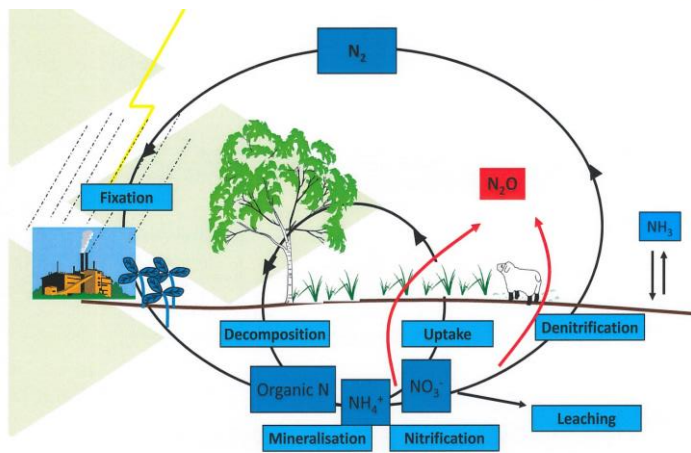


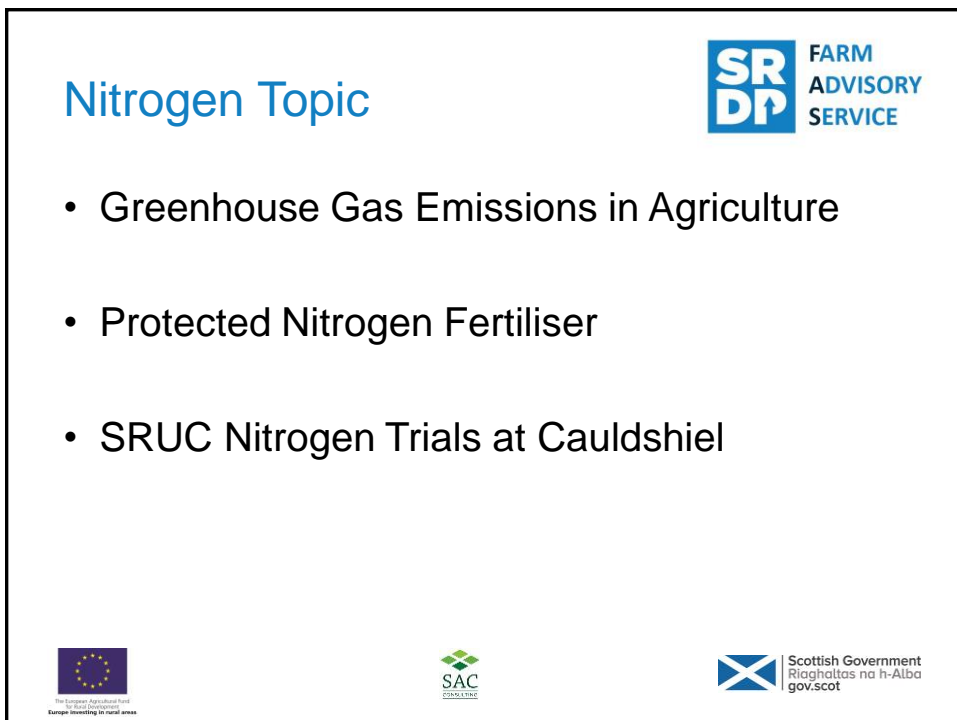
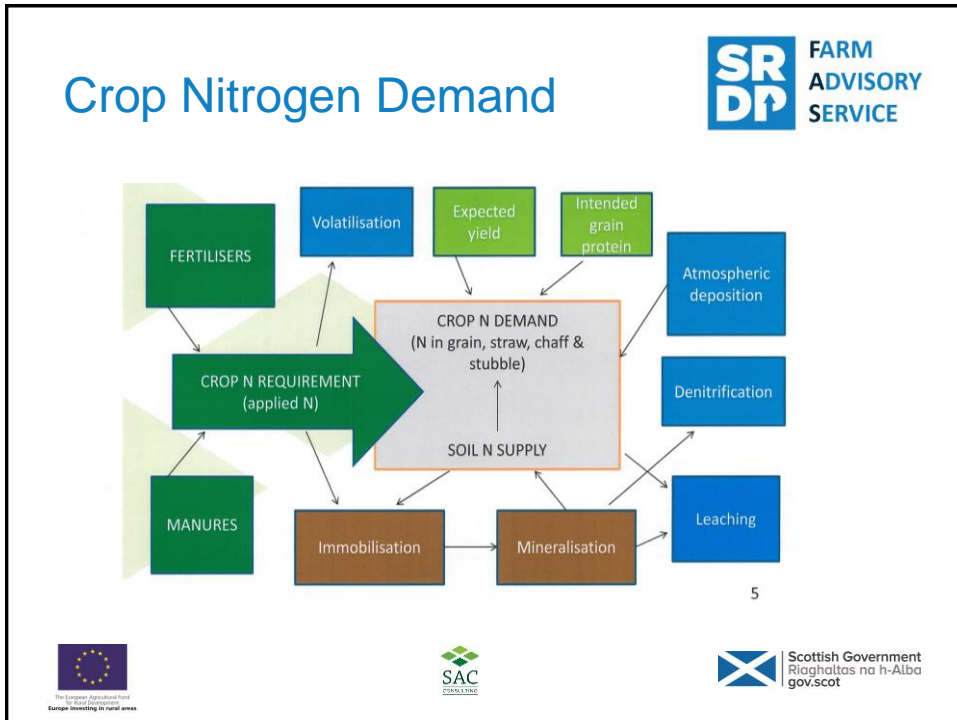
Nitrogen

