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Guidance

Using nitrogen fertilisers in nitrate vulnerable zones

Find out how much nitrogen you can use on your land and how to plan and record your fertiliser use in a nitrate vulnerable zone (NVZ).

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Storing organic manures in nitrate vulnerable zones

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You must follow this guidance if you use any manufactured fertilisers, manures or other materials that contain nitrogen on agricultural land in a nitrate vulnerable zone (NVZ).

Find out if you're in an NVZ.

You must also follow the guidance on storing organic manures in NVZs and storing silage, slurry and agricultural fuel oil if you produce or import livestock manures.

Fertilisers that contain nitrogen

Nitrogen fertilisers can be manufactured (inorganic, bagged) fertilisers that you buy, other materials containing nitrogen (like waste soil) or organic manures that you produce or bring on to your holding.

Organic manures come from animals, plants or humans. They include:

- slurry
- poultry manures
- solid manures (such as farmyard manure, sludge cake or compost)
- sewage sludge (also called biosolids)
- other liquid manures (such as abattoir waste or anaerobic digestate)

How much nitrogen you can apply to your crops

There's a limit on the average amount of manufactured fertiliser and crop-available nitrogen from organic manure that you can apply to most crops each year - this is known as the N-max limit.

These are shown in the following table:

Crop	N-max limit (kilograms of nitrogen per hectare)	Standard crop yield (tonnes per hectare)
Autumn or early winter-sown wheat	220	8
Spring-sown wheat	180	7
Winter barley	180	6.5
Spring barley	150	5.5
Winter oilseed rape	250	3.5
Sugar beet	120	-
Potatoes	270	-
Forage maize	150	-

Storing silage, slurry and agricultural fuel oil

Collection

Nitrate vulnerable zones

Field beans	0	-
Peas	0	-
Grass	300	-
Asparagus, carrots, radishes, swedes, individually or in any combination	180	-
Celery, courgettes, dwarf beans, lettuce, onions, parsnips, runner beans, sweetcorn, turnips individually or in any combination	280	-
Beetroot, brussels sprouts, cabbage, calabrese, cauliflower, leeks individually or in any combination	370	-

Crops that you can apply more nitrogen to

You can apply more nitrogen to some crops if your expected yield is higher than the 'standard crop yield' shown in the table.

You can use an additional 80kg of nitrogen per hectare if you've used straw or paper sludge on the previous or current crop.

Wheat and barley

For wheat and barley, you can use an additional 20kg of nitrogen per hectare for every tonne that the expected yield exceeds the standard yield.

Milling wheat

On milling wheat varieties, you can use an additional 40kg of nitrogen per hectare.

Wheat and barley on shallow soils

On autumn and winter-sown wheat and winter barley you can use an additional 20kg of nitrogen per hectare on fields with a shallow soil type (except on shallow soils over sandstone).

Winter oilseed rape

On winter oilseed rape you can use up to 250kg of nitrogen per hectare. This includes a maximum autumn (closed period) application of 30kg of nitrogen per hectare of manufactured nitrogen fertiliser.

If you use 30kg of nitrogen per hectare in the autumn, you can only use up to 220kg of nitrogen per hectare in the spring. However, you can increase this by an additional 30kg of nitrogen per hectare for every half tonne that the expected yield exceeds the standard yield.

Grass

On grass that's cut at least 3 times in a year, you can use an additional 40kg of nitrogen per hectare.

Grass grown for dehydration or chlorophyll production

You can use nitrogen up to the level recommended in writing by a FACTS-qualified adviser if you're growing grass to achieve a protein content of at least 16% in the dried product.

If the land is irrigated, you must not use more than 700kg of nitrogen per hectare. If the land isn't irrigated, you must not use more than 500kg of nitrogen per hectare.

In subsequent years, you must sample these fields between 1 September and 31 October for soil mineral nitrogen levels and give your FACTS-qualified adviser the results.

How much organic manure you can use (farm and field limits)

You can apply up to 170kg per hectare of nitrogen in livestock manure (including manure deposited directly by livestock and spreading) on your holding in each calendar year. This limit is the loading limit and applies as an average across your holding. It's separate from the field limit of 250kg per hectare from organic manures.

You must not use more than 250kg of total nitrogen from all organic manures spread in any 12 month period on any single hectare of your land. This limit (the field limit) doesn't include livestock manures deposited by grazing animals.

You must use standard values to work out how much nitrogen is produced by the livestock on your farm or bought on to your farm. You must plan so that you don't exceed the limit.

You can find the standard values in the blank field records and standard values tables (134 KB).

You can apply for a 'grassland derogation' to increase this limit if more than 80% of your holding is grassland.

Using compost

If the only organic manure you use is certified green or certified green/food compost, you can apply:

- up to 500kg of nitrogen per hectare every 2 years as mulch or worked into the ground
- up to 1,000kg of nitrogen per hectare every 4 years (only as mulch and in an orchard growing fruit of the genera Malus, Prunus or Pyrus)

The compost that you use must not contain livestock manure and must be produced to the PAS100 protocol.

