Scottish Farm Business Survey

Carbon audit pilot study

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Farm Business Survey - Overview

- Survey of 500 farm businesses
- Survey thresholds are >= €25,000 Standard Output and >0.5 Standard Labour Requirement
- Stratified by 8 farm types – pigs, poultry and horticulture are not included
- Representative of ~11,000 farms in Scotland
- Data collection is carried out by a contractor – currently SAC Consulting
- SAC analysts collect accounting books from the farm and ask additional questions
- Data collected is detailed and good quality but expensive - ~£2,000 per farm
- Most farms stay in the survey – drop off rate is <10%
- Farmers receive a Farm Business Report

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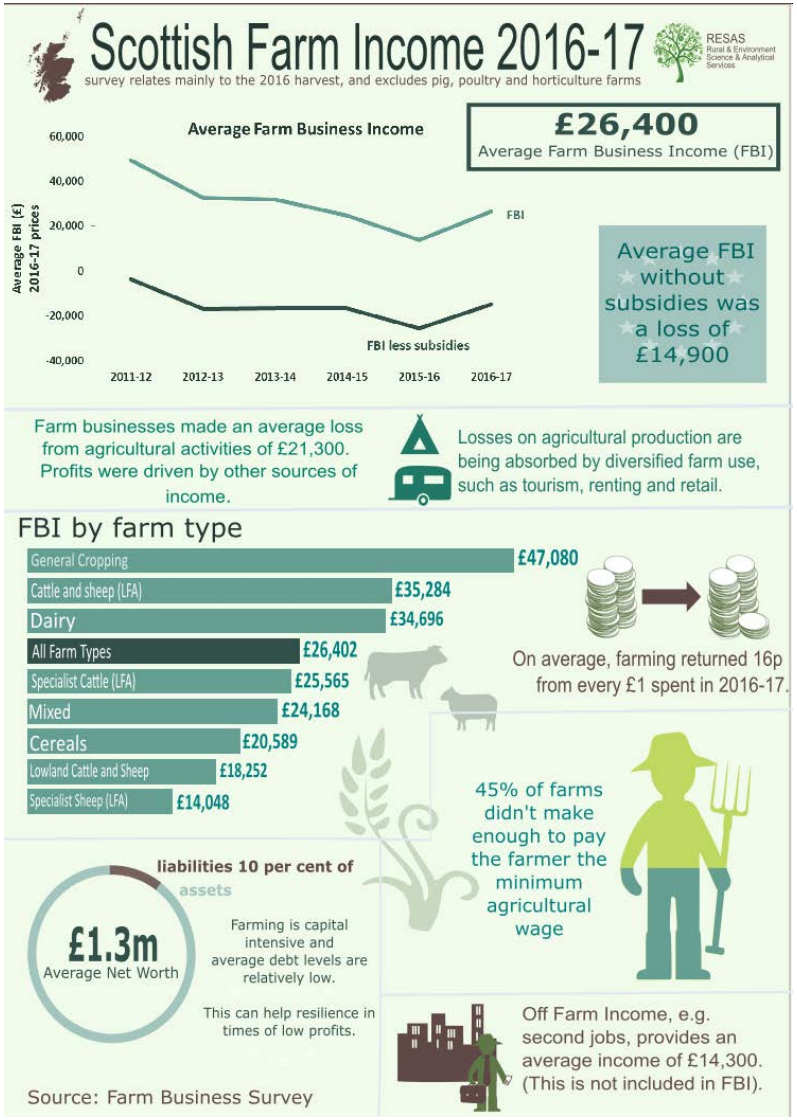
Farm Business Survey - Uses

- FADN
- RESAS statistics
- UK statistics
- Research institutes
- Industry bodies
- SG policy development



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Policy development – Carbon Audits

- Promote environmental sustainability and economic growth
- FAS – 250 free carbon audits
- SG Beef Efficiency Scheme

SRDP Farm Advisory Service

Farming for a Better Climate

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Carbon Audit within FBS

- Pilot study of 20 farms in 2017-18
- Use SAC Consulting's AgRE Calc to calculate carbon footprint
- Most data already collected in FBS
- Possibly roll out to all 500 farms next year?

