Genetic parameters for the achievement of desirable carcass specifications

David A. Kenny[1,2], Craig Murphy[2], Roy D. Sleator[2], Ross D. Evans[3], Donagh P. Berry[1]

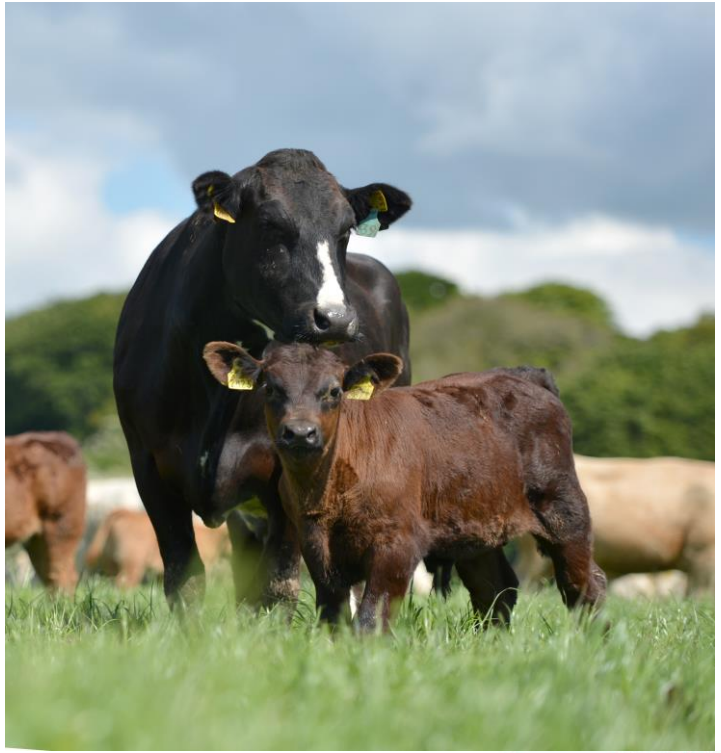
[1]Teagasc, Moorepark, Co. Cork, Ireland
[2]Cork Institute of Technology, Co. Cork, Ireland
[3]Irish Cattle Breeding Federation, Co. Cork, Ireland

