



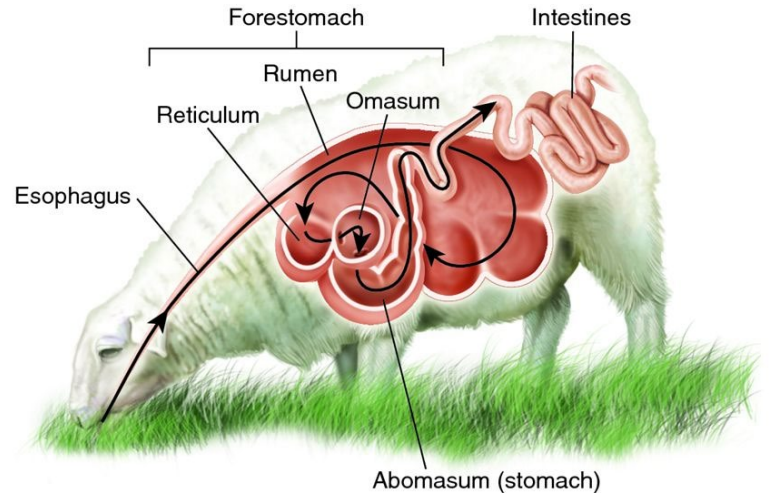
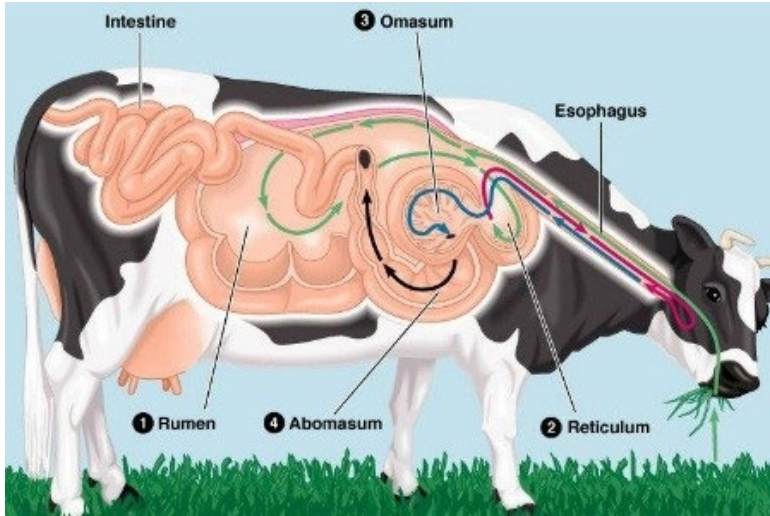
Lowering Ireland's environmental hoofprint

