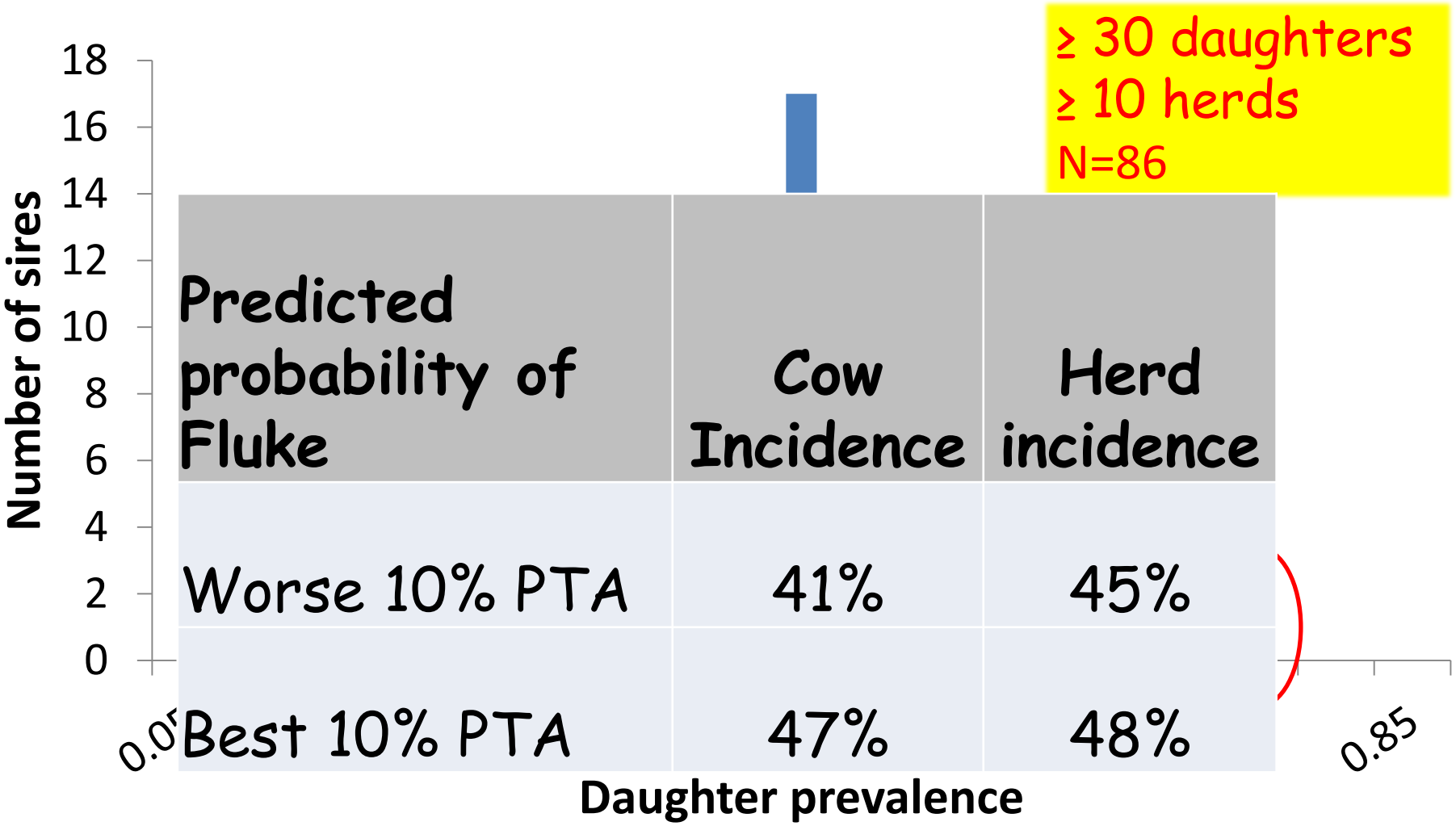


Predicted probability of TB	Cow Incidence	Herd incidence
Worse 10% PTA	31%	13%
Best 10% PTA	5%	8%



