cafre
College of Agriculture,
Food & Rural Enterprise

Sustainable Dairying at CAFRE

Don Morrow

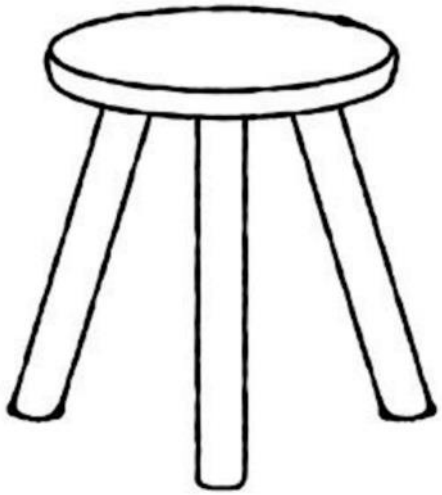
DAERA
Department of Agriculture,
Environment and Rural Affairs
www.daera-ni.gov.uk

“Sustainability”

- “The quality of being able to continue over a period of time”
- The quality of causing little or no damage to the environment and therefore able to continue for a long time”
- "Live as if you were to die tomorrow and farm as if you were to live forever"

Sustainability

Economic



Social

Environmental

CAFRE DAIRY CENTRE

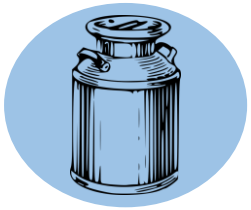
CAFRE Herd performance

Herd Size:
185

Nutrition:
- MFF: 2,738 litres
- Meal Fed per cow: 2.3t

Stocking Rate:
2 CE/ha

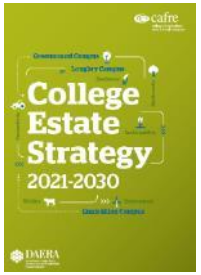
Replacement Rate: 27%



Annual Production/cow:
- Liquid milk: 8,003 litres
- Milk solids: 660 kgs

Breeding Performance:
- Calving Interval: 387 days
- Age at 1st Calving: 23.8 Mths

College Estate Strategy Targets



Reduce anti-microbial usage by 95% by 2030;

CAFRE air quality to not impact on local habitats and health by 2030;

CAFRE to be 50% carbon neutral by 2030;

CAFRE water to be of "Good" quality status by 2030;

CAFRE productive land to be in "Good" soil health status by 2030;

CAFRE habitats to be in favorable condition by 2030;

Eliminate CAFRE land fill waste by 2025; and

Eliminate the use of peat in horticulture by 2025.

Antimicrobial use

cafre
College of Agriculture, Food & Rural Enterprise

DAERA
Department of Agriculture, Environment and Rural Affairs
www.daera-ni.gov.uk

Antimicrobial use

	2016-2017		2019-2020		2023-2024	
Totals	**tubes/cc's**	**mg/PCU**	**tubes/cc's**	**mg/PCU**	**tubes/cc's**	**mg/PCU**
Dry cow tubes	468	1.6	160	0.50	276	0.90
Milking cow tubes	548	1.2	421	1.70	248	0.85
Injectibles	17,957	42.4	10459	24.9	6173	15.78
Uterine tubes	28	0.2	5	0.1	0	0
Synulox boluses	-	-	100	0.5	0	0
Footbath	0	0	0	0	0	0
	grams	mg/PCU	grams	mg/PCU	grams	mg/PCU
Total	3,462	45.3	2,343	27.6	1,246	17.5

40% reduction from 2016/17

62% reduction from 2016/17

Reducing Antimicrobial use

- **Prevention**
  - Genetics
  - Vaccination
  - Nutrition
  - Environment
  - Technology

- **Standard Operating Procedures**
  - Developed and reviewed annually with vet.
  - Focused on action before antibiotic interventions

Air Quality

cafre
College of Agriculture,
Food & Rural Enterprise

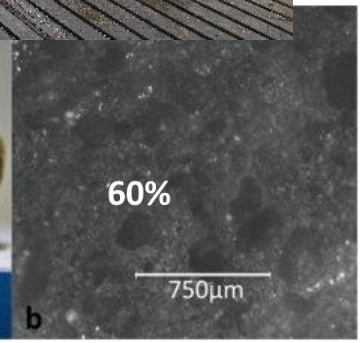
DAERA
Department of Agriculture,
Environment and Rural Affairs
www.daera-ni.gov.uk

