Outlook 2020 - Sustainability

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Teagasc
Agriculture and Food Development Authority

Overview

- Sustainability definition
- Methodology
- Projections for 2020
- Summary / conclusion

What is Sustainability?

- "Sustainable development is development that meets **the needs of the present** without compromising the ability of **future generations to meet their own needs**."

  Brundtland Commission, Our Common Future (1987)

- Sustainable agriculture is defined as a practise that meets **current and long-term needs** for food, fibre, and other related needs **of society**, while maximizing net benefits through the **conservation of resources** to maintain other ecosystem services and functions, and long-term human development

  (Rao and Rogers, 2006).

Sustainability Definition

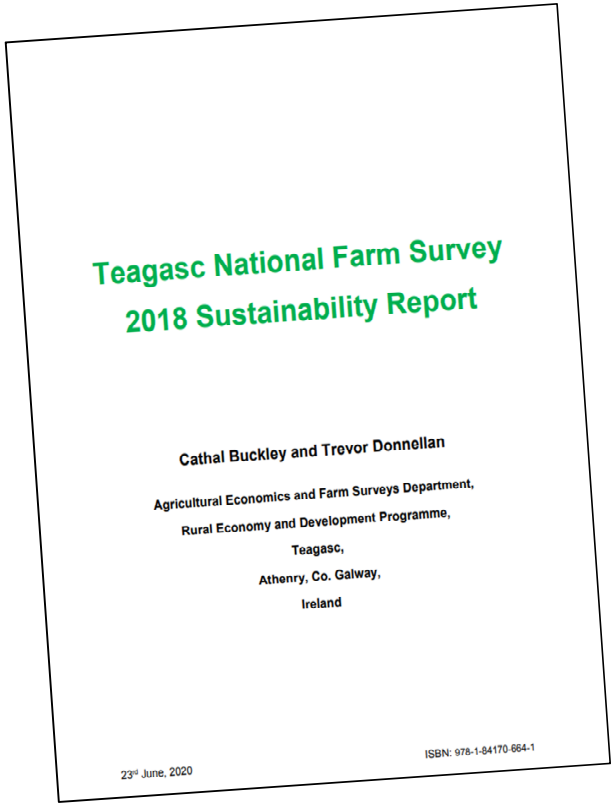
- Farm level sustainability is intersection of:
  1. Economic
  2. Environmental
  3. Social
  4. Innovation

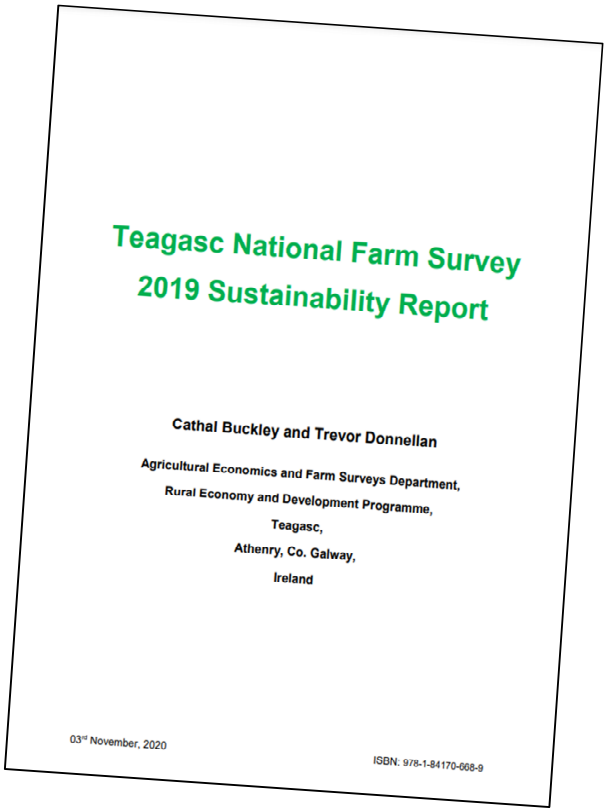
Success

Failure

Teagasc Sustainability Report Series

- Comprehensive range of results
  - 4 Farm Systems (Dairy, Cattle, Sheep, Tillage)
  - 4 Sustainability dimension
    - » Economic, Environmental, Social & Innovation
    - » 129 indicators for 2019 (most recent year)
  - Temporal
    - » Individual year results 2012 to 2019
      - 129 indicators x 6 years
    - » 3 year rolling averages 2012-2019 (longer term trend)





https://www.teagasc.ie/rural-economy/rural-economy/national-farm-survey/sustainability-reports/

