Predicted economic and greenhouse gas benefits from using improved maternal genetics in UK beef cattle

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Improving Maternal Beef traits

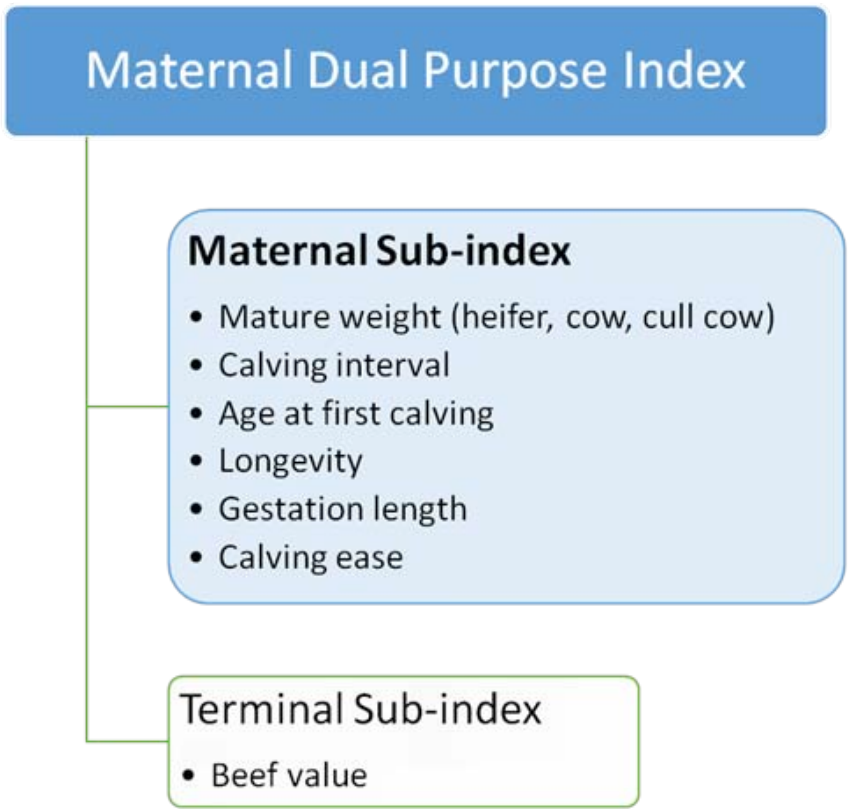
- Selection focused on beef growth and carcass traits has neglected many maternal traits

- Initiatives to improve maternal beef herds through increased use of improved maternal genotypes and genomic selection
  - UK Scotland Beef Efficiency Scheme (BES)
  - Ireland Beef Data and Genomics Program (BDGP)