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October 2020

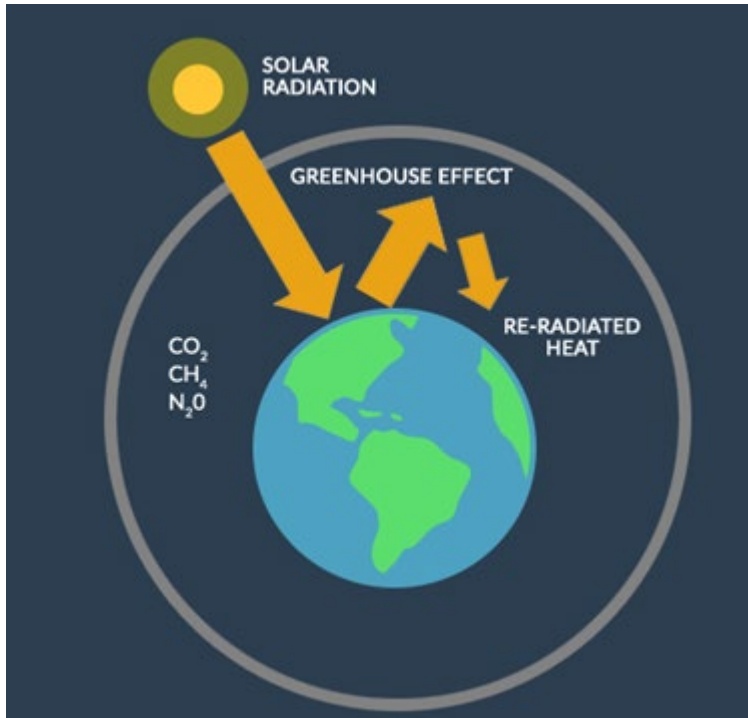
Donagh.berry@teagasc.ie

Ruminants



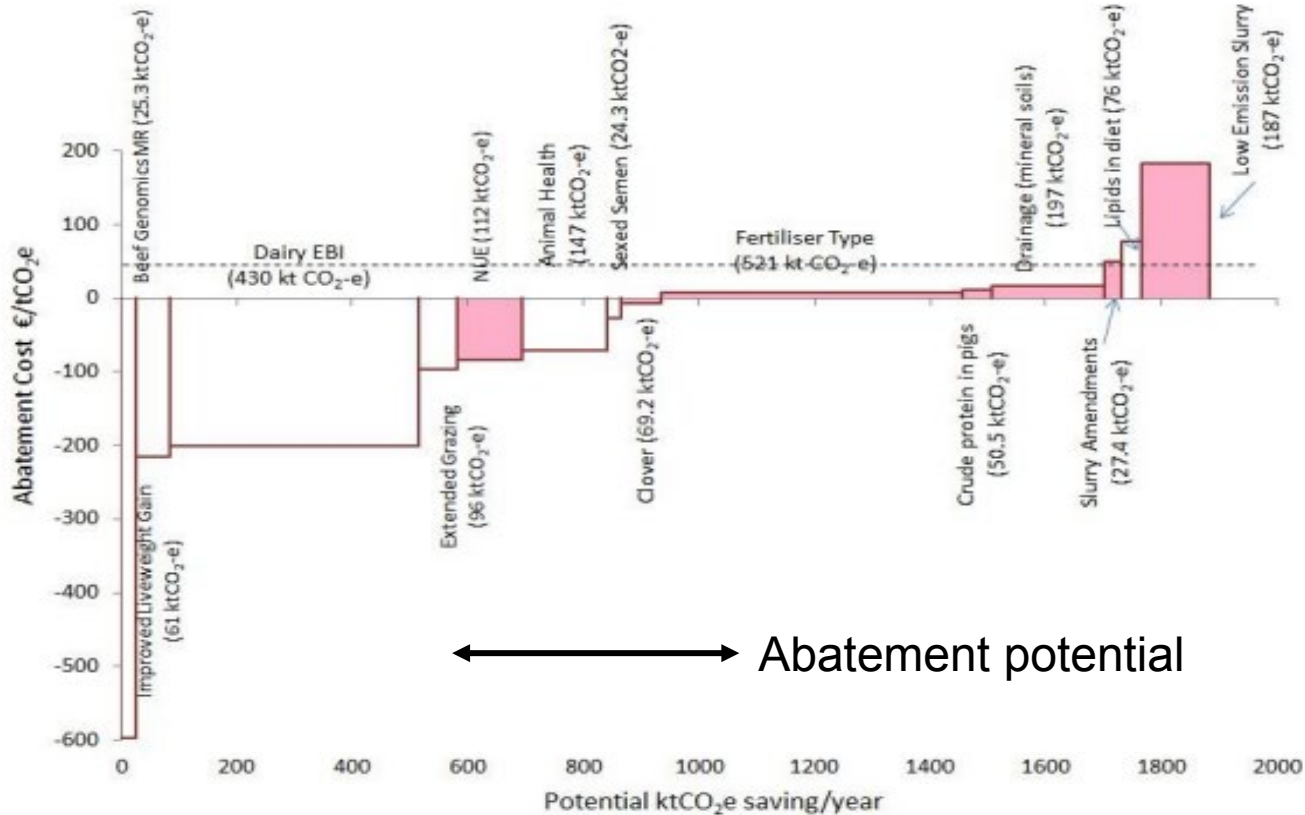
- 40% of world's terrestrial area is grasslands
- Ruminants convert non-edible energy to human-edible energy

What is a greenhouse gas



Gas	Lifetime	Global Warming Potential (GWP)	
		20 years	100 years
Methane	12.4	84-86	28-34
Hydrofluorocarbon	13.4	3710-3790	1300-1550
Chlorofluorocarbon	45	6900-7020	4660-5350
Nitrous oxide	121	264-268	265-298
Carbon tetrafluoride	50000	4880-4950	6630-7350

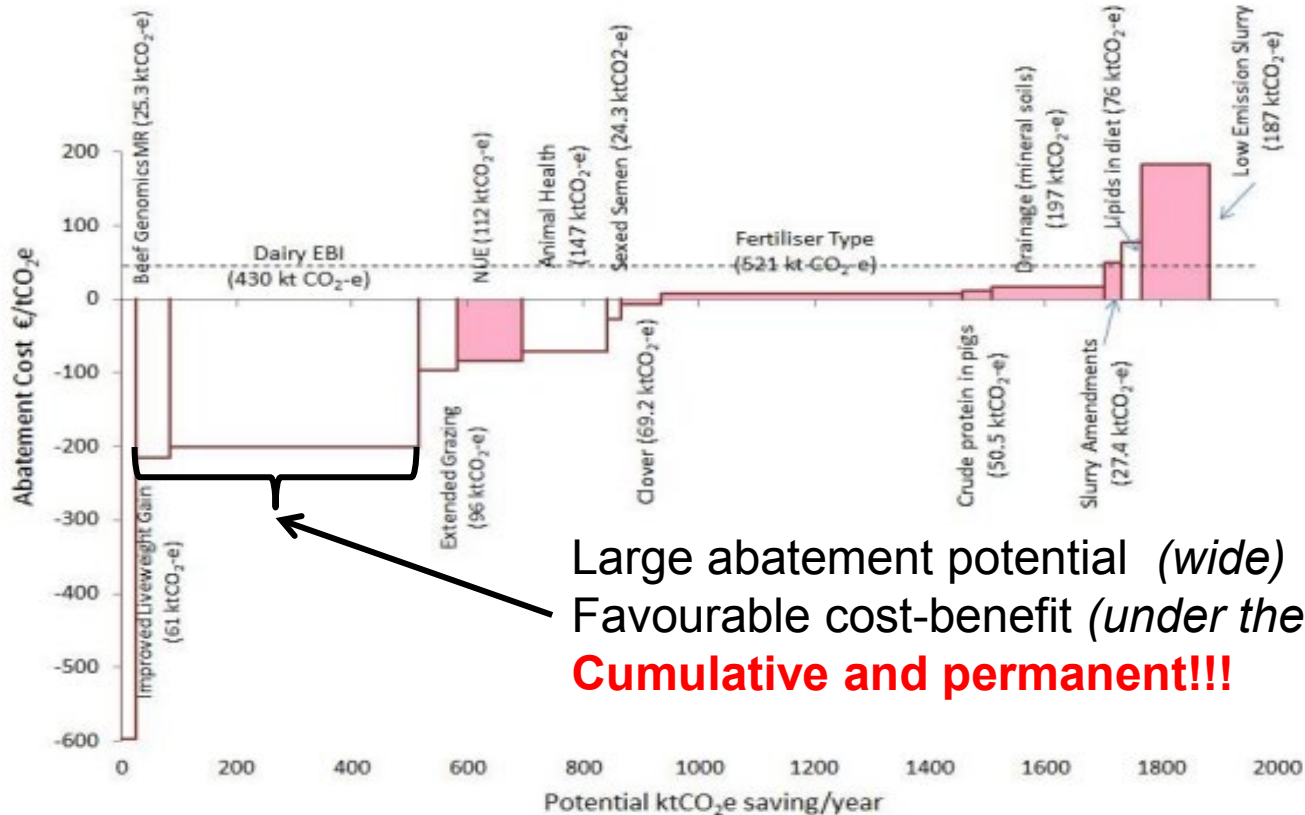
Marginal Abatement Cost curve (MACC)



