

Section 5

Soil Fertility Management

by Stan Lalor, James Humphreys, Mark Plunkett



Introduction

Find out the nutrient status of the soils on the farm by taking soil samples for analysis. The soil sample results will provide information on areas of the farm that have low, medium or high fertility. You will need this information to accurately plan fertiliser and slurry applications.

- ① How do I find out and manage my farm's nutrient status?
- ② How do I use the information supplied by soil analysis?
- ③ How important is lime?

Soil Fertility Management

Soil fertility management targets

1. Have soil analysis results for the whole farm. Soil tests should be repeated every 3-5 years (four years if applying for a Nitrates Derogation). To spread costs, soil test a portion of the farm every year.
2. Aim to have the whole farm at between pH 6.0 and 6.5 limestone should be spread as recommended. Where soil magnesium (Mg) levels are low, dolomitic limestone (contains Mg) can be used to both increase pH and supply Mg.
3. Manage slurry and soiled water to maximise the fertiliser value.
4. Aim to have all fields in Index 3 for phosphorus (P) and potassium (K). Build up soils in Index 1 and 2. Allow Index 4 soils to fall to Index 3.
5. Apply nutrients in the proper balance. Supply enough of each nutrient without oversupplying individual nutrients. Deciding where slurry should be spread, and choosing the correct compound fertiliser is critical.

1 How do I find out and manage my farm's nutrient status?

Find out the nutrient status of the soils on the farm by taking soil samples for analysis. The soil sample results will provide information on areas of the farm that have low, medium or high fertility. You will need this information to accurately plan fertiliser and slurry applications.

What does soil analysis do?

- A soil test can be used to obtain information on background soil fertility levels.
- Not all of the total nutrients in the soil are available to plant roots for uptake.
- Soil analysis methods are designed to measure and predict the amount of nutrients in the soil that are available to plants.

What nutrients can be tested for?

- Standard soil testing includes soil pH, lime requirement, P and K.
- Additional tests are also available for Mg and micronutrients.
- There is no suitable soil test for nitrogen (N) or sulphur (S).
- Analysis of herbage can provide additional information on the nutrient status of the sward. Herbage analysis is more reliable than soil analysis for S, and for trace elements such as copper, molybdenum and selenium.

How to

Take soil samples

- Soil test results are of little value if the soil sample taken is not representative of the field or area being sampled.
- Divide the farm into fields or areas that can be easily managed separately when applying fertilisers. As a guide, take one sample to represent between two and four hectares. If the area is very uniform a sample may be taken to represent a larger area. For farms with a Nitrates Derogation, the requirement is that the average soil sample area is not greater than five hectares.
- Take separate samples from areas that are different in soil type, previous cropping history, slope, drainage or persistent poor yields.



Key Risks



- Do not sample a field until three to six months after the last application of P and K. Where lime has been applied allow a time lag of up to two years before sampling for soil pH and lime requirements.
- Sampling depth: ensure that soil is sampled to 10cm. Shallower sampling can give inaccurate results, particularly for P. Where permanent pasture is ploughed for reseeding, re-sample the field as soon as possible after ploughing as the soil ploughed up to the surface may have a different nutrient status to the soil ploughed down.
- Avoid sampling under extreme soil conditions e.g. waterlogged or very dry soils. Sample at the same time of the year to aid comparisons of soil sample results.
- When taking a sample, avoid walking in the lines of fertiliser and lime spreading operations on the field.
- Avoid any unusual spots such as old fences, ditches, drinking troughs, dung or urine patches or where fertiliser /manures or lime have been heaped or spilled in the past.

2 How do I use the information supplied by soil analysis?

Soil Index

- Nutrient advice is based on a simple soil index system.
- Fields or areas can be categorised on a soil index scale of 1 to 4 for each nutrient (P, K, most micronutrients) based on soil test results.
- The index system is based on the expected response to fertilisers.
- There is no index system for N or S in grassland due to the lack to date of a reliable soil test.

Table 1. Index system for P, K and Mg in grassland soils.

Soil Index	Description	Response to fertilisers	Soil test result range for each Index (mg/L)		
			P	K	Mg
1	Very low	Definite	0–3.0	0–50	0–25
2	Low	Likely	3.1–5.0	51–100	26–50
3	Medium	Unlikely	5.1–8.0	101–150	51–100
4	High	None	≥8.1	≥151	≥101

- Nutrient advice is based on a target of maintaining soils in Index 3. At this index, soils have a bank of available nutrients to deliver nutrients to the grass. The objective is to replace the nutrients that are being removed in products such as silage, milk or meat.
- Index 1 and 2 soils have low nutrient levels, and require additional inputs in order to support grass growth and increase the soil fertility to the target Index 3.
- Soils in Index 4 have high nutrient levels and will support the grass sward without additional fertilisers.

How to

Maintain soil fertility when in Index 3



- The approach to maintaining soil fertility is to replace the nutrients removed in product.
- For example, one kg of P is removed from the farm in approximately 1,000 litres of milk or in 100 kg of animal liveweight.
- Nutrient advice rates are based on replacing the nutrient off-take.

How to

Build soil fertility when in Index 1 and 2



- Additional nutrients above those required to replace nutrients removed in products are required to build soil fertility from low Index 1 and 2 levels up to Index 3.
- The length of time required for soil nutrient levels to increase or decrease will depend on the soil type, but can take a number of years. Therefore, apply additional nutrients for soil build up for a number of years until soil analysis indicates increased fertility.

Soil Fertility Management

③ How important is lime?

Soil pH and lime application

- Acidity in soils is measured by soil pH. Acid soils have low pH (<7) and alkali soils have high pH (>7).
- The optimum pH for productivity, biological activity and nutrient availability in grassland soils is 6.3.
- The pH of acid soils can be increased by applying lime.
- The lime requirement of a soil is determined by soil analysis.
- The lime requirement is calculated as the lime required to increase the soil pH to 6.5.
- Lime does not need to be applied every year. Apply enough lime once every 3-5 years to reach a pH of 6.5. This will maintain the soil pH close to the optimum for a number of years.

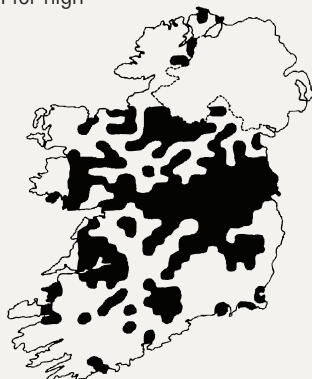
Spreading lime – How much?

- The rate of application is determined by soil analysis. The lime requirement is shown on the analysis report.
- Don't apply more than 7.5t/ha (3t/acre) in a single application.
- Where lime requirements are greater than 7.5t/ha, apply 7.5t/ha initially, and then apply the remainder after two years.
- In soils that are at risk of having high molybdenum (Mo) status (see Figure 1), reduce the lime requirement by 5t/ha to avoid potential problems with copper (Cu) deficiency. (Mo can make Cu unavailable to animals). The optimum soil pH for high Mo soils is 6.2.

Molybdenum

Areas where elevated values have been found

Figure 1. Indicative map showing distribution of potentially high Mo soils in Ireland



Checklist



Lime

Spreading lime – When?

- Lime can be spread all year round.
- Apply to bare swards if possible. Lime should not be applied to swards close to silage harvesting.
- Incorporation of lime into the seed bed is recommended for reseeding.
- Avoid applying urea fertiliser or slurry as nitrogen (N) fertilisers for 3-6 months after lime application, as lime can increase gaseous N losses from urea and slurry.

Spreading lime – How often?

- Conventional ground limestone should be applied as per the lime requirements after soil testing.
- The lime requirement is a once off application, and does not need to be repeated annually.

Spreading lime – Which lime to use?