➢Improve herd profitability

➢Reduce greenhouse gas (GHG) emissions

BES impact prediction: Gene Flow model

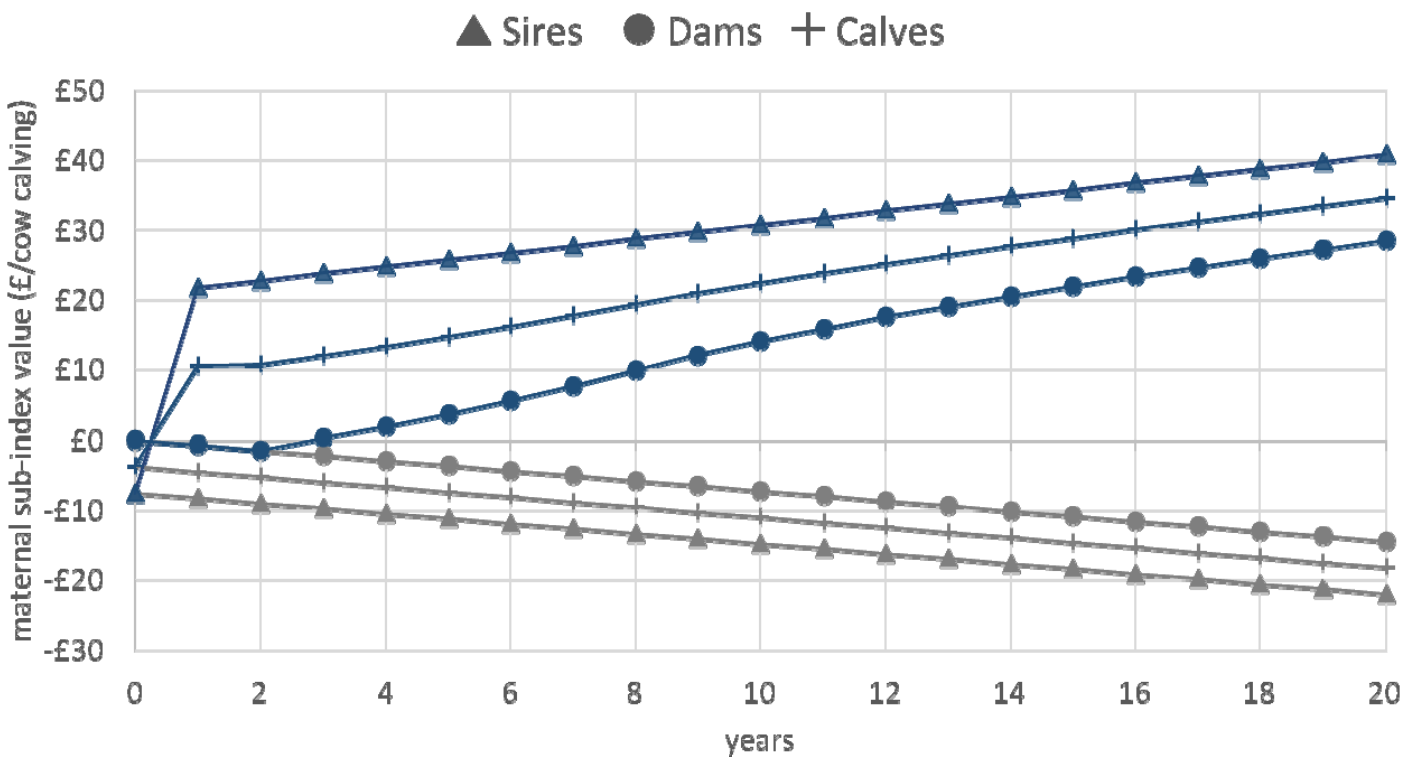


- Predict effects of farmer sourcing elite maternal genotypes to breed herd replacements
  - Maternal sub-index +£20 to +£40 (Young sires to Genomic proven sires) above sire population average

Trait values and expression

				Expressed in herd by			
Maternal Trait	**Economic value (Δ£/unit)**	**GHG value (Δkg CO_2e/unit)**		**Calf 0y**	**Heifer 2y**	**Cow 2-11y**	**Cull cow**
Mature weight, cow (kg)	-0.35	0.88	Feed for maintenance			X	
Mature weight, heifer (kg)	-0.84	1.89			X		
Mature weight, cull cow (kg)	1.52	0	-				X
Calving interval (d)	-1.29	7.46	Feed during empty days			X	
Age at first calving (d)	-348.95	3.85			X		
Longevity (d)	94.46	-0.63	Feed for replacements		X	X	
Gestation length (d)	-2.05	0	-	X			
Calving ease (% unassist)	5.07	0	-	X			