Cost - benefit

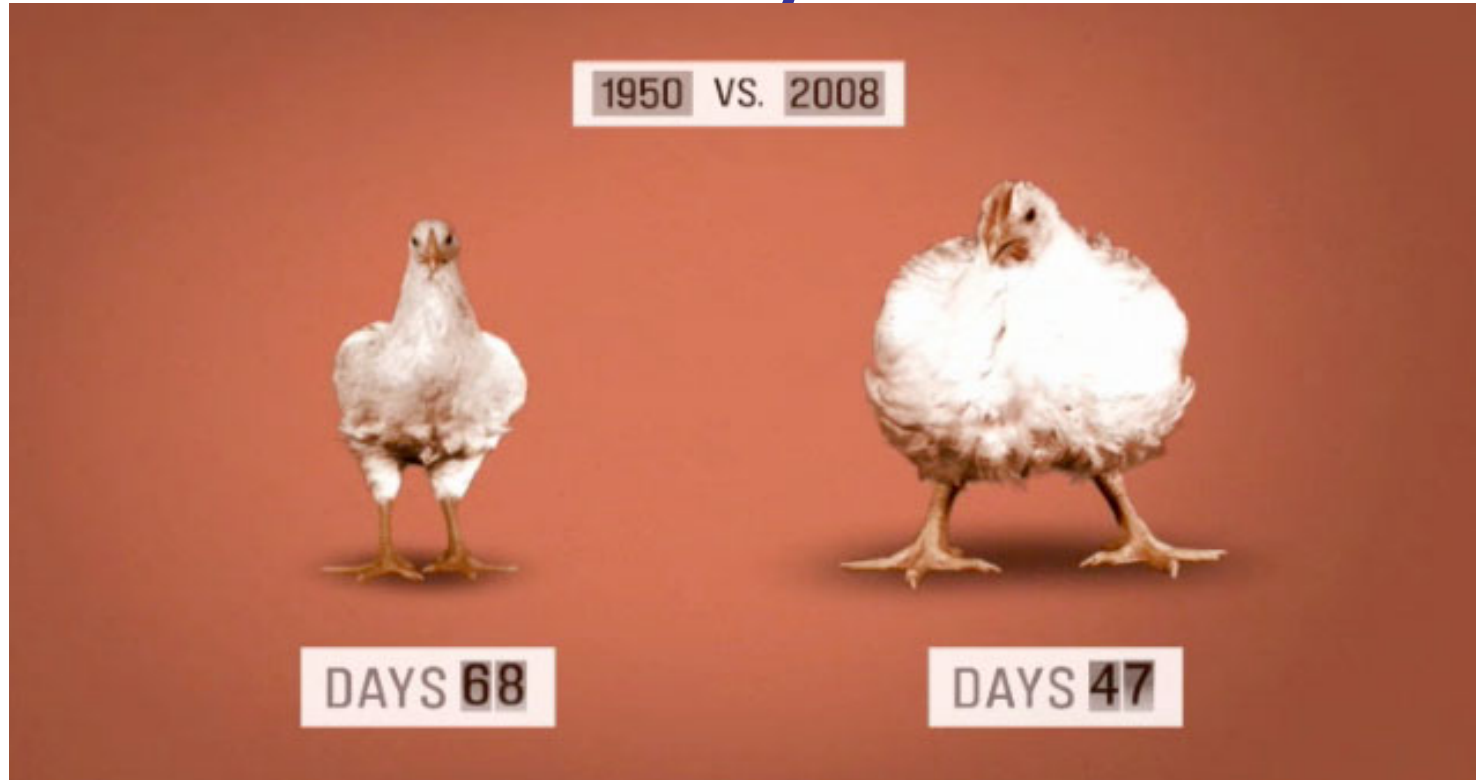
Abatement potential

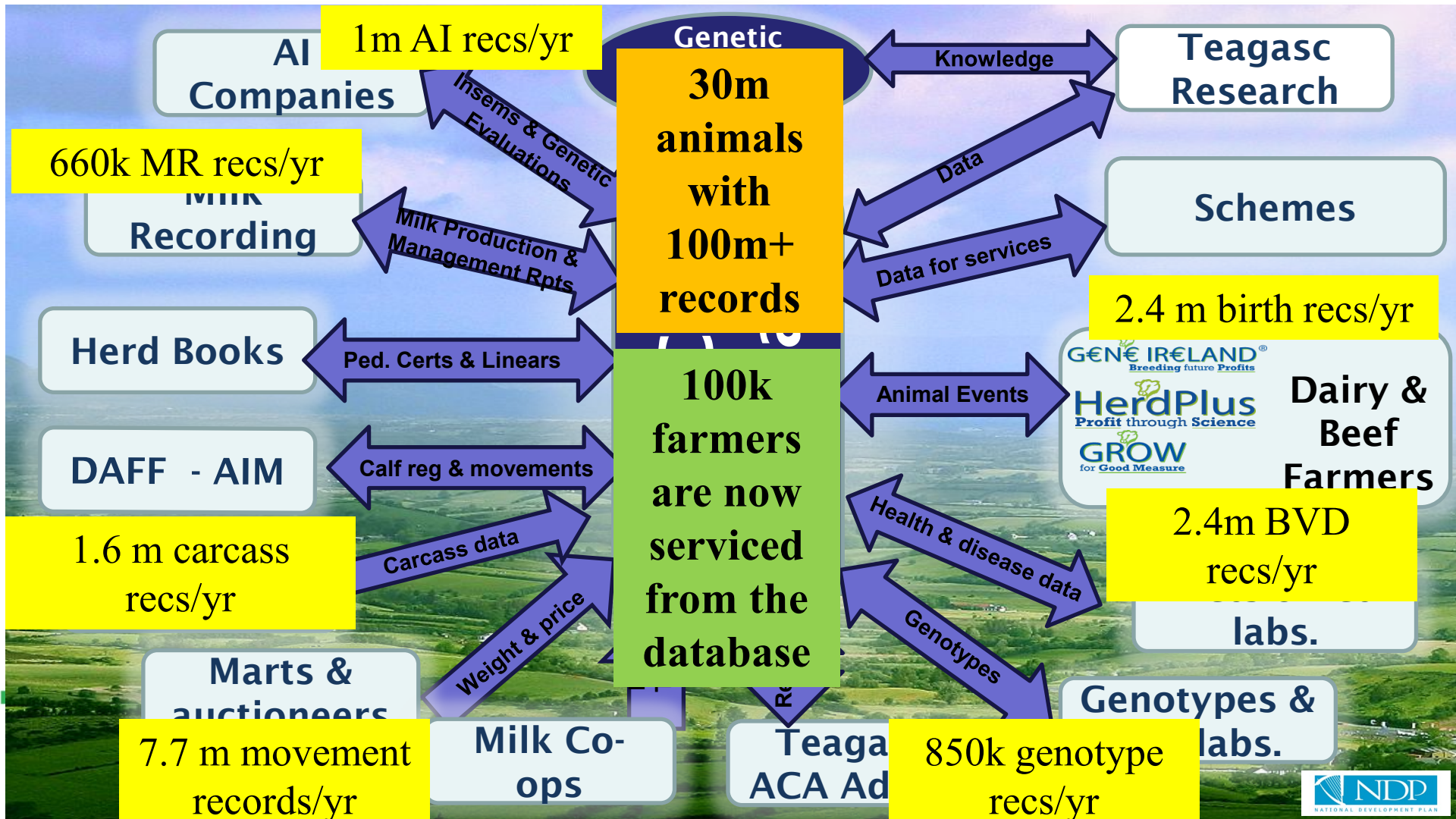
Marginal Abatement Cost curve (MACC)



