

# Soil and Nutrient Network



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Helping farmers improve soil and nutrient management

## Case study - Bogindollo Farm, Angus

Bogindollo Farm is a mixed arable and suckler unit, run by Euan Crichton. The arable rotation includes winter and spring barley, spring oats, winter wheat and winter oilseed rape. The business also lets land out on a seasonal basis for potatoes and peas. There is a herd of 110 suckler cows and 30 heifers which are grazed on the farms permanent grassland, with all progeny finished on site on a straw based system. All farm yard manure (FYM) is spread back on the fields to increase the organic matter content from its current average of 5%.

### Boron Deficiency

Soil analysis has been carried out across fields at Bogindollo. Several fields have been shown as having low Boron levels. Although soil analysis showed a deficiency, no visual impact had been observed—deficiency during early growth adversely affects germination and seedling growth.

There is a fine line between boron deficiency & toxicity.

Many producers of brassicas apply a boron foliar spray as routine, however sprayer residue resulting from inadequate cleaning can cause toxicity. Boron toxicity has not been linked to a yield penalty, but will be shown in cereals by chlorotic and necrotic patches on the leaves.

Light sandy soils contain less adsorbed boron than heavier textured soils, but the sea is the main source for boron in coastal areas, therefore fields near by are at a lower risk of deficiency. Likewise, heavy fields are less likely to leach boron through their profile. Further details on Boron susceptibility can be found at [http://sifss.hutton.ac.uk/SSKIB\\_Stats.php](http://sifss.hutton.ac.uk/SSKIB_Stats.php).

Boron can be applied either to the soil or to the foliage, together with a fertiliser or alone, as a solid or a solution. Where soil analysis indicates a deficiency, or where susceptible crops are grown, the recommendation is to apply Boron to the



seedbed (2 kg/ha B); or as a foliar spray according to manufacturers recommendations as soon as leaf cover allows.

Please refer to [Technical Note 671 \(TN671\)](#) '[Management of boron in soils for crops](#)' for more information on boron in your soils.

### Top Tips For Every Farm

- Sample soil for pH, P, K, Mg
- Ensure you optimise soil pH to enhance nutrient uptake.
- Get to know your soil structure by digging a pit and undertaking a Visual Examination of Soil Structure (Download your copy of the Valuing Your Soils Booklet at [www.fas.scot/?p=4323](http://www.fas.scot/?p=4323))
- Create a nutrient budget that takes into account your slurry & FYM before applying additional fertilisers

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## Farm Yard Manure

FYM analysis was taken for both the young stock and cows. FYM is a valuable source of nutrients and organic matter, which will reduce the need for artificial inputs and increase the soil water holding capacity. Bogindollo lies within the Strathmore and Fife Nitrate Vulnerable Zone (NVZ), therefore subject to strict application guidelines.

A demonstration was set up to show FYM application rates. One metre quadrats were laid on the ground and the manure was applied at three rates, based on standard manure analysis of 6kg/tonne of Nitrogen (N). The rates were the NVZ maximum at 41 t/ha, the standard rate 25 t/ha and a low rate of just 5 t/ha.



Figure 1: One metre squares showing 41 t/ha, 25 t/ha & 5 t/ha manure rates based on standard manure analysis of 6kg/t of N

Farmers showed surprise at the application rates, demonstrating that few growers know what rate they are applying manure at. This could be improved through the use of weigh scales on spreaders, accurate analysis including dry matter testing or repeating this exercise in field to compare spread rates from machinery with measured quadrants. Although this exercise was dependant on manure moisture content, it is a useful indicator for spreading manures.

Manure will benefit light soils the most, and regular applications will improve water holding capacity, drought resistance and structural stability, as well as the biological activity of soils. Incorporating solid manure within 24 hours of application to reduce ammonia losses through volatilisation can prevent a 15% reduction in ammonia N emissions. However, manure application can cause severe compaction and not all nutrients will be available for uptake by the immediate crop. Approximately 60% of phosphate and 90% of potash will be available in the following year.

Compaction can be reduced by selecting machinery with low pressure tyres, ensuring correct tyre pressure and most importantly only applying manure when the ground is in good condition. Assessing compaction can be done with a spade, digging down to 40cm. Compacted soils will be difficult to break up and form compacted triangular blocks. Although residual nutrients do not provide immediate benefit, soil analysis will show the residual levels of P and K in the soil which will be available for future crops. Nitrogen losses can be reduced by applying FYM in the spring which will reduce leeching and run off.

The results in Table 1 show that Bogindollo's stock manure has very high levels of potash. This is believed to be a result of cattle being bedded on oat straw, with oats taking off a large amount of potash. Solid manures, unlike high available N manures such as hen pen do not have restricted spreading dates. However, middens must be relocated every 12 months and can not return to the same site for 24 months, they must also be more than 10m from a water courses.

Farm	Name	Dry Matter %	Total N kg/t	Total Phosphate kg/t	Total Potash kg/t
Standard	TN650	25	6	3.2	8
Bogindollo	Young Stock	24	6.5	2.9	15.1
Bogindollo	Cows	30	5	3.27	17.2

Table 1 - Bogindollo manure analysis

### Bogindollo's Nutrient Savings

Table 2 & 3 show the nutrient savings that can be made at Bogindollo through effective nutrient budgeting.

<b>N</b>	34.5%	£185/t	£0.54/kg N
<b>P</b>	46%	£280/t	£0.61/kg P <sub>2</sub> O <sub>5</sub>
<b>K</b>	60%	£265/t	£0.44/kg K <sub>2</sub> O

Table 2 - Cost of artificial nutrients

	Value of nutrients per tonne of FYM			
	N	P	K	Total
Standard	£3.24	£1.95	£3.52	<b>£8.71</b>
Young Stock	£3.51	£1.77	£6.64	<b>£11.92</b>
Cows	£2.70	£1.99	£7.57	<b>£12.26</b>

Table 3 - Value of FYM nutrients

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