

Strategies to Reach Net Zero on Welsh Beef and Sheep Farms

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The Red Meat Sector in Wales

Sheep, cattle and pig numbers in Wales and number of holdings (2020)



4.5 million
sheep (over one year),
14,100 holdings



162,000 beef cows
(over 2 years, calved)
7,043 holdings

Source: Little Book of Meat Facts, Hybu Cig Cymru – Meat Promotion Wales (HCC)



The sector in Wales directly
supports an agricultural
workforce of
52,800
(June 2020)

Source: Survey of agriculture and horticulture, June 2020

Annual production of lamb, beef and pork in Wales (2020)



62,000 tonnes



51,400 tonnes

Source: DEFRA

Welsh red meat production
was worth an estimated

(which is **41%** of the total
value of Welsh agricultural
output)

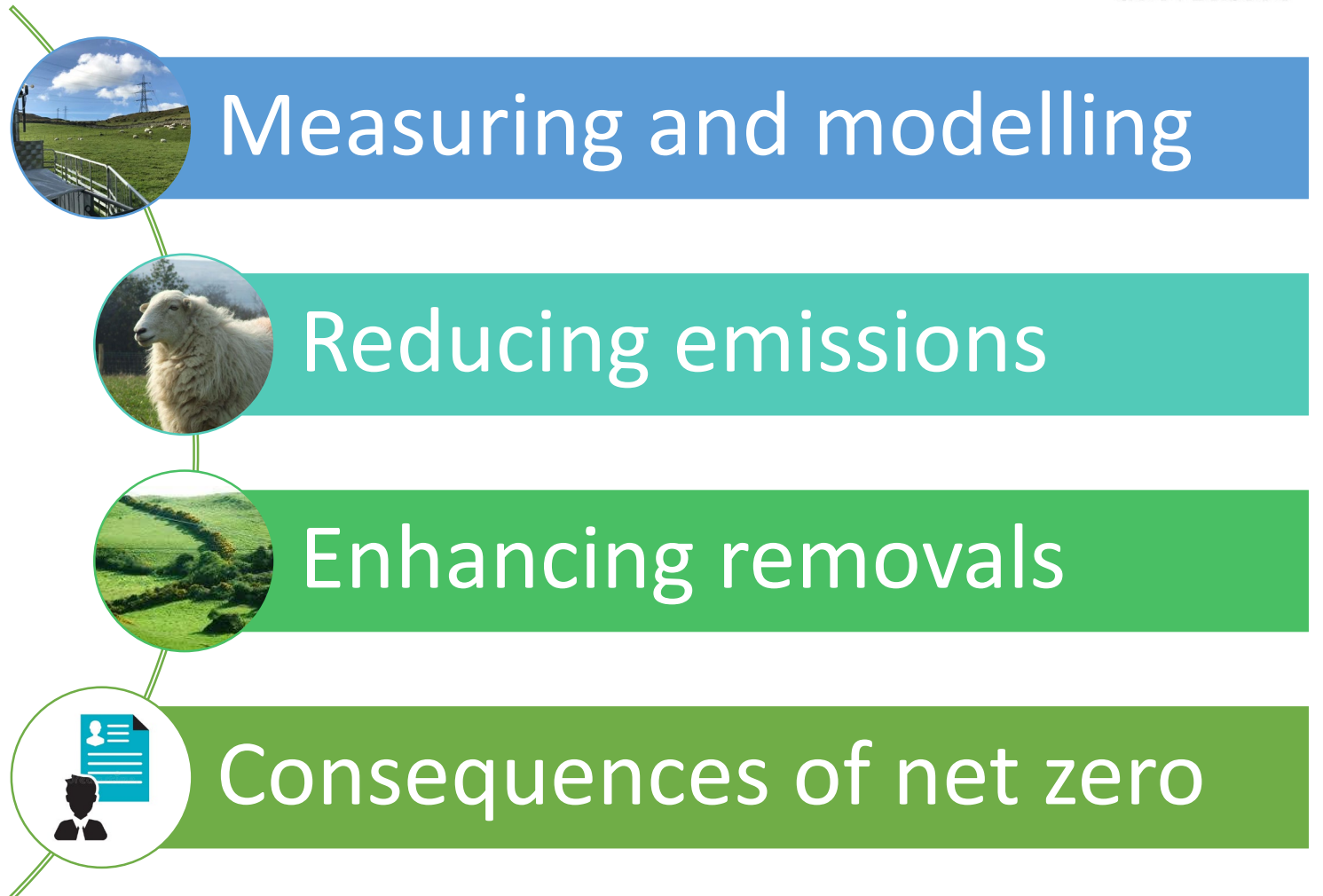
£652
Million
in 2019



Source: Welsh Government, Agriculture in the United Kingdom 2020

Net Zero by 2050?

- What is the current status of emissions on Welsh farms?
- What do we need to do to achieve net zero?
- What are the effects on production?



