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SOIL SAMPLING

WHAT IS ALL THE FUSS ABOUT?

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What is soil?

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"Soil is a dynamic mix of minerals, organic matter, air and water, which changes in response to cropping, cultivation, nutrient applications, weather and the activities of soil organisms. Good soil management starts with assessment and then managing it to maintain good structure, balanced chemistry and healthy biology."

ADHB Improving soils for Better Returns

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Soil Sampling – Why?

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- Measures the plant available nutrients in the soil
- Gives you information to manage deficits and surpluses in soil nutrients
- Measures the acidity of the soil - pH will dictate what is actually available to the plant

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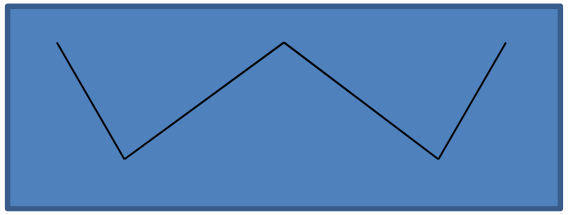
How to sample

- Twist a gouge or pot corer down to 7.5cm
- Walk the field in a ‘W’.



- Avoid gateways, feed areas or former muck-heap sites
- Collect 25 plugs of soil in a clean bucket
- Seal a well-mixed sub sample in a plastic bag or box and label
- Send to an accredited soil testing laboratory (either direct to the laboratory or via a local co-op, fertiliser merchant or independent company)

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Small Print

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- Avoid sampling when soil is waterlogged….or too dry!
- Sample amalgamated fields separately
- Sample problem areas or known soil types separatley
- Try to sample at least 2 months after slurry/manure/fertiliser or lime applications
- Sample at least every 4 years
- For fields underperforming start with a soil sample
- Try to sample the year before sowing a crop to allow time to correct any deficits

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LIME AS A KEY NUTRIENT

Seamus Donnelly BScHons Soil Science
SAC/SRUC Senior Consultant
Stranraer

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pH Status at Dormieston

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	% of samples with pH <5.8	% of samples with pH <5.5
Samples in Office since 1st May	51.2%	41.9%
Dormieston 2013	37.8%	14.3%
Dormieston 2018	59.4% 47%	40.9%
Excluding extra ground	58.6%	35.3%

Why Bother To Lime ?

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To Maintain Soil pH which:

- Encourages soil microbiology(worms+N bacteria)
- Increases utilisation of nutrients by plants
- Increases availability of nutrients in fertiliser
- Enhances availability of phosphate in the soil
- Reduces risk of Aluminium toxicity
- Helps breakdown of Organic Matter
- Provide Calcium and Magnesium which help balance soil structure

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Why Do We Need to Lime? Replace Losses

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- Leaching
- Crop Uptake
- Impact of Ammonium Nitrate Fertiliser
- Acid Rain

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How Much Lime?-Where does it go?

Eg Silage Land

Acidic effect of Fertiliser	175kg
Crop Removal 1st cut	80kg
Crop Removal 2nd cut	45kg
Leaching/Drainage	100-250kg
	400- 550kg /Ac/Yr

So 2 ton /Acre every 5 years to standstill !!!

Why Do We Need to Lime – Nutrient Availability

% Nutrient Availability at different pH

	N	P	K
pH 5 (very strong acidic)	53%	34%	52%
pH 5.5 (strong acidic)	77%	48%	77%
pH 6.0 (medium acidic)	89%	52%	100%

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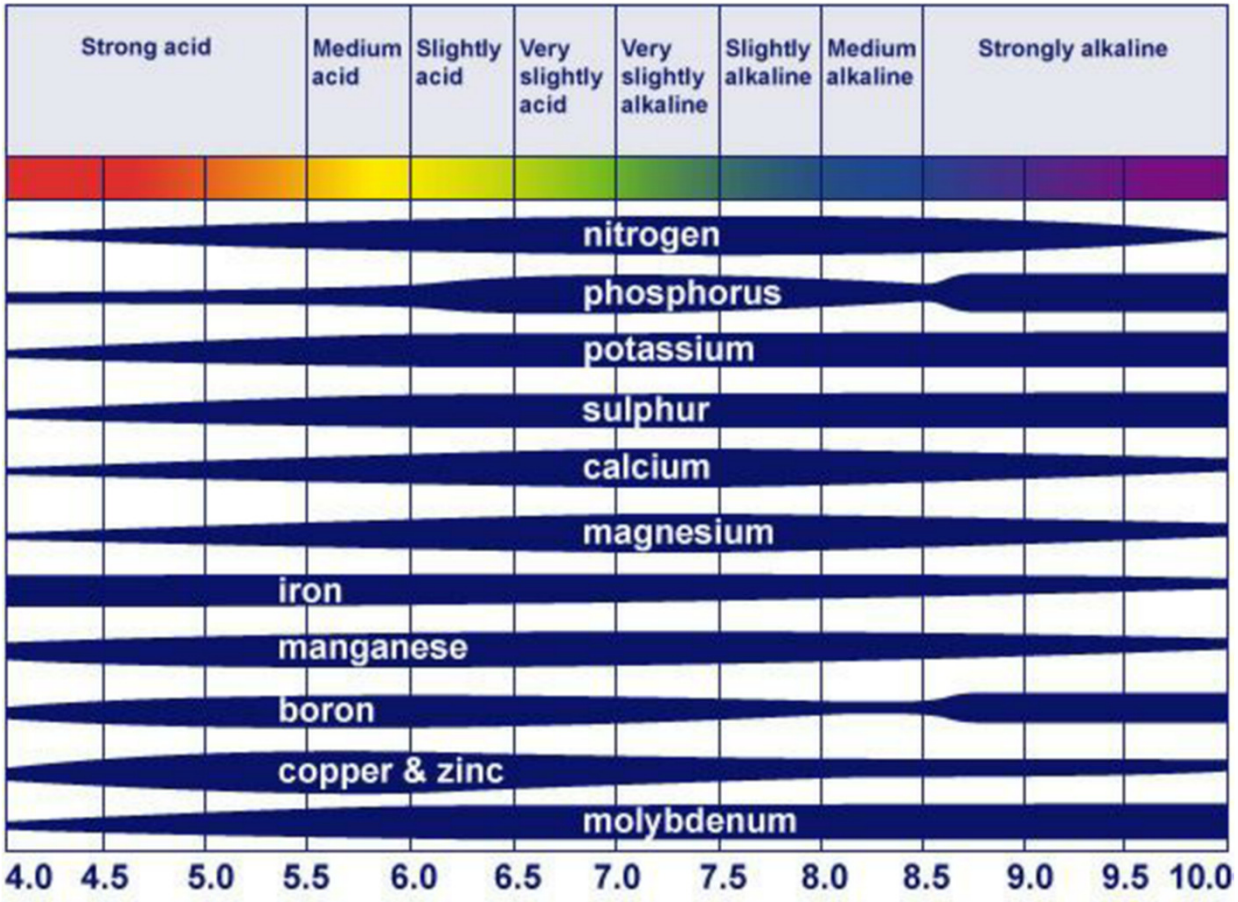

