

# Feed efficiency and proxies

Smartcow study tour - 5<sup>th</sup> March 2019  
SRUC Beef Research Centre – Easter Howgate

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*Leading the way in Agriculture and Rural Research, Education and Consulting*



# Breakdown of variable costs

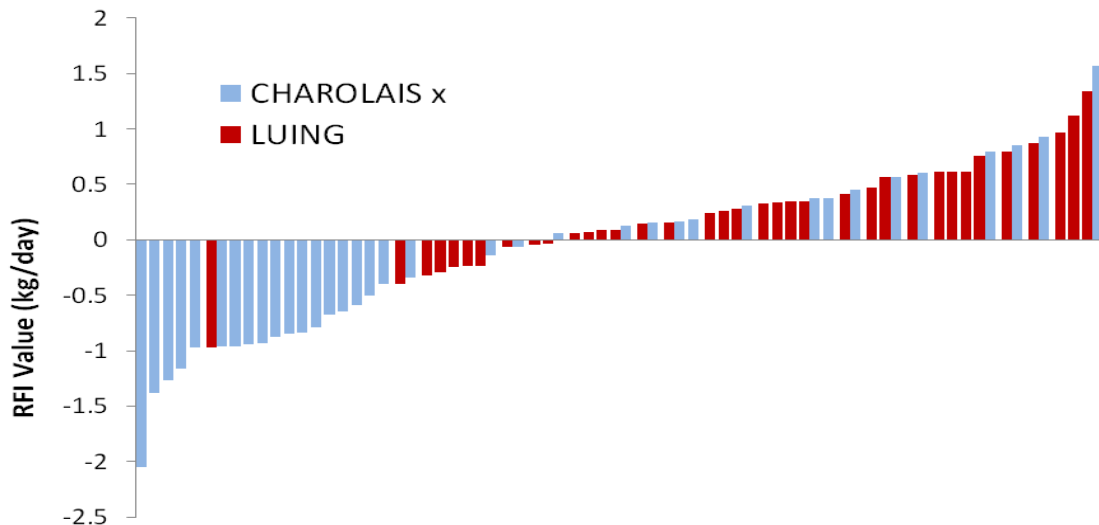
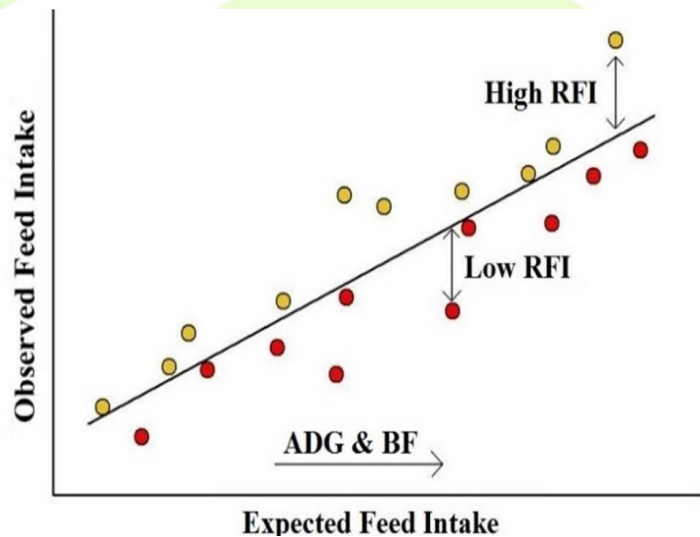
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- Upland suckler cow and calf (late Spring calving) – feed is £210 of total £352 variable costs [60%]
- Barley finishing at 12 months – feed is £295 of total £392 variable costs [75%]
- Finishing autumn-born suckled calf at 18 months – feed is £163 of total £ 272 variable costs [60%]
- Grass finishing – feed is £87 of total £150 variable costs [58%]

# Feed efficiency in beef systems

- Feed conversion ratio (FCR)
- Residual feed intake (RFI)



# Economic benefits



	Comparison	Difference in feed eaten (same gain)	Financial gain
Stabiliser bulls (UK)	Top vs Bottom	25%	£92/animal over 205 days
Simmental bulls (Ireland)	Top ⅓ vs Bottom ⅓	14%	€35/animal over 105 days
Angus or Hereford bulls (Canada)	Top ⅓ & Bottom ⅓	3.4 kg 'as fed'	C\$47/animal over 140 days
CH/CHx steers – high concs (SRUC)	Top vs Bottom	28% (3.8 kg Dry Matter)	£85 over 120 days
Luing steers – high forage (SRUC)	Top vs Bottom	31% (4.2 kg Dry Matter)	£95 over 150 days