Plan your nitrogen use

You must plan all your applications of nitrogen on each crop in each field (including grass). This is your fertilisation plan. You must keep it as part of your farm records.

To help with your plan, you can use farm software like PLANET or tools like the 'Tried and Tested' nutrient management tools.

You can also use the blank field records and standard values tables (134 KB) to calculate how much nitrogen is available in different types of livestock manure.

Your plan must show you've taken the following steps before you apply nitrogen for the first time in a field where you're going to plant a crop or have planted a crop:

1. Calculate the amount of nitrogen in the soil that's likely to be available for the crop to use during the growing season.
2. Calculate the optimum amount of nitrogen that should be applied to the crop, taking into account the amount of nitrogen already available in the soil.
3. Calculate the amount of nitrogen from any planned applications of organic manure that's likely to be available to the crop in the growing season in which you spread it.
4. Calculate the amount of manufactured nitrogen fertiliser you need.

You must also carry out steps 1 and 2 before you apply any nitrogen fertiliser or manure for the first time.

You must carry out steps 3 and 4 every time you apply nitrogen fertiliser or manure.

In subsequent growing seasons, before you apply nitrogen to any crop or land where you're going to plant a crop (including grass) you must:

- repeat steps 1 and 2
- prepare a plan for your fertiliser use for that growing season

For permanent grassland, make your calculations based on the farming year starting on 1 January. Prepare a plan for any manure or fertiliser use for the year after that date.

Work out the total and crop-available nitrogen in organic manures

Before you apply livestock manure, you must calculate the:

- total amount of nitrogen in the manure, using standard values or results from sampling and analysis
- amount of crop-available nitrogen in the manure

You can find the values you need for these calculations in the blank field records and standard values tables.

Before you apply other organic manures, work out the total amount of nitrogen and crop-available nitrogen using the technical analyses supplied by the fertiliser supplier (for example, on the delivery note).

Where these technical analyses are unavailable, typical values may be obtained from other sources such as the Fertiliser Manual (RB209) or MANNER-NPK software. The Fertiliser Manual refers to the total amount of nitrogen as 'total nitrogen'. It refers to crop-available nitrogen as 'nitrogen available to the next crop'.

You can also use values from your own sampling and analysis.

You must not spread any organic manure unless you have used one of these methods to work out the crop-available nitrogen in the manure before applying it to crops that have an N-max limit.

Assess the risk of run-off before spreading

It's an offence to allow fertiliser or organic manure to enter surface water (such as rivers or ponds).

You must inspect the field to assess the risk of nitrogen getting into surface water (for example, through runoff) before you spread any fertilisers or organic manures.

In particular, when assessing the risk of runoff, you need to take account of:

- land that's sloping, especially if the slope is over 12 degrees
- ground cover provided by vegetation
- the distance to surface water
- weather conditions
- the soil type and condition
- the presence of land drains

Where you can't spread manufactured fertilisers or organic manures

You must not spread any manufactured fertilisers or organic manures if a field is either:

- waterlogged, flooded or covered in snow
- frozen for more than 12 hours in the previous 24 hours

You must not spread:

- manufactured nitrogen fertiliser within 2 metres of surface water
- organic manure within 50 metres of a spring, well or borehole or 10 metres of surface water

You must only spread manufactured nitrogen fertilisers and manures on agricultural land that you're using to grow crops (including grass).

You must spread manufactured nitrogen fertilisers and organic manures as accurately as possible.

Exceptions for precision spreading equipment for organic manures

You can spread slurry, sewage sludge and anaerobic digestate no less than 6 metres from surface water if you use precision manure spreading equipment like:

- band spreaders (trailing hose or trailing shoe)
- shallow injectors (that inject no more than 10cm below the surface)
- dribble-bar applicators

Exceptions for straw-based solid manure

You can spread straw-based solid manure (such as farmyard manure) within 10 metres of surface water on land that's notified as a site of special scientific interest or managed under an agri-environment scheme if you meet one of the following conditions:

- you're managing the land for breeding wader birds
- the land is designated as a 'species-rich semi-natural grassland'

You must only spread between 1 June and 31 October and not:

- directly into surface water
- more than 12.5 tonnes per hectare each year

Using manures with high readily available nitrogen

Some organic fertilisers have more than 30% of their total nitrogen content immediately available to crops. These are called 'high readily available nitrogen manures'.

They include:

- poultry manure (layer manure and litter)
- liquid organic manures (such as sludge, cattle and pig slurries and anaerobic digestate)

If you use sewage sludge or slurry on your holding, you need to follow the rules in this guidance and separate rules on managing sewage sludge, slurry and silage.

When you can't spread manures with high readily available nitrogen (closed periods)

You must not spread high readily available nitrogen manures on or between the dates shown in this table.