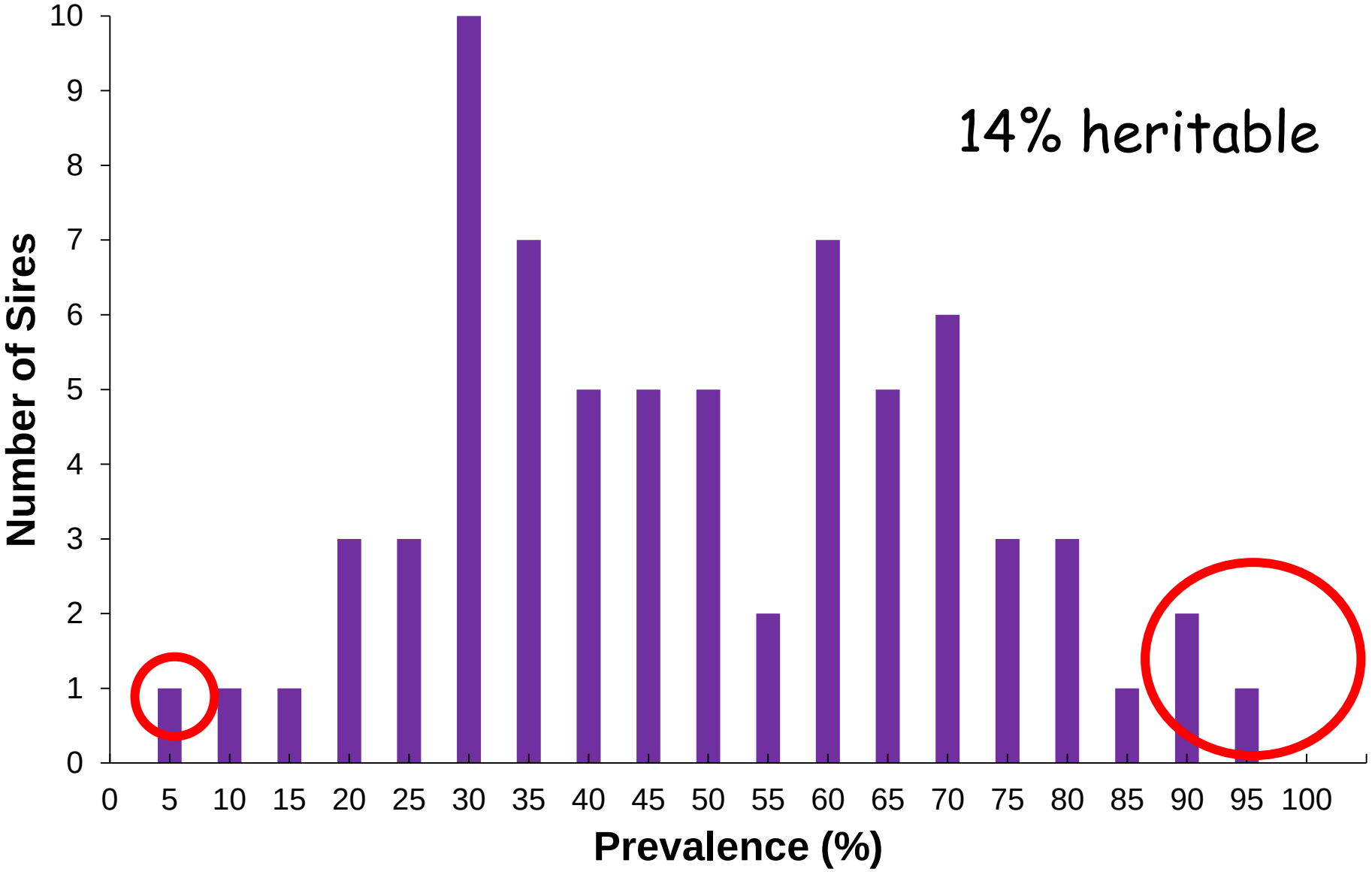


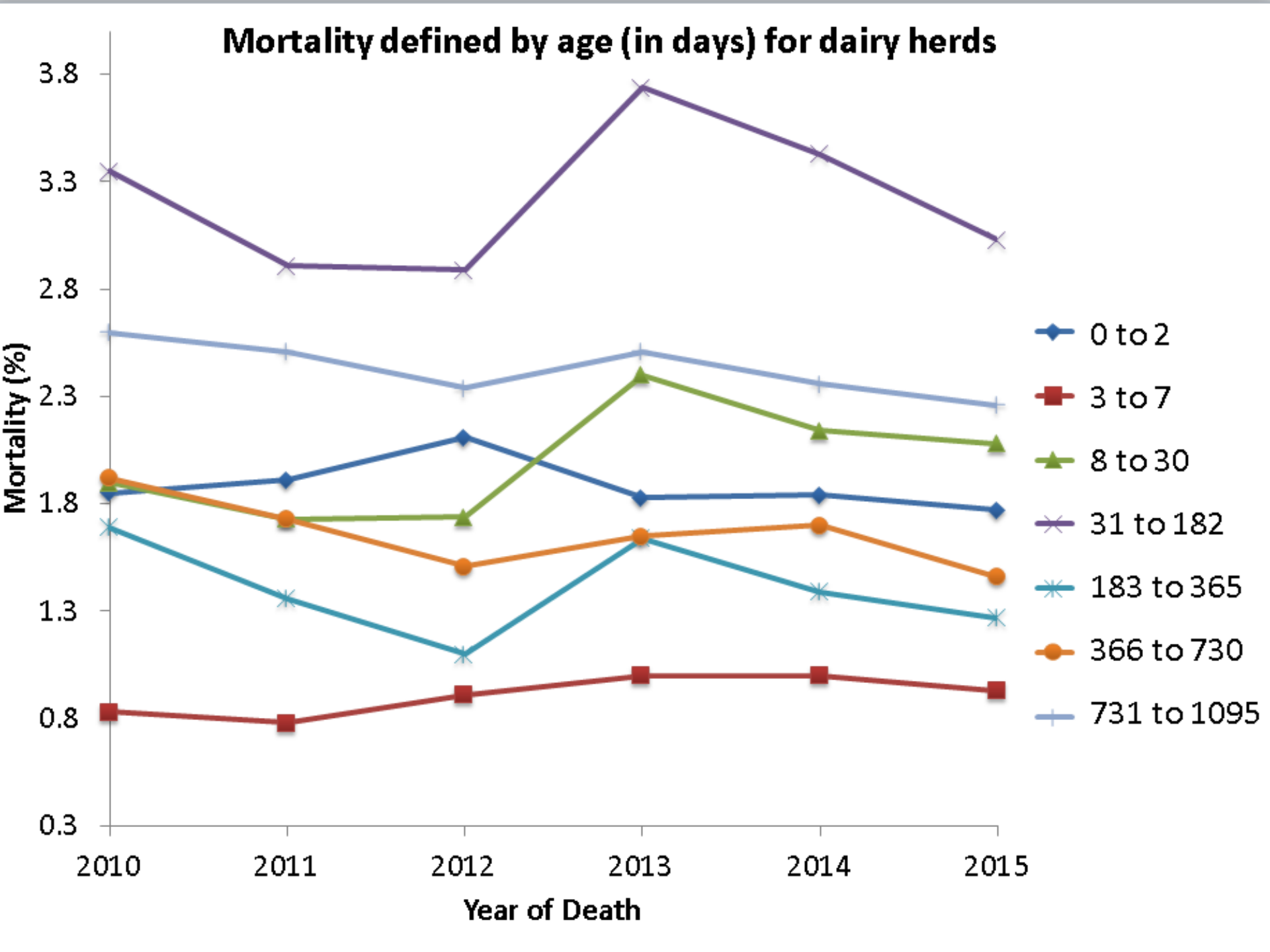
Liver-fluke

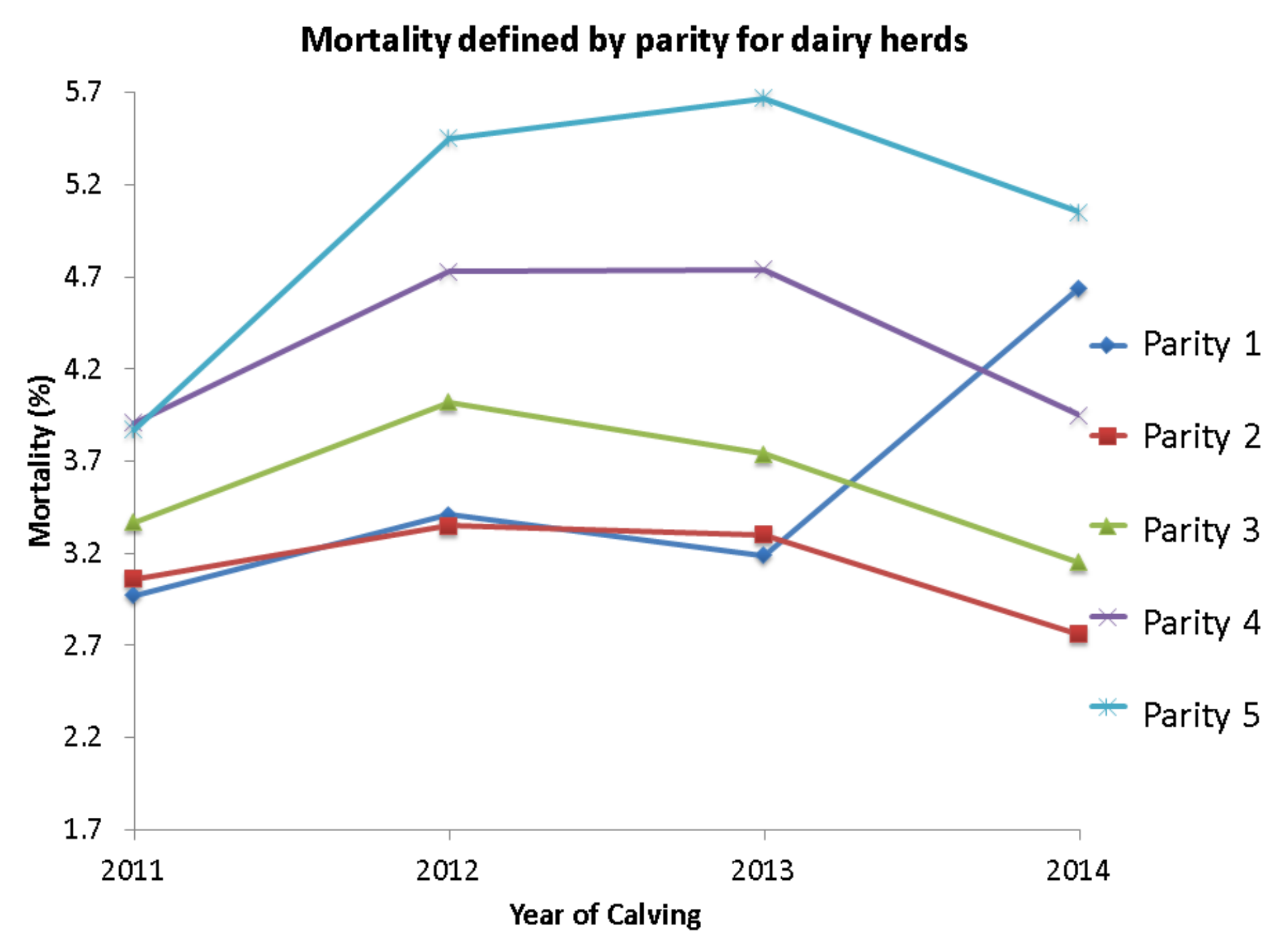


Predicted probability of Fluke	Cow Incidence	Herd incidence
Worse 10% PTA	41%	45%
Best 10% PTA	47%	48%