Large abatement potential (*wide*)
Favourable cost-benefit (*under the line*)
Cumulative and permanent!!!

The sky is the limit





AI Companies

1m AI recs/yr

Genetic 30m animals with 100m+ records

100k farmers are now serviced from the database

Teagasc Research

Schemes

2.4 m birth recs/yr

GENE IRELAND®
Breeding future Profits
HerdPlus
Profit through Science
GROW
for Good Measure

Dairy & Beef Farmers

2.4m BVD recs/yr
labs.

Genotypes & labs.

660k MR recs/yr
Milk Recording

Herd Books

DAFF - AIM

1.6 m carcass recs/yr

Marts & auctioneers

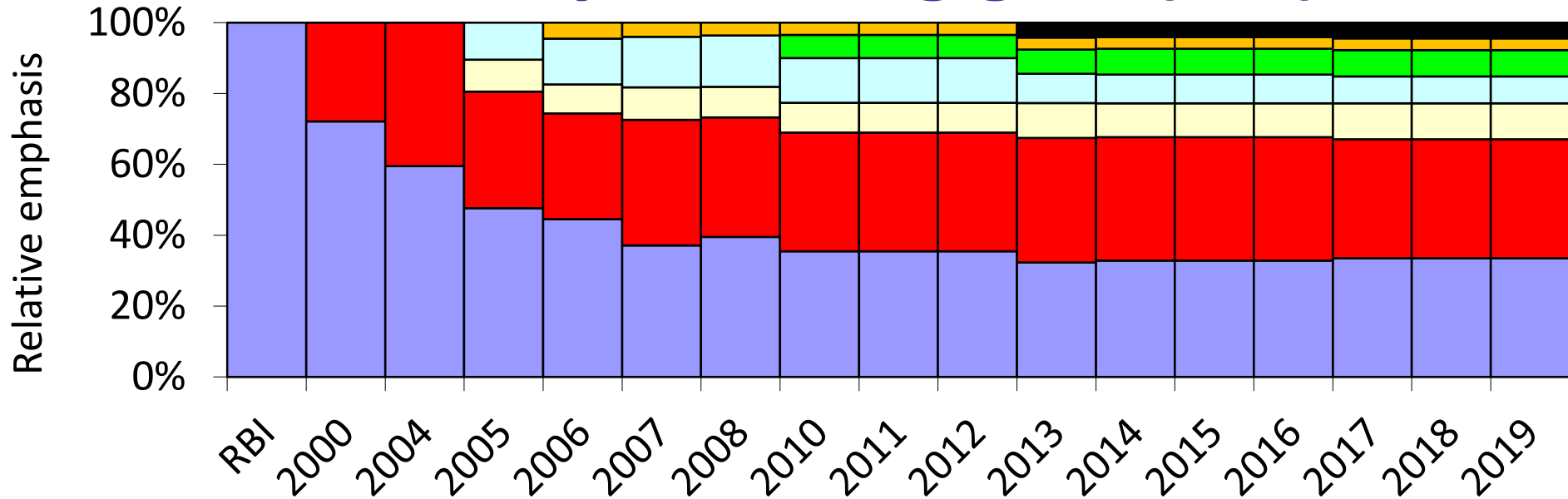
7.7 m movement records/yr

Milk Co-ops

Teaga ACA Ad

850k genotype recs/yr

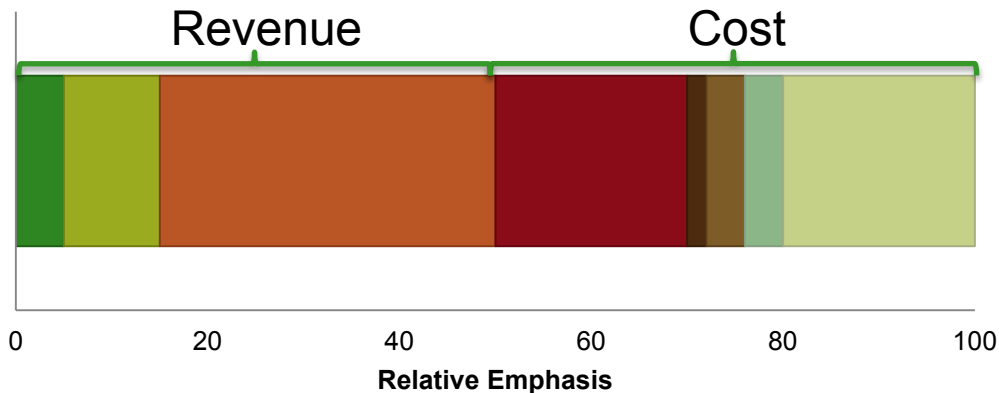
Irish dairy breeding goal (EBI)