Carbon Calculators

Different tools available, calculator choice is dependent on the **farm**,
purpose of footprinting and **level of detail**

20 Welsh beef
and sheep
farms



agrecalc



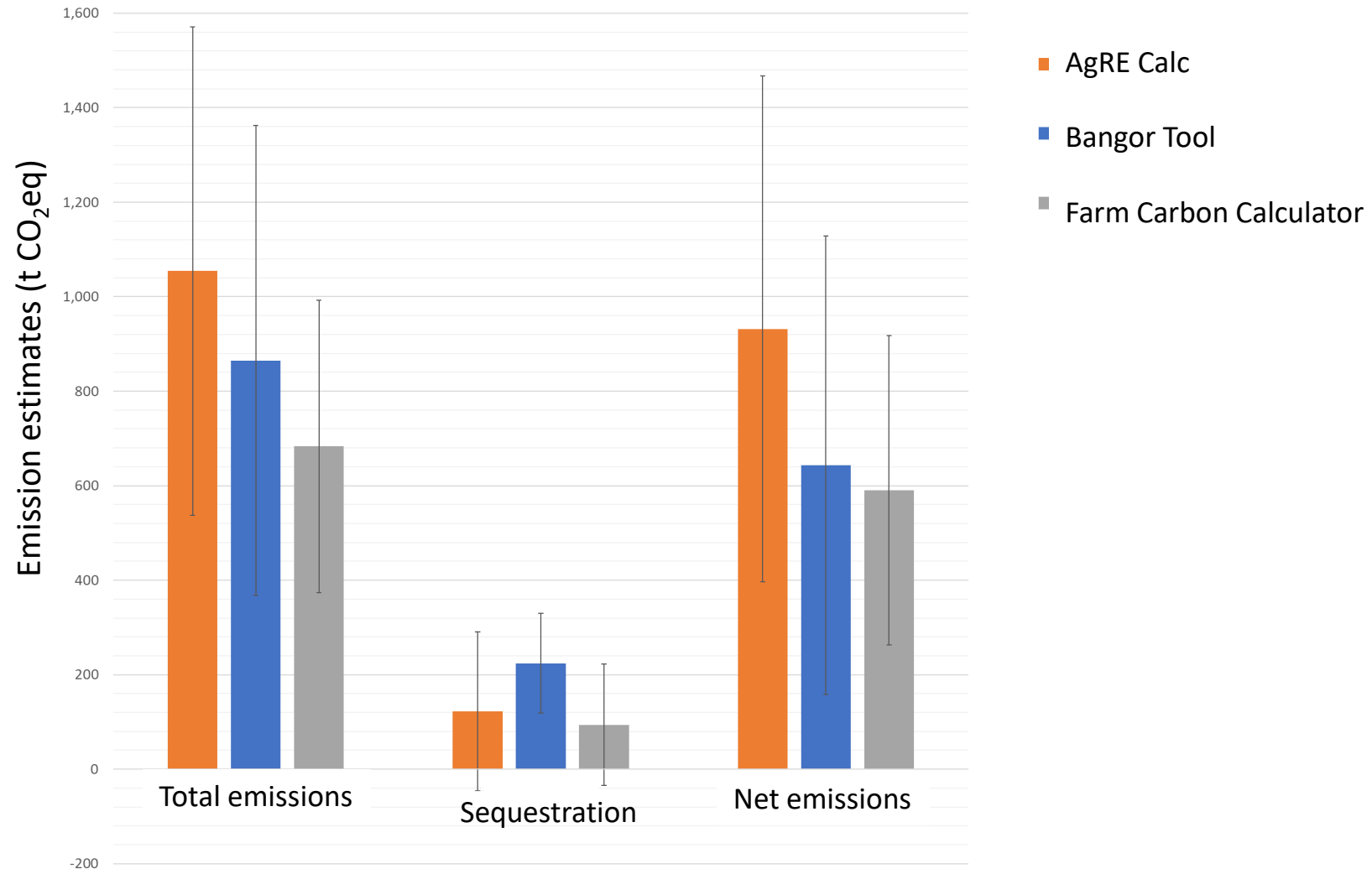
Comparison of:

Input requirements

Emission estimates

Sensitivity to mitigation
options

Calculator Comparison Results



Most important conclusion: **tools are not directly comparable**

Mitigation Modelling

- 20 Welsh **beef and sheep farms**
 - Hill, upland and lowland
 - Mix of enterprise types
- Calculator choice:
 - AgRE Calc emission** estimates
 - Bangor Tool sequestration** estimates
- Mitigation measures and initial **abatement potentials** taken from most recent UK **Marginal Abatement Cost Curve**