Agriculture and Food Development Authority

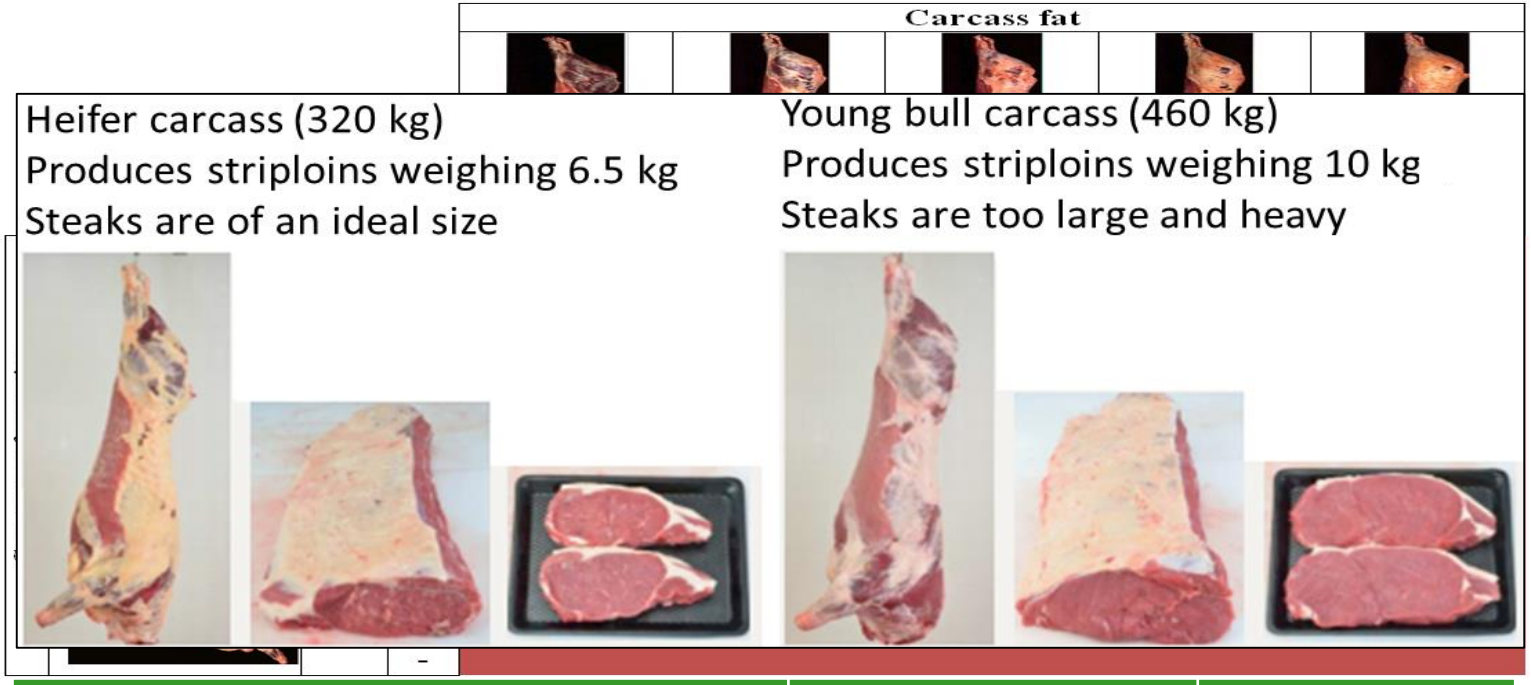
DavidA.Kenny@teagasc.ie

Irish beef industry

- 1.7 million cattle slaughtered yearly
  - 55% suckler beef & 45% dairy beef
  - 80% of Irish beef is exported
- Carcass value is based on the measurement of:
  1. Carcass weight, kg
  2. Carcass fat, EUROP
  3. Carcass conformation, EUROP



Desired specifications



Desired specification	Minimum	Maximum
Carcass weight, kg	270	380

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Problem?

- Failure of the desired specifications:
  - 5
  - 6

Objective

Can we breed for the achievement of desirable carcass specifications in cattle?

Herd (%)					ght
					30 kg
Beef					2.6
Dairy	41.2	20.8	8.0	31.2	15.0

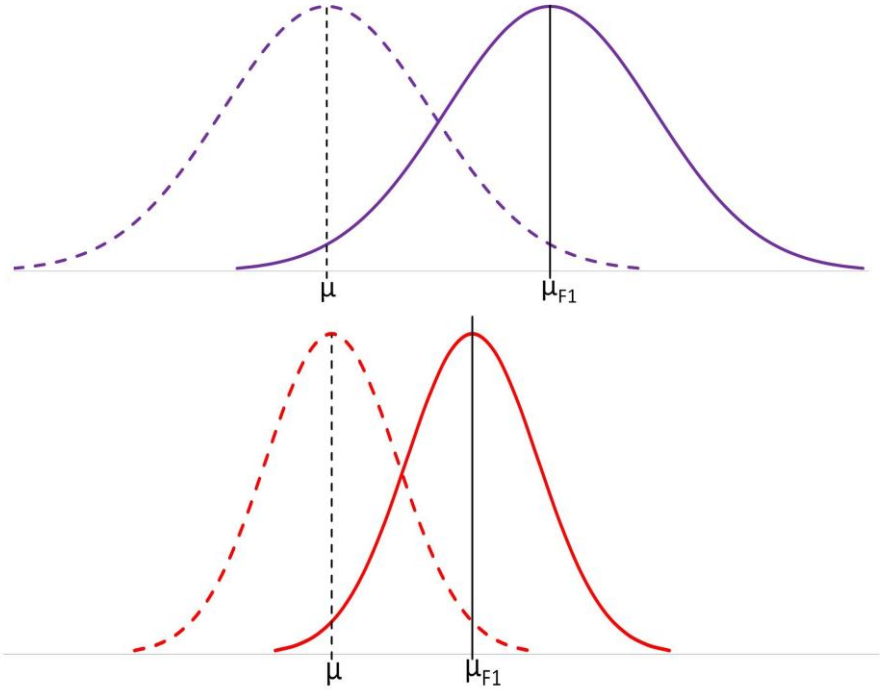
Methodology

- Carcass information for 1.5 million cattle was available
- Achievement of the desired specifications was defined as a series of binary traits
- Variance components were estimated using a linear mixed model:

$$\text{Specification} = \textit{dam parity} + \textit{birth herd} + \textit{singleton/twin} + \textit{heterosis} + \textit{recombination loss} + \textit{contemporary group} + \textit{direct genetic effect} + \textit{residual}$$

Genetic parameters

- Heritability: Proportion of phenotypic differences that are due to genetic differences
- Genetic variation: Measure of the potential for genetic improvement within a trait



Breeding for the desired specifications?