IBR

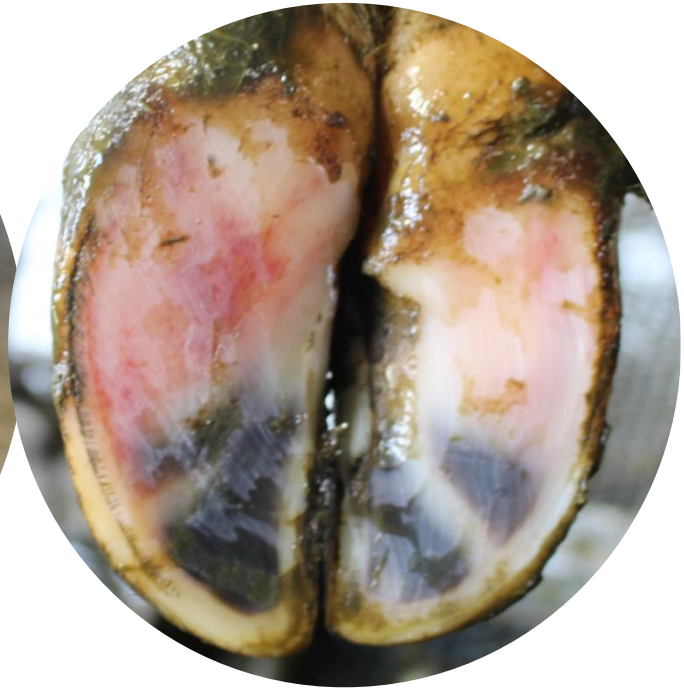

14% heritable
Number of Sires
Prevalence (%)
0
1
2
3
4
5
6
7
8
9
10
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
95
100


Mortality defined by age (in days) for dairy herds
3.8
3.3
2.8
2.3
1.8
1.3
0.8
0.3
Mortality (%)
2010
2011
2012
2013
2014
2015
Year of Death
0 to 2
3 to 7
8 to 30
31 to 182
183 to 365
366 to 730
731 to 1095


Mortality defined by parity for dairy herds
5.7
5.2
4.7
4.2
3.7
3.2
2.7
2.2
1.7
Mortality (%)
2011
2012
2013
2014
Year of Calving
Parity 1
Parity 2
Parity 3
Parity 4
Parity 5