UK Marginal Abatement Cost Curve

UK 2030, CFP, d.r. 3.5%

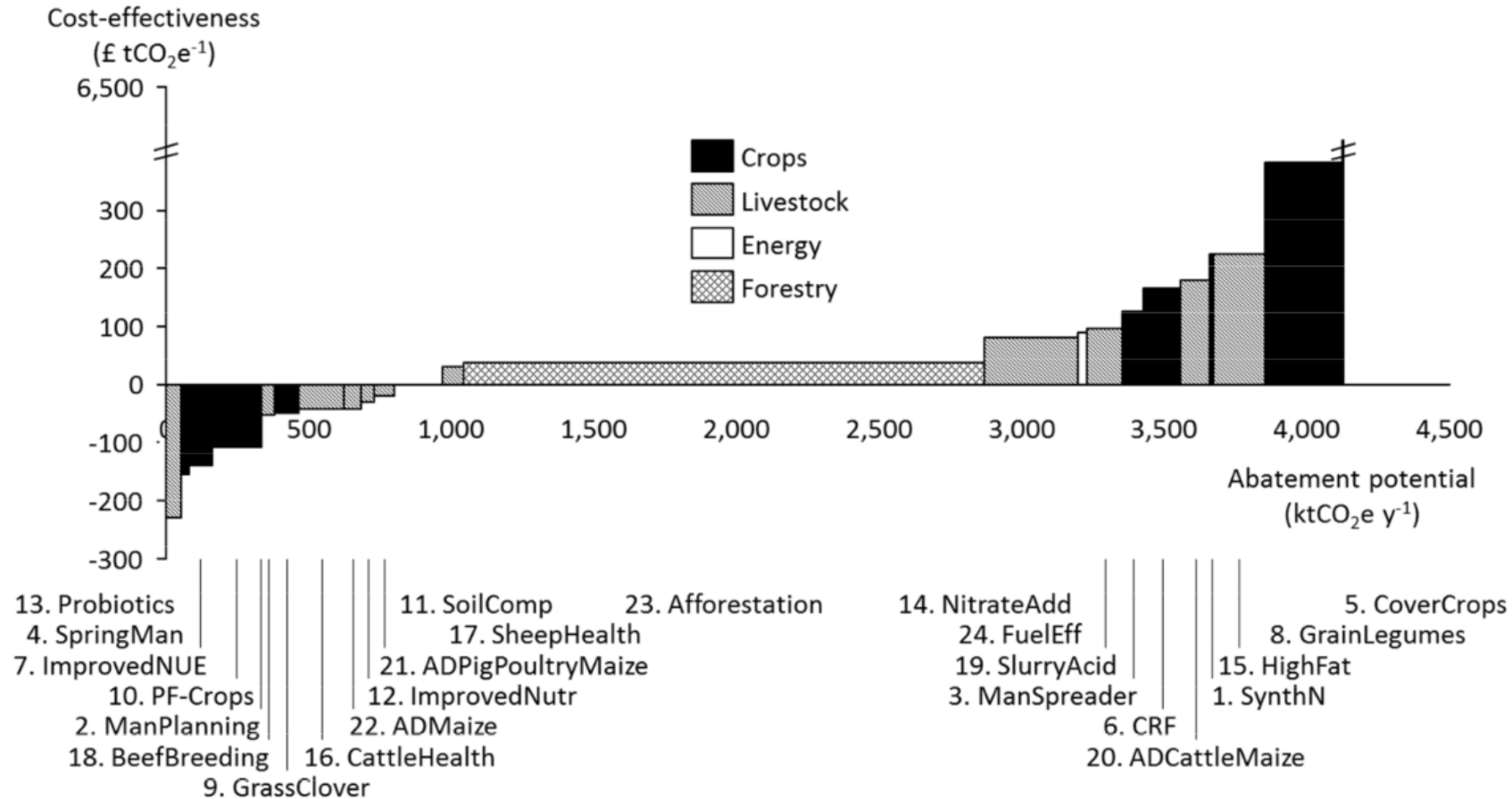


Figure ES 2 Marginal abatement cost curve (with interactions, 2030, UK, CFP, d.r. 3.5%), note that the C price in 2030 is $\text{£78 t CO}_2\text{e}^{-1}$

MACC Mitigation Measures

Improved synthetic N use

Improved organic N use

Variable rate N and lime

Catch/cover crops

Controlled release fertiliser

Plant varieties with improved N-use efficiency

Legumes in rotation

Legume-grass mixtures

Precision farming (crops)

Loosening compacted soils and preventing soil compaction

Nitrification and urease inhibitors

Slurry injection

Trailing hose/shoe slurry application

Improving beef and sheep nutrition

Probiotics

Nitrate as feed additive

3NOP feed additive

High fat diet (dietary lipids)

High starch diet

Improving cattle and sheep health

Selection for balanced breeding goals in beef cattle

Slurry acidification

Slurry cover – impermeable

Anaerobic digestion

Behavioural change in fuel efficiency of mobile machinery

Hill Farm Example



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Results so far

- **Emission reductions potential**
 - Average **29%**
 - Range from 20 - 38%
 - Lower on sheep only farms
- **Woodland needed to achieve net zero**
 - Equivalent to **7 - 78% of total farm area**
 - Dependent on several factors
 - Lower on hill farms and higher on lowland
 - Lower on sheep only farms
- **Area footprint vs area footprint plus offset**
 - **59 m²/kg meat vs 75 m²/kg meat**



Conclusions

- **Transparency** and **vigour** is needed in **carbon accounting tools** to understand baseline emissions and mitigation measures
- **Significant changes** are needed on farms to reach net zero
- There are **different strategies** for farms to move towards net zero



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