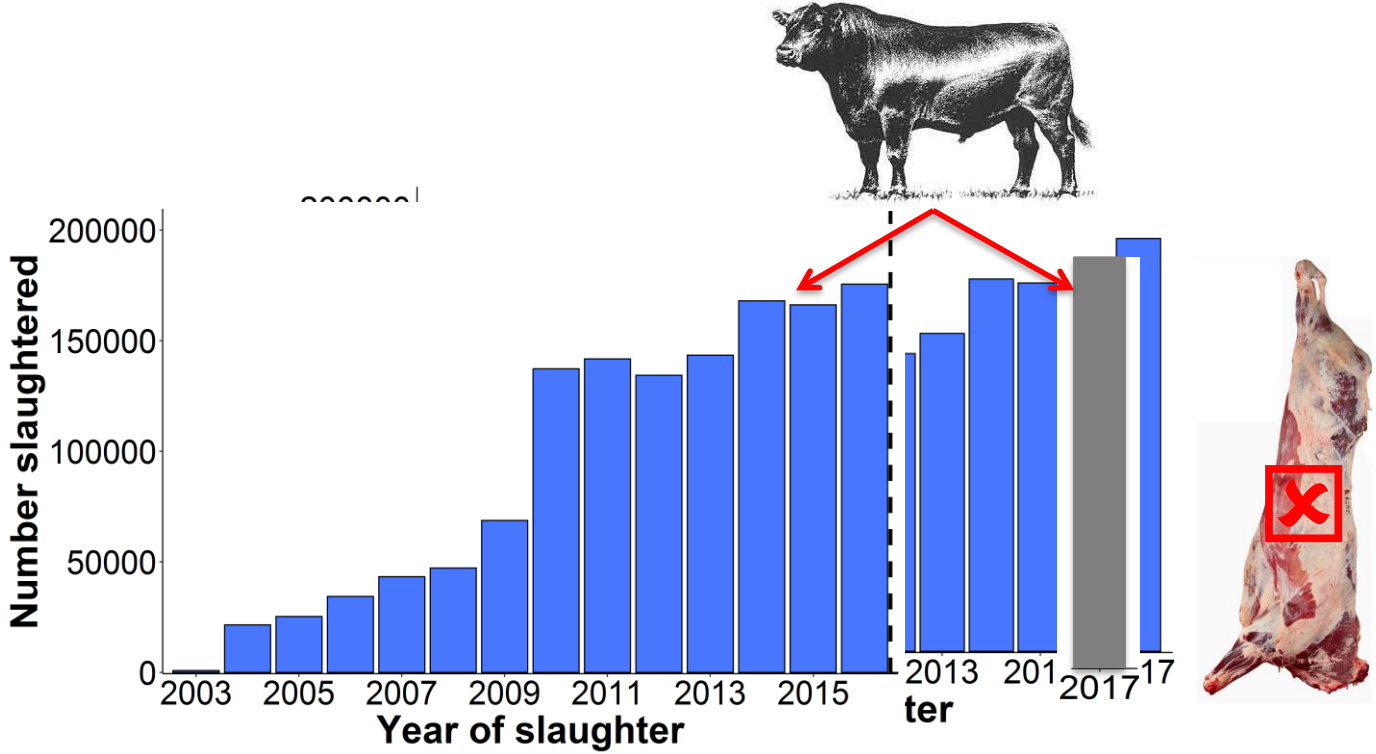
- Achievement of the desired specifications:
  - Heritable ☑
  - Exhibit genetic variation ☑

Trait	Heritability	Genetic standard deviation
Conformation specification	0.17	0.18
Fat specification	0.08	0.12
Weight specification	0.11	0.11