- Calcium (Ca)-based ground limestone is most common.
- Dolomitic limestone contains both Ca and magnesium (Mg) and is recommended for soils that have low Mg levels.
- Granulated lime products can be applied at lower rates on a 'little and often' basis for soil pH maintenance. The rate applied will depend on the product, but usually lower rates can be used as the material is ground finer than conventional ground limestone and will therefore react faster in the soil. These products offer convenience as they can be applied using standard fertiliser spreaders. However, they are usually more expensive than conventional limestone applied on a 3-5 year cycle, particularly on soils with high lime requirements.

Section 5



Nitrogen and Sulphur Requirements for Pasture and Silage

by Stan Lalor, James Humphreys, Mark Plunkett



Introduction

Nitrogen and sulphur are key plant nutrients but there is no suitable soil test for either element.

- ① How much nitrogen should I be using?
- ② How do I get the most from clover?
- ③ How much sulphur should I be using?

Nitrogen and Sulphur Requirements for Pasture and Silage

1 How much nitrogen should I be using?

Nitrogen (N) requirements for pasture and silage

- There is no reliable soil test currently available for N. Therefore, there is no soil Index system for N in grassland.
- Recommendations are based on average soil fertility levels.

Table 1. Maximum permissible rates of fertiliser N for grassland in different counties

Rates of fertiliser N are shown as kg/ha (units/acre in brackets)

Stocking rate (kg per ha of organic N)	Carlow Cork Dublin Kildare Kilkenny Laois Offaly Tipperary Waterford Wexford Wicklow	Clare Galway Kerry Limerick Longford Louth Mayo Meath Roscommon Sligo Westmeath	Donegal Leitrim	Cavan Monaghan
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≤ 170	205 (166)	202 (164)	200 (162)	197 (160)
171 – 210	280 (227)	277 (224)	274 (222)	270 (219)
211 – 250	248 (201)	244 (198)	241 (195)	237 (192)

- Total N application on the farm and time of application must be compliant with nitrates regulations (Table 1).
- Matching N fertiliser use “to stocking density” or “to stocking rate” on the farm at different times of the year avoids excessive use.
- Applying N fertiliser ‘little and often’ during the growing season gives most efficient response in terms of grass growth.

How to

Calculate stocking rates



For comparison and cross checking with nitrates regulations, it is useful to calculate stocking rate on the grassland area based on organic N excretion per hectare.

- Table 2 provides a template for how to do this for your farm
- Firstly, estimate the average numbers of each type of cattle that your have on the farm over the year (A).
- Then, multiply the number of animals by the organic N excretion per animal per year (B).
- Then, add up the total organic N excreted by all the animals (C).
- Then, divide the total N excretion (C) by the area of grass land on the farm (D) to give the grassland stocking density in kg/ha.
- Other animals (e.g. sheep, horses or dairy cows) also need to be included if they are present on the farm

Table 2. Template for calculating stocking rate on the grassland area on a beef farm

Animal Type	Average no. of animals on the farm per year	Excretion of organic N per animal per year (kg/hd/yr) Total Organic	Total Organic N excretion per year (kg/yr)
	(A)	(B)	(= A x B)
Suckler Cow		65	
Cattle < 1 yr old		24	
Cattle 1-2 yr old		57	
Cattle > 2 yr old		65	
Total Organic N Excreted (kg)		(C)	
Total Grassland Area (ha)		(D)	
Stocking rate (kg/ha)		(= C ÷ D)	



Table 3: N fertiliser advice for grazing

Rates and timing of N fertiliser applications for swards grazed by cattle at various stocking rates. Rates of fertiliser N are shown as kg/ha (units/acre)

Stocking rate (kg/ha organic N)	Jan/ Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total N (u/ac.)
90 (or less)			25 (20)		15 (12)				40 (32)
91-110		15 (12)	30 (24)	15 (12)	15 (12)				75 (60)
111-130		28 (22)	35 (28)	25 (20)	23 (18)				111(89)
131-140		28 (22)	35 (28)	25 (20)	17 (14)		17 (14)		122 (98)
141-150		29 (23)	44 (35)	26 (20)	26 (20)		17 (14)		141 (113)
151-160		29 (23)	44 (35)	35 (28)	35 (28)		26 (20)		168 (134)
161-170		34 (27)	53 (42)	42 (33)	42 (33)		31 (25)		201 (161)
171-180	32 (25)	32 (25)	48 (39)	38 (31)	38 (31)		28 (23)		216 (173)
181-190	31 (25)	41 (32)	54 (43)	37 (30)	37 (30)		37 (30)		237 (190)
191-200	30 (24)	53 (43)	53 (43)	37 (30)	37 (30)	37 (30)	27 (22)		275 (220)
201-210	31 (25)	54 (43)	54 (43)	56 (45)	37 (30)	37 (30)	37 (30)	37 (30)	306 (245)
≥ 210	32 (25)	49 (39)	55 (44)	38 (31)	38 (31)	38 (31)	28 (23)		279 (223)

The rates shown above refer to recommended application of available fertiliser. Chemical fertiliser rates should be calculated by deducting the available N contained in organic fertiliser applications from the rates shown in the table above. Stocking rate is calculated as the total annual nitrogen (kg) excreted by grazing livestock averaged over the net grassland area (grazing and silage area). Stocking rate refers to grassland area only.

Rates shown above refer to grazed swards only, and are not suitable as a guideline value of the N requirement for the entire grassland area. The N requirement for the entire grassland area will depend on the proportions of the area that are grazed, or cut as silage or hay. Lower rates of N should be used where clover is present in the sward. A good clover sward will reduce N requirements. Only fertilize to the stock-carrying capacity of the soil. This often varies within the farm.

Chemical or organic fertilisers cannot be applied during periods when application is prohibited by nitrates regulations. At stocking rates above 210 kg/ha N, N advice is constrained by nitrates regulations.

Table 4. N fertiliser advice for cut swards. Rates of fertiliser N are shown as kg/ha (units/acre in brackets)

Crop	N application rate
Silage: First Cut	125 (100)
Silage: Second or subsequent cuts	100 (80)
Hay	65-80 (52-64)

Rates shown above refer to application of available N. Chemical fertiliser rates should be calculated by deducting the available N contained in organic fertiliser applications from the rates shown in the table above.

If N is applied for early grazing, assume that 20% of this remains available for first cut silage.

An extra 25 kg/ha may be used where necessary for establishment of a good ryegrass sward if pasture is less than 4 years old, provided that the maximum N allowed within the nitrates regulations is complied with.

Where silage fields were grazed rather than cut in the previous year, apply 100 kg/ha for first cut, and 85 kg/ha for second and subsequent cuts. When more than 2 cuts are taken there is a danger that the allowance in the nitrates regulations will be exceeded.

Less N is advised for hay crops when there is a high risk of crop loss due to high rainfall.

Nitrogen and Sulphur Requirements for Pasture and Silage

Checklist



Controlling N fertiliser costs

1. Apply 28 kg/ha for the first application in spring (mid-January to early March, depending on location and soil type etc.). Urea is more cost-effective than CAN in spring.
2. Replace the first application of N fertiliser by an application of slurry. Aim to apply slurry on two-thirds of the farm in late January, allowing 4-6 weeks between application and the expected date of grazing. Umbilical systems can reduce the machinery compaction when applying slurry. Bandspreading/trailing shoe/injection systems reduce herbage contamination.
3. Apply the second application of N fertiliser four to six weeks after the first, usually some time during March. The third application should roughly coincide with closing up for silage in April. Match N fertiliser applications to stocking rates on the farm at various times of the year.
4. Replace some of the N fertiliser for first-cut silage with slurry in late March. The slurry should be applied at least six weeks before the expected silage harvest date. Allow approximately one week between slurry and N fertiliser application.
5. Make as much silage as possible as first-cut. First, work out how much silage is required. Second, depending on requirements, aim to maximise stocking rate on the grazing area during April and May. This makes as large an area as possible available for first-cut silage. There is a very high response to N fertiliser during April and May. First-cut silage yields will be at least 25% higher than second-cut for lower input costs.
6. Dilute slurry with dirty water to increase the efficiency of utilization of N in the slurry applied to silage stubble after first-cut silage. Dilution should only be carried out where it is a convenient way to manage dirty water and at times of the year outside of the closed period for slurry application. Diluting slurry will increase the cost of application as it will increase the volume of slurry to be spread
7. Avoid making second-cut silage if possible. Having the whole farm available for grazing from June onwards lowers the requirement for N fertiliser.