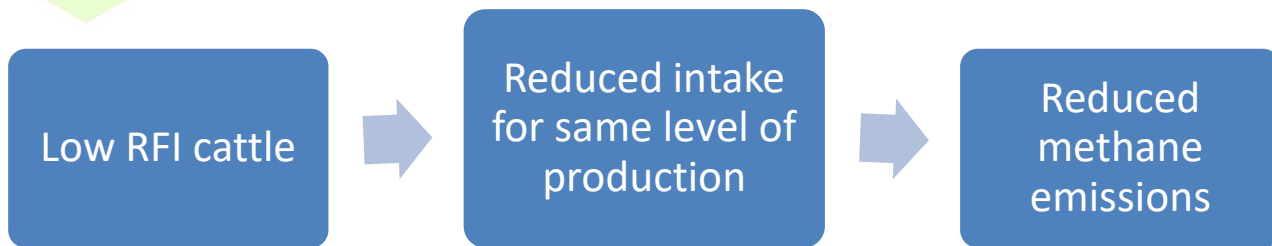
# Selection for RFI

Significant animal-animal variation in RFI exists in beef:

- huge scope for genetic improvement
- independent to many performance traits

Selection for RFI should:

- Result in animals which consume less feed for the same output (economic benefits)
- Result in reduced methane per kg product



# Efficiency in beef production

How do we measure it in an R&D sense?

Measure inputs

feed intake (facilities here)

Measure outputs

LWG, carcass weight/yield & quality

Accuracy in measurements is essential

Across different breeds and feeding systems

Why ? - More profit & lower environmental impact / kg beef



# Feed Intake and Performance 2011 - 2019



Red indicates RESAS co-funded

Experiment	Breeds	Diets	Year
Beef finishing study	AAx & LIMx	Concentrate vs. Mixed	2011
Beef cows	LIMx & Luig	Straw with brewers grain or silage	2012
Beef finishing study	CHx & Luig	Concentrate vs. Mixed	2012
Beef cows with calves	AAx & LIMx	Silage	2013
Beef finishing study	CHx & Luig	Conc. vs. Mixed (3 treatments / diet)	2013
Beef finishing study	AAx & LIMx	Mixed (4 treatments / diet)	2014
Beef finishing study	LIMx	Concentrate vs. Mixed	2016
Beef finishing study	LIMx	Mixed	2015-2017
Beef finishing study	AAx, LIMx, Luig	Mixed	2017
Beef finishing study	Dairy and beef	Silage (2 contrasting silages)	2017
Beef finishing study	HFx	Mixed (2 treatments)	2018