- Donald Dunbar



Nitrogen Cycle





GHG Emissions



Five main sources of Agri emissions:

1. Fuel – combustion carbon dioxide
2. Livestock – ruminants produce methane
3. Soils – nitrous oxide and carbon dioxide
4. Nitrogen fertiliser manure and slurry - nitrous oxide
5. Cropland conversion – release of carbon from grassland when ploughed



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GHG Emissions



The 3 gases have different impacts

Expressed as carbon dioxide equivalents (**CO₂e**)

- Carbon Dioxide =1 CO₂e
- Methane = 25 CO₂e
- Nitrous Oxide = 298 CO₂e



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- Good nitrogen management
 - reduces losses into environment
 - reduces greenhouse gas emissions
 - improves efficiency of crop response to available nitrogen
 - good for profit



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Stabilised N Fertiliser



Stabilised Products feature

- Urease Inhibitor
- or
- Nitrification Inhibitor



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Stabilised Fertiliser

SR DP FARM ADVISORY SERVICE

- Urease Inhibitor

```

graph TD
    Urea --> Ammonium
    Ammonium --> Nitrate
    Ammonium --> Ammonia
    Urea -- Volatilisation --> Ammonia
  
```

The diagram illustrates the nitrogen cycle. Urea is converted to Ammonium, which is then converted to Nitrate. Urease inhibition blocks the conversion of Urea to Ammonium. Ammonium is also converted to Ammonia through Volatilisation.

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Stabilised Fertiliser

SR DP FARM ADVISORY SERVICE

- Nitrification Inhibitor

```

graph TD
    Ammonium --> Nitrate
    Nitrate --> Nitrous_oxide[Nitrous oxide]
    Ammonium -- Nitrification --> Nitrous_oxide
    Nitrate --> Leaching
  
```

The diagram illustrates the nitrogen cycle. Ammonium is converted to Nitrate, which is then converted to Nitrous oxide through Nitrification. Nitrification inhibition blocks the conversion of Ammonium to Nitrate. Nitrate is also subject to Leaching.

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Conclusion



- Nitrification inhibitor, reducing nitrous oxide emissions. Works well with ammonium based fertilisers in arable soils
- Urease inhibitors reduce ammonia emissions
- Yield effects small or non-existent and will be offset to some extent by more efficient N use



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Benefits



- Good for reducing GHG emissions
e.g. 5% improvement
200kgN = 10kgN not lost to environment
10 x 298 CO₂e = 2,980 CO₂e/ha
- Can safely apply large single application?



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Benefits



- Reduce the number of applications saving time and money?

But

- Cost benefit needs to be considered



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Nitrogen Trials Work in Progress



1. Wheat Diversity Trial

Comparing varieties from different NABIN grps

Are there differences between wheat varieties
are more efficient at utilising nitrogen?

Zero N rate also used to pick up difference in
varieties ability to scavenge residual soil
nitrogen



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Nitrogen Trials Work in Progress



2. Remote Sensing Work (SRUC & UOE)

Anna Florence

Remote monitoring of crop development,
growth and nitrogen use.

Method: Drone and satellite imaging



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Nitrogen Trials Work in Progress



3. Grain Nitrogen Supply (AHDB + Scot Gov)

- Improve our understanding of supply of nitrogen to heads
- Applicable to different market sectors for low and high grain nitrogen requirements
- Trial evaluating different rates at different timings



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Manipulating grain nitrogen also relevant to livestock grower.

- Grain N% x 6.25 = Crude protein %
- 1.45% N = 9% crude protein
- 2.0% N = 12.5% crude protein

- Reduce purchased protein requirement

