

Application of non-linear weightings in industry breeding indexes

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Introduction

- Development of a dairy beef index for use in Ireland
- Initial formulations with linear weightings lead to bulls with undesirable calving difficulty levels ranking highly
- Challenge to breed for calves that would meet the minimum processor specifications



Dairy beef index

- Developed in collaboration with ICBF and Teagasc
- Traits incorporated:
 - Gestation length
 - Calving difficulty
 - Calf mortality
 - Carcase weight, fat and conformation
 - Feed intake
 - Docility



Why non-linear approach to calving?

- A linear formulation was tested with the new calving proofs
- The top ranked bulls had undesirable levels of calving difficulty

Average PTAs of the top 30 ranked bulls on the DBI

Component PTA	Calving only	Linear calving DBI	Non-linear calving DBI
Dairy heifer % difficult	4.8	12.5	7.8
Dairy cow % difficult	1.5	7.5	4.0
Carcase weight	-0.87	34.23	27.17
Carcase conformation	0.58	2.77	2.08

Calving difficulty survey

- Farmers tolerate a small amount of calving difficulty for a higher calf value, but not a large amount

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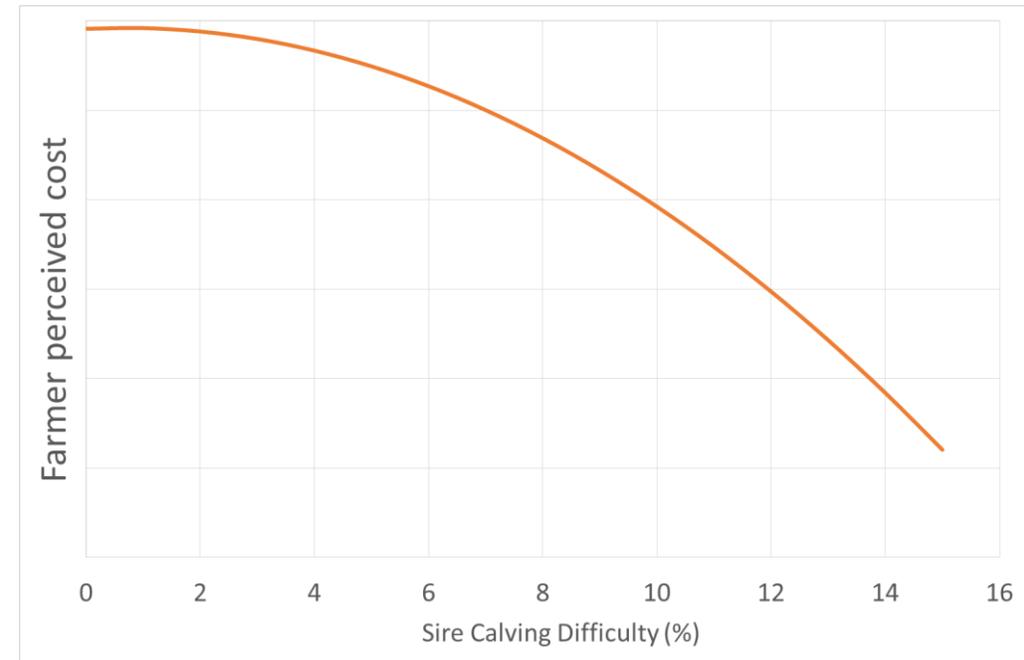