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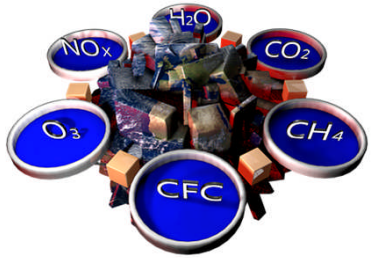
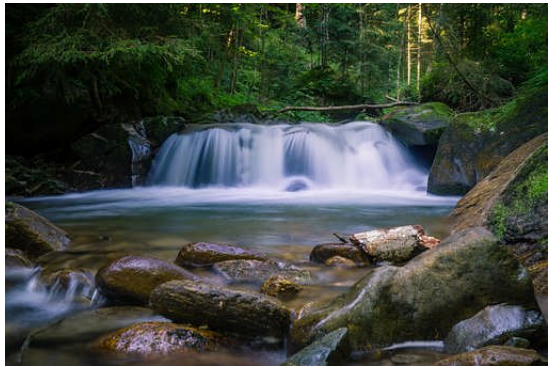
Environmental Sustainability

1. Gaseous Emissions
   - Greenhouse Gases
   - Ammonia

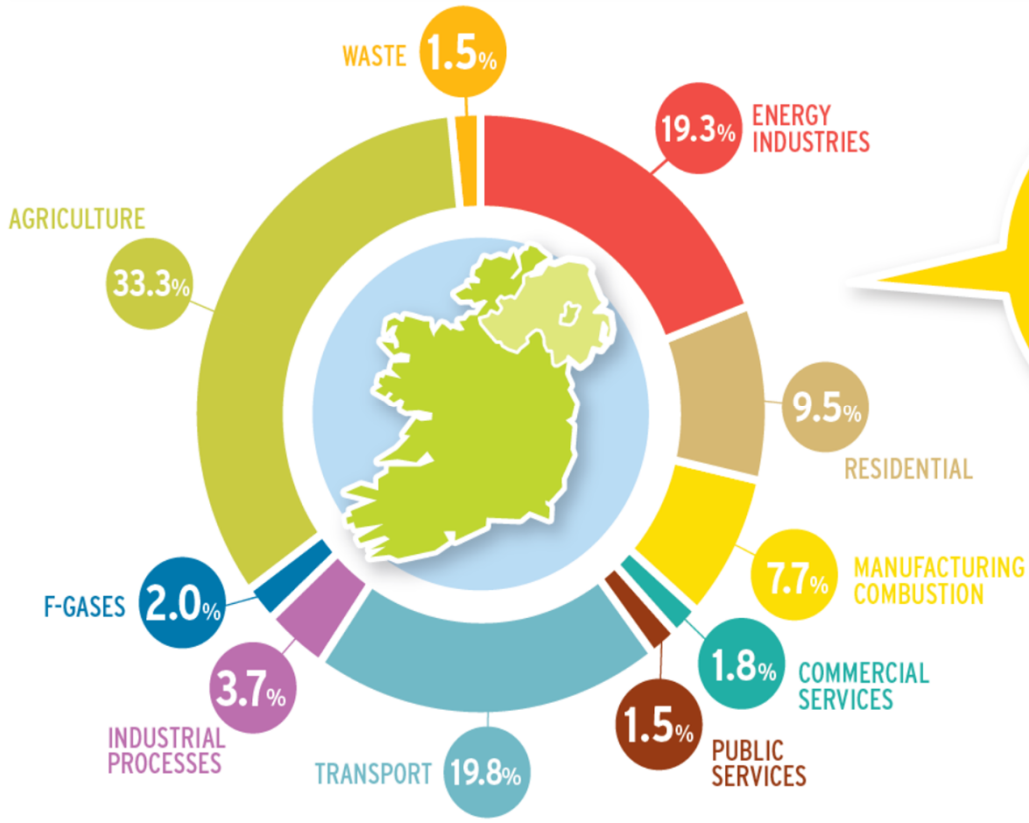
2. Risk to water quality
   - Use of nitrogen & phosphorus