Apply N fertiliser in line with stocking rate and pasture cover. If pasture cover is above target, lower the amount or increase the interval between applications of N fertiliser. Do not skip applications.
8. Plan to build pasture cover by extending the rotation from late July to mid August. N fertiliser applied in July and August has a greater effect on grass supply in November and in the following spring than applications later in the autumn.
9. Blanket spreading of N fertiliser simplifies record-keeping, and this helps to keep N fertiliser use on the farm under control.
10. White clover has the potential to reduce the amount of N fertiliser used on the majority of grassland farms.



② How do I get the most from clover?

Over-sowing clover to reduce N costs

- White clover has the ability to manufacture 150 kg/ha of plant available N in the soil.
- Over-sowing is a low-cost method of introducing and maintaining clover in swards.

Checklist

Eight steps for successful over-sowing of clover into permanent grassland

1. Soil fertility: Soil pH should be between 6.0 and 6.5, and soil P and K levels should be at Index 3.
2. Open swards: Over-sowing will only work where there is a reasonably open sward as the clover seed has to come in contact with the soil. Reseeding is a better option for old dense swards or swards heavily infested with weeds.
3. Weed control: Eliminate docks and other broad-leaved weeds with a suitable herbicide before over-sowing. Once the clover is established, the range of herbicides that can be used is greatly restricted.
4. Sowing date: Moist soil conditions during and after over-sowing are crucial. On heavy wet soils the ideal time is after harvest of first-cut silage in late May or early June. On light drier soils it is better to over-sow earlier in May; after grazing or a harvest of baled silage. Tight grazing before and afterwards is important to ensure success. Over-sowing during the late summer and autumn is not recommended.
5. Sowing rate: Apply clover seed with 0:7:30 or similar fertiliser at a rate of one and a quarter bags per hectare. Apply 5 kg/ha of a mixture of two clover varieties on the recommended list. Pelleted or unpelleted seed can be used with equal success.
6. Broadcasting the mixture: Mix the clover seed with the fertiliser in the field. This will avoid the fertiliser and seed separating out while driving to the field. While pouring in the fertiliser, mix in the seed to ensure an even mixture of fertiliser and seed. Up to five hectares can be done at one time.



7. Post-sowing management: Apply slurry after over-sowing. Apply no N fertiliser for the remainder of the year, as N fertiliser will drive on the grass to the detriment of the clover seedlings. Tight grazing is important. Do not allow covers to get too high (>800 to 1,000kg DM/ha) and graze out to low residuals (<4cm).
8. Over-winter management: Graze tightly before closing up for the winter and do not leave a heavy cover to build up over the winter. Graze tightly again in spring to allow light to penetrate down to the clover stolons. More stolon growth in spring increases the clover content and productivity of swards later in the growing season.

③ How much sulphur should I be using?

Sulphur

- Sulphur (S) is an important nutrient for grassland, and is closely associated with N uptake and efficiency.
- There is currently no soil test or soil Index system for S.
- Herbage analysis is the best predictor of S deficiency.
- Lighter soils with low organic matter contents are generally more prone to S deficiency.

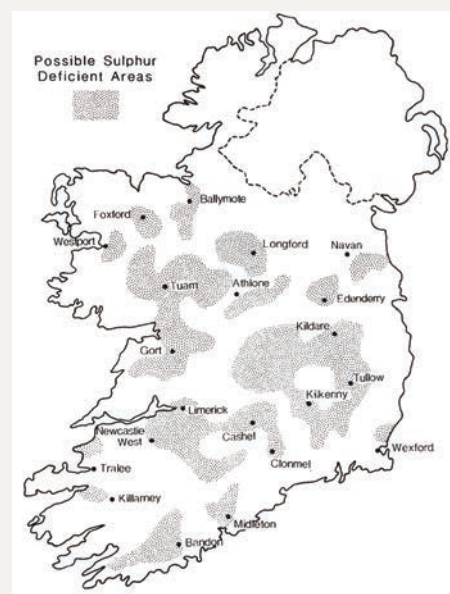


Figure 1. Map of Ireland showing sulphur deficient areas of the country. Shaded areas indicate where response to S fertiliser is more likely

Nitrogen and Sulphur Requirements for Pasture and Silage

S fertiliser advice

- The response to S fertiliser increases as the rate of N fertiliser increases.
- On S deficient soils, apply 20kg /ha (16 units/acre) per year for grazed swards.
- For silage swards on S deficient soils, apply 20kg /ha (16 units/acre) of S per cut.
- Avoid S application to soils not deficient in S, as excess S may affect the trace element nutrition of plants and animals.
- S can be applied by using any of a number of straight or compound fertilisers that contain S.
- Apply S fertilisers in early spring for grazed and silage swards as recommended



Section 5

Phosphorus (P), Potassium (K) and Slurry

by Stan Lalor, James Humphreys, Mark Plunkett



Introduction

Straight N, P or K fertilisers contain only one nutrient; compound fertilisers (e.g. 18-6-12, 0-10-20, etc) contain several. It is important to apply the fertiliser products that best supply the nutrient requirements in each field. A single compound fertiliser will not be suitable in every case.

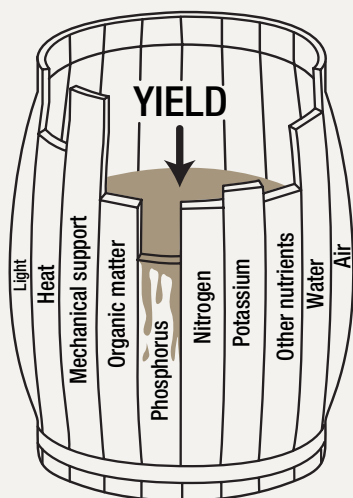
- ① How much phosphorus and potassium should I be using?
- ② How much fertiliser is in slurry?
- ③ How much fertiliser will organic fertilisers replace?
- ④ How important is the choice of fertiliser compound?

Phosphorus (P), Potassium (K) and Slurry

① How much phosphorus and potassium should I be using?

Phosphorus (P) and potassium (K) requirements for pasture and silage

- P and K can be applied either as a single annual application, or little and often through the year.
- P and K application rates should be based on the soil test and on the usage of the field.
- Requirements for silage are substantially higher than for grazing, particularly for K.
- The target soil Index is Index 3. For Index 3 soils replace the P and K removed in product (milk and meat) or as silage.
- P and K requirements increase with increasing stocking rate and production.
- Index 1 and 2 soils require additional P and K to allow soil levels to increase to Index 3.
- Index 4 soils have sufficient P and K to meet the grass requirements, and should receive no fertiliser until the soil test P and K declines to Index 3.
- Total P application on the farm and time of application must be compliant with nitrates regulations.
- There are no restrictions on K application rates and timings.



Checklist

Sources of Phosphorus (P)

- P in slurry generated by livestock on the farm.
- P in concentrates fed to livestock.
- P in manufactured fertiliser.
- P in any organic manures (e.g. pig and poultry slurry, dairy sludge etc.) imported onto the farm.

