Nutrient Management – Measuring to Manage and Apply

The farmers view
Bedfordia Farm’s

- In 22 years at Bedfordia Farm’s I have seen many changes
- 400 dairy cows and followers and weaner pigs being finished on contract in Lincolnshire. Lots of straw, lots of Muck and Slurry.
- 6 year rotation of Wheat, Wheat ,Beans ,Wheat , Barley, OSR.
- Muck and Slurry more of a waste disposal than a true asset.
- 2003 Dairying stopped.
- 2004 started the building of new Finishing unit and Twinwood AD to use slurry and food waste. Online 2005
- Westwood AD opened 2010.
Twinwood and Westwood Anaerobic Digestion plants
Processing 90,000t of food waste annually
33,000 pigs finished annually
12,000t of pig slurry annually to AD plant
Autumn Application - 3,000t of Pig Muck

- Approximately 3000 t of Pig Muck is moved pre harvest to point of use where the Phosphate can be utilised.
- Usually OSR stubble to WW 1 or WW 1 to WW 2. (100 to 120 Ha each year)
- Pig Slurry is stored from 2 production units each has a 4,000 M3 lagoon and are stirred and emptied Autumn and Spring.
Autumn Digestate Injection
Current Farm Regime

• 2,200 Ha Cropping 3 year rotation of 2 Milling Wheats and OSR
• Organic product annually applied to 85% of the cropped area.
• Excess Digestate applied to neighbouring farms mainly in the autumn and 4 next door farms in the spring.
• On Bedfordia Farm’s land for 2016 harvest in N max terms 34,700 kg of N came from autumn application (11,000 M3) 182,800 kg from spring application (33,500 M3)
• This accounted for approximately 40% of the total Crop Nitrogen for 14,000 t of Milling Wheat and 2,600 t of OSR
Spring Digestate Application
Autumn and Spring Digestate Spreading

• Both Twinwoods and Westwood production is PAS 110 accredited

• Average analysis per m³ is as follows:
  • Nitrogen – 7.5kg (N)
  • Phosphate – 1.25kg (P₂O₅)
  • Potash – 3.8kg (K₂O)
  • Sulphur – 0.75kg (SO₃)
  • Magnesium – 0.1kg (MgO)

• Autumn application - 50% of the total N applied is allocated to the N max

• Spring application - 80% of the total N applied is allocated to the N max
Management Decisions

- Regular sampling of all organic products applied
- Soil sampling for other nutrients to identify limitations.
- Maintenance of a good soil structure to enhance Root development
- Balancing nutrients to maximise Nitrogen utilisation
- Soil Mineral Nitrogen test year on year via GPS to monitor changes
- Use Of LAI for benchmarking reaction of organic application.
- Use of N tester for plant chlorophyll /nitrogen analysis.
- Use of SAP test to analysis a snapshot of the plant nutrient health
N Tester

• Used throughout the season to benchmark plant Nitrogen
• Trace Element balancing to improve plant health and protein performance.
• These include
  • Manganese
  • Sulphur
  • Magnesium
  • Zinc
LAI Scan Data

- Allows management zones to be ground-truthed.
- End of April LAI after digestate application 6 weeks previous.
- Variable rate map generated from LAI data.
Rainfall

- The timing and amount of Rainfall has a great influence on nutrient movement and the ability of the plant to extract those nutrients.
- As farmers its never the right quantity or the right time.
Nitrogen Cycle

- The aim has to be, whether Organic or Inorganic Nitrogen, that its use to the growing plant is maximised.
- 60% utilization for applied Nitrogen Fertilizer is an accepted standard.
- 23kg N per t of wheat requires 40 Kg per t to be applied.
- How much do we lose through leaching, ammonification or as nitrous oxide?
- Can the Precision Armoury help each of us to manage Nitrogen use better?
Rotational Ploughing
Seedbed Quality
The End Results

- Yield
- Quality particularly Protein
- Straw
- Minimal damage to soil structure
Straw Removed to Reduce Potash – 10,000 Hesston Bales 2016
Bedfordia OSR Yields 2005-2016

- **Winter OSR**

- **UK Average Yield**

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<th>Winter OSR</th>
<th>UK Av. Yield</th>
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<td>5 Year Av.</td>
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**Tonnes/ha**
Bedfordia Milling Wheat Yields 2005 - 2016

- Winter Wheat Yields
- UK Average Yields

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<th>Yield (Tonnes/ha)</th>
<th>5 year av.</th>
<th>UK Av. Yield</th>
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Harvest Yield Data 2016 – Raw Scan Data
Protein mapping v Yield maps
Questions?