	On grassland	On tillage land
Sandy or shallow soils	1 Sep to 31 Dec	1 Aug to 31 Dec
All other soils	15 Oct to 31 Jan	1 Oct to 31 Jan

Your soil is sandy if it lies over sandstone or it has all the characteristics shown in this table:

Layer of soil	Up to 40cm	From 40cm to 80cm
Content of the soil	more than 50% by weight of particles from 0.06mm to 2mm in diameter	more than 70% by weight of particles from 0.06mm to 2mm in diameter
	less than 18% by weight of particles less than 0.02mm in diameter	less than 15% by weight of particles less than 0.02mm in diameter

	less than 5% by weight of organic carbon	less than 5% by weight of organic carbon

Your soil is shallow if it's less than 40cm deep

Exceptions for crops on sandy or shallow soils

If you sow a crop on sandy or shallow tillage land on or before 15 September, you can apply manures with high readily available nitrogen between 1 August and 15 September inclusive.

Exceptions for organic farms

If you're an organic farmer, or you're formally converting to organic status, you can spread manures with high readily available nitrogen in the periods shown in the table.

You must not spread more than 150kg of total nitrogen per hectare.

Crop	When you can spread nitrogen	Additional limits on spreading
Asparagus, overwintered salad onions, parsley, bulb onions	from the start of the closed period to the end of February	
Brassica	from the start of the closed period until harvest	no more than 50kg of nitrogen per hectare every 4 weeks
Winter oilseed rape	from the start of the closed period to the end of October	
Grass	from the start of the closed period to the end of October	no more than 40kg at any one time

Restrictions on applications outside the closed period

You must not spread more than 30 m^3/ha of slurry or 8 tonnes/ha of poultry manure in a single application from the end of the closed period until the end of February. You must allow at least 3 weeks between each individual application.

The poultry manure limit remains the same but the slurry limit has been reduced from 50 m^3 to 30 m^3.

Equipment for spreading slurry

You must only spread slurry using precision spreading equipment or equipment that either:

- has a low spreading trajectory (below 4 metres from the ground)

- spreads slurry at a maximum rate of no more than 1 millimetre per hour when operating continuously

Work organic manures into the soil after spreading

When you spread manure on bare soil or stubble (except if it's been sown with seed), you must:

- work poultry manure, slurry and liquid-digested sludge into the soil (for example, by ploughing) as soon as it's practically possible to do so and within 24 hours at the latest
- work any organic manure into the soil (unless it's been spread as mulch on sandy soil) as soon as possible and within 24 hours at the latest if the land is sloping and within 50 metres of surface water that could receive run-off from it

You don't have to work in slurry and liquid-digested sludge if you have applied it using a trailing hose, shoe band spreader, dribble bar applicator or an injector.

When you can't spread manufactured nitrogen fertilisers (closed periods)

You must not spread manufactured nitrogen fertiliser on or between the following dates (closed periods):

- from 15 September to 15 January on grassland
- from 1 September to 15 January on tillage land

Exceptions to the closed periods for manufactured nitrogen fertilisers

You can spread manufactured nitrogen fertiliser during the closed period if you grow the crops listed in the table and you keep to the limits and times shown.

If you grow crops that aren't listed in the table, you must have written advice from a FACTS-qualified adviser before you spread manufactured nitrogen fertilisers.

Crop	Maximum amount of nitrogen you can spread within the closed period on each hectare
Winter oilseed rape	30kg (you must not spread nitrogen after 31 October)
Asparagus	50kg
Brassica	100kg (no more than 50kg can be applied every 4 weeks, up to the date on which you harvest the crop)
Grass	80kg (you can apply a maximum of 40kg at any one time, and you must not spread nitrogen after 31 October)
Over-wintered	40kg

salad onions	
Parsley	40kg
Bulb onions	40kg

Exemptions for greenhouses and low-intensity farms

Greenhouses

You don't need to keep to limits on fertiliser use on land inside greenhouses, glasshouses and polytunnels where the land is enclosed for the whole calendar year. If land is exposed to the open air at any time (for example, if you uncover a polytunnel) the limits apply for the whole of that year.

You don't need to keep records of your use of nitrogen fertilisers or the yield of arable crops in a greenhouse.

Low-intensity farms

You're a low-intensity farmer if all of the following apply to you:

- at least 80% of your land is grassland
- you apply no more than 100kg of nitrogen per hectare per year as organic manure (including any nitrogen in manure deposited on the field by livestock)
- you spread no more than 90kg of nitrogen per hectare per year as manufactured fertiliser
- you don't bring any organic manure onto your holding

You don't have to keep a record of your actual applications of manufactured fertiliser and organic manure in each field. You must have recorded information to show that you meet the criteria for low-intensity farms. You must still plan your nitrogen use by keeping a fertilisation plan.

When calculating your fertiliser applications, you must not include any area of your holding where you don't spread any fertiliser or work the soil (for example, on rough grazing areas).

Keeping records

You must keep all records of your fertiliser use for at least 5 years.

Fertilisation plan

You must keep records of each step in your fertilisation plan for each field in which you use nitrogen fertiliser.

Step 1

Record the:

- name and area of the field to be planted
- type of crop to be grown
- month in which you plan to plant the crop
- soil type
- previous crop (if the previous crop was grass, record whether it was cut or grazed)
- amount of nitrogen from the soil that is likely to become available for uptake by the crop during the growing season (the soil nitrogen supply)