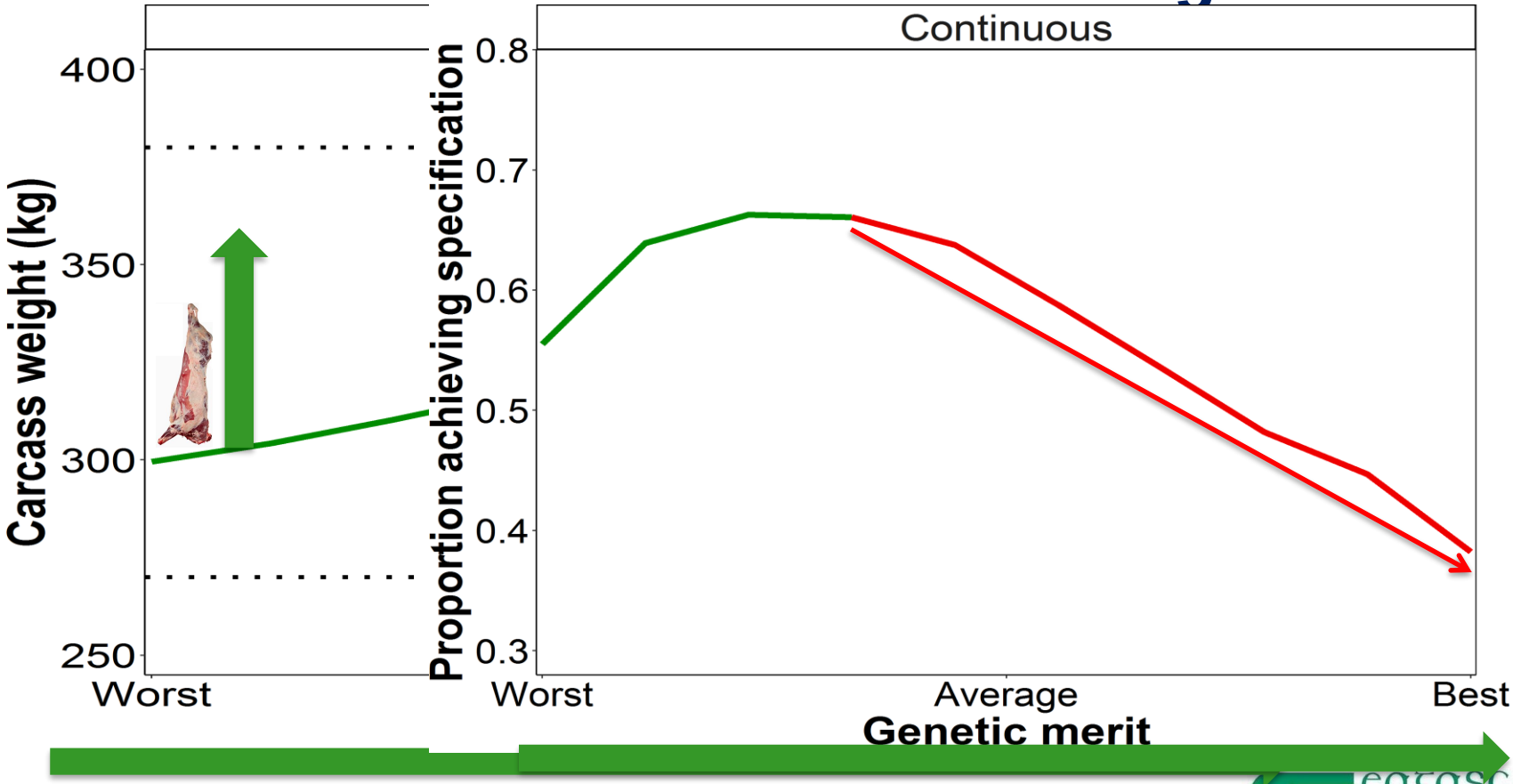
Genetic evaluation

- Estimates the genetic merit of individual animals for traits of interest
- Based on:
  - Phenotypic information
  - Pedigree information
- Traits evaluated:
  - Continuous carcass traits
  - Binary specification traits