Farmer views on calving difficulty consequences on dairy and beef farms

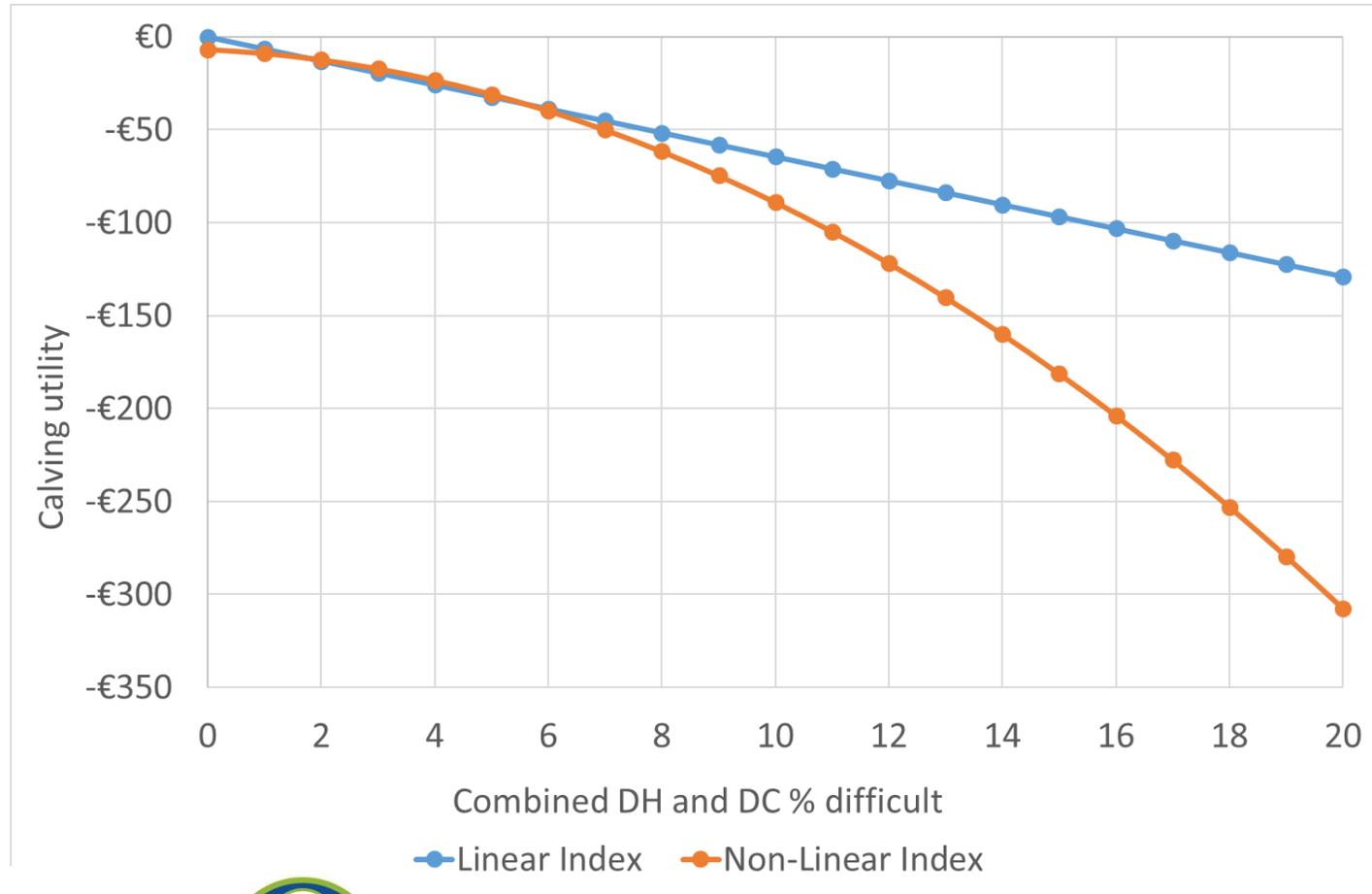
