SILAGE DECISIONS FACTSHEET

APPLYING MANURE

Much of the nitrogen, phosphate and potash eaten by cattle in feed is subsequently excreted in dung and urine, so ends up in the slurry store or farmyard manure (FYM) heap. These manures contain appreciable amounts of plant nutrients and can be used to reduce expenditure on bag fertiliser. They also pose a potential risk of pollution through losses of nutrients to water or air. Management aimed at using plant nutrients in manures for crop production both saves on fertiliser and minimises the likelihood of causing pollution.

Amounts of nitrogen, phosphate and potash in manures
As for bag fertiliser, you need information about the concentration of nutrients in manures to be able to use them effectively. This is best done through analysis of a representative sample via a reputable lab. Alternatively, you can refer to typical or standard analyses for all different types of manure published in advisory literature (see *Managing Livestock Manures* booklets).

Typical cattle farm yard manure nutrient content (kg/t)

Dry matter (%)	Nitrogen (N)	Phosphate ($P_2 0_5$)	Potash ($K_2 0$)
25	6	3.5	8

However, the nitrogen available to the next crop will be lower and will depend on the timing of application and whether it is stored or fresh. For example, for fresh manure less than three months stored applied in January to medium heavy soil, only 15% will be available to the crop, giving an available application of 0.9kg/t in typical cattle manure (see *Managing Livestock Manures* booklet 2).

For cattle slurry, the main source of variation is dry matter. The more water added, such as rain from yards, the lower the concentration of nutrients, as illustrated for beef cattle slurry in the table below.

Typical total plant nutrient contents ($kg/m^{3)}$ of beef cattle slurry

Dry matter (%)	Nitrogen (N)	Phosphate ($P_2 0_5$)	Potash ($K_2 0$)
10	3.8	2.0	4.5
6	2.3	1.2	2.7
2	0.8	0.4	0.9

Minimising unnecessary dirty water collection ensures storage is reserved for high nutrient manures. Maximising storage can be especially relevant in NVZs because there maybe spreading restrictions (or “closed periods”) for slurry, even if it is very dilute, but not for dirty water.

Plant available nutrients.
Some of the nutrient within manure is present as inorganic (or plant available) compounds taken up by crops immediately, in the same way as nutrients in bag fertiliser. The rest is present as organic compounds that cannot be taken up by

plants. Over time, organic compounds are broken down in soil to release inorganic nutrients.

Calculating the proportion of nutrients in the inorganic form is easily done because percentage availabilities for nutrients in different types of manure are readily obtained from advisory literature.

The calculation is more complicated for nitrogen because, as well as being present in inorganic and organic compounds, it is easily lost from the soil. Nitrates from manures spread in autumn or winter can be lost through leaching to groundwater and drains, especially from sandy or shallow soils. This is why there is a closed period for spreading at this time of the year in NVZs.

Where feasible, spreading should be delayed till late winter/spring when nitrates are rapidly taken up by actively growing crops.

Nitrogen in manures is also lost as ammonia gas (NH_3) from livestock buildings, manure stores and from spreading on land. Options for conserving this manure nitrogen for crop uptake is to plough in, immediately after spreading to retain 90% of the available N in slurry and 6 hours to retain 50%. An alternative is to apply slurry via an injector or band spreading machine. Although the amount of N retained may not justify the extra cost, using these machines has other advantages on grassland. It has been shown, for example, that they enable spreading up to two weeks prior to cutting for silage or grazing with no adverse effects on silage fermentation or herbage intake.

Slurry dry matter has an effect on ammonia loss. Losses from dilute slurries are lower because they soak into the soil more rapidly than thicker slurries or FYM.

Unlike the case with phosphate and potash, the appropriate availability of manure nitrogen depends upon time of spreading, soil type and slurry dry matter content and can be obtained from advisory literature for all types of manure.

Using manures and fertilisers for crop production
The first step should be to establish the rate of fertiliser required to obtain the economically optimum yield for your crop (e.g. by referring to RB209). Next, using results of manure analysis or data from tables, work out how much available nitrogen, phosphate and potash is supplied from manure. Subtracting the amounts of nutrients supplied by manure from the crop fertiliser requirement then gives the amount of nitrogen, phosphate and potash to be provided by bag fertiliser – and illustrates the savings that can be made. Often, cattle slurry can be used to provide all the phosphate and potash for grass cut for silage so only straight N has to be purchased. Surplus phosphate and potash applied in the slurry can be used by subsequent cuts.

Further information Managing Livestock Manures, Booklets 1, 2 and 3, available free from ADAS Gleadthorpe, phone: 01623 844331 or online at www.defra.gov.uk Fertiliser Recommendations (RB209) The Stationery Office, PO Box 29, Norwich or online: www.defra.gov.uk/farm/environment/land-manage/nutrient/fert/rb209/intro.pdf

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