Hoof disorders

Overgrown



Bruising

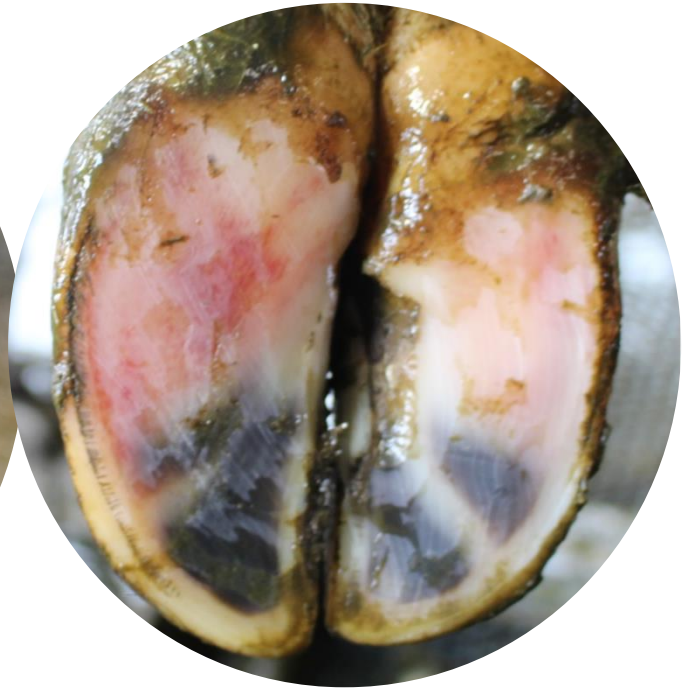
White Line

50% of cows had at least one hoof-disorder

Breeding for reduced lameness

Overgrown

8% heritable



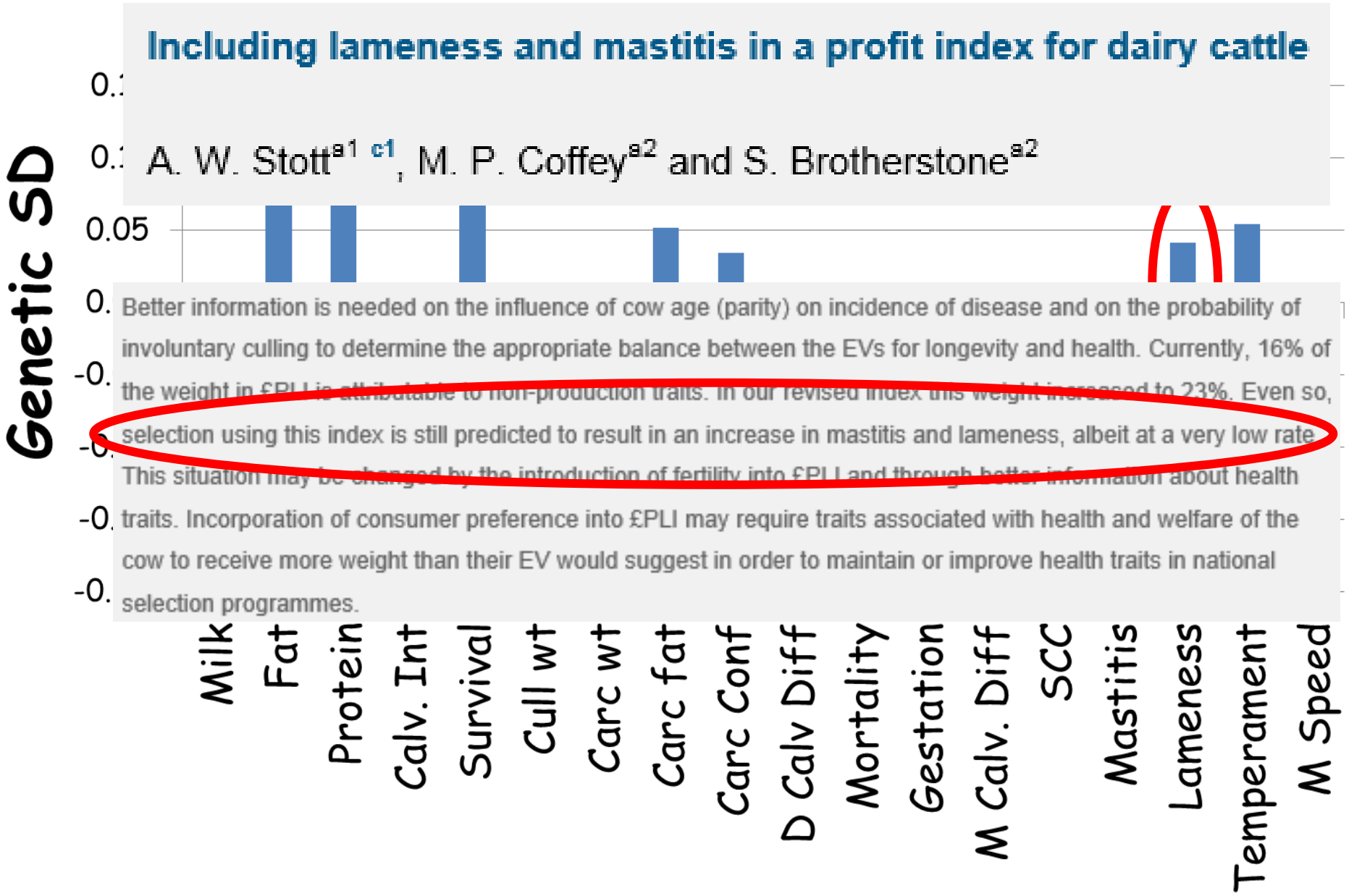
Bruising