■ Milk ■ Fertility ■ Calving ■ Beef ■ Maintenance ■ Health ■ Management

Irish beef breeding goals

Terminal Index



- Carcass fat
- Carcass conformation
- Carcass weight
- Feed Intake
- Docility
- Direct perinatal mortality
- Direct gestation length
- Direct calving difficulty

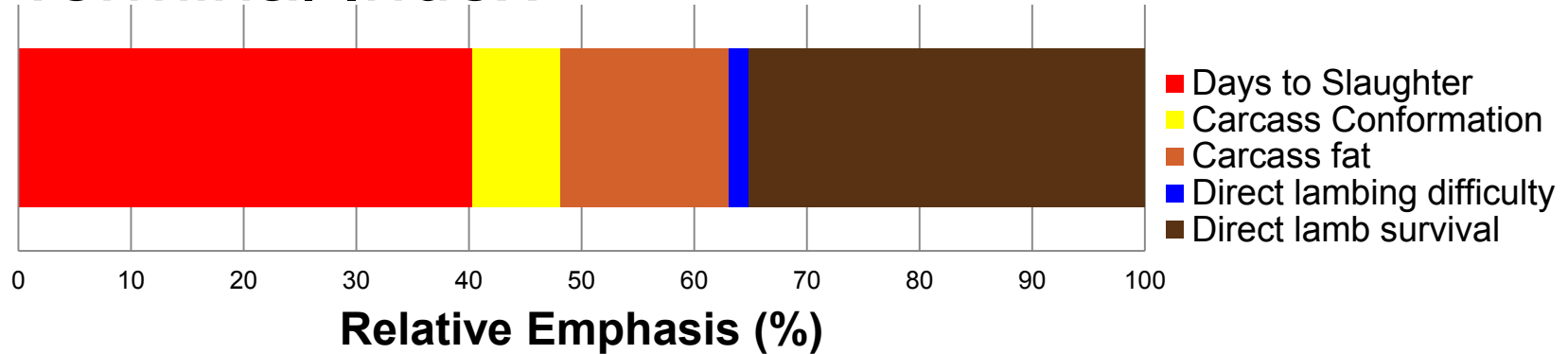
Replacement Index



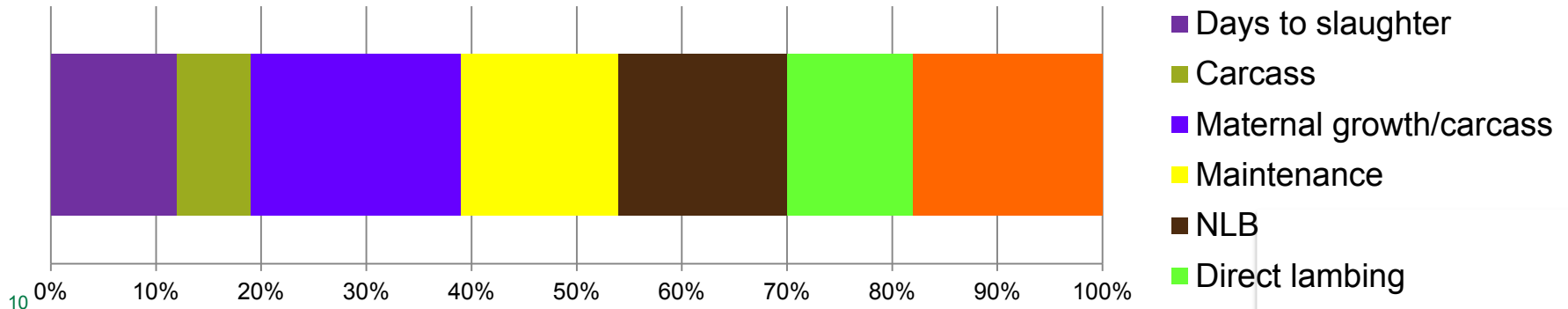
- Cull cow weight
- Maternal weaning weight
- Maternal calving difficulty
- Fertility and survival
- Progeny Carcass
- Feed Intake
- Docility
- Direct Calving Difficulty