Ammonia Modelling – NARSES Model
(National Ammonia Reduction Strategy Evaluation System)

1. **Models the flow of total N and total amount of ammoniacal N (TAN)**
2. **Livestock production and manure management system**
3. **NH_3 losses given at each stage as a proportion of the TAN present at that stage**

- Dairy Unit
- The Hill Farm Centre
- The Beef and Sheep Centre
- Enniskillen

Impact of mitigations on ammonia emissions at CAFRE



Impact on Ammonia emissions

- **CAFRE Dairy Enterprise 2022 data Modelled with NO Mitigation technologies = 6.61 t NH_3**
  - 187 herd 30% RR, 100% CAN, no stabilised urea, no LESSE, no reduced CP diet, no LE flooring, no covered above ground slurry stores

- **CAFRE Dairy Enterprise 2022 = 3.54 t NH_3**
  - 187 herd 30% RR, No CAN used , 100% stabilised Urea, 100% LESSE, reduced CP diet, covered above ground slurry stores

6.61 t NH_3 → 3.54 t NH_3 = 3.07 t NH_3 reduction = 54 % reduction when mitigation strategies are included

Carbon

cafre
College of Agriculture,
Food & Rural Enterprise

DAERA
Department of Agriculture,
Environment and Rural Affairs
www.daera-ni.gov.uk

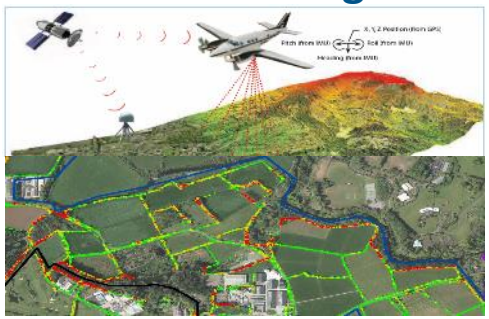
Measure to Manage Carbon at CAFRE

Carbon Footprint Assessment

Assessed Annually

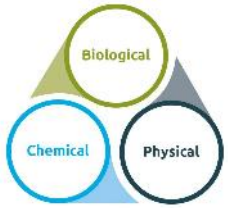
LiDAR Survey Carbon

Trees and Hedges



Assessed in 2020

Soil Carbon Stocks



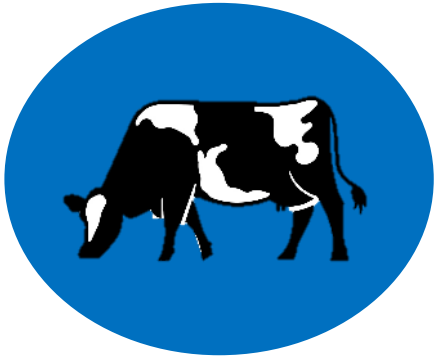
Target to measure in Spring 2025

Dairy Enterprise Emissions 2023

Carbon Intensity for 2023

CAFRE: 1.12

CAFRE: 1.34 in 2019



Top 25%: 1.18

NI Average: 1.38

Bottom 25%: 1.61

Reducing emissions at CAFRE

Feed

Livestock

Forage

Manure/ Fertiliser

Potential mitigations at CAFRE

Emission Reductions:

	tCO2e
• Improve milk from forage	23.7
• Reduce replacement rate	41.7
• Reduce fertilizer use	14.4
• Improve animal health	21.9
• Improve genetics	21.9
• Feed Additive	153.5

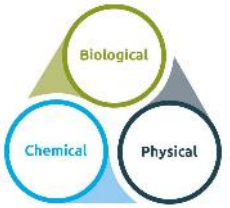
Total reduction 277.1 tCO2e (13%)

Additional Sequestration:

	tCO2e
4.5 ha to forestry	63.0
Bulking of hedgerows	9.4
Improved soil OM	115.5

Total add. sequestration 187.9 tCO2e

Carbon Coring Project



- Sample soil carbon stocks across CAFRE Estate
- (mineral soils, peat soils and non-active farmland).
- Four sampling depths
- Aiming to detect tonnes C / ha change over 5 yrs
- Sampling will commence in Mid-February 2025.
- Supported by Plastic Bag Levy Fund