A number of steps need to be taken to interpret available P in terms of the amount of fertiliser P that can be applied on the farm:

1. Determine the soil P status through soil testing. This is compulsory on derogation farms. Where there are no soil test results available on non-derogation farms, it is assumed that the soils on the farm are in soil P Index 3.
2. Deduct the P in slurry generated by farm livestock and stored over the winter. Manure applied to soil P index 1 or 2 is reduced to 50% P availability (for example cattle slurry P reduced from 0.8 to 0.4kg P/m³). This 'stored slurry' is a notional quantity based on the statutory requirement for slurry storage on the farm (16, 18, 20 and 22 weeks depending on location). Target organic manure applications to soils with P index 1 or 2 to avail of reduced P availability to 50%.
3. Deduct the P in concentrate feed used on the farm. Discount the first 300kg of concentrate P per 85 kg Org N/ha based on the previous calendar year. The default assumption is that concentrate feed contains 5kg of P per tonne. Alternative values can be used for straight feeds or using feed labels for compound rations. Examples of the quantities of P in concentrate where 0.5, 1.0 and 2.0t of concentrate are fed per ha are presented at the bottom of the table 1 (make adjustment for discounted concentrate P as above).
4. Where reseeding takes place on the farm, an additional 15kg/ha of P may be applied over normal requirements, provided the reseeded area is in Index 1, 2 or 3. No additional P is allowed for reseeding on soils in P Index 4.

Example:

Take a farm in Zone A stocked between 130 and 170 kg/ha of organic N and where soils are tested in Index 3. No organic manure is imported onto the farm in this example. The amount of fertiliser P that this farmer can apply assuming that no concentrate is being fed on the farm is approximately 13.0kg/ha of P (10.4 units of fertiliser P per acre).

If 1 tonne of concentrate is fed per ha on the farm, deduct the first 600kg (300 per LU) based on the previous year's concentrate usage. The farmer is allowed to apply 11.0 kg/ha (8.8 units/acre) – 13.0 kg minus 2 kg in concentrate. If 2 tonnes of concentrate is fed per ha, this farmer is allowed to apply 6kg/ha (4.8 units/acre).

Where moderate to high levels of concentrate feed is being used, the level of P fertiliser that can be applied will be reduced on the farm. To increase the level of P fertiliser that can be applied on the farm target slurry to P Index 1 and 2 fields first to avail of the 50% reduction in slurry P availability. This will increase the level P fertiliser on the farm. If organic manure is imported onto a farm, the P in this manure is further deducted from the quantity of P allowed under the regulations. Update farm fertiliser plan annually to determine maximum farm P allowances.



Table 1. Approximate rates* of fertiliser P allowed in different parts of the country after deducting P in slurry generated by livestock but before deducting the P in concentrates fed to livestock. Examples of quantities of P in concentrate are at the bottom of the table. Rates of fertiliser P are shown as kg/ha (units/acre in brackets).

Soil P Index	Grassland stocking rate (kg/ha of organic N per year)					
	<85	86 – 130	131 – 170	171 – 210	211 – 250	>250
Zone A						
1	27 (21.6)	32 (25.6)	37 (29.6)	42 (33.6)	47 (37.6)	47 (37.6)
2	17 (13.6)	22 (17.6)	27 (21.6)	32 (25.6)	37 (29.6)	37 (29.6)
3	3 (2.4)	8 (6.4)	13 (10.4)	18 (14.4)	23 (18.4)	23 (18.4)
4	0.0	0.0	0.0	0.0	0.0	0.0
Zone B						
1	26.5 (21.2)	31.5 (25.2)	36.5 (29.2)	41.5 (33.2)	46.5 (37.2)	46.5 (37.2)
2	16.5 (13.2)	21.5 (17.2)	26.5 (21.2)	31.5 (25.2)	36.5 (29.2)	36.5 (29.2)
3	2 (1.6)	7 (5.6)	12 (9.6)	17 (13.6)	22 (17.6)	22 (17.6)
4	0.0	0.0	0.0	0.0	0.0	0.0
Donegal/Leitrim						
1	26 (20.8)	31 (24.8)	36 (28.8)	41 (32.8)	46 (36.8)	46 (36.8)
2	16 (12.8)	21 (16.8)	26 (20.8)	31 (24.8)	36 (28.8)	36 (28.8)
3	1 (0.8)	6 (4.8)	11 (8.8)	16 (12.8)	21 (16.8)	21 (16.8)
4	0.0	0.0	0.0	0.0	0.0	0.0
Cavan/Monaghan						
1	25.5 (20.4)	30.5 (24.4)	35.5 (28.4)	40.5 (32.4)	45.5 (36.4)	45.5 (36.4)
2	15.5 (12.4)	20.5 (16.4)	25.5 (20.4)	30.5 (24.4)	35.5 (28.4)	35.5 (28.4)
3	0 (0)	5 (4)	10 (8)	15 (12)	21 (16.8)	21 (16.8)
4	0.0	0.0	0.0	0.0	0.0	0.0
Concentrate (t/ha)	Amount of P in concentrates fed to livestock (this must be deducted from fertiliser P above)					
0.5	2.5 (2)	2.5 (2)	2.5 (2)	2.5 (2)	2.5 (2)	2.5 (2)
1.0	5 (4)	5 (4)	5 (4)	5 (4)	5 (4)	5 (4)
2.0	10 (8)	10 (8)	10 (8)	10 (8)	10 (8)	10 (8)

*The rates in this table are a rough guideline to permissible rates and are presented for the purposes of example. Rates of P fertilisation that can be used on individual farms must be based on the specific details of each farm.

Phosphorus (P), Potassium (K) and Slurry

P and K advice for grazed swards

While the previous table indicates average maximum P limits for the farm, the P requirements within the farm will vary depending on stocking rate and usage for grazing or silage. The following advice must be cross checked against the maximum P allowed for the whole farm.

- Rates shown must be deducted to account for P fed to livestock in concentrate feeds.
- The P and K rates shown can be supplied by either slurry or fertiliser.

Table 2. Simplified P (in Kg/ha) for grazed swards on beef farms. (Rates shown are total P requirements, before deductions for concentrate feeds or organic fertilisers). Rates of fertiliser P are shown as kg/ha (units/acre in brackets)

Soil P Index	Grazed swards Farm stocking rate (kg/ha Org N)			
	< 130	131-170	171-210	>210
1	27 (22)	30 (24)	33 (26)	36 (29)
2	17 (14)	20 (16)	23 (18)	26 (21)
3	7 (6)	10 (8)	13	16 (13)
4	0	0	0	0

Rates shown in the table above are guideline P rates advised for grazed swards. Allowable application rates will vary depending on the farm specific circumstances and the P allowances under the Nitrates Regulations. These rates may need to be adjusted in order that the whole farm does not exceed the limits for P.

Table 3. Simplified K requirements (kg/ha) for grazed swards on beef farms. (Rates shown are total K requirements, before deductions for organic fertilisers). Rates of fertiliser K are shown as kg/ha (units/acre in brackets).

Soil K Index	Grazed swards Stocking rate (kg/ha Org N)			
	< 130	131-170	171-210	>210
1	70 (56)	75 (60)	80 (64)	85 (68)
2	40 (32)	45 (36)	50 (40)	55 (44)
3	10 (8)	15 (12)	20 (16)	25 (20)
4	0	0	0	0



P and K advice for silage

- Silage crops remove more P and K from fields than grazing.
- Where swards are being grazed and harvested for silage, use the rates of P and K shown in Table 4, in addition to the grazing requirements.

Table 4. P and K requirements of silage. (Rates shown are total requirements, before deductions for organic fertilisers). Rates of fertiliser P and K are shown as kg/ha (units/acre in brackets).

Soil Index	Cut once		2nd and subsequent cuts	
	P (kg/ha)	K (kg/ha)	P (kg/ha)	K (kg/ha)
1	20 (16)	120 (96)	10 (8)	90 (72)
2	20 (16)	120 (96)	10 (8)	75 (60)
3	20 (16)	120 (96)	10 (8)	60 (48)

Rates of P shown in the table above are guideline P rates advised for silage swards. Allowable application rates will vary depending on the farm specific circumstances and the P allowances under the Nitrates Regulations. These rates may need to be adjusted in order that the whole farm does not exceed the nitrates limits for P.



② How much fertiliser is in slurry?

Key fact

Slurry is a fertiliser

Slurry and soiled water produced on the farm can be a valuable source of nutrients for grass. The following guidelines will ensure that soiled water and slurry are used to maximum potential:

1. Where to spread?

- Most of the fertiliser value is due to the P and K content.
- Decide which fields have the highest P and K requirements and spread slurry on these fields.
- This may mean transporting slurry for long distances to outfarms, but this will usually pay for itself through savings in fertiliser costs.