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Carbon Audit within FBS

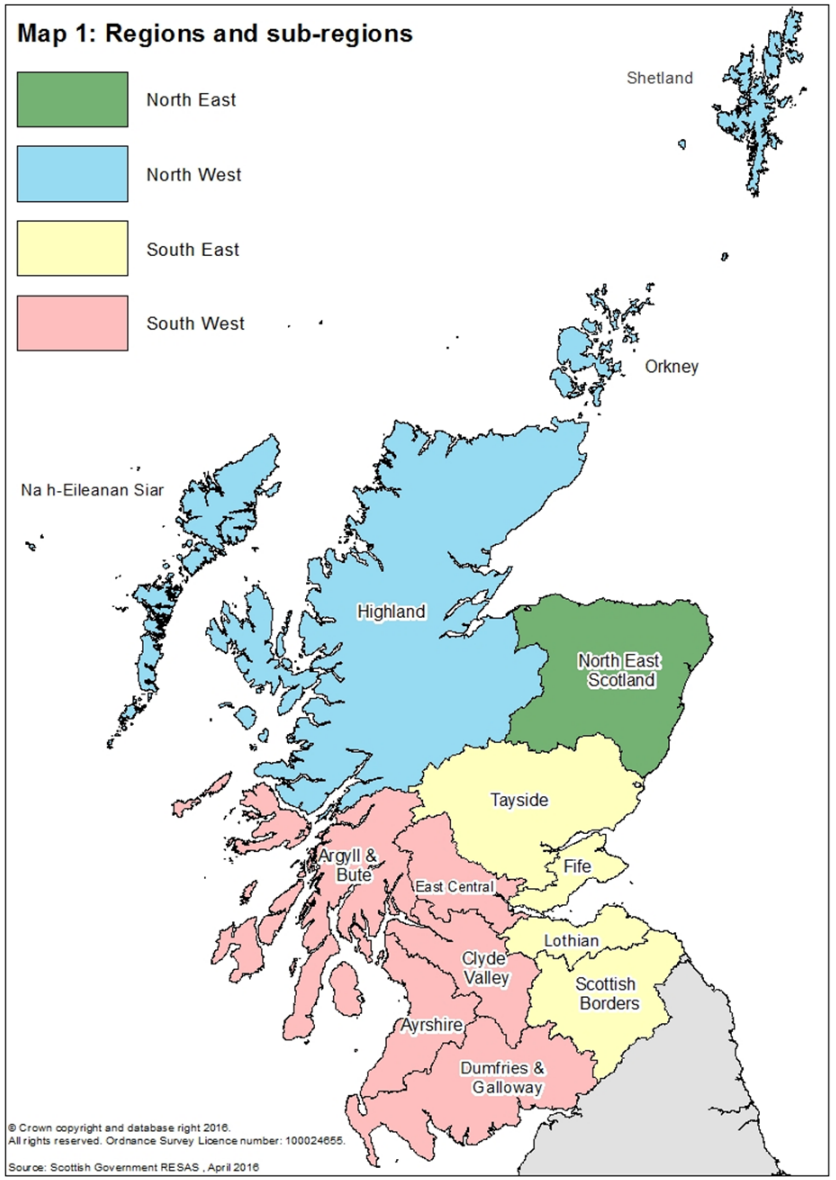
1 cereals
2 general cropping

2 LFA sheep
2 LFA mixed beef & sheep

2 cereals
1 LFA sheep
1 mixed lowland

4 dairy (1 organic)
4 LFA beef
1 LFA sheep

LFA: less favoured area



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What is AgRE Calc?

- Online tool used to calculate resource use efficiency of a farm
- Emissions are calculated for the whole farm, per enterprise and per unit of saleable product
- Enterprises include beef, sheep, dairy, pigs, poultry, cereals, oilseeds, potatoes, vegetables and fruits
- Generation of year on year comparisons

Carbon dioxide (CO2)	burning fossil fuels to produce energy, embedded in purchased inputs and disposal of waste
Methane (CH4)	natural by-product of enteric fermentation during ruminant digestion and from management of organic manure
Nitrous Oxide (N20)	released during the application of synthetic and organic fertilisers to the soil, from urine deposition by grazing animals and from crop residues

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AgRE Calc methodology

- The methodology employed is consistent with international and national standards including:
  - Intergovernmental Panel on Climate Change (IPCC)
  - BSI standard for life cycle analysis (PAS 2050:2011)
  - Carbon Trust (Footprint Expert)
  - Feed Print 2015-08
- Based on a PAS2050 compliant tool providing assurance that the greenhouse gas emissions being reported are calculated in a consistent way across the industry
- IPCC Tier I and Tier II calculations used

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What FBS variables are required?

