

# Improving soil fertility and protecting water quality

A guide for  
dairy farmers



North Cork  
Creameries

SUPPORTING PROFITABLE  
AND SUSTAINABLE DAIRYING

Dairy   
Sustainability  
Ireland

## Profitable and Sustainable Dairying

Increasing profitability is a key goal of every dairy farmer. While grass is the cheapest feed we can produce for our livestock we are not getting the most from our grassland because of poor soil fertility. Research by Teagasc has shown that only 10% of Irish farms are at peak soil fertility – if this fertility level were increased, significantly greater farm income can be achieved.

Soil fertility needs a focussed approach where nutrients are applied in a targeted way rather than as done traditionally. In this way farmers can significantly improve grass growth and significantly improve farm income.

There is an added bonus – if nutrients are applied where they are most needed on the farm, they are more readily absorbed in the soil and do not end up in streams, rivers and lakes.

Likewise, better farmyard management to prevent nutrient leakage and discharge will also protect clean water sources.

The core message is a simple one – better nutrient management will improve soil performance and farm profitability, while also protecting local water sources and improving environmental performance.

With the publication of this guidebook, we ask that farmers apply the approaches and recommendations in relation to soil fertility improvement and better farmyard management.

“Irish dairying lays claim to the unique advantages of a temperate climate, rich soil and clean water. Together they create the perfect conditions for grasslands which feed our dairy herds.”

### SOIL FACTS

ONLY 10% OF IRISH SOILS ARE AT OPTIMUM FERTILITY



POOR  
LEVELS OF  
**PHOSPHORUS**



POOR  
LEVELS OF  
**POTASSIUM**



WERE BELOW  
THE **OPTIMAL pH**  
LEVEL OF 6.2



# Soil Fertility

## The Benefits

Better soil fertility will support milk expansion, improve farm income and enhance environmental performance on the farm.

### 1 MILK EXPANSION

Irish dairy farmers' biggest cost advantage is grass. It is the cheapest feed we can produce. Our focus should be to grow as much as we can. A deficiency in any one of the key nutrients nitrogen (N), phosphorus (P) and potassium (K) will impact grass growth and farm income.

	Average farm	Top 10% performing farms
Pasture growth (t DM/ha)	10-12	12-16
Grass utilisation (tons DM/ha)	8.3	10.6
Milk solids (kg/ha)	894	1,155

### 2 IMPROVE FARM INCOME

Figures produced by Teagasc have shown that a total annual investment of just €120 per hectare in more targeted fertiliser application and in bringing soil pH to optimum levels will result in increased yields worth €360 per hectare, per annum. This could generate increased income of over €42,000 for the average 35 hectare farm over a five year period.

35 Ha Dairy Farm at low soil fertility	/ha / year	For entire 35 Ha farm over 5 years
Investment in Phosphorous, Potassium and Lime	€120	€21,000
Value of extra grass (2 tonnes /ha)	€361	€63,175
Profit	€241	€42,175



### 3 ENVIRONMENTAL PERFORMANCE

Once spread, fertiliser and manure are either absorbed by soil and plants or lost to air and water. Our goal should be to maximise the utilisation of nutrients whilst minimising losses. Correct pH with lime application will ensure that nutrients applied are better utilised.

- ▶ Avoid spreading fertiliser on wet soil or ahead of heavy rain.
- ▶ Use slurry in spring in good conditions.
- ▶ To achieve high levels of productivity while minimising losses requires that a detailed nutrient management plan be prepared and implemented.

If the right steps are taken to improve sub-optimal soil fertility and pH, involving targeted fertiliser application and appropriate lime spreading, a 35 hectare grassland dairy farm could generate up to €42,175 in additional farm income over five years.

**“For every €1 invested in building up soil fertility, you can get a minimum return of €3 over 5 years.”**

# Steps to achieving optimal soil fertility

Teagasc has developed a simple **FIVE-STEP PROCESS** to follow to help achieve optimal soil fertility.

## 1

### CARRY OUT A SOIL TEST

If you don't know what nutrients are in the soil you can't know how much extra nutrient it needs. Soil testing allows your fertiliser programme to be tailored to the specific needs of the soil and grass growth. Regular analysis is critical to monitor the effectiveness of the fertiliser strategy.

#### TIP

FOR EFFECTIVE NUTRIENT MANAGEMENT TAKE SOIL SAMPLES FOR ALL YOUR LAND ONCE EVERY **3 YEARS**

#### TIP

SOIL SAMPLES SHOULD BE TAKEN BETWEEN **OCTOBER** AND **FEBRUARY** AND **PRIOR TO FERTILISER APPLICATION IN SPRING**

#### TIP

TAKE A SOIL SAMPLE **EVERY 4 HECTARES**.

## 2

### SPREAD LIME

The optimum pH level for grass is 6.3. This level will increase the microbiological activity of the soil and help maximise the nutrients applied in fertilisers. A sub-optimal pH level costs money in wasted fertiliser. Spreading lime to improve soil pH generates better grass growth and additional farm income.