Water Quality and Soil Health

cafre
College of Agriculture,
Food & Rural Enterprise

DAERA
Department of Agriculture,
Environment and Rural Affairs
www.daera-ni.gov.uk

CESG water targets

Water quality to be ‘Good status’

Soil health to be ‘Good status’

Water Quality related metrics

	2020	2023
N Loading (N/ha)	138.28kg	151.16
Grassland N application (N/ha)	211kg	149kg
P Balance (P/ha)	5.2kg	4.1kg
Grassland P application (P/ha)	0 kg	0 kg
Purchased Concentrate/cow (t)	2.78t	2.00t
Optimum soil status	38% (2021)	25%

Water Quality

- Water Quality is monitored at 9 sites as it leaves the CAFRE Estate.
- Soluble Reactive Phosphate
  - Good <78µg/l
  - CAFRE = 62µg/l

- Advice from UU scientists is that P balance is the best measure for demonstration (management) purposes.
- Aim to demonstrate, through Phosphorus lifecycle analysis the importance of reducing P use in the dairy herd and the associated water quality outcomes.

Run off maps – spreading nutrients

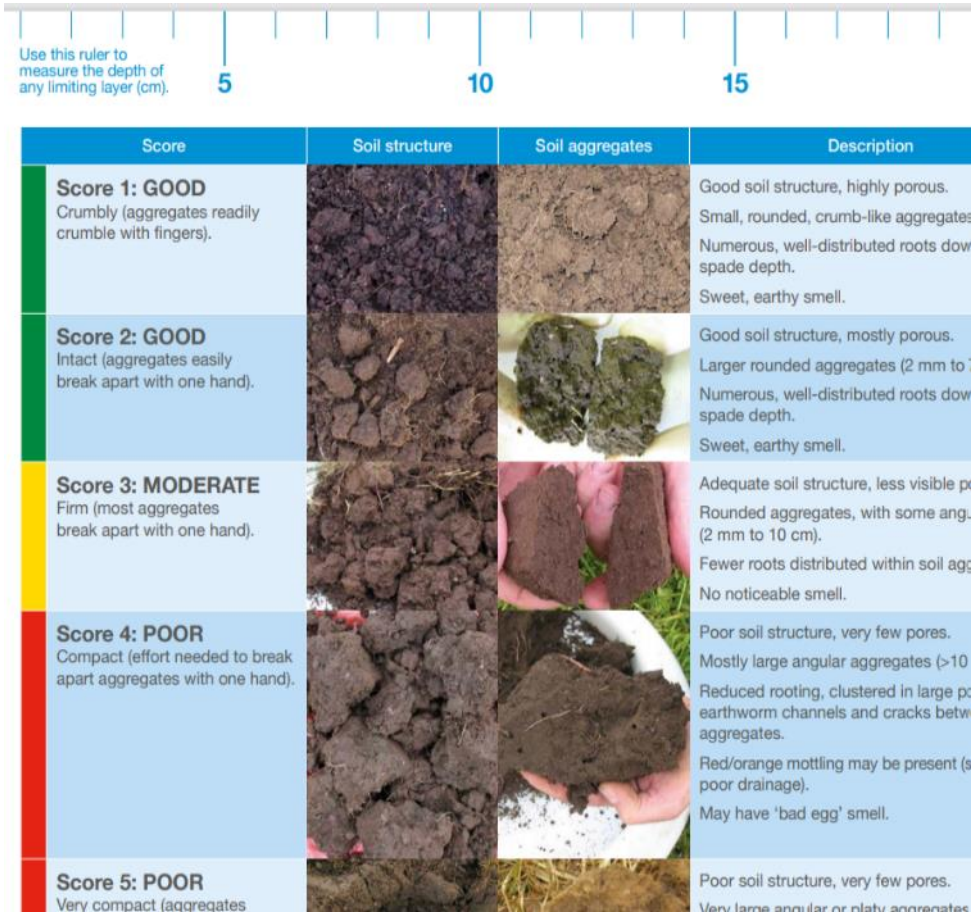
- Identify high risk areas
- Extra consideration to conditions when applying nutrients
- Target mitigations to reduce runoff
  - Grassland
  - Cover crops
  - Riparian zones