2. When and how to spread.

- The N value of the slurry is affected by timing and method of application.
- N can be lost to the air as ammonia in warm and dry conditions.
- Apply in cool moist weather conditions where possible. Light mist is ideal.
- Application in spring normally gives better results than summer.
- Applying with trailing shoe or bandspreader will improve the N value compared to splashplate.

Phosphorus (P), Potassium (K) and Slurry

3. Dilute slurry and soiled water.

- Soiled water and dilute slurries have lower total nutrient contents than undiluted slurry.

Table 5. Fertiliser value of slurries and soiled water. Values are shown as kg/m³ (units per 1,000 gallons in brackets)

Slurry type	Application		Fertiliser value (kg/m ³)		
	Timing	Method	N	P	K
Undiluted slurry	Spring	SP	0.7 (6)	0.6 (5)	3.2 (30)
		BS/TS	1.1 (10)		
	Summer	SP	0.4 (3)		
		BS/TS	0.7 (6)		

Multiply by 9 to convert kg/m³ to units/1,000 gallons

SP = splashplate

TS/BS = trailing shoe or bandspreader

3 How much fertiliser will organic fertilisers replace?

The simplest way to think of the value of organic fertilisers is to consider what they are equivalent to in terms of a 50 kg bag of fertiliser.

Values shown are typical average values. Actual nutrient content and availability can vary considerably around these averages. For best results, it is advised to have samples of the material analysed in a laboratory.

Using Organic fertilisers to reduce fertiliser costs

There are a number of organic fertilisers that can be used to replace chemical fertiliser on farms.

Manure type	Equivalent value as a 50 kg bag of NPK fertiliser	Comments
Cattle Slurry (1000 gallons) (Applied in spring with splashplate)	6-5-30	Where slurry is applied in summer, reduce N value shown by 3. Where slurry is applied with trailing shoe or bandspreader, increase N value shown by 3.
Farmyard Manure (1 tonne)	3-2.5-12	
Pig Slurry (1000 gallons)	19-7-20	
Spent Mushroom Compost (1 tonne)	3-3-18	

Where importing organic fertilisers onto the farm, it must be done in compliance with the nitrates regulations regarding spreading times, and the amount of manure that can be imported relative to the farm stocking rate and maximum N and P fertiliser limits. Farms with a nitrates derogation cannot import animal manures.

4 How important is the choice of fertiliser compound?

Nutrient balance

- Applying nutrients in the correct proportion is key to maximising grass production with minimal costs.
- Response to fertilisers is determined by the law of the minimum.
- This means that the limiting nutrient determines yield. For example, additional N is of no benefit if P or K is the limiting factor.
- Therefore, balanced nutrient applications are very important.

How to

Choose a suitable fertiliser compound

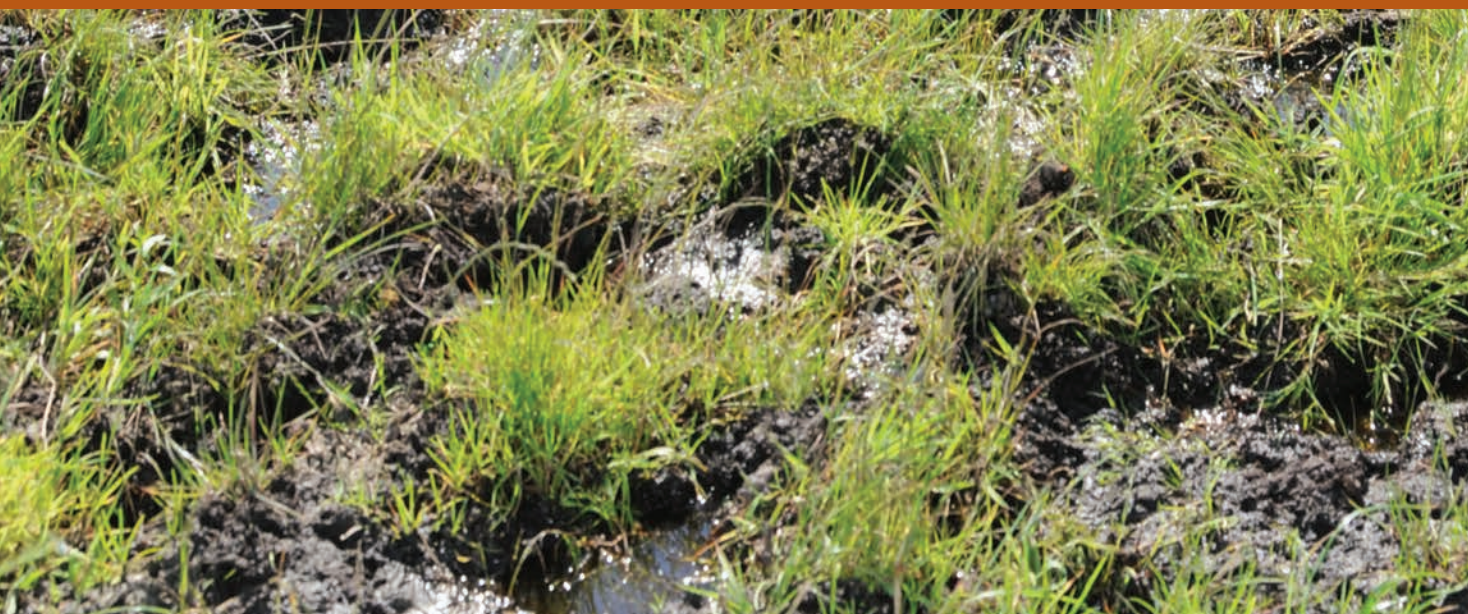


- Fertilisers are available in a number of forms.
- Straight N, P or K fertilisers contain only one nutrient, while compound fertilisers (e.g. 18-6-12, 0-10-20, etc) contain a combination of nutrients.
- It is important to apply the fertiliser products that best supply the nutrient requirements in each field.
- A single compound fertiliser will not be suitable in every field.

Section 5

Beef farming on heavy soils

by James O'Loughlin



Introduction

Approximately half the land area in Ireland is in need of reclamation and drainage. Wet soil conditions have been identified as the most important factor limiting the utilization of grazed grass on Irish farms. The drainage problems in Ireland result from high excess rainfall and a complex geological and glacial history.

- ① Why is farming on heavy, imperfectly drained, soils more difficult?
- ② How widespread is the problem?
- ③ Which management steps will help reduce the problem?
- ④ How should the underlying problem be addressed?
- ⑤ Are there regulations to consider before draining land?

Beef farming on heavy soils

① Why is farming on heavy, imperfectly drained, soils more difficult?

- In wetter years there can be 25 per cent lower herbage production for the same inputs, more difficult grazing conditions, shorter grazing season (220 versus 255 days), a lower proportion of grazed grass in the diet, higher supplementation with concentrates, lower body condition score at the end of the grazing season and lower annual growth rates.

In poorly drained soils the rate of infiltration at the soil surface is regularly exceeded by the rainfall rate due to:

- Low hydraulic conductivity in the subsoil (or a layer of the subsoil).
- High watertable due to low lying position and poor/poorly-maintained outfall.
- Upward movement of water from seepage and springs.

② How widespread is the problem?

- Approximately 20 per cent of the utilizable agricultural area of Ireland has undergone artificial drainage, compared with 65 per cent in the England and 74 per cent in the Netherlands. Almost half of agricultural land in Ireland would benefit from reclamation and drainage.
- Cost effective artificial drainage will increase herbage production and utilization, extend the grazing season, help keep rushes under control, minimise fluke infestation and increase the profitability of dairy production.

③ Which management steps will help reduce the problem?

Calving date

Turn-out to grass is normally later on heavy soils, so the start of calving should also be later. Compactness of calving is more critical on heavy soils as the grazing season is shorter.