Irish sheep breeding goals

■ Terminal Index

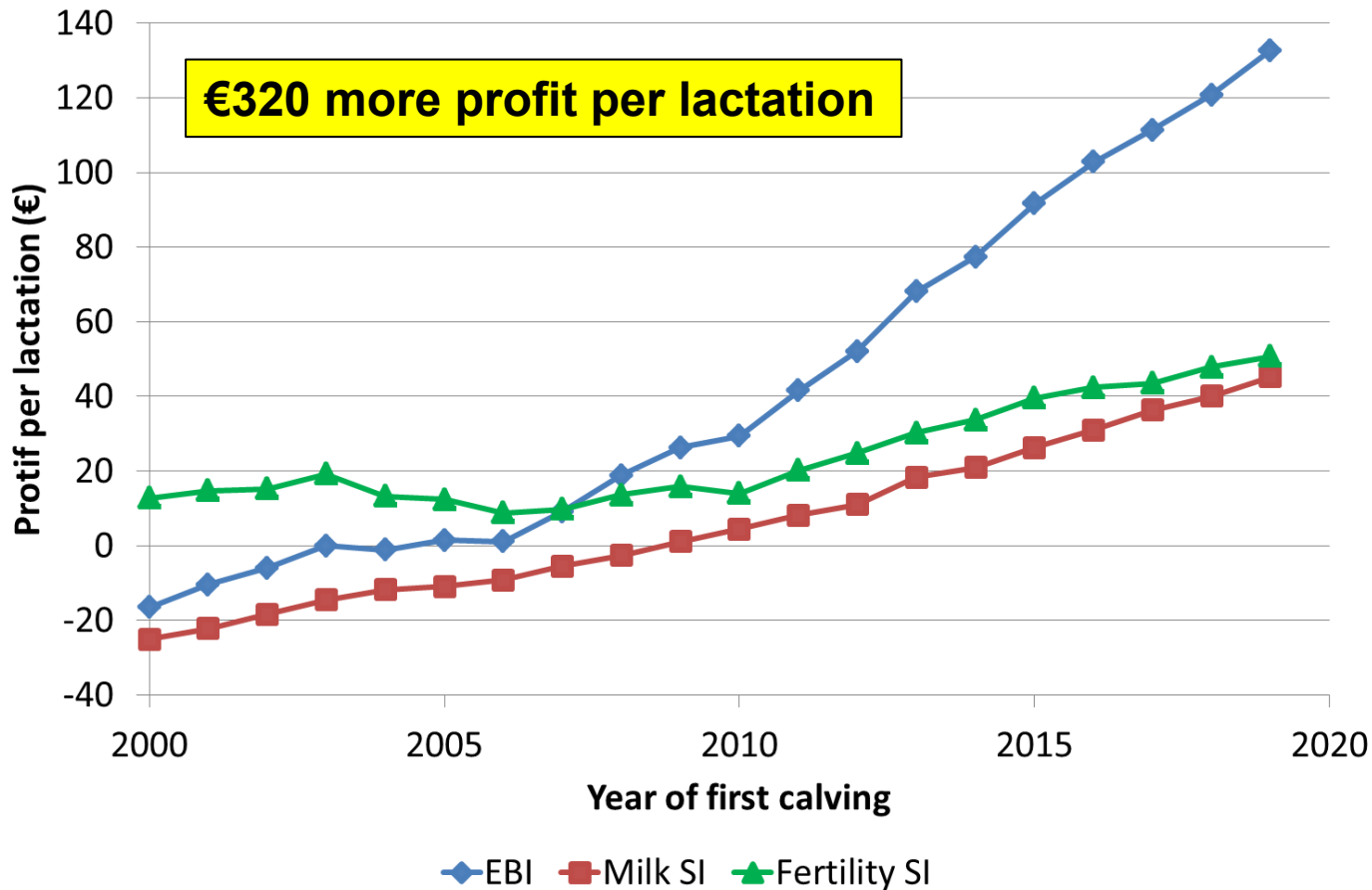


■ Replacement Index



We're currently breeding lower hoofprint animals

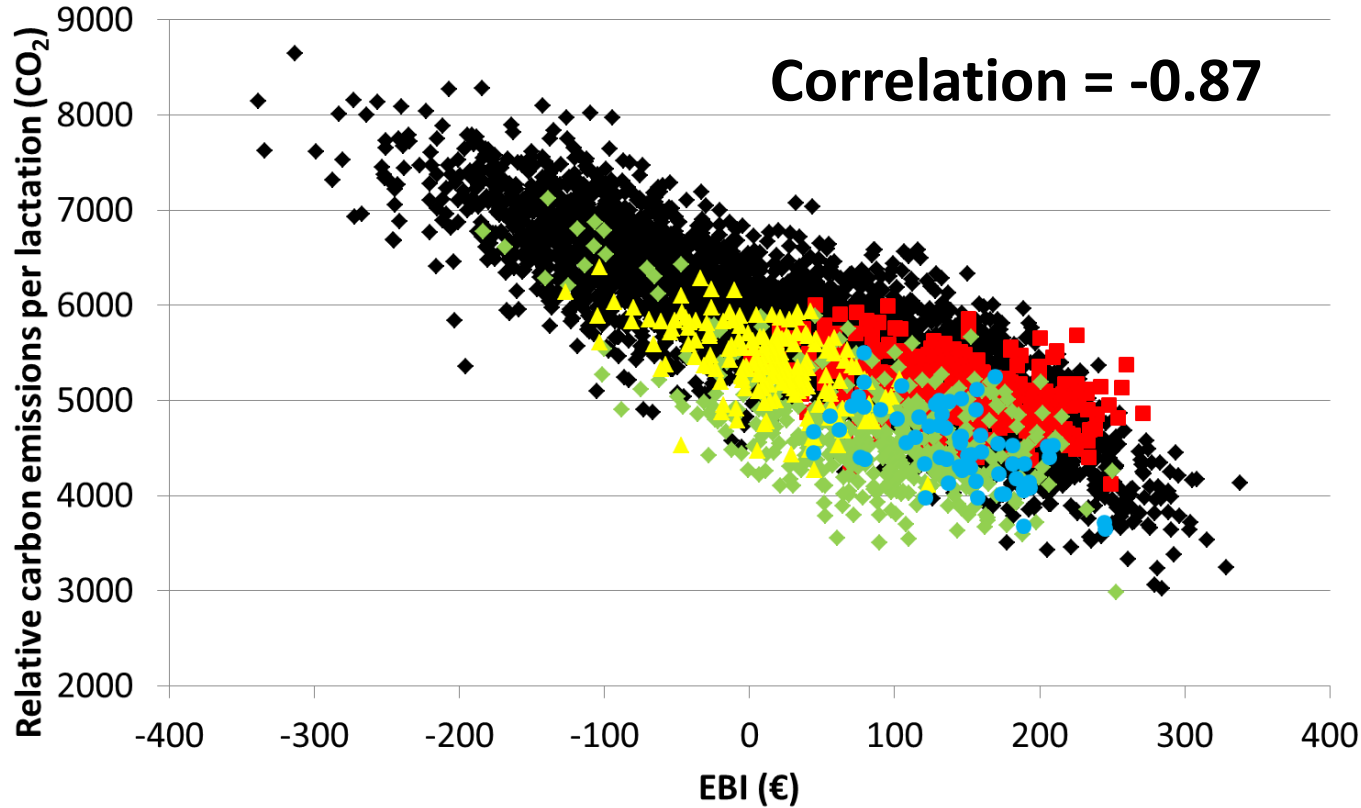
€320 more profit per lactation



14% improvement in carbon footprint per kg fat+protein corrected yield

Also improved nitrogen use efficiency

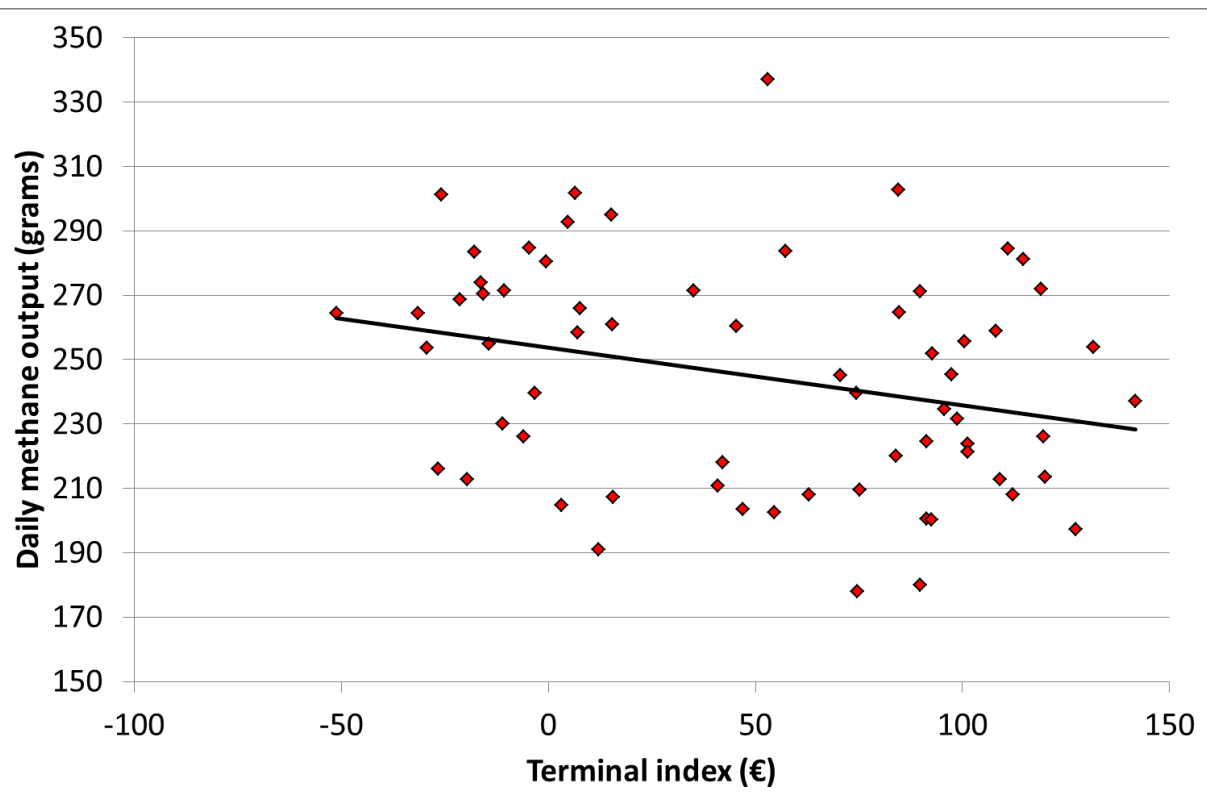
EBI v Carbon index