3. Biodiversity Indicator
   - In development

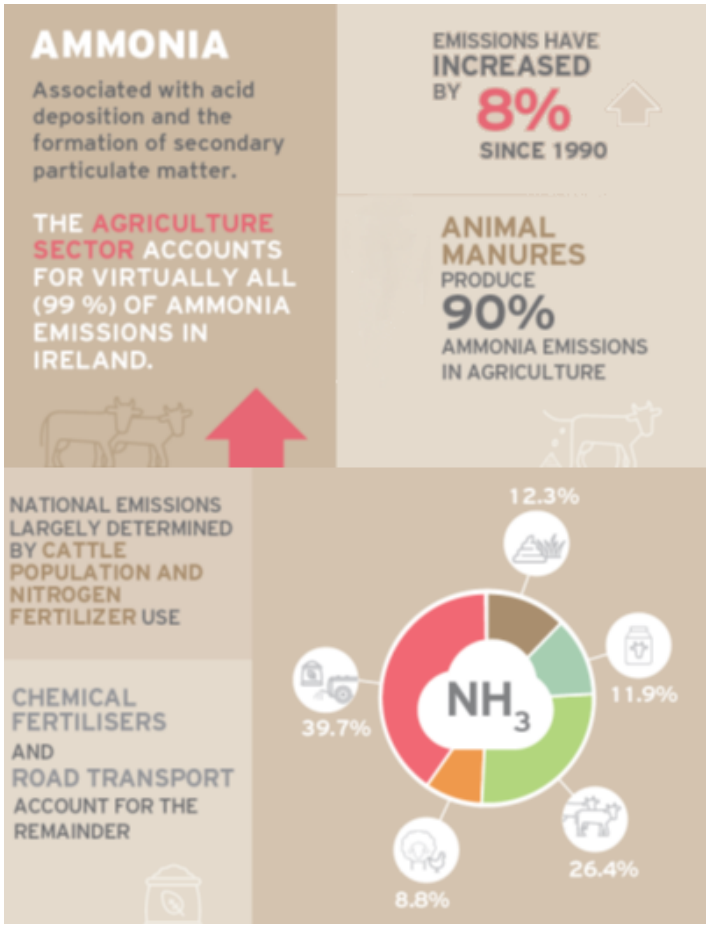




Gaseous Emissions - Agriculture



Source: EPA, 2018



Source: EPA, 2018

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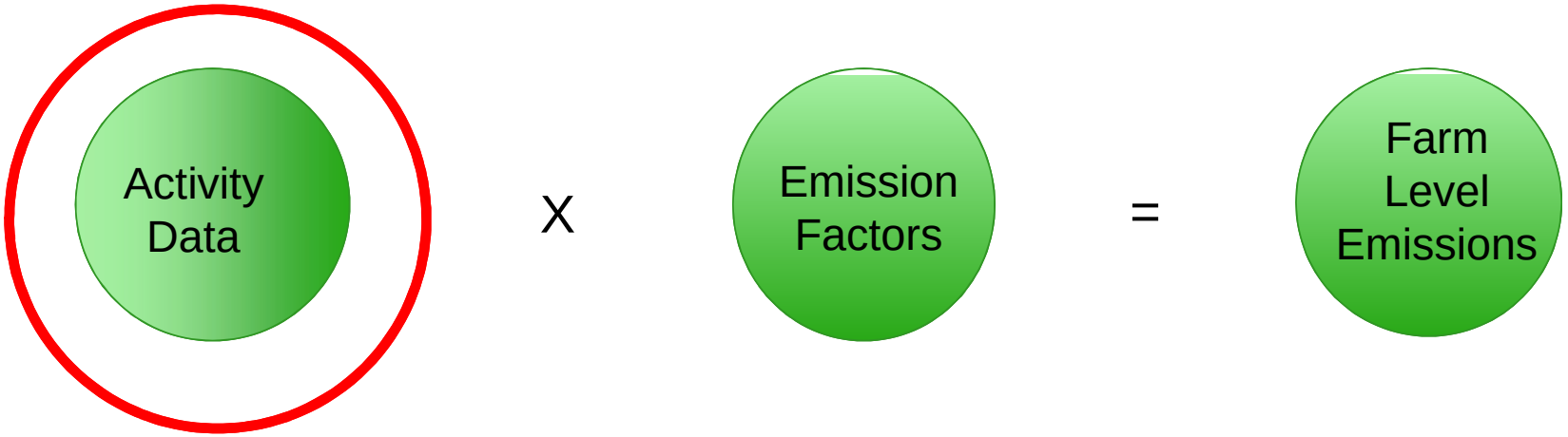
Emissions – How are they calculated

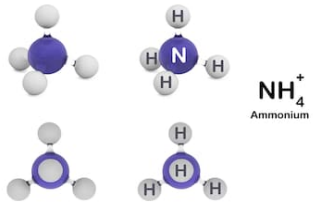


- Activity Data
  - Farm Practice (e.g. animal numbers, chemical fertilisers & manures)
- Emission Factors
  - Scientific evidence from lab/field experiments, national level if possible (peer reviewed)

Methodological approach – Emission Factors

- GHG - All in common currency of CO_2 equivalence
  - » IPCC based national inventory approach for all farm types
  - » Replicating approach used by EPA at national level

- Ammonia
  - » National inventories approach for all farms
  - » Replicating approach used by EPA at national level for reporting under the EU NEC Directive



Methodological approach – Activity Data

- Activity data from Teagasc National Farm Survey
- NFS conducted by Teagasc since 1972 (part of EU Farm Accountancy Data Network)
  - Sample of 850+farmers representing over 90,000 nationally
- Data capture for environmental modelling
  - Animal numbers by category (e.g. Dairy Cows)
  - Crops grown (e.g. barley, wheat, oats)
  - Fertilisers applies (e.g. CAN, urea, protected urea)
  - Lime applied
  - Manure management practices (housing, storage, landspreading)

Activity Data Projections – 2020

1. Animal Inventories
   - CSO June survey 2019 vs 2020

2. Chemical Fertiliser Sales
   - Sales data DAFM Sept 2019-October 2020

- Apply these changes to farms with the Teagasc NFS
  - Using 2019 as the base year

Animal Numbers June 2019 vs 2020

Animal inventories	2019 vs 2020
Total cattle	+1.47%
Dairy cows	+4.18%
Other cows	-1.64%
Bulls	-4.92%
Cattle: 2 years and over	+0.66%
Cattle: 1-2 years	-2.82%
Cattle: under 1 year	+5.43%

