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Department for Environment  
Food and Rural Affairs

# The Agricultural Greenhouse Gas Research and Development Platform 2010 -2015

*Accounting for greenhouse gases from  
agriculture*

Toby Mottram 24/11/2011

# WHAT are the GHG Inventory projects ?

- **AC0114 Inventory Tool Building**
- **AC0115 Methane Emissions from Livestock**
- **AC0116 The *InveN<sub>2</sub>O*ry project : improving the UK agricultural GHG inventory (nitrous oxide)**

# Building the new inventory

- AC0114 Inventory Tool Building/Data Mining
- Aim: improve the UK's greenhouse gas inventory by replacing generic IPCC emission factors with british factors linked to new data sources

# Building



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## LIVESTOCK

### TOTAL CAT

### Dairy herd To

### Beef herd To

### Dairy heifers

SUMMARY:		AGRICULTURAL METHANE EMISSIONS					
YEAR COUNTRY		Total	England	Wales	Scotland	N Ireland	Total
<b>Agricultural CH4</b>							
Total CH4		892.37	480	115	142	115	852.18
Enteric CH4, (ruminants)		749.14	392.04	103.52	125.44	97.44	718.44
Waste CH4, (manure)		143.24	88.28	11.41	16.25	17.79	133.73
Burning CH4		0.00	0.00	0.00	0.00	0.00	0.00
[Difference x-check CH4, kt]		0.00	0.00	0.00	0.00	0.00	0.00
[Total x-check CH4, kt]		892.37	480.32	114.92	141.69	115.24	852.18
SUMMARY:							
AGRICULTURAL NITROUS OXIDE EMISSIONS							
YEAR COUNTRY		Total	England	Wales	Scotland	N Ireland	Total
<b>Agricultural N2O kt</b>							
Total N2O		92.37	56.41	7.03	12.26	6.87	82.56
Animals N2O, kt		7.41	4.18	0.51	0.90	0.85	6.44
Direct N2O, (from crops)		55.32	34.83	4.06	7.27	3.69	49.85
Indirect N2O, (ammonia)		29.12	17.09	2.36	3.97	2.27	25.69
Bio fix by improv grass N2O		0.52	0.32	0.09	0.11	0.06	0.58
Burning N2O		0.00	0.00	0.00	0.00	0.00	0.00
[difference x-check N2O, kt]		0.00	0.00	0.00	0.00	0.00	0.00
[Total x-check N2O, kt]		92.37	56.41	7.03	12.26	6.87	82.56

	2008	2009
Total CH4	808	1,025,481
Enteric CH4, (ruminants)	477	5,484,083
Waste CH4, (manure)	218	1,129,968
Burning CH4	749	1,812,405
[Difference x-check CH4, kt]	541	1,599,025
[Total x-check CH4, kt]	985	10,025,481
NE <sub>m</sub> MJ d <sup>-1</sup>	260	187,361
NE <sub>f</sub> MJ d <sup>-1</sup>	247	284,698
NE <sub>p</sub> MJ d <sup>-1</sup>	345	1,856,863
NE <sub>m</sub> /DE	785	735,399
NE <sub>f</sub> /DE	519	182,564
GE MJ d <sup>-1</sup>	175	450,817
DM Intake as % body wt	363	256,776
EF kg CH <sub>4</sub> head <sup>-1</sup> yr <sup>-1</sup>	142	1,625,556
Beef cows	360	254,114
Animal weight, kg	443	52,972
Ave Milk yield kg/hd/d	327	40,335
Average fat content %	272	62,489
% time spent grazing	302	409,910
Feed digestibility (DE %)		
NE <sub>m</sub> MJ d <sup>-1</sup>		
NE <sub>a</sub> MJ d <sup>-1</sup>		
NE <sub>f</sub> MJ d <sup>-1</sup>		
NE <sub>p</sub> MJ d <sup>-1</sup>		
NE <sub>m</sub> /DE		
NE <sub>f</sub> /DE		
GE MJ d <sup>-1</sup>		
DM Intake as % body wt		
EF kg CH <sub>4</sub> head <sup>-1</sup> yr <sup>-1</sup>		

- How it will be remade

- New sources of data

- Breed society records?
- Farm Business Survey ?
- others

- New Emission Factors

- literature search
- AC0115
- AC0116

Methane EFs

Nitrous Oxide



- **Outputs**
  - A data archive
  - A new inventory tool
  - Spatially disaggregated data
  - Mitigation strategies

# Methane Emissions – the missing data ?

- **AC0115 Methane Emissions**
- **Aim: improve the accuracy and reliability of the UK's methane inventory**

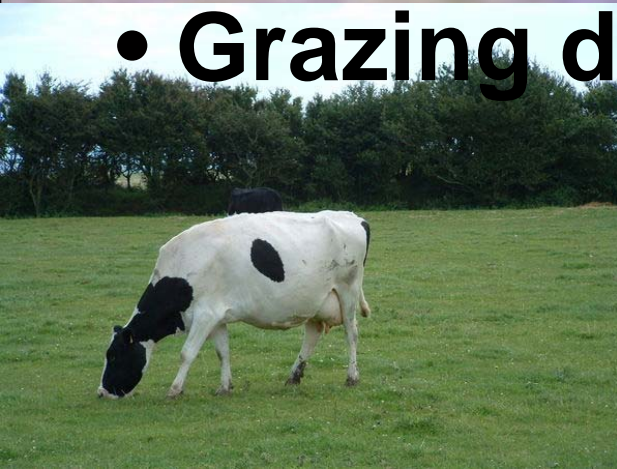
# Agricultural Greenhouse Gas Research Platform – missing data

**Table 5.** An approximate representation of knowledge of methane emissions from cattle and sheep under UK-relevant conditions, where 0 = no information, + to ++++ = some to lots of information, ? = unknown, NA = not applicable.