Farm infrastructure

To maximise grass utilisation on heavy soils it is critical to have:

- good farm roadways.
- a well laid-out paddock system.
- multiple water access points.

Ground conditions are often marginal on farms with heavy soils. It is inevitable some damage will be done; therefore it is essential that when animals come off a damaged area, they do not go in there again until the next rotation. This cannot be done without an adequate farm roadway system; easy to operate paddock system with multiple access/exit points and easy access to water for animals.

Adequate winter feed

Heavy farms have longer winter feeding requirements. The growing season will be shorter and often a higher peak growth rate occurs. This must be harnessed to maximise the amount of quality silage harvested. Making round bale silage is very useful to keep grass supply under control and provide quality short-term feed in times of deficits and/or poor grazing conditions. There should be a greater emphasis on quality silage, as cows will end and begin lactation on some silage. Good weight gains can be achieved on quality silage with reduced concentrates.

Winter housing and slurry storage

Longer winters mean more slurry storage. Most farmers who farm on heavy soil farms have adequate slurry storage and housing for the existing herd.



Ryegrass content

Levels of ryegrass are quite low on a lot of heavy farms. There are challenges in reseeding as the 'window' to reseed is much shorter on heavy land. Nonetheless it is essential that ryegrass is established to maximise grass production. Late heading diploid varieties are the most suitable.

Grazing management practices

Severe damage to pasture must be avoided at all costs. Grazing management practices (e.g. grazing from the back of the paddock, back fencing) that will limit damage to pasture must be considered.

Drainage

There are opportunities to improve grass production and utilisation through drainage. It is costly and needs to be part of an overall business plan. Before drainage is undertaken, the basics must be right. Watercourses must be opened and cleaned, existing drains examined and repaired, etc.

4 How should the underlying problem be addressed?

- Impeded drainage has three main causes; low hydraulic conductivity, high water-table and seepage & springs.
- The first step of any drainage works is a detailed investigation into the causes of poor drainage using test pits.
- Two main types of drainage system exist: a groundwater drainage system and a shallow drainage system. The design of the system depends entirely on the drainage characteristics of the soil.
- The decision between the two main systems comes down to whether or not a layer is present (at a workable depth) that will allow the flow of water with relative ease. If such a layer is evident a piped drain system is likely to be effective, at this depth. If no such layer is found during investigations, it is necessary to improve the water carrying capacity of the soil. This involves a disruption technique such as moling, gravel moling or subsoiling in tandem with collector drains.

- Drainage system outlets and outfalls need to be maintained to ensure full efficiency of land drainage systems.

5 Are there regulations to consider before draining land?

Land drainage works on lands (other than wetlands) used for agriculture is covered by the EIA (Agriculture) Regulations and is controlled by DAFM. Such drainage works include the following:

- Installing open drains
- Installing field drains (not open) such as field drains using plastic pipe with drainage stone or field drains with drainage stone only or mole drains (no pipe or drainage stone) or gravel filled mole drains (no pipe but filled with gravel)
- Opening of a short distance of watercourse

Installing a field drain is covered by the Regulations; such work is not regarded as maintenance work for the purposes of the legislation (regardless of whether the field had field drains installed in the past or not).

Subsoiling of improved lands is not covered by the Regulations. Cleaning of open drains and adjacent levelling of spoil from such cleaning operations is also exempt (not covered by the Regulations).

If you intend to undertake land drainage works that (a) exceed 15 hectares, (b) the works are to be carried out within (or may effect) a proposed NHA or a nature reserve or (c) the proposed works may have a significant effect on the environment, screening by DAFM is required.

For the purposes of the Regulations the area will be considered to be the area of works (drains plus immediate vicinity) rather than the area of the field. The 15 hectares threshold can be made up of all new drainage works or new works in combination with upgrading of previous works (since 8th Sept 2011).



Section 5



Key Environment Issues for Beef Farmers

by Pat Murphy, Catherine Keena, Tim Hyde, Mark Gibson



Introduction

Environmental issues will be an increasing challenge for beef farmers but may also provide a marketing benefit for Irish products on world markets.

- ① Why is greenhouse gas policy relevant to beef farming?
- ② What are the main greenhouse gases produced by farming?
- ③ How can greenhouse gas emissions be reduced on beef farms?
- ④ Why is water quality important for beef farmers?
- ⑤ How can countryside management benefit beef farmers?

Key Environment Issues for Beef Farmers

① Why is greenhouse gas policy relevant to beef farming?

Key Facts

- In Ireland agricultural greenhouse gases (GHGs) account for 33% of total GHGs.
- The average for the EU 27 is 9%.
- Agricultural GHGs have fallen by almost 10% since 1990.
- Achieving Food Harvest 2020 targets is projected to lead to an increase of 7% in GHG emissions compared with 2010 levels.

The commitments

- The European Union has committed itself to a reduction of 20% below '1990 levels' by 2020 with an agreement to increase this to 30% as part of a global agreement.
- The EU is committed to a 40% cut in emissions by 2030.

From the market

- There is increasing pressure from manufacturers and retailers to reduce GHG emissions in the inputs/products being purchased. This will result in pressure on farmers to quantify GHG emissions of their output and to put measures in place to reduce it.



② What are the main greenhouse gases produced by farming?

There are three main agricultural greenhouse gases:

Carbon dioxide – CO₂

Methane – CH₄

Nitrous oxide – N₂O

Methane

Methane is the most important GHG in Irish agriculture. It is 25 times more potent than CO₂ (1kg CH₄ = 25kg CO₂ equiv.). The main sources are fermentation in the ruminant animal and manure storage and handling.

Nitrous oxide

Nitrous oxide is 296 times more potent than CO₂. The main sources are the application of artificial and organic manures and animal excreta (mainly urine) deposited on grassland.

Carbon dioxide

Carbon dioxide from Irish agriculture arises mainly from the use of energy on the farm and in the transport of farm inputs and produce. While CO₂ accounts for only a small proportion of agricultural greenhouse gasses, there is scope to reduce this on many farms.

Policy

Counting greenhouse gas emissions

There is considerable argument about how best to account for the greenhouse gas emissions from the agricultural sector. This issue is important because future policies on controlling GHGs will be based on a system of counting carbon.

IPCC (International Panel on Climate Change) vs LCA (Life Cycle Analysis)

Both methodologies calculate the carbon footprint for agricultural output produced in the country. The main difference between the two methodologies is that IPCC measures the carbon which was actually produced in the country while the LCA methodology calculates the carbon emissions associated with the food regardless of where it occurred. This includes the carbon footprint of imported inputs such as fertiliser and meals.



Food produced in Ireland is very efficient when considered in terms of kg of CO₂ per kg of product. In a report produced by the Joint Research Committee (JRC) of the EU, Irish dairy production was ranked first and beef production fifth in the EU 27, in terms of kg CO₂ per kg of output. On the world stage, Ireland is amongst the most carbon efficient producers of milk and beef.

The dilemma: carbon leakage

- Ireland has committed to challenging targets to reduce carbon emissions. Developing countries do not have the same targets.
- If Ireland reduces agricultural output to meet GHG targets, the production of food may shift to less carbon efficient countries.
- This will lead to a global increase in global GHG emissions.
- It is important to bear in mind that demand for food is growing in line with world population.

3 How can greenhouse gas emissions be reduced on beef farms?

To improve sustainability and to meet legislative and market requirements, it is important for all beef farmers to reduce their carbon footprint.

There are opportunities to reduce CH₄ emissions through increased efficiency and adoption of a range of management practices:

Increased grazing season increases grass utilisation and reduces the volume of slurry to be stored and spread. A 10 day increase in the grazing season can reduce GHG per kg beef by approximately 2%

Better production and utilisation of grass means improved nitrogen efficiency and improved animal performance. Inclusion of clover in swards can significantly reduce GHG emissions by replacing purchased N with clover fixed N.

Efficiency per suckler cow. Your suckler cow produces the same level of CO₂ equivalents per year as an efficient car travelling 17,000 Km per annum. Unproductive cows increase your carbon footprint. You can reduce this by Improving calving rates through improved fertility management, lowering the age at first calving.