24% heritable

White Line

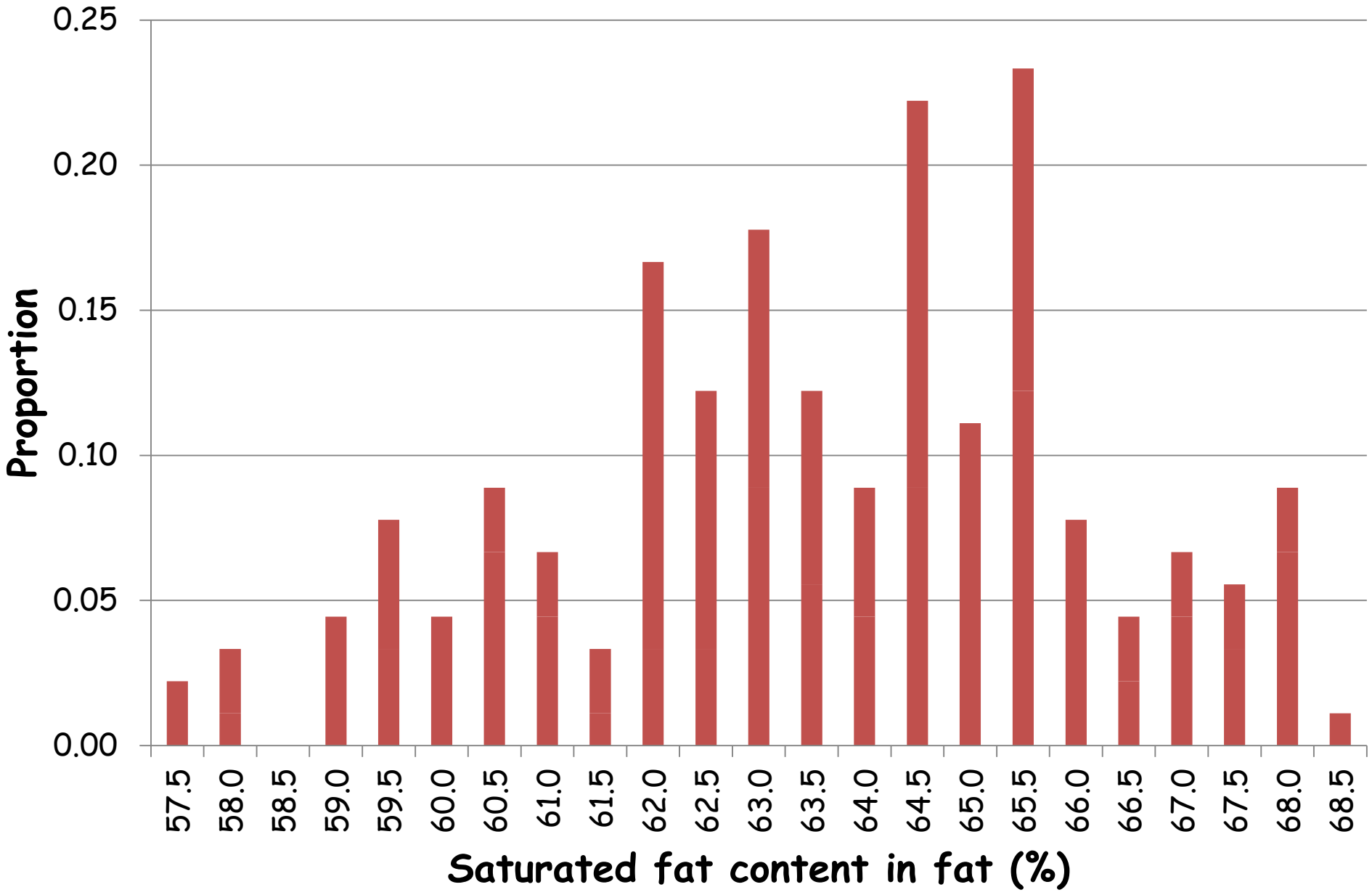
21% heritable

Expected response to selection

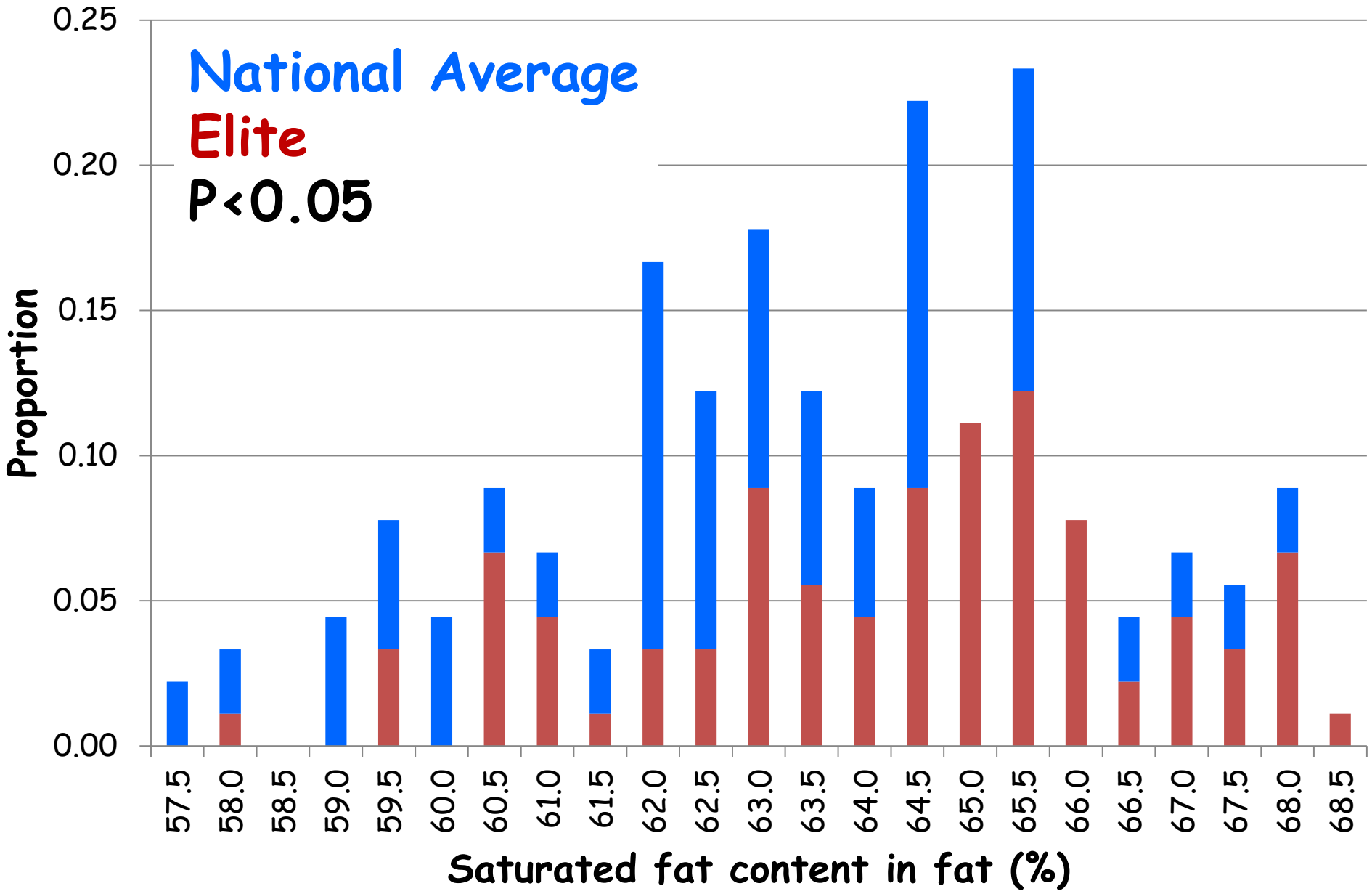


Product quality

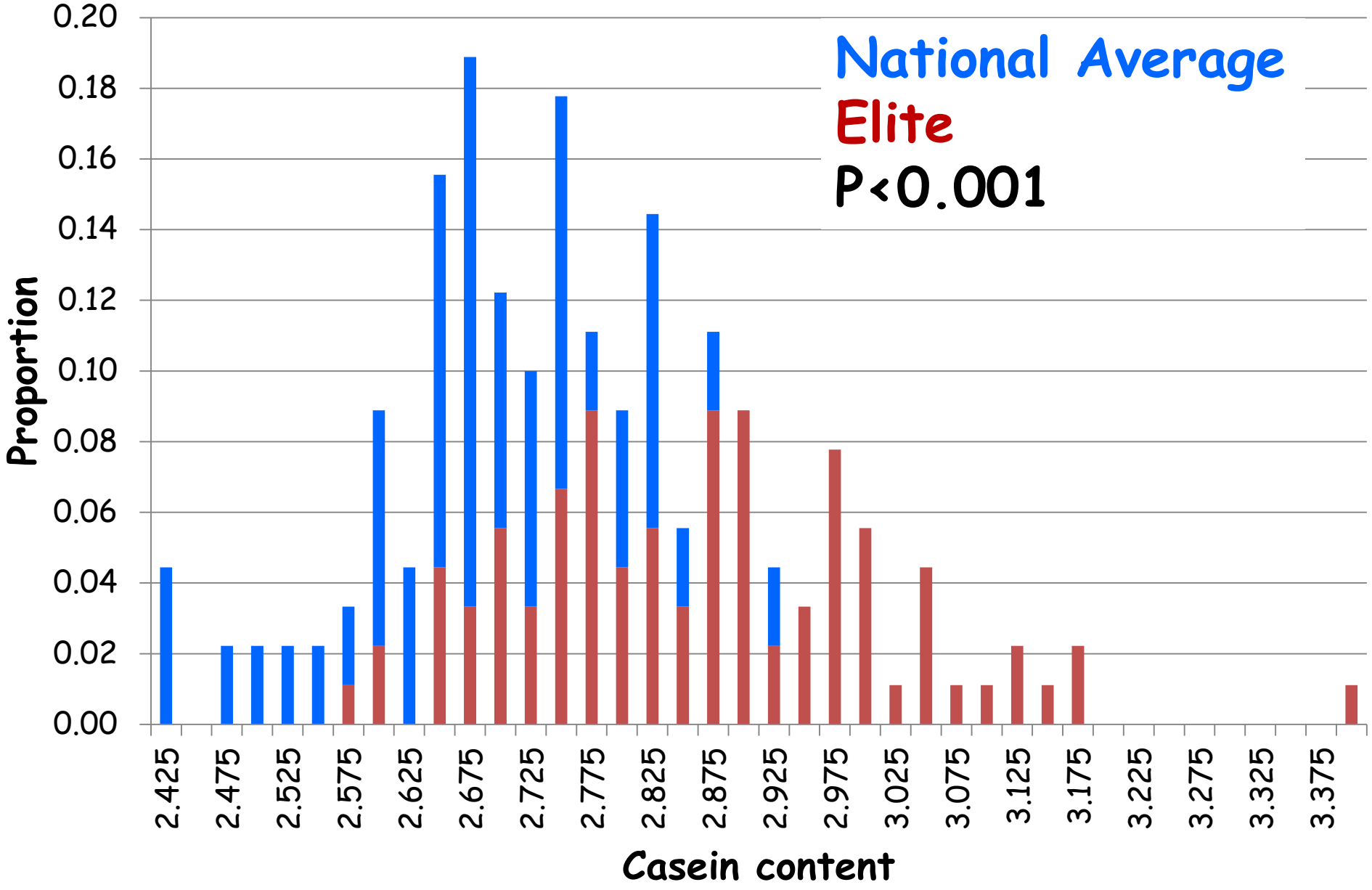
Saturated fatty acid content