# 3

## CORRECT THE P AND K LEVELS

Once the pH level is corrected, phosphorus (P) and potassium (K) need correction. Aim to have P and K in all fields in Index 3. The Soil Index system divides soils into four levels and indicates the expected response to nutrients applied.

Index 1 is highly responsive while Index 4 is unresponsive. Soil Index 3 is considered the optimum index for production, as it is in this range that the soil fertility level is considered sufficient for good grass growth.

Soil Index	Index Description	Response to Fertiliser
1	Very low	Definite
2	Low	Likely
3	Medium	Unlikely
4	Sufficient	None

**IF YOU DON'T KNOW YOUR BASE LINE SOIL FERTILITY, SPREADING FERTILISER IS A WASTE OF MONEY**

# 4

## USE SLURRY WHERE POSSIBLE

Cattle slurry is a valuable source of nitrogen, phosphorus and potassium. The proper use of slurry can reduce fertiliser costs with more slurry being applied on grassland in early spring when nitrogen utilisation is highest.

Knowing the actual nutrient content of your slurry can be helpful. A once a year laboratory analysis of slurry can offer a useful guide.

Target fields with low P and K levels and high requirements like silage.

# 5

## BALANCE SLURRY WITH COMPOUND FERTILISER

Over-supplying one nutrient will be negated by the lack of adequate levels of another nutrient. Fertilisers should complement the remaining nitrogen, phosphorus and potassium in the soil as determined by soil test results.

On grassland farms, nutrient applications must also be adjusted for the nutrients supplied in slurry derived from silage and compound feeds.

## FACT

**62% OF IRISH SOILS ARE SUB-OPTIMUM FOR pH**

**For further information on soil testing services or nutrient and fertiliser advice contact your milk processor's farm advisory team.**

# Farmyard Management

Farmers should view farmyards as a significant resource in terms of animal manure whilst also posing an environmental threat.

Animal waste or organic manure has a real value as a fertiliser and a source of nutrient on the farm. Therefore it is important for farmers to properly store organic manure to minimise nutrient loss.

Poor quality slurry storage can result in discharge into watercourses. This can result in farmers being subject to fines and other penalties as well as putting their neighbours' livestock and domestic wells at risk.

Not only can these threats be eliminated through good farmyard practice but farmers can profit financially.

Teagasc has developed this simple five-step guide to protecting water quality.

# 1

## SEPARATE

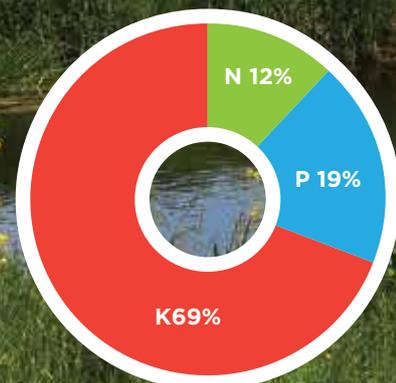
All soiled water and slurry must be kept separate from rainwater. Ensure that all dairy washings are collected, stored and spread correctly. Make sure all gutters are working and rainfall is diverted away from soiled water/slurry. Keep soiled water/dairy washings out of slurry tanks. Keep concrete areas clean so that rainfall on these areas is not mixing with soiled water/slurry.

# 2

## MINIMISE

Keep soiled water to a minimum – reduce, reuse, recycle where you can. Keep the rain out by roofing areas that will create soiled water. Avoid soiling yards where possible by keeping livestock off them when you can. Ensure that all areas that farm machinery cross are cleaned regularly. When silage pits are in use clean these exposed concrete areas daily/weekly.

## COMPOSITION OF ORGANIC MANURE



**TIP**

IF YOU DRAW WATER FROM A WELL ENSURE IT IS  
**PROPERLY PROTECTED AND TESTED ANNUALLY**

**3****CONTAIN**

The farm must have sufficient capacity to store and manage all slurry, soiled water, effluents and manure. Ensure that all manure is contained and that no seepage can occur from defects in manure storage structures. Effluents collected on the concrete yards where cattle feed or stand before and after milking must be contained, stored and landspread correctly. Farm roadways should be cambered away from any waterbody.

**4****MAINTAIN**

Ensure there are no defects in soiled water/slurry tanks, and other manure storage structures. Silage pit floors and channels must be crack-free with all joints sealed. Drains, channels, pipes, chutes and gutters need to be kept clear and in good condition to ensure clean and dirty water are kept separate.

**5****SPREAD CAREFULLY**

Spread slurry, soiled water, effluents, manure and fertilisers accurately and evenly and in accordance with your nutrient plan and Teagasc and Fertiliser Association of Ireland guidelines.