Soil Quality

Setting Baselines

3 sites per field

- Visual evaluation of soil structure score
- Root mat score
- Worm counts
- Biology



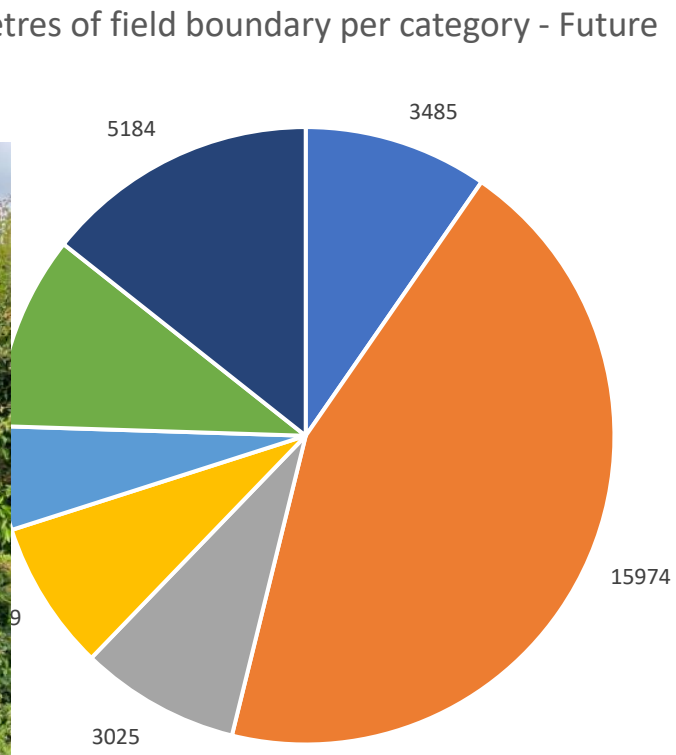
Biodiversity

cafre
College of Agriculture,
Food & Rural Enterprise

DAERA
Department of Agriculture,
Environment and Rural Affairs
www.daera-ni.gov.uk

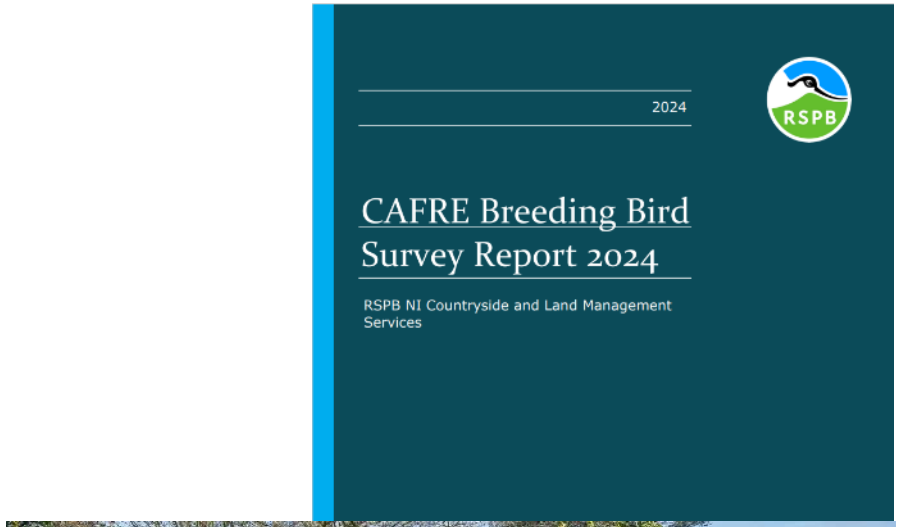
Biodiversity on the CAFRE Dairy Unit

Field Boundary Audit – 2019 verses Future Plans



RSPB Breeding Bird Survey

- Conducted Spring/Summer 2024
- Identified numbers of Breeding pairs
  - Amber and Red Listed
- Key habitat was well managed hedgerows



Thank you

Questions