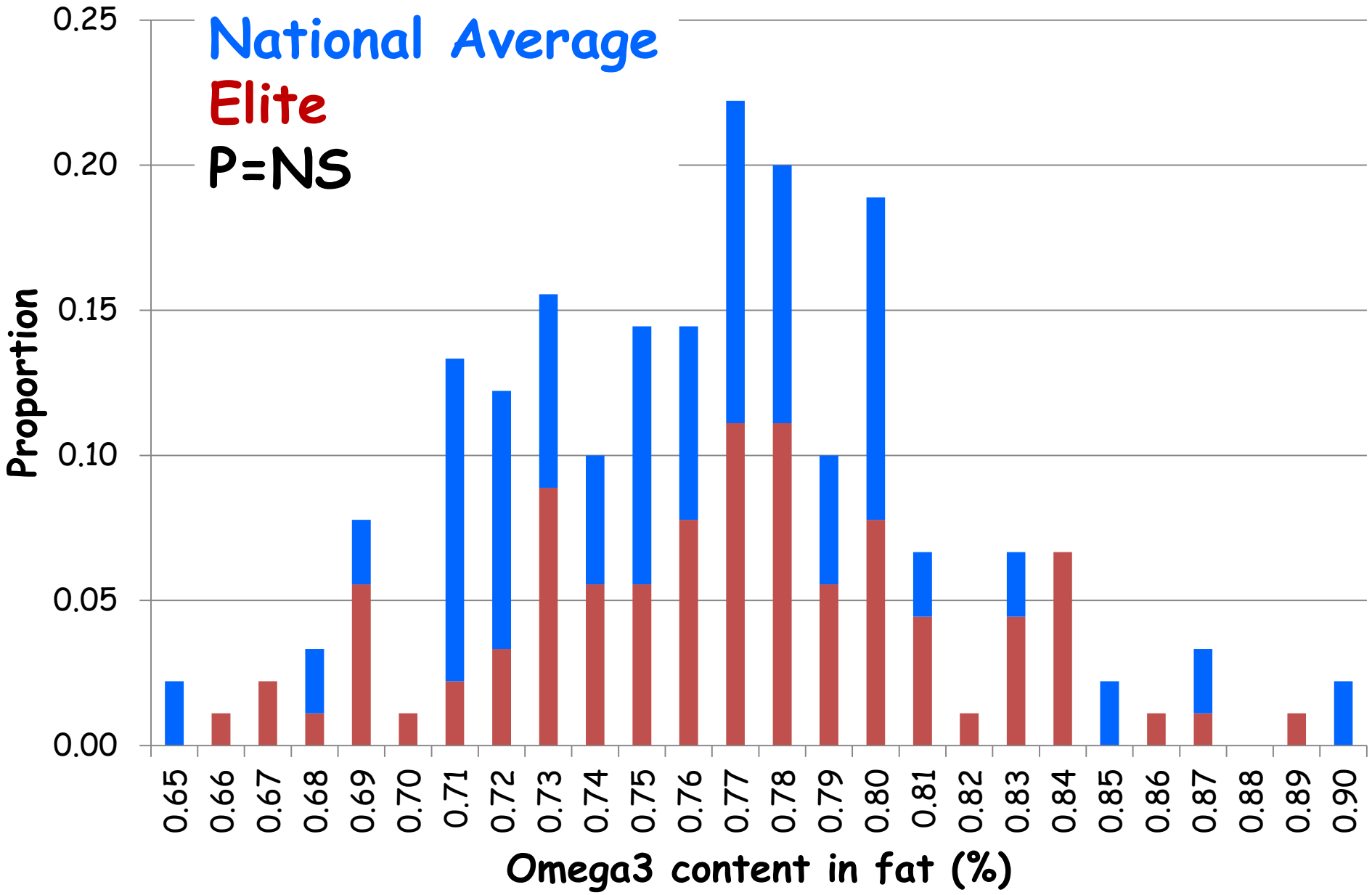
Saturated fatty acid content



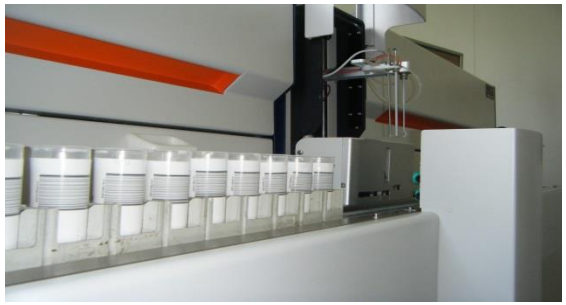
Casein content

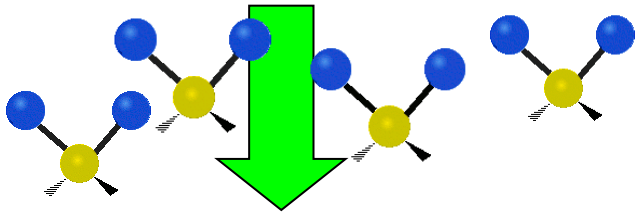


Omega-3 content in fat



Mid-infrared spectroscopy (MIR)