Slurry spreading and storage. Timing and spreading technology have a significant impact on GHG emissions. Reducing N losses to water and air are important from an environmental perspective but also lead to increased availability for plant growth.

Correct nitrogen usage. Getting the timing and type of nitrogen fertiliser type right for the prevailing conditions can significantly reduce losses and improve the effectiveness of N fertiliser

Improved liveweight gain improves GHG efficiency by reducing finishing age and/or increasing carcass weight and thereby reducing the emissions per unit of output.

Land Use – sequestration. Grassland and forestry take carbon dioxide out of the atmosphere and store it in wood and soil.

Fortunately, most of the mitigation options outlined above are consistent with improving the efficiency and profitability of the beef farm. Adopting these technologies could significantly reduce the carbon footprint of Irish beef.

4 Why is water quality important for beef farmers?

When compared with other EU member States, Ireland has good water quality. The 2010-2012 water quality report, published by the EPA, shows evidence of improvements in water quality in Ireland. However, there is a considerable challenge to meet the target of good status for all water bodies (currently 72.9%).

The main pressures on Irish water quality arising from agriculture include: phosphorus, nitrate, sediment and pathogens. These pressures are controlled under the Nitrates Regulations.

Importance of high quality water

At an industry level, Ireland's high water quality contributes to our 'green' image and is crucial to the future marketing of Irish dairy products.

Good quality surface and groundwater is needed for human and animal health, fisheries, tourism, and wildlife and habitat conservation.

Key Environment Issues for Beef Farmers

Legislation

The 2003 Water Framework Directive was established to coordinate existing water legislation. The Water Framework Directive requires river basin management districts (RBDs) to be established in each member state. Eight RBDs have been established, each of which must develop and implement a management plan. The plans contain detailed standards for measurements of water such as biological and chemical status which must be reached within a specific timescale.

The **Nitrates Regulations** were introduced in Ireland in 2006 and updated in 2010, and 2014. The regulations are designed to control diffuse and point source pollution from agriculture.

It is vital that beef farmers play their part in protecting water quality by ensuring that they put in place an effective nutrient management plan, ensure that there is no point source losses to the environment and comply with the provisions of the Nitrates Regulation.

Key Actions

Nutrient Management

- Carry out soil nutrient analysis on all fields on the farm
- Prepare a nutrient management plan consistent with nutrient status and level of output
- Apply lime as per recommendation
- Utilize slurry effectively
- Apply the correct level of appropriate chemical fertiliser at the right time

Point source management

- Ensure clean water is separated
- Make sure there is adequate slurry storage
- Pay particular attention to farm roadways, yards and silage pits to ensure that there is effective collection of soiled water and no potential for losses to watercourses

Water footprinting

Water footprinting relates to the total volume of fresh water that is used to produce goods by a business. It is probable that retailers will eventually include a 'water footprint' label on food products.

Approximately 80% of the world's population live in areas where the fresh water supply is not secure. International research has shown that grass-based beef systems, such as we have in Ireland, have the lowest water footprint. This places Ireland in a strong position to continue to produce beef competitively with both a low water and carbon footprint.

5 How can countryside management benefit beef farmers?

Biodiversity enhances farms and the rural countryside. It contributes to the 'green' image of beef. Leaving space for biodiversity maintains assets for future generations. Beef farms can help to halt the decline in Ireland's biodiversity and contribute to a living landscape in their own rural area. Examples of biodiversity enhancement on beef farms are:

- planting native Irish trees in corners or rows
- erecting bird or bat boxes
- creating a pond
- growing a small area of a crop for wildlife
- planting new stock-proof hedgerows and maintaining/improving existing hedgerows.

The decline in biodiversity can be halted by a network of biodiversity areas on all farms in the country. Agri-environment schemes provide opportunities to invest in the future of your farm.

Hedgerows

Common images which market Irish beef inevitably feature cattle in lush green fields with scenic hedgerows in the background. Hedgerows are now landscape features which means the area beneath them is eligible for the single payment scheme. In order to avoid penalties under cross compliance, farmers must replant an equivalent length elsewhere before removal of any hedgerows. Hedgerows must not be trimmed from March to August to avoid the destruction of nesting birds.

Hedgerows

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Archaeological and historical features

The Irish countryside is rich in ancient settlements and ritual monuments. These tell the story of generations of farming communities who have made their living from the land and are essential to our understanding of the past.

The traditions and beliefs of older generations have prevented much interference with the 'fairy rings' or 'giants' graves' and mass rocks. They are now protected by law and any interference can lead to penalties under cross compliance.





Section 5



Cross Compliance and the Nitrates Derogation

by Pat Murphy, Tim Hyde, Andy Boland



Introduction

Complying with legislation is greatly eased by careful planning and record-keeping.

- ① What is meant by cross compliance?
- ② How are cross compliance inspections managed?
- ③ What are the key issues in relation to animal identification?
- ④ What are the key issues in relation to nitrates?
- ⑤ How do I secure a nitrates derogation?
- ⑥ What are the key issues in relation to pesticides?
- ⑦ What other compliance issues are relevant to beef farmers?

Cross Compliance & the Nitrates Derogation

① What is meant by cross compliance?

All farmers in receipt of the “Single Farm Payment” are obliged to adhere to 13 statutory management requirements (SMRs) and must also maintain their lands in **good agricultural and environmental condition and eligibility** (GAEC). Together these are commonly known as cross compliance.

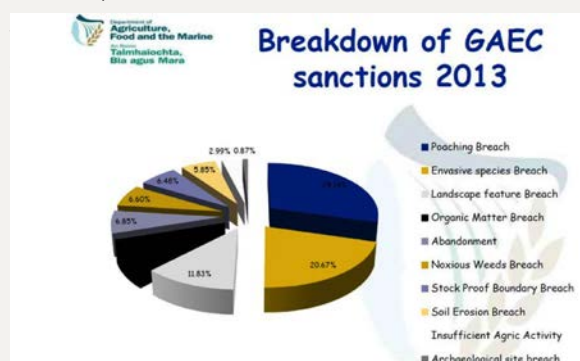
The SMRs relate to the following areas:

SMR1	Protection of the environment against pollution caused by Nitrates
SMR2	Conservation of wild birds
SMR3	Conservation of natural habitats of wild flora and fauna
SMR4	Food and feed hygiene
SMR5	Hormones – prohibition of Beta Antagonists
SMR6,7,8	Identification and Registration of animals (porcine, ovine, bovine)
SMR9	Prevention and control of transmissible spongiform encephalopathies
SMR10	Plant protection products (pesticides)
SMR11	Animal welfare (calves)
SMR12	Animal welfare (pigs)
SMR13	Animal welfare (general)

GAEC measures refer to the following areas:

1. Establishment of buffer strips along water courses.
2. Where use of water irrigation is subject to authorisation, compliance with authorisation procedure – non applicable in Ireland.
3. Protection of ground water against pollution.
4. Minimum soil cover.
5. Minimum land management reflecting site specific conditions to limit erosion.
6. Maintenance of soil organic matter through appropriate practices.
7. Retention of landscape features – minimum level of maintenance.

For detailed information on cross compliance including explanation of SMRs and GAEC, guides and forms for inspections and information on nitrates see DAFM website at: www.agriculture.gov.ie/farmerschemespayments/crosscompliance



② How are cross compliance inspections managed?

The Department of Agriculture, Food and the Marine (DAFM) has implemented a system of farm inspections which meet EU requirements. There are two types of inspections carried out under the Single Farm Payment Scheme: land eligibility and cross compliance.

- 5% of all farmers receive land eligibility inspections, some by remote sensing (satellite).
- 1% full cross compliance (1,350 farmers).
- 3% cattle identification (5,000 farmers).
- Ovines 3% of applicants and 5% of flocks.

A full cross compliance inspection means that a farmer is inspected for all 18 SMRs (if they are applicable to the farm) and GAEC, or farmers can receive a cross compliance inspection on just one of the SMRs and/or GAEC. Inspections by the DAFM are selected on the basis of a risk assessment, but some farms are also selected at random.