(CSO, 2020)

Chemical Fertiliser

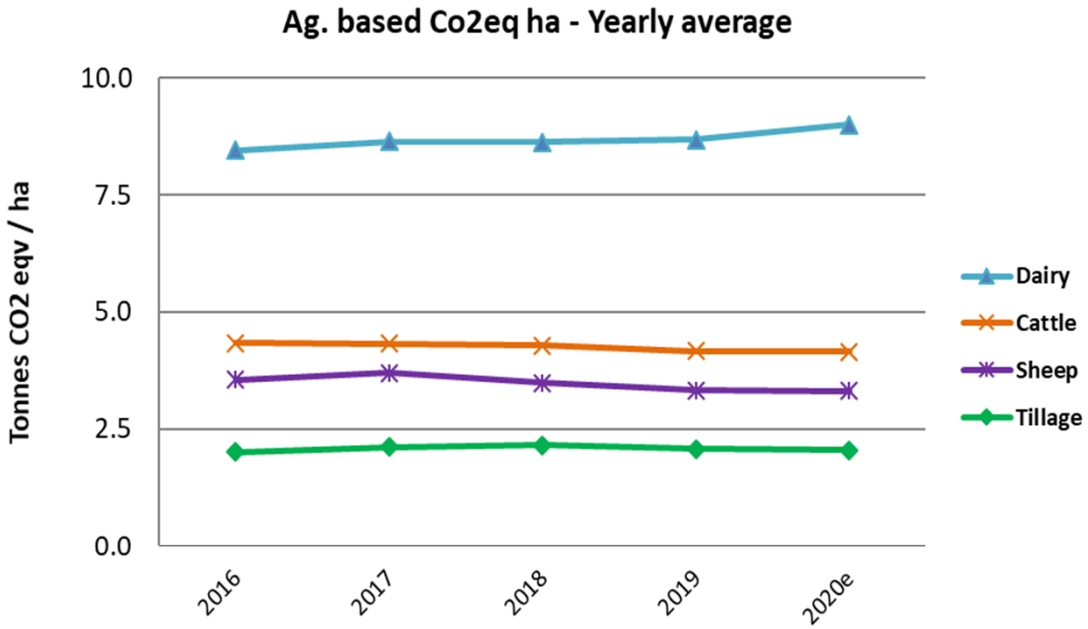
	2018-2019*	2019-2020*	% change
Straight CAN	121,502	122,167	0.55%
Straight Urea	44,765	43,976	-1.76%
Protected Urea	11,012	19,984	81.48%
NK Compounds	3,848	3,600	-6.44%
NP Compounds	2,204	2,003	-9.12%
NPK Compounds	179,404	184,625	2.91%
Other N Fertilisers	3,323	3,162	-4.84%
Total	362,734	376,355	3.75%

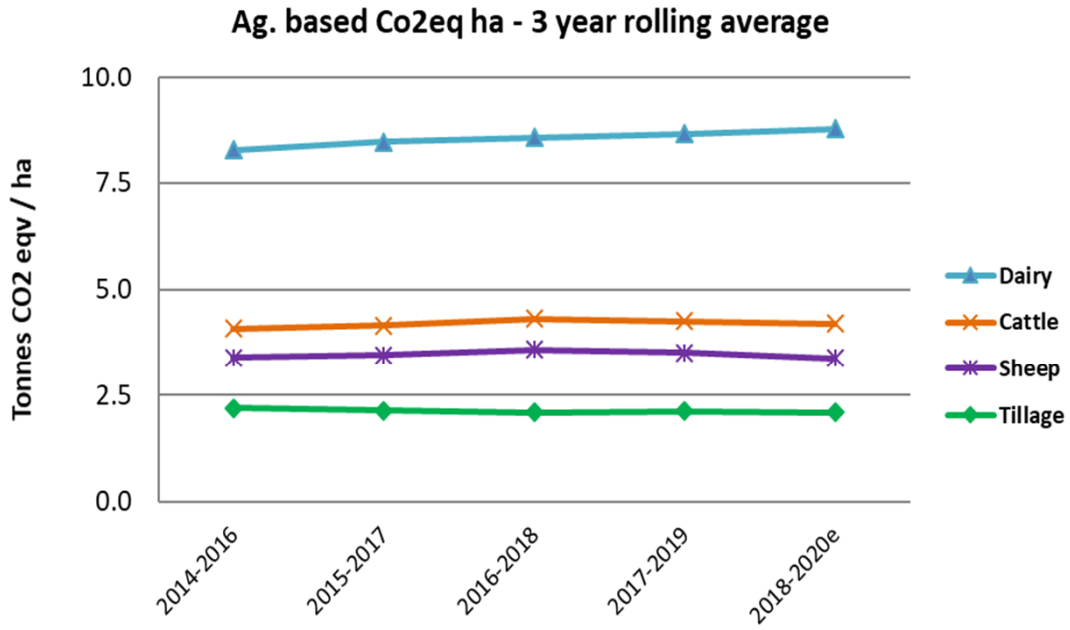
* September to October sales year (DAFM,2020)