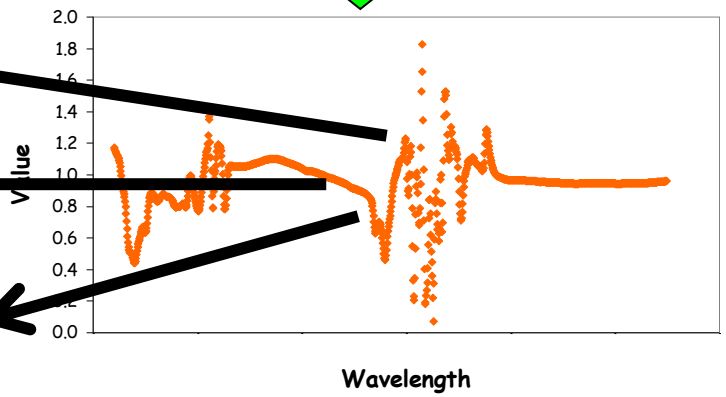




Fatty acids

Protein composition

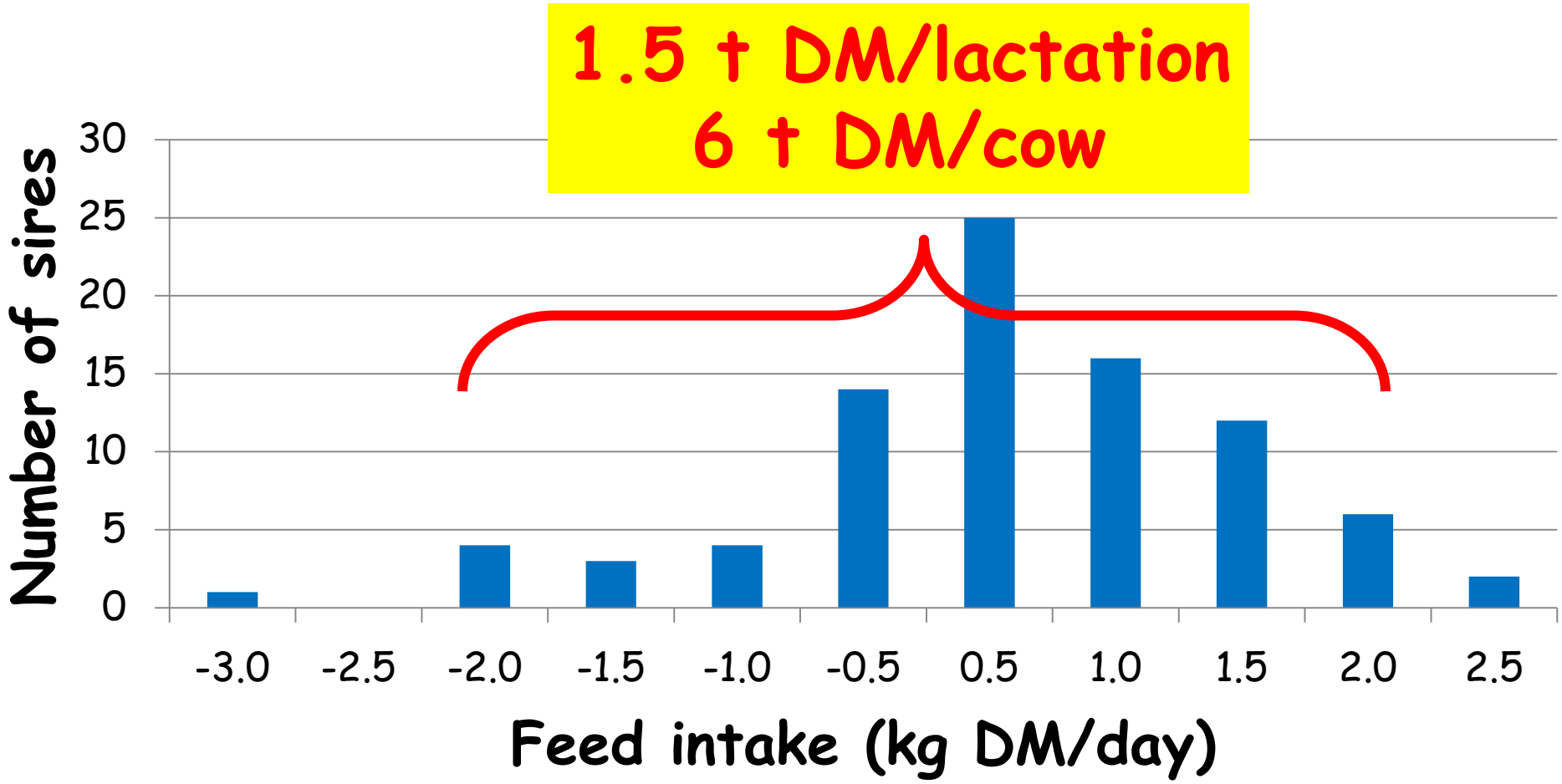
Coagulation properties



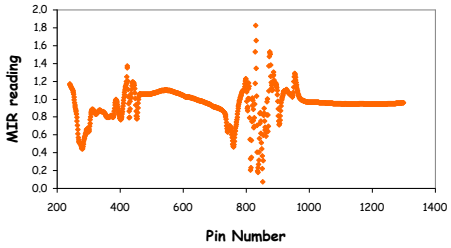
Feed intake and efficiency

Feed intake and efficiency

Feed intake for same yield and body size



Fat:protein and energy balance



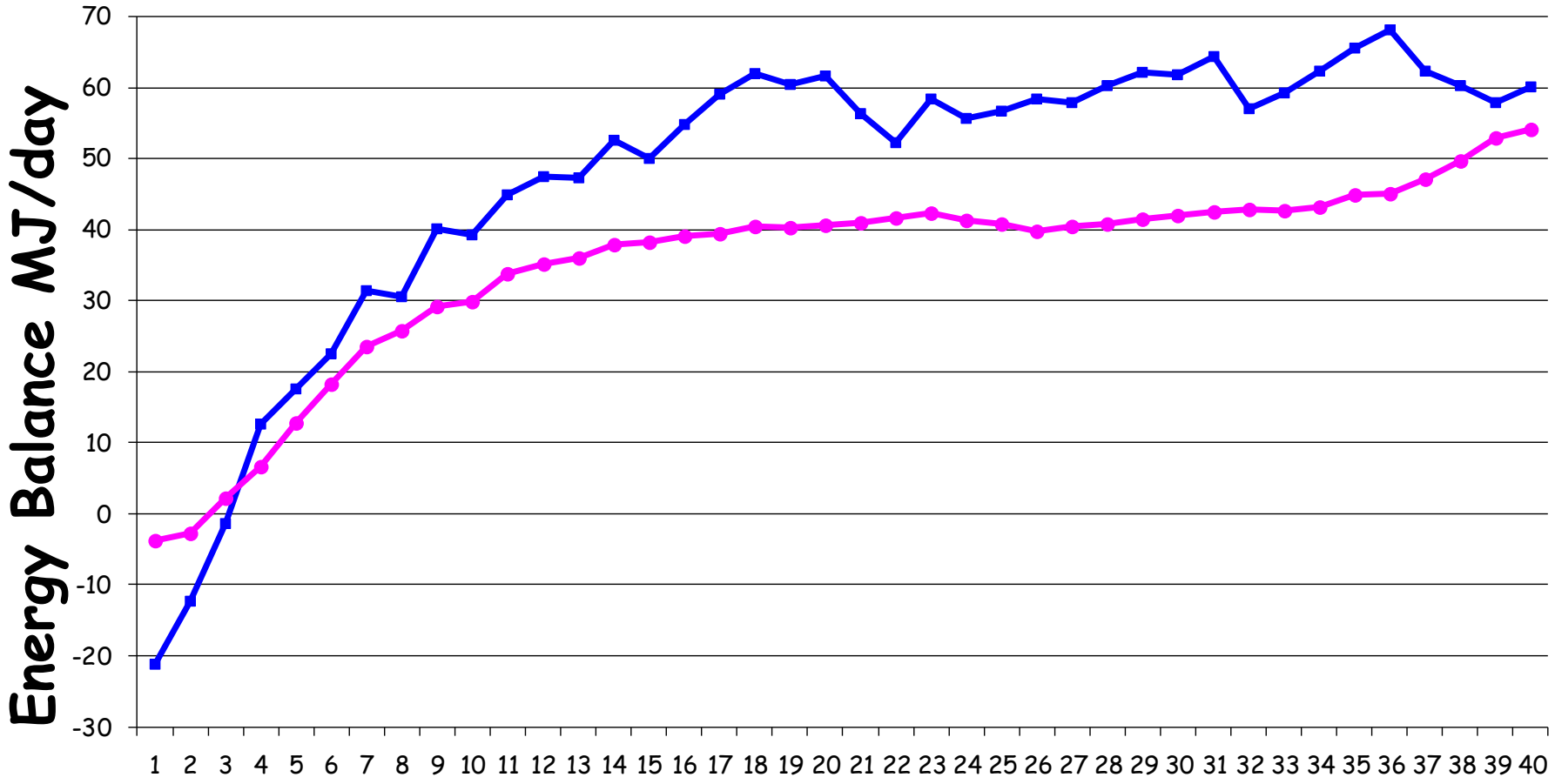
Milk fat content

Milk protein content

:

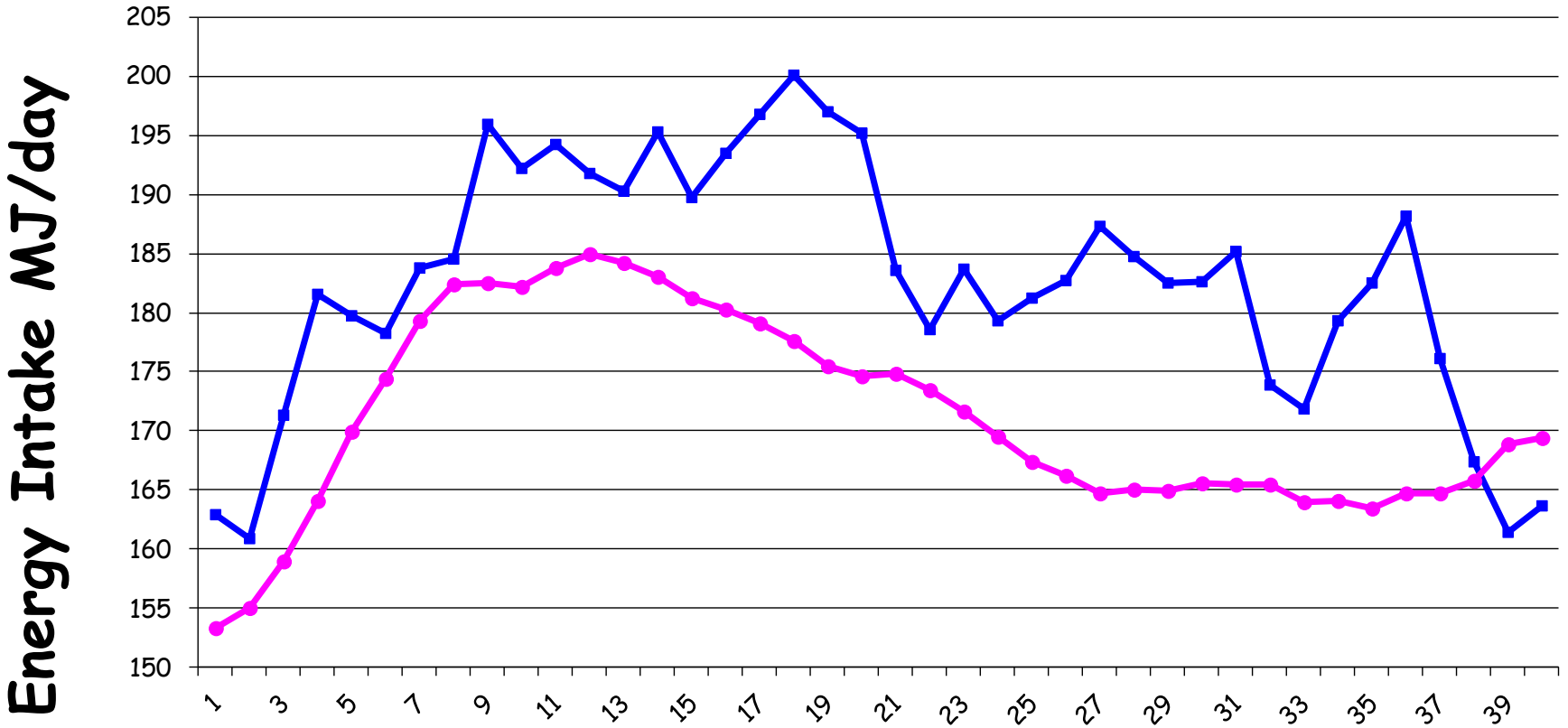
Predicted Energy Balance

True & MIR-predicted Energy Balance



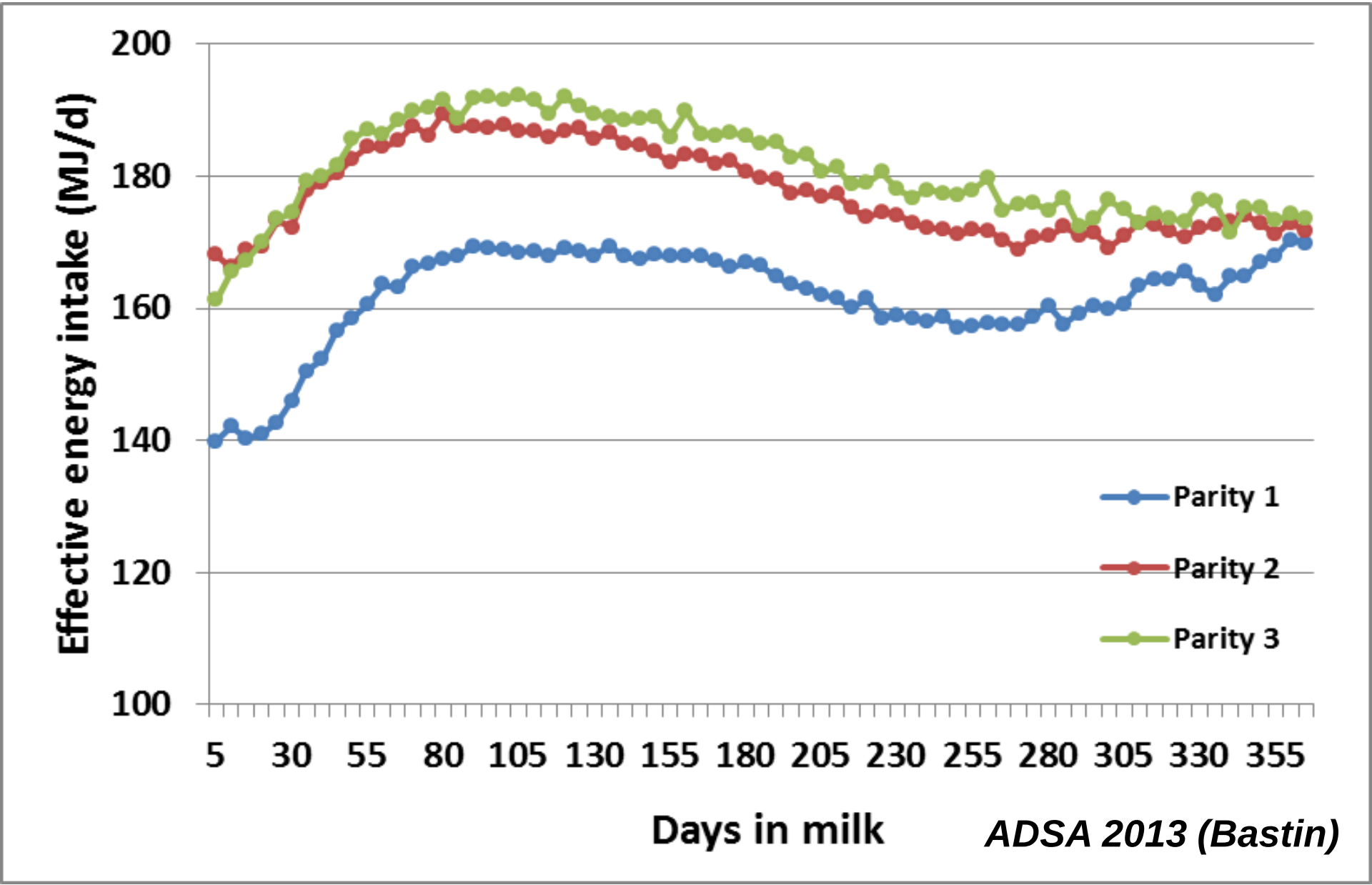
JDS. 98: 1310-1320

True & MIR-predicted Energy Intake



JDS. 98: 1310-1320

Intake predicted for Belgian Holsteins



ADSA 2013 (Bastin)

Genetic parameters

Heritability	True	Predicted (IRL)	Predicted (BEL)
Energy Intake	0.35(0.02)	0.20 (0.01)	0.20
Energy Balance	0.16(0.02)	0.10(0.01)	0.43
RFI	0.10(0.05)	0.16(0.01)	-

- r_g True & predicted EB = 0.54
- r_g True & predicted intake = 0.84

JDS. 98: 1310-1320

WCGALP 2014 (McParland)

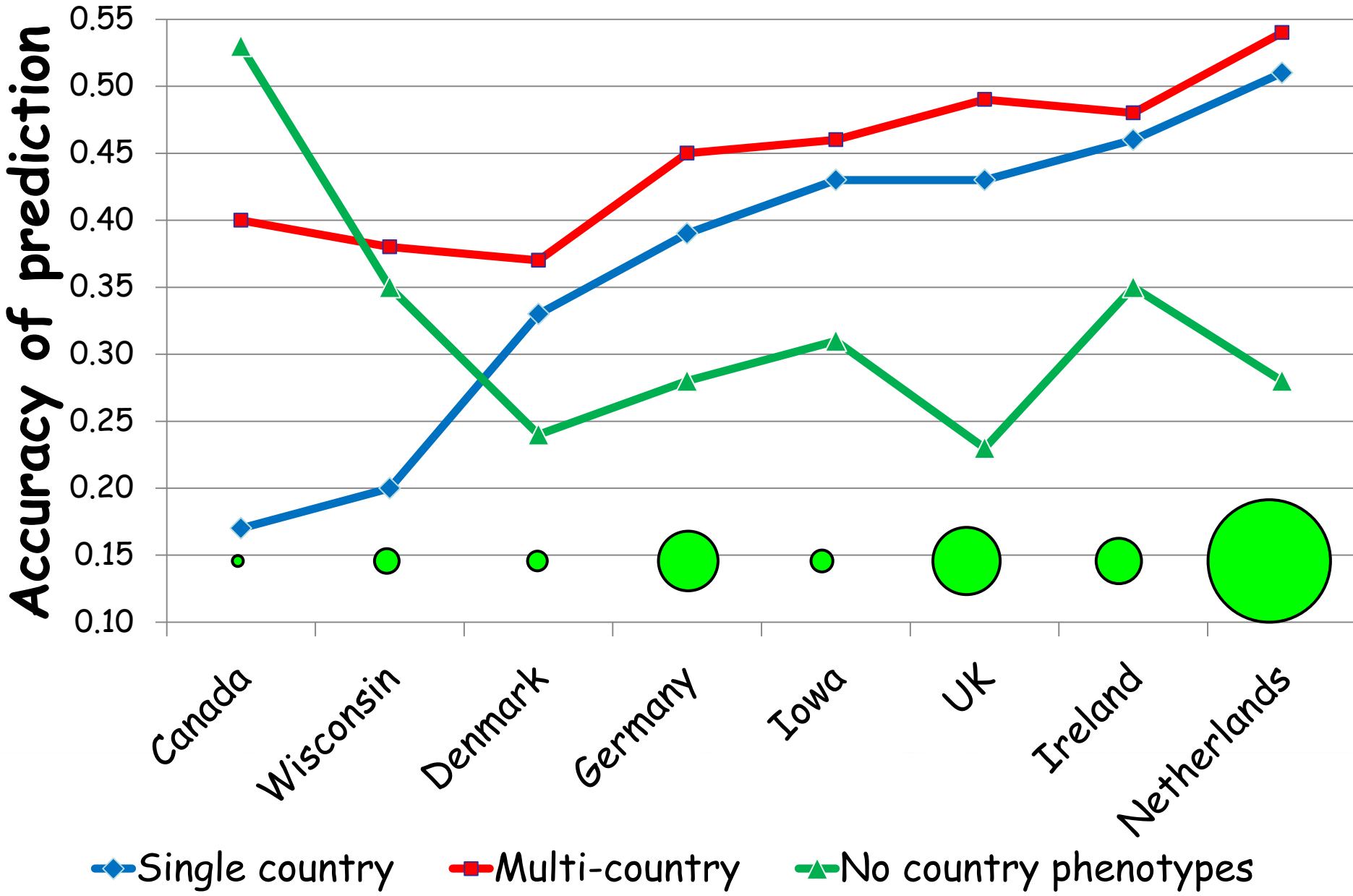
ADSA 2013 (Bastin)

Validation of genetic evaluations

- Breeding values predicted for intake
  - 198 animals with actual intake recorded
  - MIR predicted intake for these animals removed from genetic evaluation

	EBV (MJ/d)	Actual intake (MJ/d)
Low	-1.5	154
Medium	4.4	156
High	10.2	163

International Genomic Evaluations



Conclusions

- Breeding is for 7-10 years' time
  - What will the likely issues be?
- Animal health and disease, feed intake and efficiency, product quality