DAFM may give no notification at all, or up to 14 days, depending on the regulations being inspected. Notification can only be given “where such notice does not jeopardise the objective of the inspection”. It is important that all records as required are maintained and available for inspection. SMRs that are unannounced are feed, food hygiene and welfare requirements.

- 20-25% are random and remainder are risk based.

If the inspector finds a problem he/she will issue a non-compliance notification (NF) detailing the non-compliance issues found at inspection. When the file is processed, the farmer is informed in writing of the eligibility/cross compliance inspection results if non-compliance is found and informed if penalties are to be applied.

3 What are the key issues in relation to animal identification?

Animal identification - Guidelines and tips:

- There are four different aspects involved (tagging, CMMS/AIM database, passports and bovine herd register “blue book”).
- Inspectors come prepared with current herd profile and BPS maps and will check this against the passports/herd register.
- The herd register will be checked for movements, births, deaths and animals sold. The buyer is responsible for notifying the DAFM within seven days if an animal is bought/sold.
- There must be a passport for every animal, signed by the keeper.
- Passports for dead animals must be given to the disposal agent or returned to the Divisional Veterinary Officer.
- All calves must be tagged within 20 days of birth and registered within seven days of tagging.
- A sample of tags are read during an inspection and checked against the herd register. Animals missing one tag or both tags are recorded.
- Calves not tagged at inspection greater than 7 days old will be sanctioned under tagging, transport, AIM and Bovine Herd Register.
- All animals must have at least one ear tag.

Key facts

The top four SMR non-compliance issues for cattle in recent years were:

- CMMS/AIM breaches
- passport breaches
- register discrepancies
- tagging.

4 What are the key issues in relation to nitrates?

Nitrates guidelines and tips:

- Get the yard right and you will eliminate most of the nitrates penalties.
- The inspector starts in the yard by doing a farmyard sketch (REPS plan etc.), and will identify all animal housing and storage facilities.
- Every storage facility (slatted tanks, loose houses, FYM stores etc.) is measured (length, depth and width).
- All facilities (tanks, stores, concrete-floored sheds, silage pits) must be “fit for purpose” and the inspector will check for structural defects.
- Dirty yards which cattle have access to are measured and assessed in relation to the collection of dirty water.
- Silage facilities will be checked to ensure that effluent is collected and diverted correctly.
- Round bale storage will be checked. If stored within 20m of a watercourse, there must be storage facilities for the effluent. There should be no escape of effluent.
- All guttering on sheds will be checked to ensure it is functioning and that downpipes are in place and that no clean water is mixing with dirty water.
- Farmers must be careful not to use an earthen banked lagoon/earth lined out-wintering pad or a reed bed that does not have planning permission or is not certified by an engineer and built to specification. (20% penalty irrespective of the volume or type of material stored or 100% where it is causing significant pollution).
- Records must be submitted to the DAFM by the 31st March of the year after the inspection – the inspector will leave this with you to complete.
- Farmers must not apply more than 170kg organic N per ha without a derogation.
- Every farmer must have a fertiliser plan.
- All farmers must have completed fertiliser records on the farm by March 31st following the year end.

Cross Compliance & the Nitrates Derogation

Where a farm is at risk of exceeding 170kg of organic N per ha and has not applied for a derogation, there are a number of actions which could alleviate the problem if taken in time:

- reduce stock numbers for the remainder of the year
- export organic manures and submit relevant paperwork (Record 3) before the end of the year
- graze or house stock off-farm through DAFM-approved AIM B&B arrangements
- rental of additional land as per single farm payment regulations.

5 How do I secure a nitrates derogation?

Under the Nitrates Regulations (S.I. 31 of 2014) farmers cannot apply more than 170kgs of nitrogen from livestock sources per hectare per year. **However, grassland farmers, with grazing stock, may apply annually for a derogation to apply up to a limit of 250kg per hectare in a calendar year, under certain conditions.**

- An application must be made on-line by the 31 March annually to DAFM, undertaking in writing to fulfill the conditions set out therein.
- The farm holding must be at least 80% grassland and have grazing livestock.
- A fertiliser plan (or an approved REPS 4) must be on the holding by 1 March each year.
- Fertiliser accounts must be submitted on-line to DAFM by 31 March each year. (Fertiliser and meal docket must be included).
- Soil analysis must be performed at least every 48 months and at least one analysis per five hectares of land is required. e.g. where samples were taken for 2016, they will need to be retaken for 2020.
- Livestock manure may not be spread in the autumn (from 1 August to 15 October) before grass cultivation.
- Grassland shall not be ploughed between 16th October and 30th November.

- Crop rotation should not include leguminous or other plants fixing atmospheric nitrogen. This will not apply to grassland with less than 50% clover and to cereals and peas undersown with grass.

The fertiliser plan must include:

- the number of livestock
- a description of the housing and storage system, including the volume
- a calculation of manure nitrogen (less losses in housing and storage) and phosphorus produced on the farm
- the crop rotation and area of each crop, including a sketch map indicating location of individual fields
- the foreseeable nitrogen and phosphorus crop requirements
- the amount and the type of manure exported from or imported onto the holding
- results of soil analysis related to nitrogen and phosphorus soil status if available
- nitrogen and phosphorus application from manure over each field (or parcels of the farm which are homogeneous in terms of cropping and soil type)
- application of nitrogen and phosphorus with chemical and other fertilisers over each field

Plans shall be revised no later than seven days following any significant changes in agricultural practices to ensure consistency between plans and actual agricultural practices.

IMPORTANT

- If farm stocking rate exceeds 250kg/ha, alternative arrangements, such as exporting some of the livestock manure, must be undertaken.
- All manure export forms must be submitted to DAFM by 31st December of the year concerned.



6 What are the key issues in relation to pesticides?

New regulations, increased inspections, and increasing instances of penalties mean that farmers need to ensure that their handling of pesticides and chemicals meets the required standards. Check out **www.Teagasc.SUD**

- Regulations apply to every farmer with chemicals on the farm (grassland and tillage sprays/plant protection products - PPPs).
- All chemicals are included. They must be stored in any lockable shed.
- All other products must have a dedicated store.
- Every farmer with plant protection products and disinfectants must keep up to date records of all chemicals used (purchases, where used and returns).
- Powders must be stored above liquids.
- Every container/packet should have a PCS number on it. (Protection Chemical Service)
- Pesticides must be stored away from food and feed for animals, poultry or pet food.
- Storage facilities must be secure, lockable and have concrete/bunded floors.
- The door in to the store must have a warning sign.
- All chemicals must be stored in their original containers.
- Protective clothing and equipment must be available and properly maintained.
- A bucket of sand or peat should be available to soak up spillages.
- A scales/graduated jugs for measuring products should be available.
- Sprayers must be suitable for purpose and will be inspected and sprayer serial numbers recorded.

7 What other compliance issues are relevant to beef farmers?

- Removal of landscape features such as hedges and open drains is not permitted except under very unusual and agreed circumstances.
- Land eligibility – land must be actively farmed (grazing, cutting, topping) to be eligible for the Single Farm Payment.
- Failure to control noxious weeds and scrub encroachment can lead to penalties.
- All animal feeds should be stored in secure self-contained vermin-proof units, with no dog food or similar materials in the same vicinity. Records of feed purchases are required.
- Fuel tanks should be well located and maintained with no evidence of discharge/leakage.
- Waste oils and batteries should be properly disposed of.
- All bedded cattle and horse sheds must have concrete floors.
- Boundaries of land declared as forage must be stockproof.
- There must be no damage to designated lands or monuments.
- Animal remedy records must be kept up to date; all animal treatments recorded and withdrawal periods should be adhered to.
- Tail docking and/or mutilation has been banned since 2003.
- Meat from animals receiving treatment or administered with Anthelmintic products must be prevented from entering the food chain. Animal remedies records must be kept for all animals.