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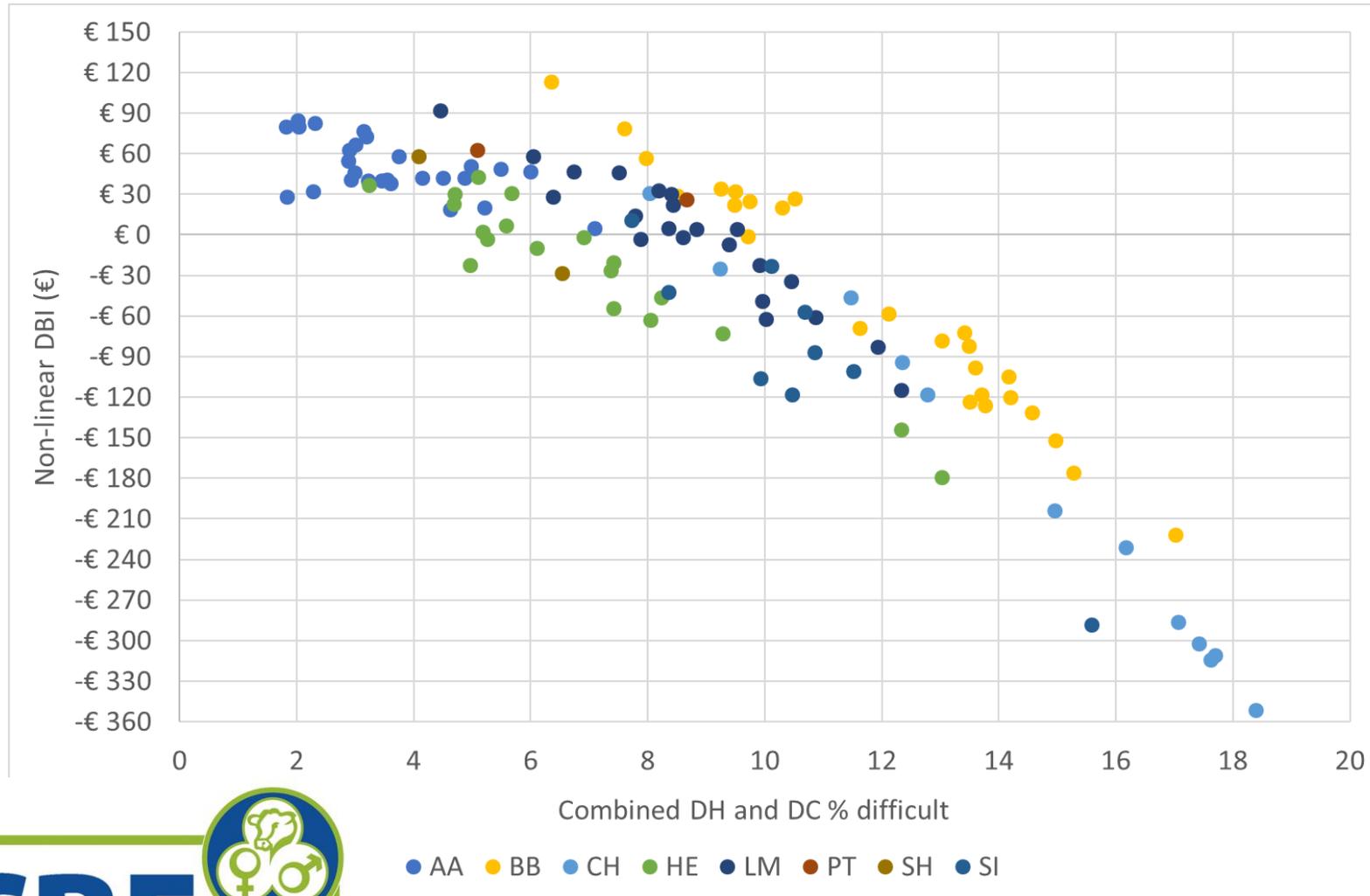