GHG National Inventory Accounts

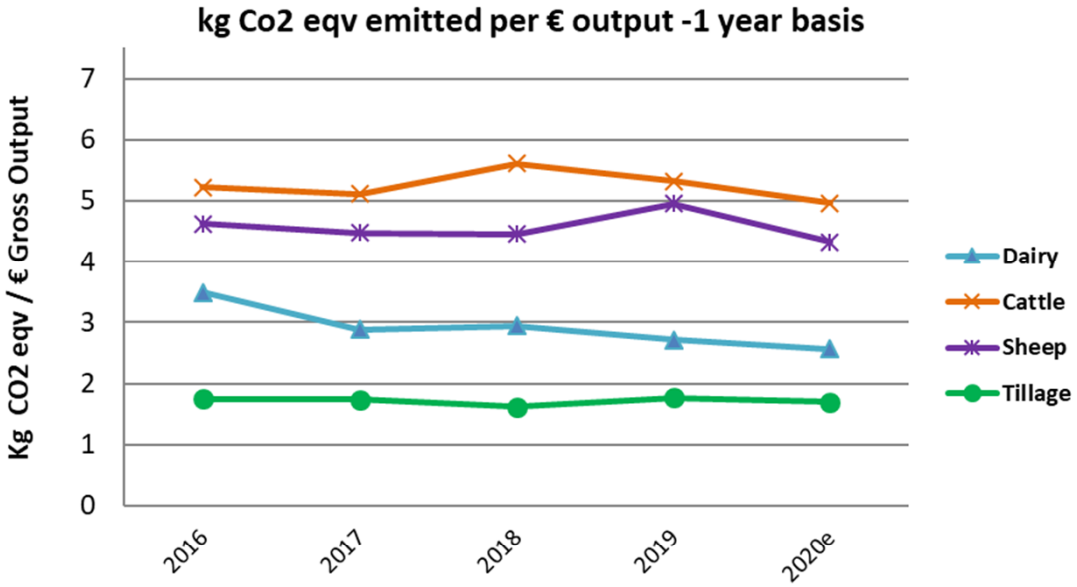
3. Agriculture (CO_2 eq)	National Emission Profile IPCC Approach 2018 (% by Gas CO_2 eqv)	% Teagasc NFS - 2018 Profile (% by Gas CO_2 eqv)
3.A Enteric Fermentation (CH_4)	58%	57%
3.B Manure Management (CH_4 & N_2O)	10%	11%
3.C Rice Cultivation	-	-
3.D Agricultural Soils (N_2O)	30%	30%
3.E Prescribed Burning of Savannas	-	-
3.F Field Burning of Agricultural Residues	-	-
3.G Liming	2%	2%
3.H Urea Application	0%	0%
3.I Other Carbon-containing fertilizers	-	-
3.J Other	-	-
Total Emissions	100%	100%