# Difficulties encountered

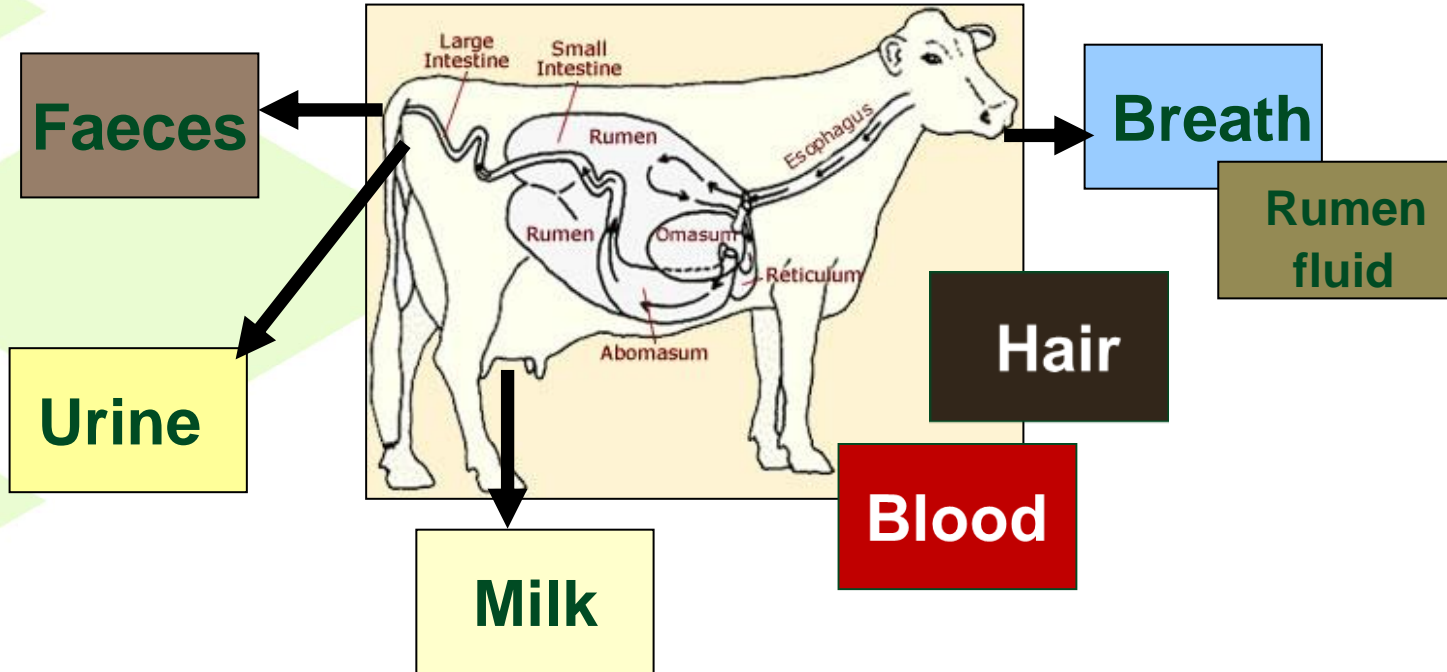
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- Cost of recording: £500-1000 per animal
- Difficulty of sourcing the animals at the right age (seasonal calving patterns)
- Challenges in achieving good representation of the population for genetic evaluation (AI and natural service)
- Health issues of moving animals (from ringworm to BVD)