From FBS Data	Extra data required
Land and Crops • Crop areas • NPK of fertiliser • Yields of cereal and cash crops • Sales (£) of all crops • Farm use of crops	• Forage - time since last ploughed - sales £/tonne - yield tonnes/ha • All crops - Lime quantity - Manure type - Manure qty tonne/m3
Livestock • Average livestock numbers • Number purchased • Number sold • Deaths • Wool sales • Milk production • Milk - Butterfat % - Protein %	• Beef/Dairy/Sheep system used • Manure management • Split of feeding types and bedding for each enterprise
Energy • Electricity value (£) • Machinery, fuel & oil (MFO) (£) • Crop drying fuel (£) • Heating fuel (HF) (£) • Renewable energy produced (£)	• MFO split between red diesel, white diesel, petrol etc • HF split between burning oil, gas coal etc • Average prices per litre for all fuels • Renewables split between wind, solar, hydro, biogas and what is used for heating • Average prices per kilowatt of electricity & renewables

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Output from AgRE Calc

Summary of Carbon Footprint Results - average of 6 farms		Whole farm kg CO2e
Carbon Dioxide		
Direct Emissions	Diesel	25,069
	Electricity	16,176
	Other Fuels	9,588
	Renewable Electricity	0
	Renewable Heat	0
	Direct CO2	**50,834**
Direct & Indirect Emissions (embeded in purchased inputs)	Fertiliser	103,281
	Lime	7,904
	Feed	33,941
	Bedding	10,421
	Pesticides	33
	Waste plastic/ packaging	0
	Refrigerant losses	0
	Disposal of carcasses	1,848
	Transport	0
	Indirect CO2	**157,428**
	Total CO2 from energy use	**208,262**

Methane		
	Fermentation (feed digestion)	530,380
	Manure management	75,618
	Total CO2e from methane	**605,998**
Nitrous Oxide		
Volatilisation, leaching & run-off	Inorganic fertiliser and imported organic manure input to soil	204,784
	Grazing deposition, manaure management and organic manure input to soil	151,321
Vegetation, stubble & roots	Crop N residues	78,893
	Total CO2e from nitrous oxide	**434,999**
Whole farm and enterprise CO2e emissions	kg CO2e	**1,249,259**
Sequestration by forestry	kg CO2e	11,162
Net emissions from land use		**1,238,096**
Whole farm CO2e emissions per kg of farm output	kg CO2e/ kg output	**25**
Total CO2e emissions per LU eqivalent	kg CO2e/ LU	**0.21**
Total CO2e emissions per hectare	kg CO2e/ ha	**8,908**
Farm and enterprise output	kg	**264,943**

Note: Power is for farming activity (excluded personal and household demand)

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Output from AgRE Calc

Whole farm and enterprise CO2e emissions	kg CO2e	**988,955**
Sequestration by forestry	kg CO2e	-
Net emissions from land use		**988,955**
Whole farm CO2e emissions per kg of farm output	kg CO2e/ kg output	**49**
Total CO2e emissions per LU eqivalent	kg CO2e/ LU	**0.32**
Total CO2e emissions per hectare	kg CO2e/ ha	**3,358**

Whole farm and enterprise CO2e emissions	kg CO2e	**1,595,489**
Sequestration by forestry	kg CO2e	19,602
Net emissions from land use		**1,575,887**
Whole farm CO2e emissions per kg of farm output	kg CO2e/ kg output	**3**
Total CO2e emissions per LU eqivalent	kg CO2e/ LU	**0.19**
Total CO2e emissions per hectare	kg CO2e/ ha	**14,999**

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Uses and benefits

- Being able to track an “average” farms carbon footprint
- Include in farm business reports to participating farmers
- Analysis with FBS data - farm business income?
- Could help recruit more farmers into survey?
- TBC – require a few more years of data
- Hopefully pilot will get policy buy in!

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Thank you for listening

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