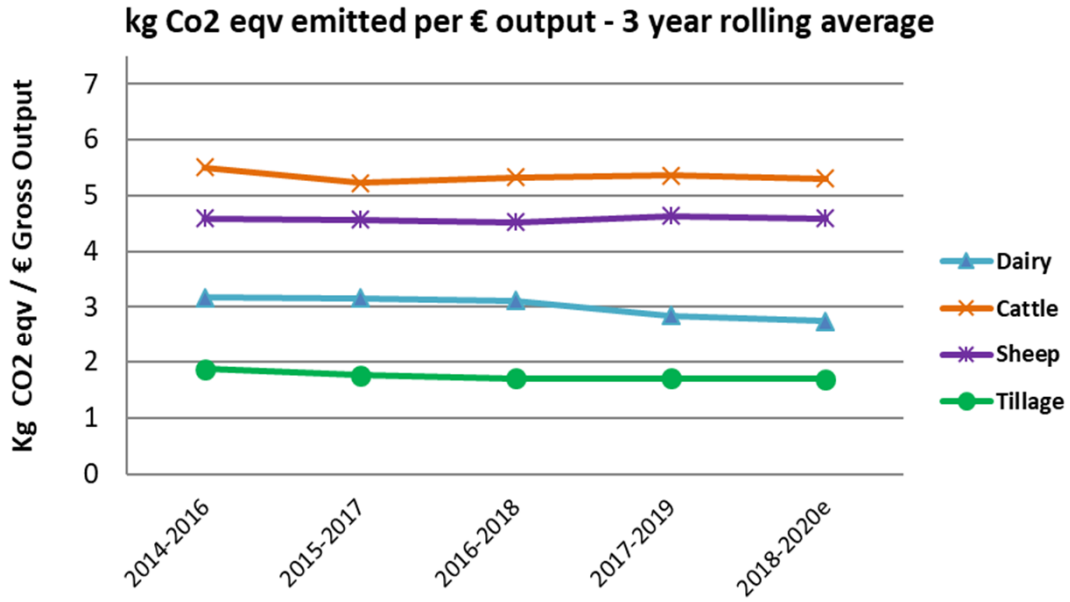
GHG emissions per hectare





GHG emissions per € output generated





Dairy based Ag. GHG emissions - Components

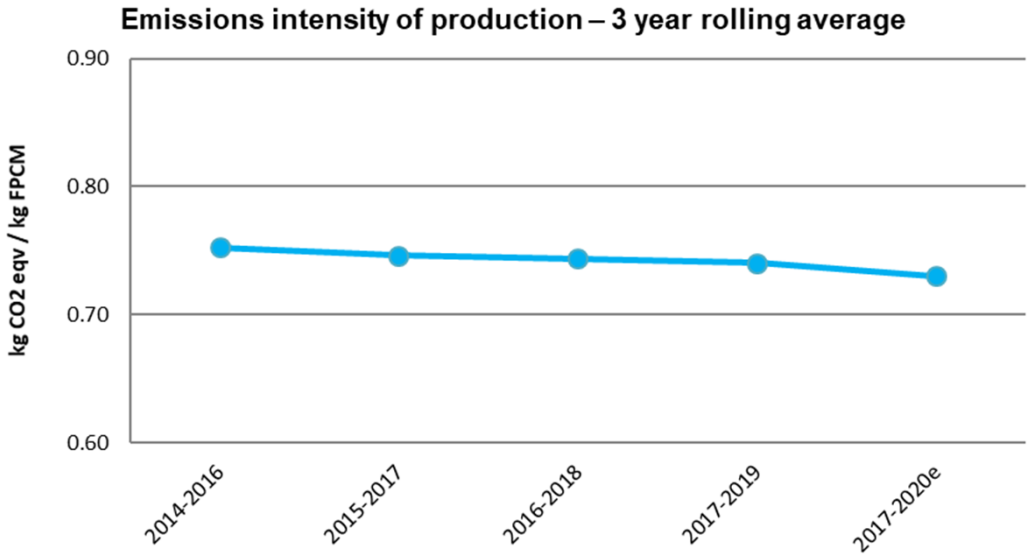
Dairy absolute GHG emissions equation = 3 Components