Proposed non-linear calving utility



- Curve from the survey results used as a base
- 23% Dairy heifer + 77% Dairy cow
- Linear economic weighting -€6.44
- Shift from 3-4% difficult calvings in non-linear calving utility of -€6.18

Application within the dairy beef index



- Active beef bulls with greater than 50 dairy progeny

Effect of non-linear calving

- Calving difficulty values in top ranked bulls more in line with farmer preference
- Acceptable changes in other traits

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The “not in spec” sub-index

- Dairy beef tends to have a high proportion of low carcass weight and low conformation carcasses
- The price per kg paid by processors drops sharply when carcasses do not meet the minimum specifications

	U+	U=	U-	R+	R=	R-	O+	O=	O-	P+
2+	24	18	12	6	0	0	-18	-24	-30	-36
3	24	18	12	6	0	0	-12	-18	-24	-30
4-	24	18	12	6	0	0	-12	-18	-24	-30
4=	24	18	12	6	0	0	-12	-24	-30	-36
4+	18	12	6	0	-6	-6	-18	-24	-30	-36
5	0	-6	-12	-18	-24	-24	-36	-42	-48	-54



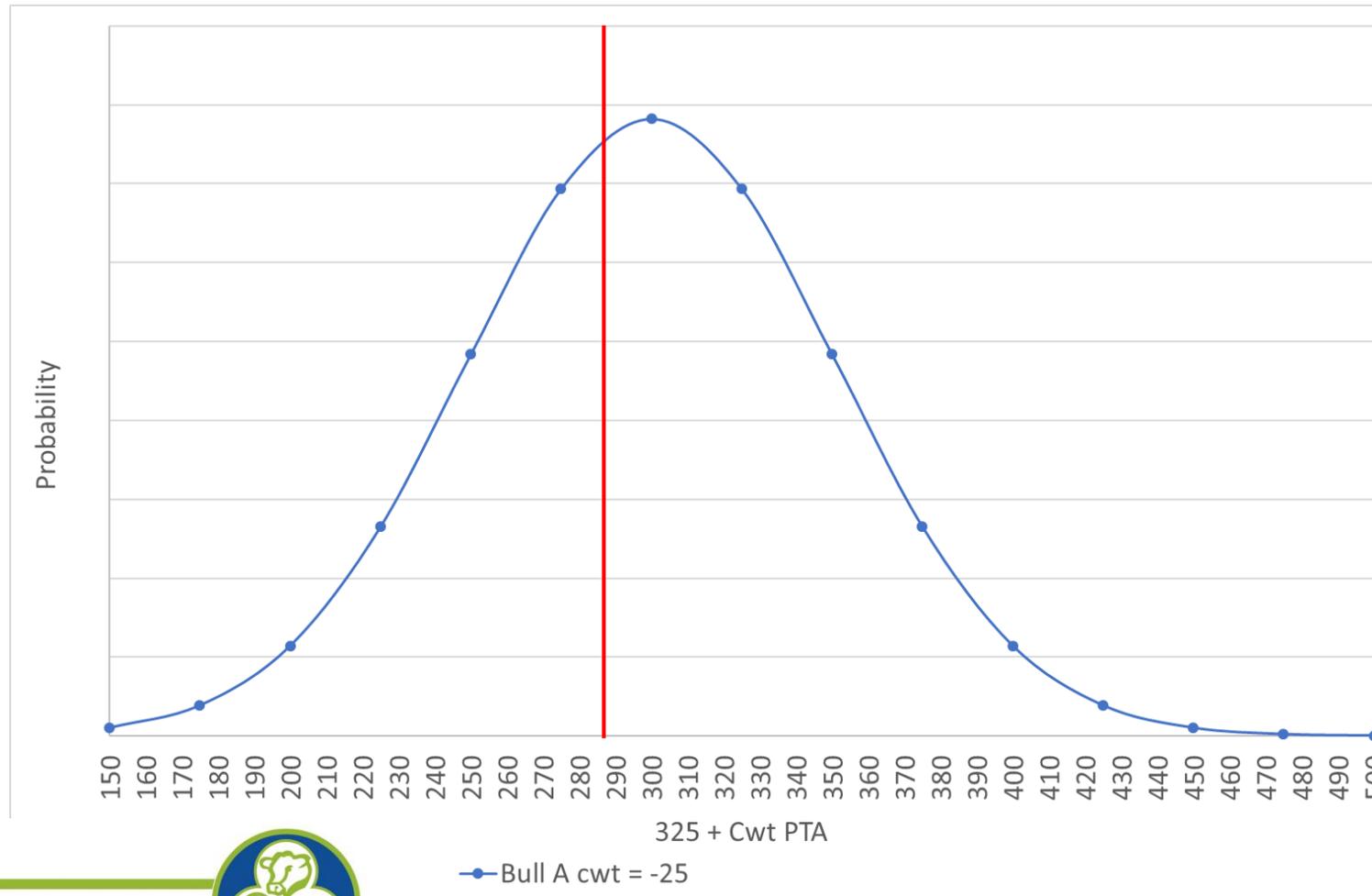
The “not in spec” sub-index

- Based on a bull’s PTA, estimate the probability of producing a carcass that falls below the minimum processor spec for carcass weight or conformation
- Create a “not in spec” sub-index:
 - € 0.40/kg x 325kg avg CW x % out of spec conformation
 - € 0.70/kg x 325kg avg CW x % out of spec carcass weight