Genetic effect of Elite Maternal sires



Elite maternal +£30 sires used for 20y

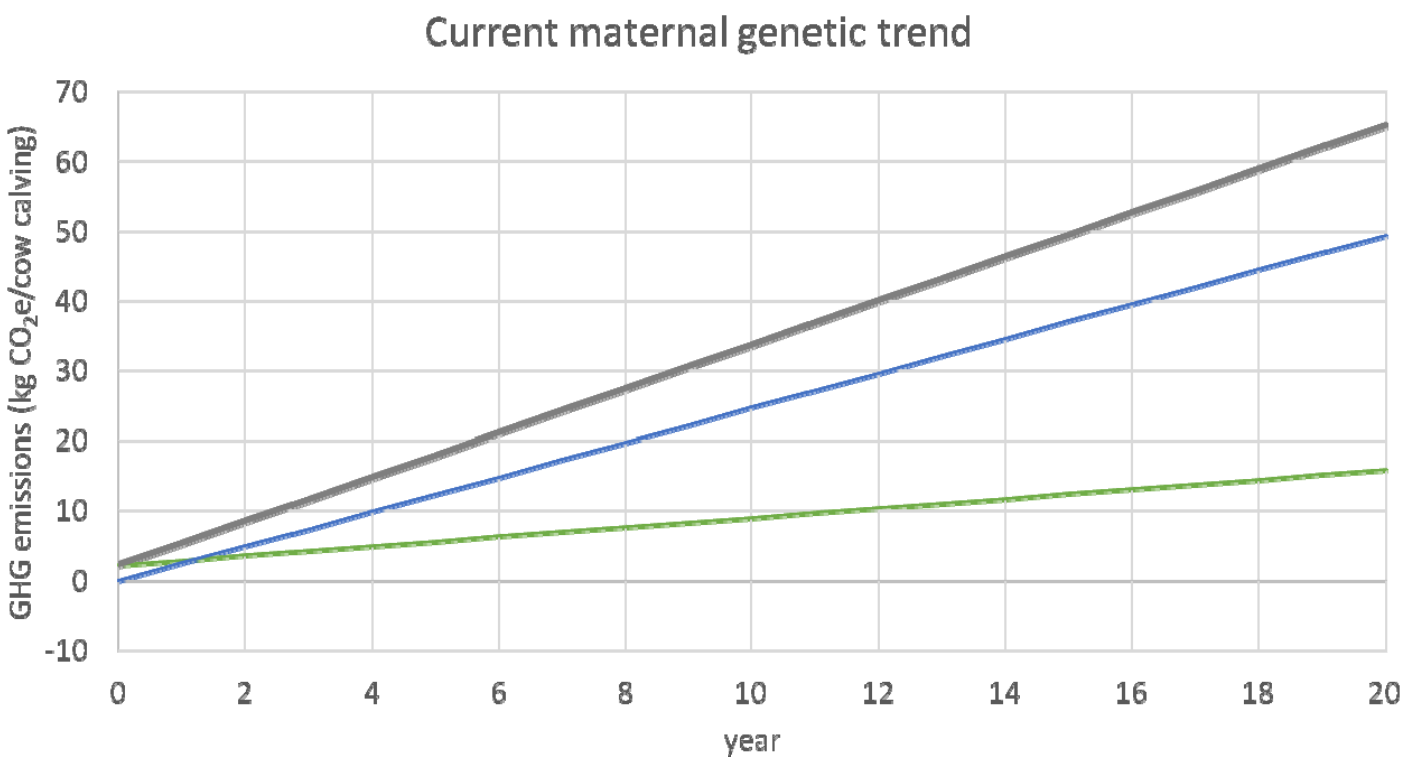
Current trend = -£0.722/y

↑ Mature weight

↑ Calving interval

↓ Calving ease

Expressed GHG: Current trend

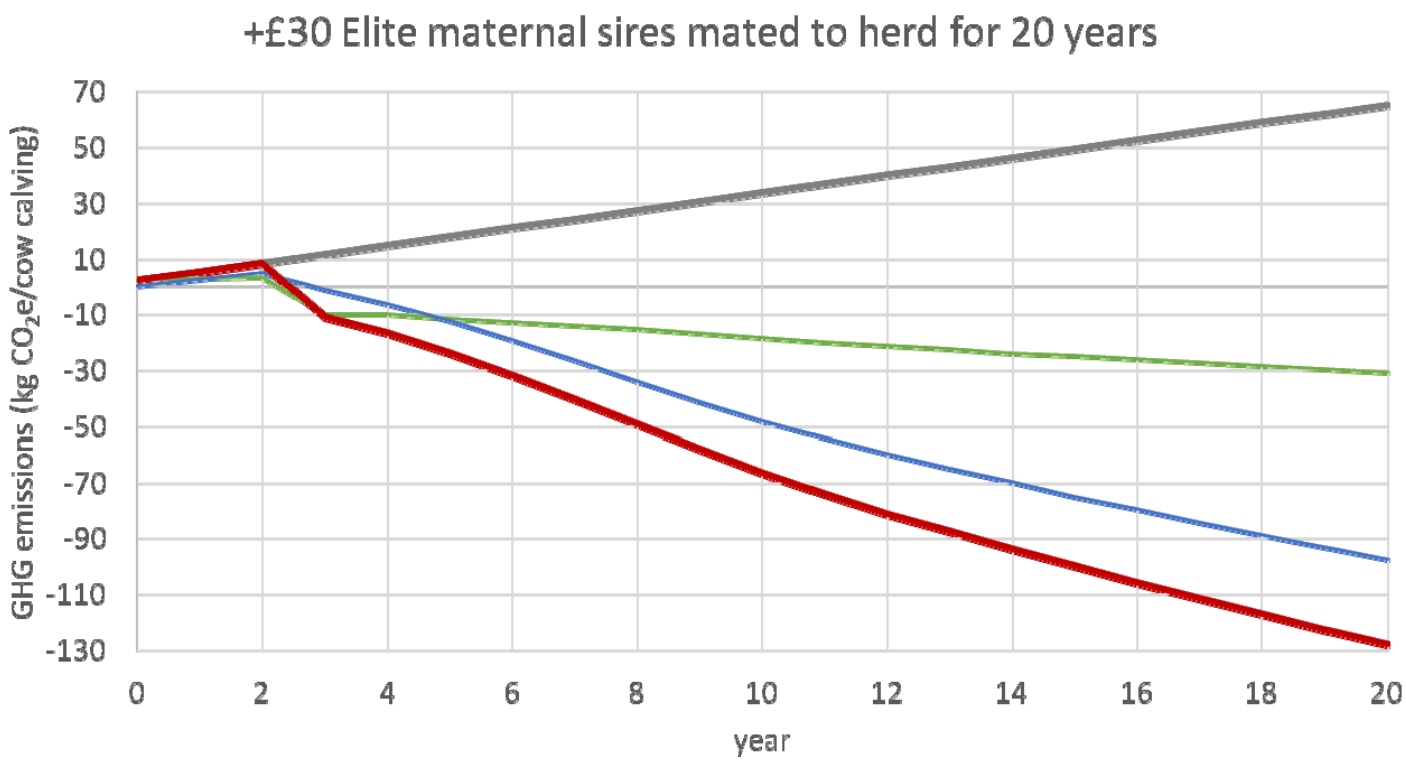


Total maternal GHG trend = +3.15 kgCO_2e/y

Breeding cows

Replacement heifers

Expressed GHG with Elite Maternal sires



Key Findings

- Genetic improvement of maternal traits through selection of high maternal-value sires is predicted to have substantial benefits
  - Improved Mature weight, Calving interval, Longevity, Calving ease
  - ➢Increased Profitability
  - ➢Reduced GHG emissions (kg CO_2e) and Emissions Intensity (kg CO_2e/kg meat)
- Short-term programs also have longer-term benefits

Scottish Government Rural Affairs Food and Environment Strategic Research