Genetic evaluation



Genetic evaluation – carcass weight



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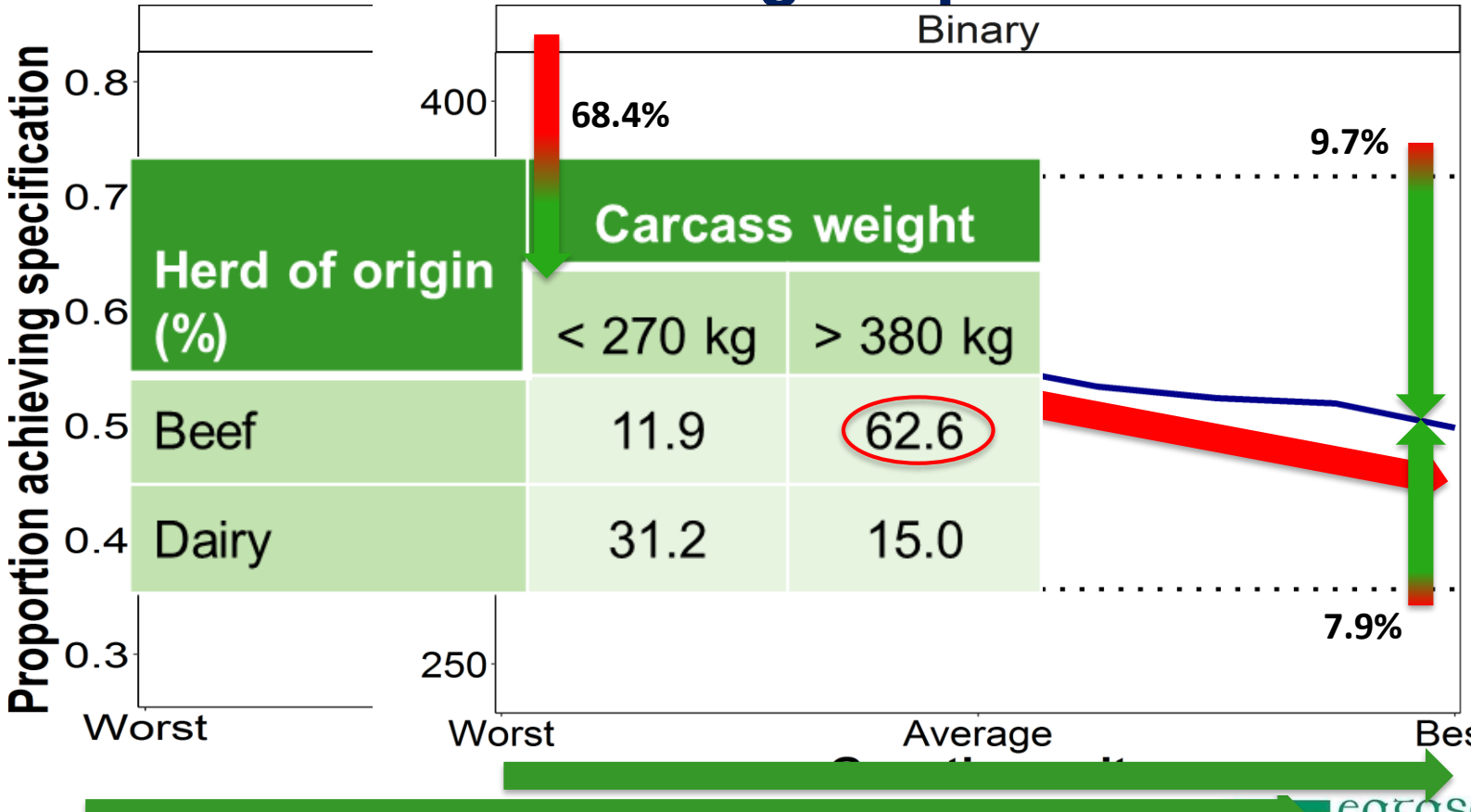
Genetic evaluation – weight specification



Herd of origin (%)	Carcass weight < 270 kg	Carcass weight > 380 kg
Beef	11.9	62.6
Dairy	31.2	15.0

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Conclusion

- Potential exists to breed for the achievement of the desired carcass specifications
- Genetic selection for the continuous carcass traits is detrimental to the achievement of the desired specifications
- Cattle selected on the binary specification traits consistently achieve the desired carcass specifications

Thank you

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