Each €10 increase
in EBI
↓
61.7 kg CO₂
equivalents less
per lactation

◆ Holstein ■ Jersey ◆ Friesian ▲ Montebeliarde ● Norwegian Red

We're currently breeding lower hoofprint animals



Each €10 increase in the Terminal Index value corresponds to a 1.7 grams lower daily methane

We're currently breeding lower hoofprint animals



7.87 g per day

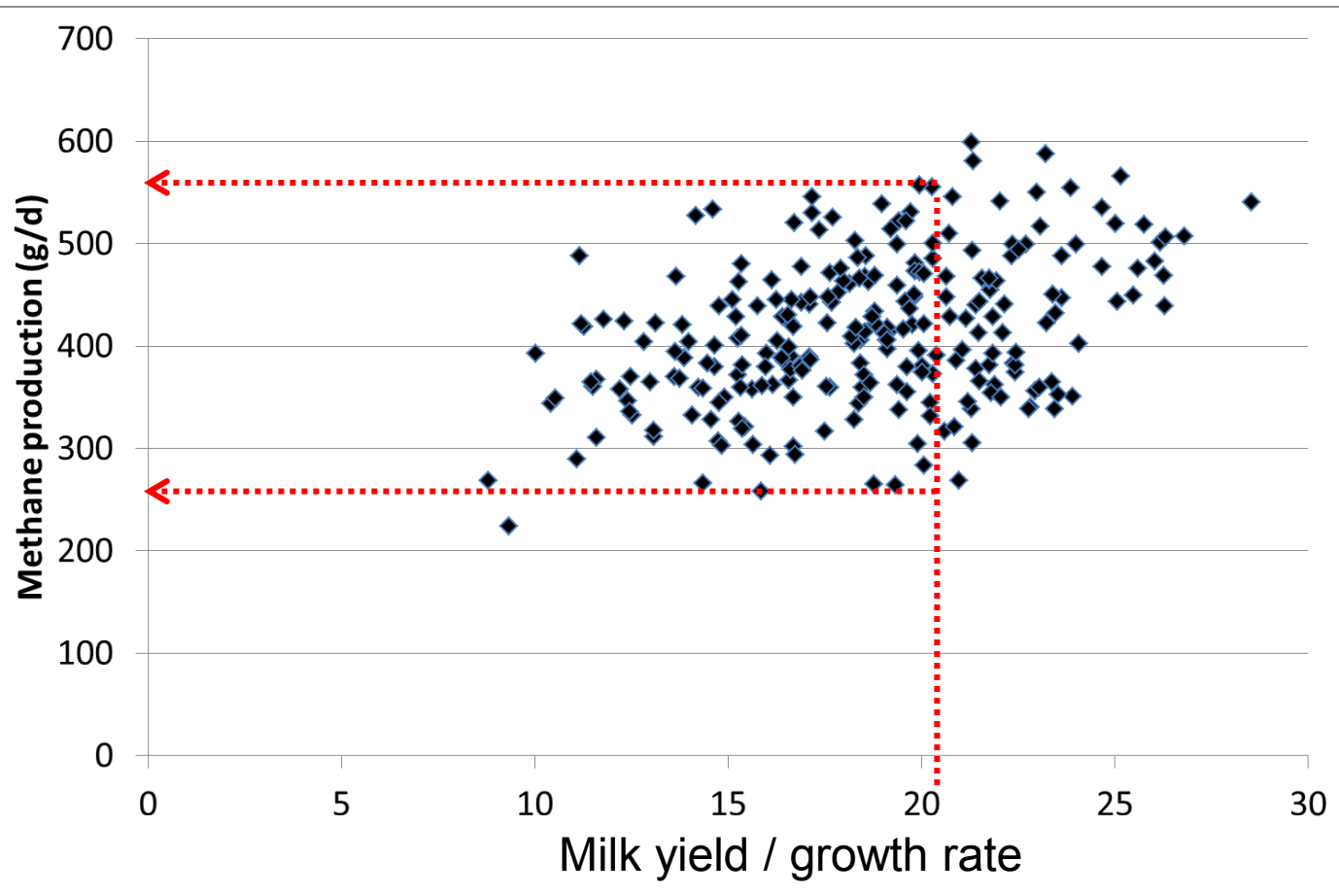


8.47 per day

What's missing??

