ORGANIC MANURE USE IN ARABLE SYSTEMS

To make the best use of manure and inorganic fertiliser N inputs, an integrated policy is required. The aim is to support up to 50-60% of the crops expected N requirement for optimum yield from the applied organic manure with inorganic fertiliser N used to "top up" crops needs. Failure to allow adequately for the full N values of manures not only costs money in terms of wasted fertiliser N but can compromise crop yields and quality e.g. through lodging in cereals, depressed sugar levels in beet, and reduced DM in potato tubers.

Fertiliser Value

- Fertiliser value of manures is influenced by manure type, DM content, application timing and technique, soil type and weather patterns.
- These factors will also influence N availability to the next crop grown.
- Cultivation using discs and tines is less likely to be effective than ploughing in minimising ammonia losses.

Soil mineral N

- When there is uncertainty about the level of residual mineral N present in the soil such as following long term manure use of where manures have been applied at unknown rates, sampling for soil mineral N (SMN) is recommended.
- SMN results will enable top up inorganic fertiliser N additions to be calculated for the next crop grown.

Phosphate and potash

- Manures are valuable sources of plant available P and K although short term availability can be lower than from water soluble P and K fertilisers.
- Where crop responses to P and K are expected or when responsive crops such as potatoes are grown, the available P and K content of the manure should be used to estimate manure P and K supply and any additional need for inorganic P and K fertiliser additions.
- Where P and K applications are for the maintenance of soil reserves, the total P and K content of the manure should be used. For most arable crops, typical manure application rates will supply all the P and K the crop needs.
- Over the crop rotation, manure P and K should be considered the same as inorganic P and K fertiliser in balance sheet calculations.
- At soil P index 3 or above, care is needed to ensure that the total phosphate inputs in organic manures do not exceed that removed in crops during the rotation.

Sulphur and Magnesium

- On S deficient soil types, generally sandy and shallow soils in areas of low S deposition, yield responses to S fertiliser additions are

becoming increasingly common in OSR and cereals.

- Manures supply useful quantities of S and Mg although there is limited data on availability to the next crop grown.
- For cattle slurry, 50% S availability has been measured in the season following application. The remaining organically bound S will slowly become available to the following crops.
- Mg inputs from manures should largely be regarded as contributing to the maintenance of soil reserves.

Soil conditioning benefits

- Livestock manures, particularly soil manures add useful amounts of organic matter to the soil, acting as a soil conditioner and structural improver.
- The water holding capacity and drought resistance of light and heavy soils can be increased, though the greatest benefits are likely on sandy soils.
- Increased structural stability can be important on sandy and silty soils, particularly where small seeded crops are grown and where soil erosion by wind and water is a problem.
- Biological activity of soils can be stimulated by manure additions and in some soils, earthworm numbers can be increased. Such improvements in soils physical and biological fertility are most likely to be achieved where regular manure applications are made.

Heavy metals

- Livestock manures contain heavy metals, which on certain soils, (e.g. copper deficient soils) can correct a trace element deficiency.
- In the majority of situations, soil heavy metal accumulation is a more important issue. Pig and poultry manures can contain elevated levels of zinc and copper, which in the long term – over 100 years – may lead to undesirably high soil levels.
- In situations where pig and poultry manures have been applied to land for a number of years and will continue to be applied, it is advisable to have the soils tested to determine current heavy metal status and to monitor build up periodically.

USE OF MANURES ON ARABLE CROPS

Winter cereals and Winter Oilseed Rape

- Commonly applied to stubbles prior to drilling winter cereals and OSR.
- Rapid incorporation within a few hours will minimise ammonia losses.
- To make best use of manure N and minimise N leaching losses, high available N manures should be applied in late winter or early spring.

- Band spreaders are now available which enable slurry to be top dressed from tramlines with precision and reduced ammonia emissions compared to conventional surface applications.

Spring Cereals and Spring oilseed rape.

- Manure applications before spring cereals and OSR should be make from January onwards to minimise nitrate leaching losses, particularly for high available N manures.
- Rapid incorporation will minimise ammonia losses.
- Slurries and poultry manures can also be top dressed following drilling.

Potatoes and sugar beet.

- Potatoes are a good crop on which to use the nutrients supplied by manures as the crop has high nutrient requirements.
- Particular care is needed for sugar beet as its nutrient requirements are modest.
- Manure management should be the same as for spring cereals.
- Excessive application rates, particularly of poultry manures should be avoided as this can depress tuber dry matter and in beet, root amino N levels can be increased depressing sugar yields.

Key messages.

- Know the nutrient content of applied manures.
- Apply manures evenly at known rates
- Rapidly incorporate manures, where appropriate or use an application technique that will minimise ammonia losses.
- Apply manures in spring where possible to reduce nitrate leaching losses.
- Take the nutrient supply from manures into account when calculating inorganic fertiliser additions.

Visit www.swarmhub.co.uk for more information on these issues.

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