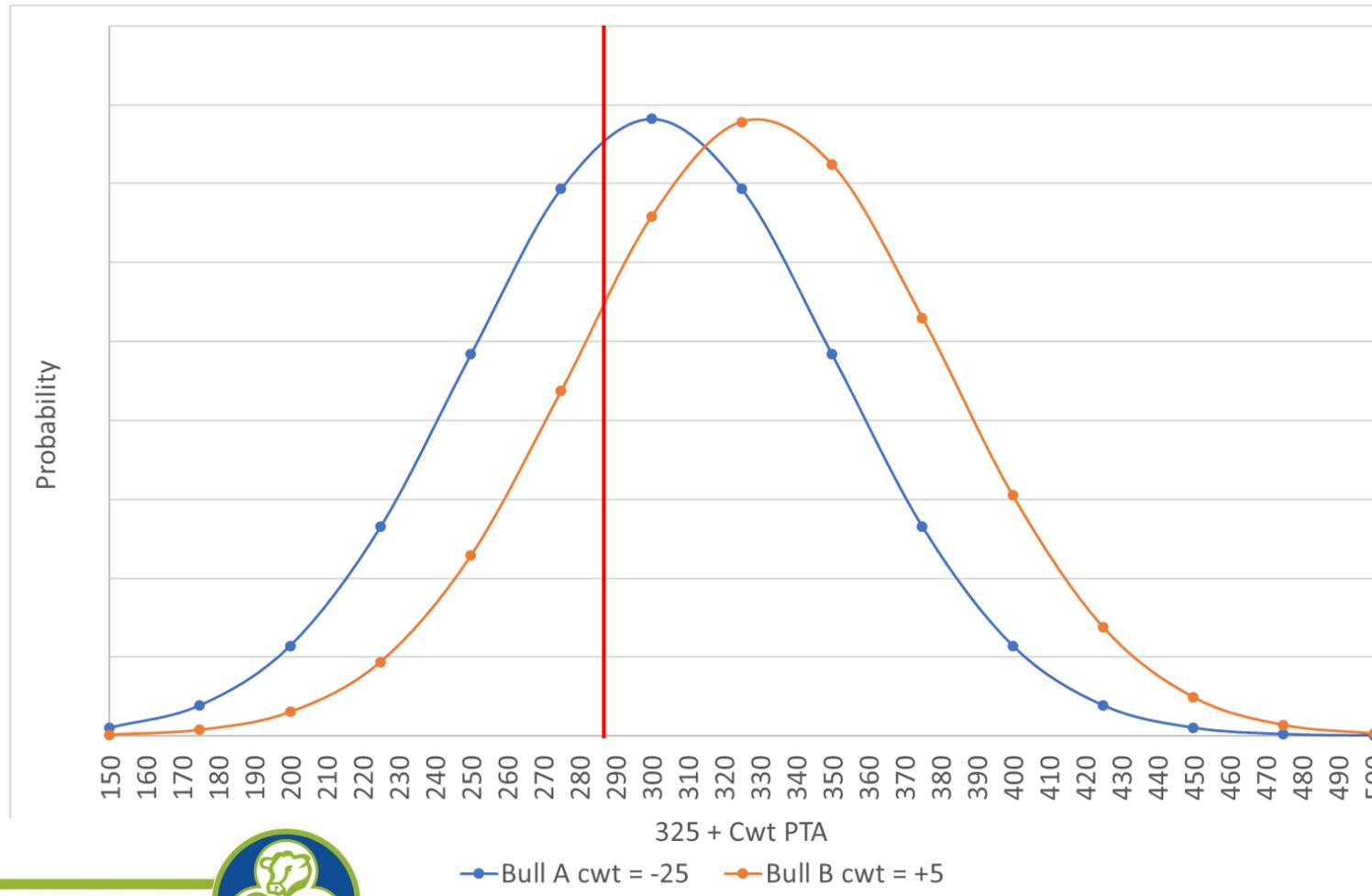


Example for carcass weight component

- Bull A has cwt = -25
 - 35% probability out of spec
 - Penalty of €49



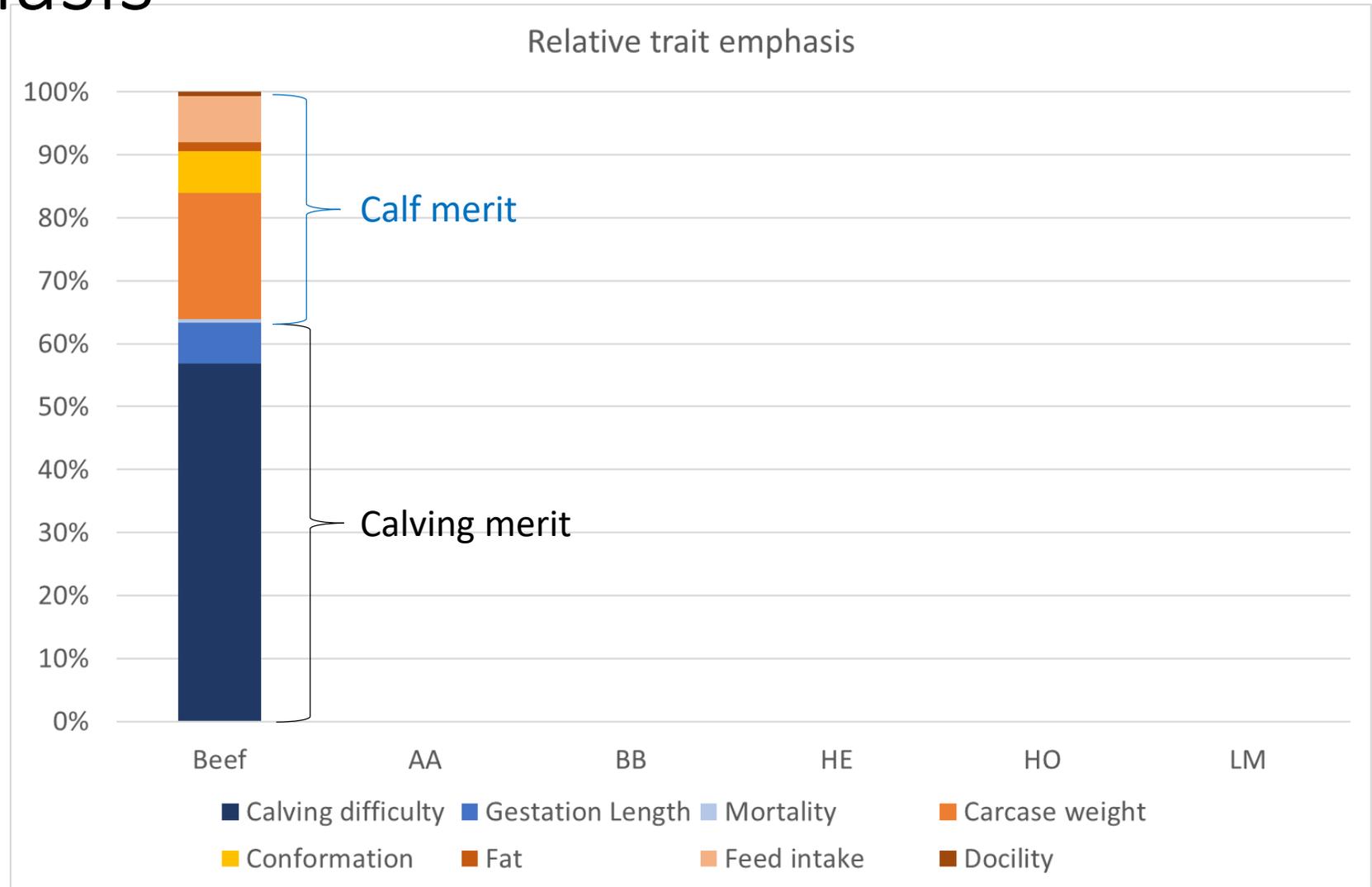
Example for carcasse weight component



- Bull A has cwt = -25
 - 35% probability out of spec
 - Penalty of €49
- Bull B has cwt = +5
 - 16% probability out of spec
 - Penalty of €23

Trait emphasis

Trait emphasis is dependent on breed



Trait emphasis

Trait emphasis is dependent on breed



Where to from here?

- Currently testing these non-linear approaches in the
 - Dairy EBI
 - Beef Terminal index
 - Beef Replacement index



Conclusions

- Non-linear weightings have been key in developing a dairy beef index formulation acceptable to farmers
- AbacusBio has developed non-linear weightings for traits in a number of contexts