1. Product quality (milk and meat)
2. Feed intake and efficiency
3. Animal health and well-being
4. Environmental hoofprint
5. ??????

Can we do better?



What is the variability?

Is it worth chasing?

Measuring methane emissions

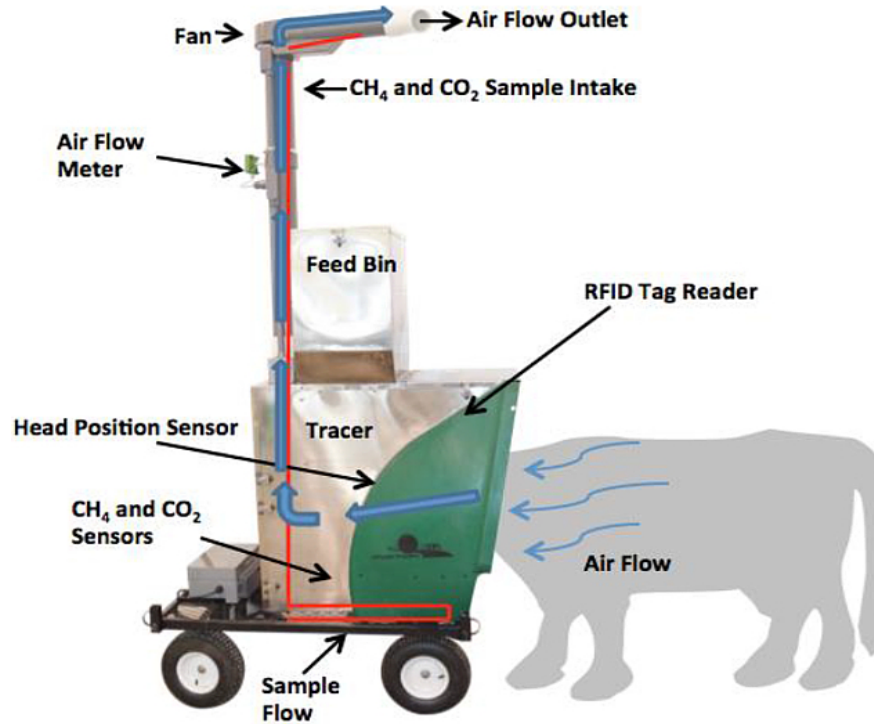


Prerequisites for breeding

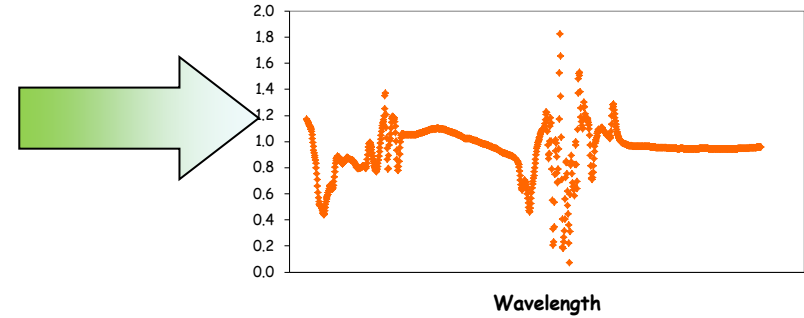
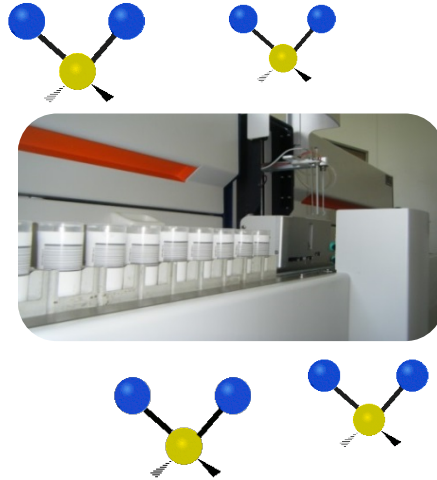
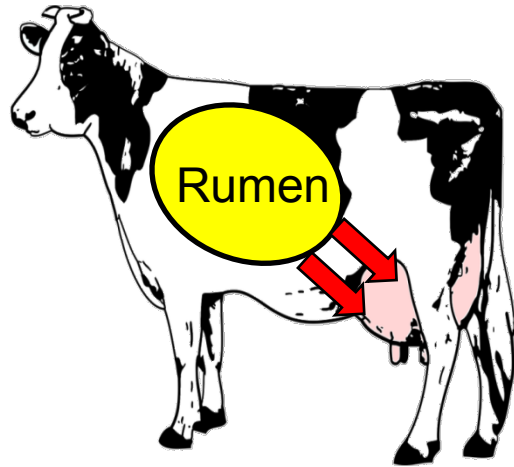
1. Important
2. Exhibit genetic variability
3. **Data availability**



GreenFeed systems



Milk infra-red spectroscopy



Take home message

- **Sustainability is key**
 - **Social sustainability includes profitable sectors**
- **Unbelievable opportunity to improve the environmental footprint of ruminant livestock**
- **Breeding is cumulative and permanent**
 - **And it is not slow!!!!**

Acknowledgments

- **Research Stimulus Fund GREENBREED**
- **SFI – VistaMilk & SIRG funding**