**Slurry Spreading Guidelines**

Slurry should be applied at the start or during the growing season when plants require the nutrients. For hay or silage crops spread cattle slurry 33m<sup>3</sup>/ha (3,000 gls. per acre) in one application. When spreading slurry remember;

- ▶ **Keep** 10 metres from water courses
- ▶ **Keep** 100 meters from wells
- ▶ **Do not** spread on hedgerows
- ▶ **Do not** spread when heavy rain is forecast
- ▶ **Do not** spread when soils are saturated
- ▶ **Do not** spread when soils are frozen

**Fertiliser Spreading**

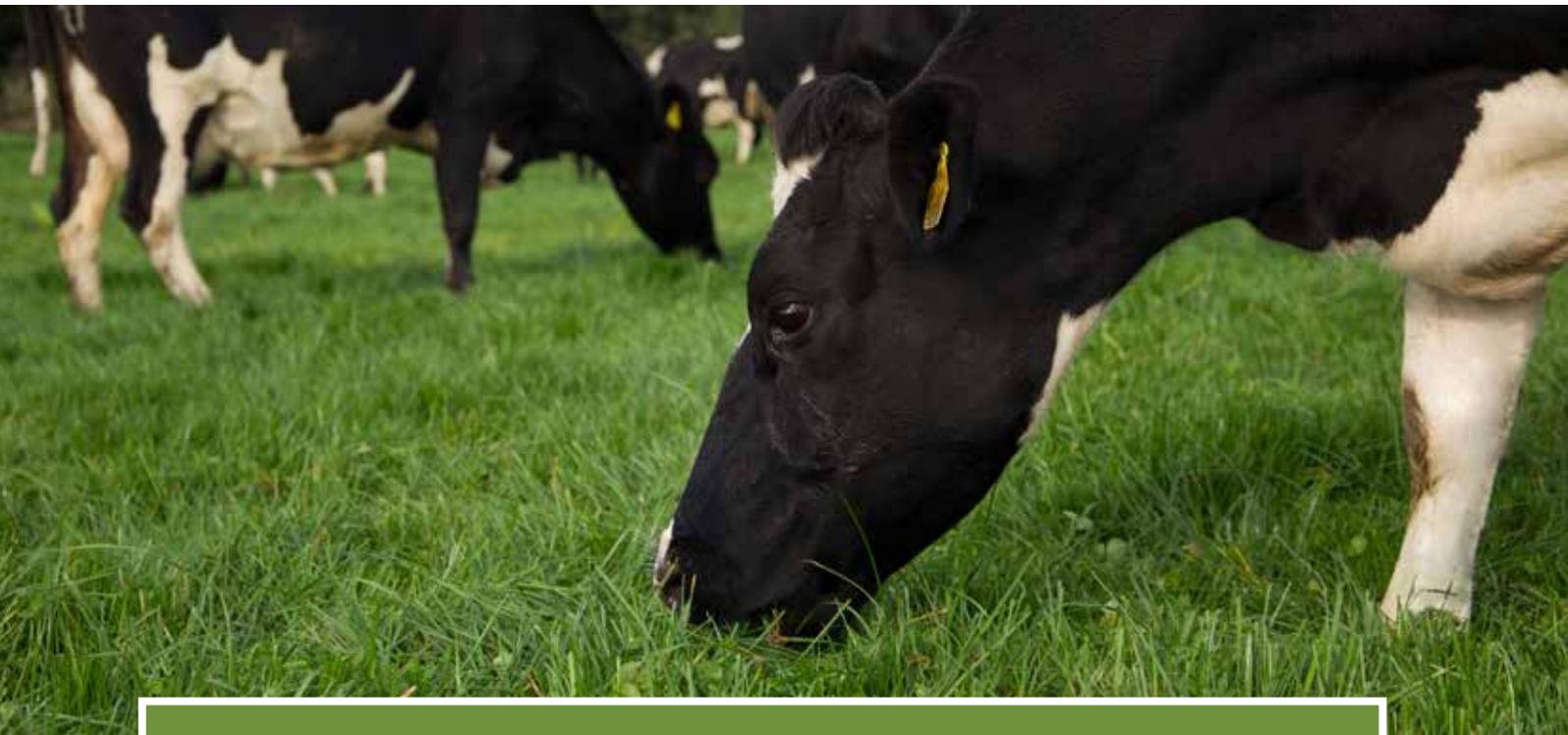
Use Teagasc recommended levels which take account of the availability of soil N. Avoid fertiliser application during extended drought periods.

# Dairy Sustainability Ireland

**Ireland's dairy industry established Dairy Sustainability Ireland in 2016 to provide industry leadership to the issue of sustainable dairy practices.**

Dairy Sustainability Ireland is a pro-active industry led, whole of sector and whole of Government partnership which is working to develop and implement new approaches to dairy farm sustainability both economic and environmental.

A Working Group on Dairy Economic and Environmental Sustainability has been established with membership drawn from the key sectoral and industry stakeholders including Bord Bia, the Co-ops, the Department of Agriculture, Food and the Marine, the farm organisations-ICOS, IFA, ICMSA, and Macra na Feirme, the National Dairy Council and Teagasc.



This guidebook offers advice in relation to the simple and low cost steps farmers can take to achieve better soil fertility and nutrient management to improve the economic and environmental sustainability.

**MORE DETAILED INFORMATION ON THE SPECIFICS ARE AVAILABLE FROM TEAGASC OR YOUR DAIRY PROCESSOR.**

**Dairy Industry Ireland**

84/86 Lower Baggot Street  
Dublin 2  
D02 H720

T: + 353 1 605 1500  
conor.mulvihill@ibec.ie

**Dairy**   
**Sustainability**  
Ireland