# Biomarkers



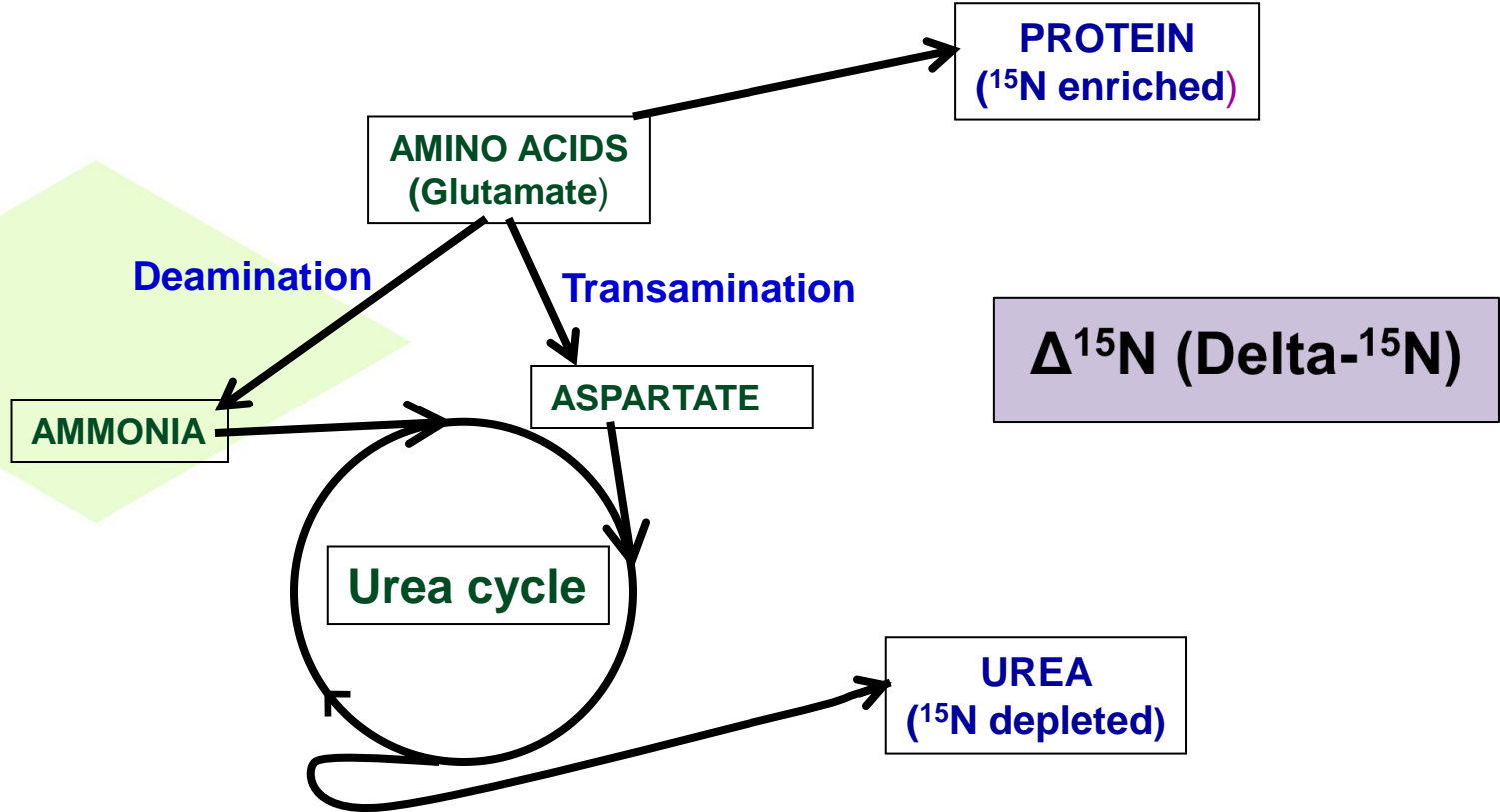
# Nitrogen isotopic fractionation

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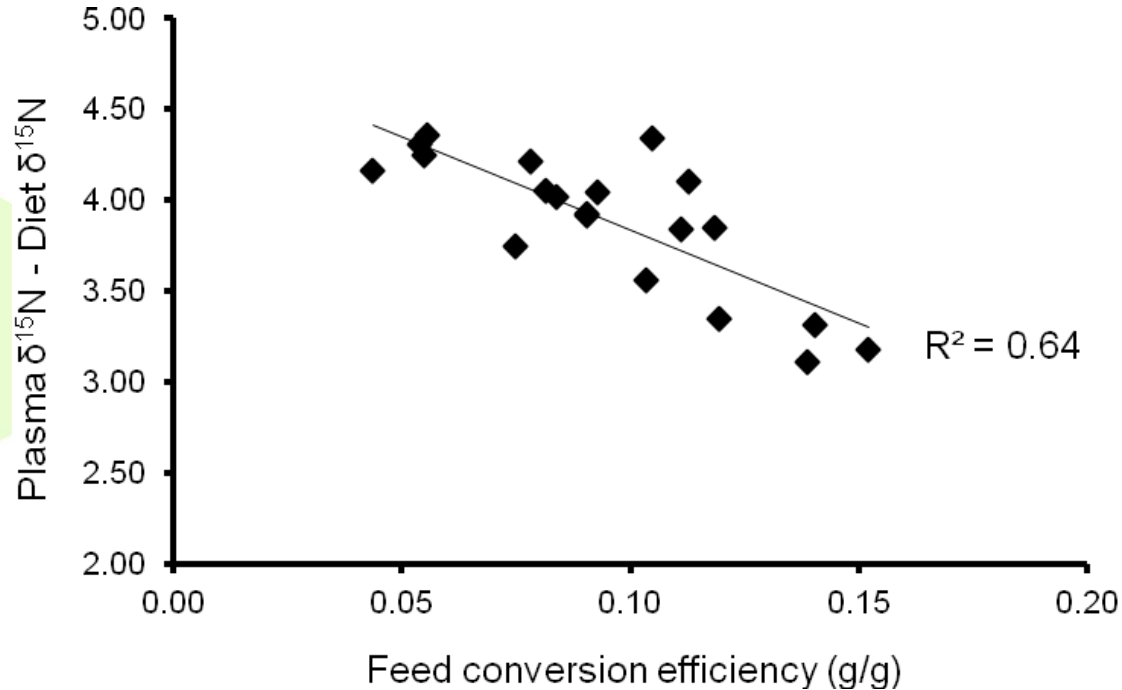
- $^{14}\text{N}$  and  $^{15}\text{N}$  behave differently in the animal, so:
  - Urine is depleted in  $^{15}\text{N}$  relative to the diet
  - Milk and animal tissues are enriched in  $^{15}\text{N}$  relative to the diet
- Ecologists use this to work out food chains

# Nitrogen isotopic fractionation



# Proxy for FCE

$\Delta^{15}\text{N}$  (Delta- $^{15}\text{N}$ )



# Meta-analysis (38 diets)