Diet/System	Dairy cows	Dairy young-stock	Beef cows	Growing/finishing beef cattle	Sheep	Weaned lambs
<b><u>Housed</u></b>						
Grass silage	++++	+	++	++	+	+
Maize silage	++++	?	++	++	+	0
Straw and by-product based	++	?	?	?	?	0
High concentrate inputs	++++	+	+	+	?	?/NA
<b><u>Grazing</u></b>						
Improved grass grazing	+	?	0	0	?	+
Mixed swards	?	?	0	0	0	0
Permanent pasture grazing	?	?	0	0	0	0
Rough grazing	NA	NA	0	0	0	0
Moorland	NA	NA	0/NA	0	0	0



- **Measuring methane emissions**
  - **Beef Cows**
  - **Sheep**
  - **Grazing dairy cows**



# AC0115 – led by IBERS



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AFBI calorimeter chamber

# AC0115 – led by IBERS



SF6 technique based on bolus and sampling device

- Deliverables
  - Better emission factors for the inventory
  - Systems information for improved future emissions
  - Policy inputs by identifying optimal mitigation strategies

- **Improved EFs for Nitrous Oxide emissions**
- **Identifying UK mitigation techniques**

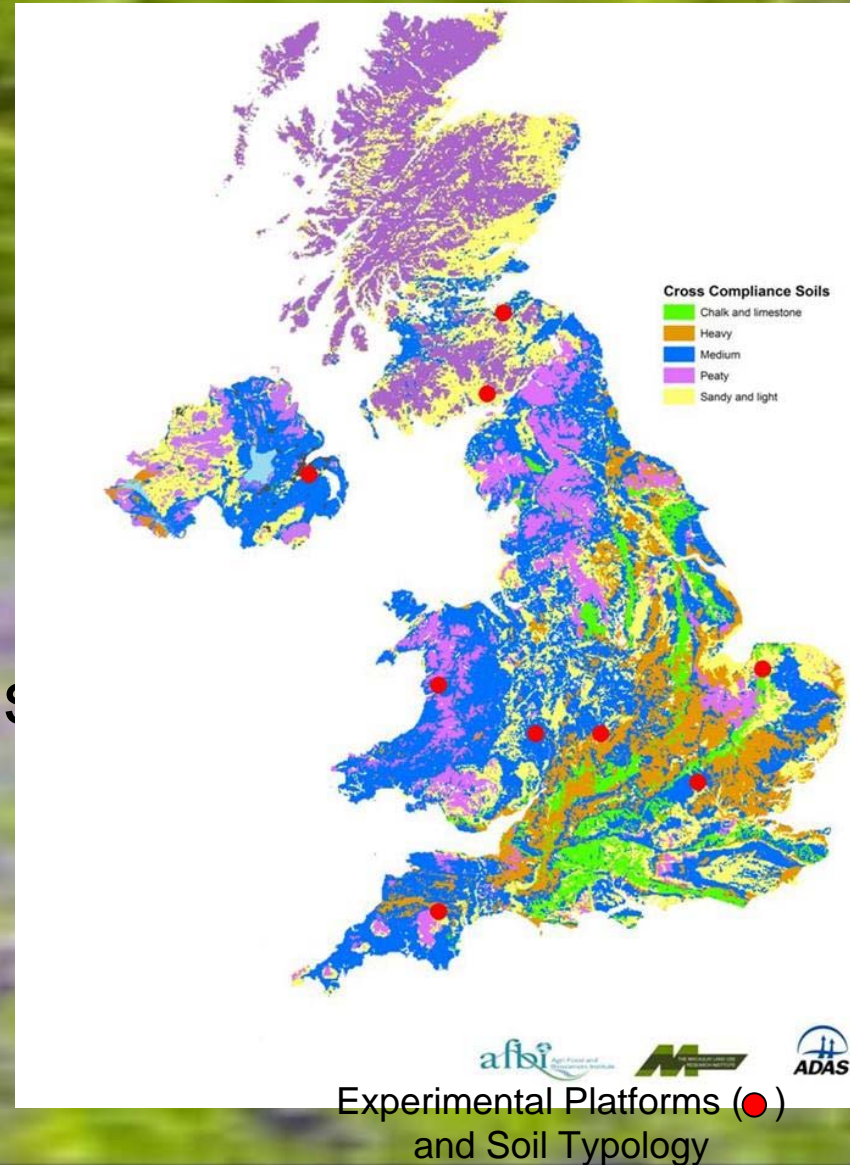
- **Field measurements**
  - **Mineral and organic sources of N**
- **Building/improving models**
  - **DNDC**
  - **DailyDayCent**
- **Close links to emissions to water**

# AC0116 – measurement sites



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- Land areas under soil type rainfall zones
- Ranking of N sources (Tier 1 assumptions)
- Modelling sensitivities of soil, Climate, N source combinations
- Previous and current studies delivering EFs and model validation data



# Agricultural Greenhouse Gas Research Platform Communications



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- **Via AC0112 to Defra to DECC and the annual inventory**
- **Reports and refereed papers**
- **A platform website**
- **Annual Workshops with stakeholders**
- **Direct KT and KT via the Levy Boards**
- **Global Research Alliance**



# Global Research Alliance

- **Hosted by NZ**
- **Three Groups**
  - **Croplands**
  - **Livestock**
  - **Paddy Rice**
- **UK fully committed**

# Agricultural Greenhouse Gas Research Platform

- More information at
- <http://www.ghgplatform.org.uk/>
- Thank You