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What's the right pH?
Grassland Mineral Soil

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pH

- Intensive TGRS/dairy grazing/silage > 6.2
- Less Intensive > 6.0

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Benefits of Liming

- Improved Plant growth
- Efficient use of fertiliser
- Promotes Bacterial activity in soil
- Supports Soil structure
- Animal health e.g. Johnes
- Water quality in streams etc.
- Efficacy of Agrochemicals improved in neutral soils

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What is the right pH?

Below 5	-	risk of failure of all arable crops
5.0 – 5.4	-	risk of failure of barley/OSR
5.5 – 5.9	-	barley, wheat, swedes, clover may suffer from acidity (pH patches)
6.0 – 6.5	-	optimum pH (watch scab in potatoes)
Above 6.5	-	induced Trace element deficiency risk

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Benefits of Calcium

- Root Development
- Cell Walls
- N^2 fixing bacteria
- Protein

Benefits of Magnesium

- Reduces risk of Tetany

(but availability in herbage decreases if Nitrogen and Potassium levels increased)

- Advisable to maintain high level of soil magnesium for intensive grass

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What's Available?

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Liming Material	Neutralising Value of % of CaO
Calcium Carbonate	56%
Magnesium Lime (dolomitic)	56%
Ground Limestone	48%
Hydrated Lime (Ca OH^2)	70%
Burnt Lime (Industrial)	90%
Shell Sand	30%

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What's Available?

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Calcium Lime	NV 55%	£ 32/t.
Magnesium Lime	NV 55%	£ 31/t
Prillied Lime	NV 51%	£120/t

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How Much Lime?
-Rules of thumb

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- pH drops 0.1 unit/year on Intensive land
- Need 1t/ha to lift 0.1 unit pH

pH	**Lime Required**
5.5	8 t/ha = 3.2 t/acre
6.0	4 t/ha = 1.6 t/acre

Acidic Effect of Fertiliser

Every 50kg of 34%N needs 25kg of lime to neutralise.

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How Much to Spread

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pH 5.5

Crop Requirement 9t/ha or 3.6t/acre

Safe maximum at one go 2-2½t/acre

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When to Spread

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Autumn before ploughing

or

After field ploughed

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Liming Timing

Don’t apply Urea within 8 weeks after Liming

BUT can spread Lime 1 week after applying Urea

Don’t apply Slurry within 10 weeks after Liming

BUT can spread Lime 3 weeks after applying Slurry

Don’t apply Lime to Silage fields within 6 weeks of cutting(or between cuts?)

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Liming Timing

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If low pH and also low Phosphate –Apply lime first (unless using Rock Phosphate)

No need to leave a gap between spreading lime and CAN or NPK Compound fertilisers

Advisable to keep stock of limed paddocks until lime washed off the leaves

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Risk of Over-liming?

Too much lime can lift pH and reduce uptake of

* Copper
* Cobalt
* Selenium
  Manganese

but increase availability of Molybdenum

Take Home Messages

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- Work a year ahead for lime (and phosphate)
- 2 t/acre or 5 t/hectare every 5 years to maintain pH
- Don't lime within 3 weeks of spreading slurry—to avoid ammonia release into atmosphere/loss of N
- In Spring apply Urea first then Lime at least 7 days later to reduce loss to volatilisation

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The Next Meeting-Jan 2019

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Topics

- Nutrient Budgeting, maximising slurry to save fertiliser
- Drainage
- Special soil sampling offer for anyone here today:
  - select poorer performing fields and soil sample at a cost price £15/sample. From these sample results we can start to build your nutrient budget during the next event.

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