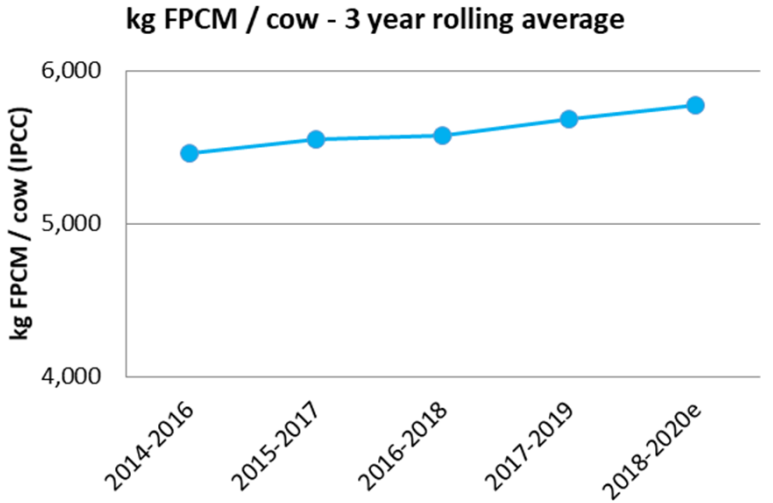
(1) kg of milk produced per cow *

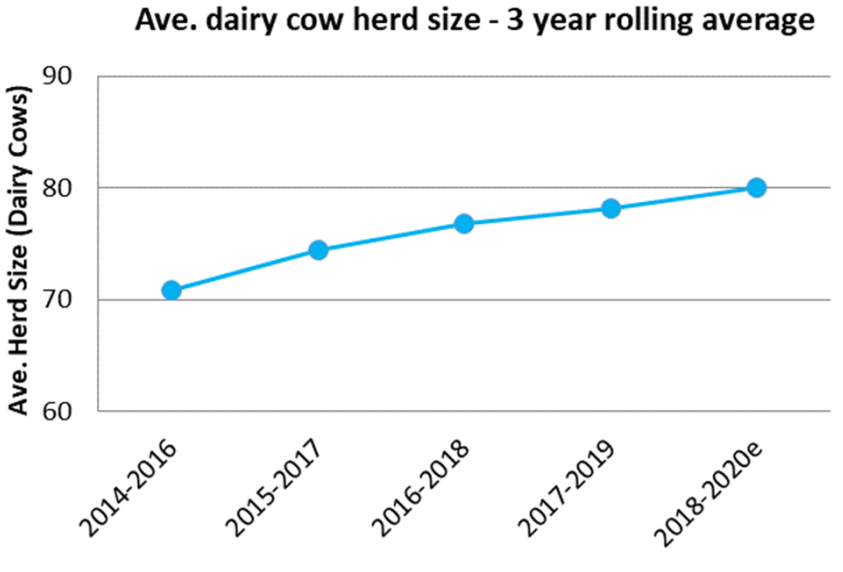
(2) CO_2e per kg of milk *

(3) No. of cows

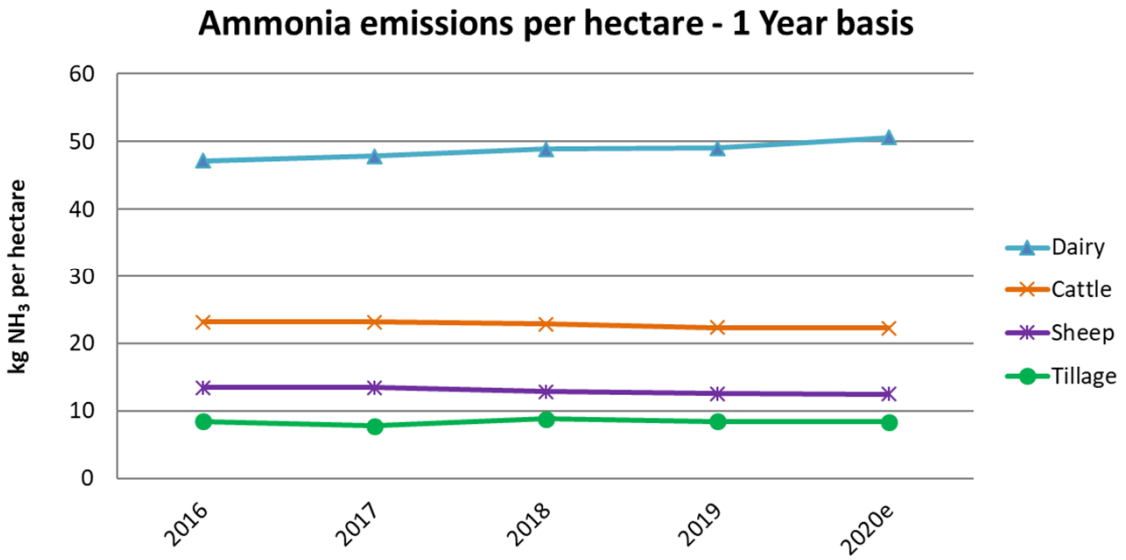
- Kg of Fat & Protein Corrected Milk (FPCM) milk = Standardized to 4% fat and 3.3% protein.

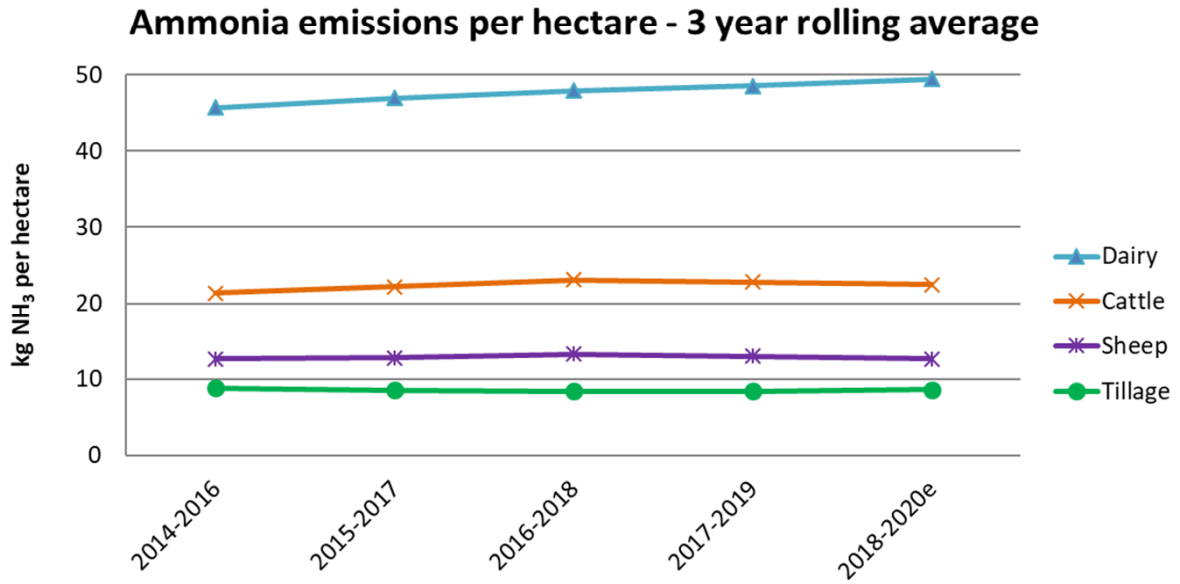




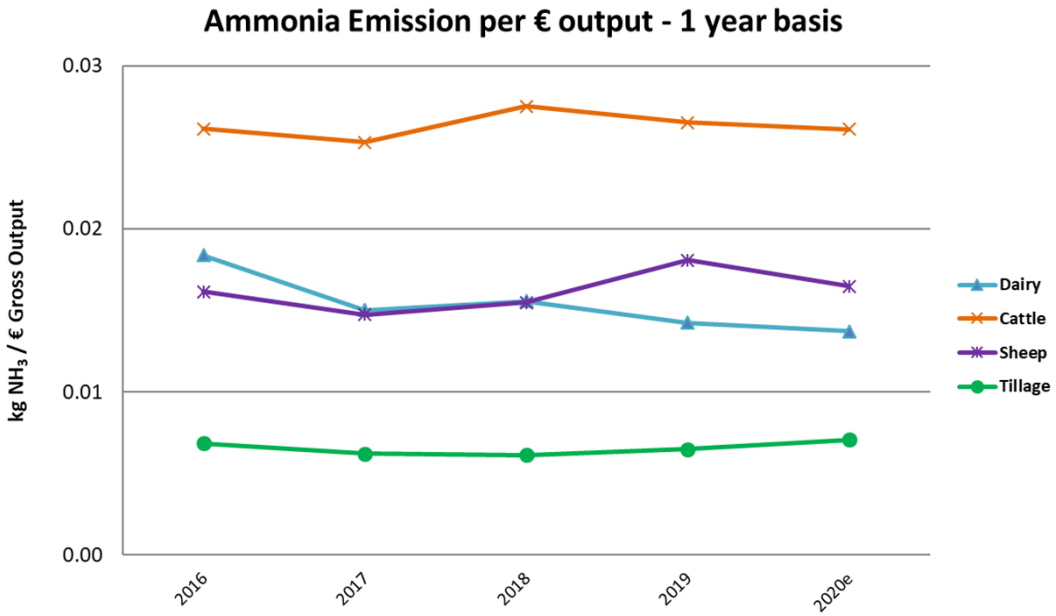


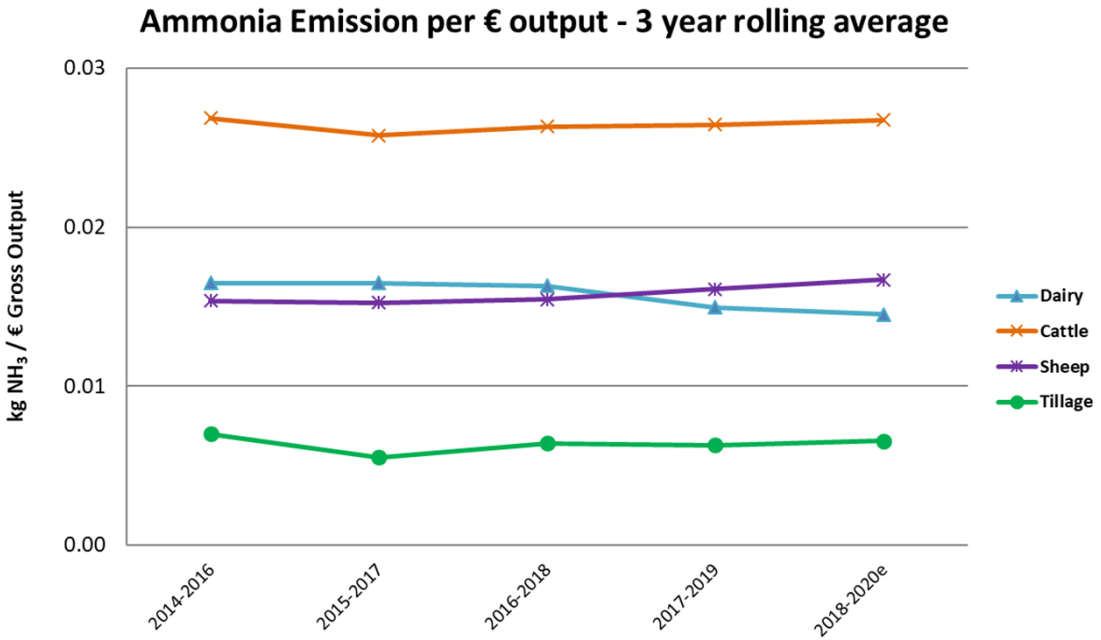
NH3 emissions per hectare





NH3 emissions per € of output generated





Summary / Conclusion

- **Increased animal numbers and fertilisers applied in 2020**
  - June animal number +1.45%
  - Chemical N sales (Sept-Oct) up by +3.75%

- **Absolute GHG & NH3 Emissions in 2020 estimates:**
  - continued to increase on dairy farms (compared to preceding years)
  - other farm systems static or in decline (cattle, sheep, tillage)

- **Emissions intensity GHG& NH3 per € of output:**
  - GHG – Tillage and Dairy have lower emission per € of output generated vs cattle/sheep farms
  - NH3 – Tillage have the lowest emission per € of output generated, cattle farms have the highest

- **Some encouraging signs:**
  - Sales of protected urea fertilisers increased by 81% year on year
  - Low emission slurry spreading transition? Not included in analysis!

Thank You

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