

INCORPORATION OF POULTRY MANURE INTO GRASSLAND FARMING

Poultry manure is a highly valuable resource to be utilised within nutrient management planning on a farm. The high nutrient levels give the potential to offset the use of bagged fertiliser and provide significant financial savings. The addition of organic matter will also benefit the soil quality.

It is often more difficult to utilise in grassland farming systems that routinely receive other organic manures as these systems can have at or above target soil index of phosphorus already and therefore low P fertiliser requirements. The spreading scenarios overleaf highlight the low application rates required to meet the grassland phosphate requirement. Surface applications of poultry manure to grass also have a lower nitrogen use efficiency than applications that can be incorporated into the soil, reducing the value of the material.

High Nutrient Content

Relative to other manure types, poultry manure has high levels of both nitrogen and phosphorus. Careful management of application rates is required to ensure soil nutrient levels do not become too high and cause environmental pollution.

- The ratio of nitrogen to phosphorus (c. 1.2:1 – N:P) makes it difficult to use as an organic fertiliser – Nitrogen requirements are often higher than Phosphorus requirements. Utilising poultry manure to help meet the crop nitrogen or potassium requirement will often see an oversupply of phosphorus leading to high levels of phosphorus stored in the soil.
- The application of excess phosphorus can lead to significant environmental pollution. Phosphate enrichment of water courses results in eutrophication leading to excessive algae growth which impacts water quality and biodiversity.

Regulations controlling use

The Water Resources (Control of Agricultural Pollution) Regulations 2021 (CoAP) contains control measures for the use of poultry manure on farms. Some of the key measures are summarised below – further guidance should be sought to understand the full requirements and restrictions on the use of poultry manure.

- Restrictions on storage – required infrastructure and storage capacity;
- Restrictions on spreading – field slope, proximity to water courses and boreholes, weather and field conditions;
- Limit on application rates – limit of 250kg total N per individual hectare for a 12-month period from organic manures;
- Poultry manure has a high (>30%) Readily Available Nitrogen (RAN) content – additional restrictions on its use therefore include: winter closed periods for spreading; application limit of 8t/ha until end of February; incorporation of manure into soil within 24 hours if applied to bare ground or stubble.

Ammonia Emissions

The high concentration of urea and ammonium within poultry manure means there is a risk of high levels of ammonia emissions if it is not handled correctly. Emissions of ammonia when mixed with other gases, such as nitrogen oxides and sulphur dioxide, form Particulate Matter (PM) which is an air pollutant which can have major human health implications.



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Pathogens

Poultry manure can have particularly high levels of pathogens, such as Salmonella and Campylobacter. Grazing is not recommended within 8 weeks of the application of poultry manure (fresh, stored or composted) or until visible signs of the manure have gone to minimise disease transfer risk. Applications should also not be made to silage land within a time where manure residues will still be present on the grass at the time of cutting.

Management options for grassland farms:

- Have your manure tested and use this to develop a phosphate budget for the farm – for many grassland systems, manures will be the only source of phosphate required.
- Select appropriate fields for the applications as part of your NMP – fields at or below the target P index will be able to receive more manure.
- If planned manure applications will exceed grass P requirement for that season, ensure the field has a P ‘Holiday’ next season with no phosphate application. A system of rotating fields receiving manure could be the best option if small annual application rates are hard to accurately achieve.
- Look at incorporating the manure within reseeding – this will allow the material to be incorporated into the soil for better nitrogen utilisation. Introduce a cereal crop as part of the re-seed. A spring cereal with an autumn re-seed can potentially allow two applications of poultry manure in one season.
- Ensure the material is as dry as possible to improve handling and ensure more accurate applications.
- Understand the nutrient and financial value of the manure and look to set up local contracts for exporting to other farms.

Nutrient Content & Financial Value – Book values taken from section 2 of the AHDB RB209

– Organic Materials

Dry Matter (%)	Nitrogen			Phosphate			Potash			Total Sulphur (kg SO ₃ /t)	Total Magnesium (kg MgO/t)
	Total Nitrogen (kg N/t)	Crop-available N*	£ / tonne	Total Phosphate (kg P ₂ O ₅ /t)	Available Phosphate (kg P ₂ O ₅ /t)	£ / tonne**	Total Potash (kg K ₂ O/t)	Available Potash (kg K ₂ O/t)	£ / tonne**		
20	9.4	3.76	3.65	8.0	4.8	4.70	8.5	7.7	4.70	3.0	2.7
40	19.0	7.6	7.37	12.0	7.2	7.06	15	14	8.54	5.6	4.3
60	28.0	11.2	10.86	17.0	10.2	10.00	21	19.9	11.59	8.2	5.9
80	37.0	14.8	14.36	21.0	12.6	12.35	27	24	14.64	11	7.5

*Nitrogen efficiency of 40% if material is applied in spring and incorporated into soil within 24 hours of application

** Value if applied to soil at P index 2 and K index 2

Spreading Scenarios – Created using Manner NPK

The following scenarios are based on the values of the 40% Dry Matter Poultry Manure provided in the table above. The manure is applied to medium clay loam soils in an area with 1553mm annual average rainfall. The same application rate is used for each scenario to highlight how incorporating the manure can improve nitrogen use efficiency.



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Application 1 – Spring application of poultry manure after spring grazing prior to grass growth for a first silage cut.

Application date	01/04/2024
Application rate (t/ha)	5
Application method	Broadcast spreader – Surface applied – not incorporated

Nutrients applied

		Nitrogen losses (kg/ha)			Crop-available N (kg/ha)			
Total N (kg/ha)	Mineralised N (kg/ha)	Nitrate-N	Ammonia-N	Denitrified-N	Current Grass Crop	Next Grass Crop – Current Year	Following Crop year 2	N Use Efficiency
95	2	0	26	2	24	16	4	42

Total P ₂ O ₅ (kg/ha)	Available P ₂ O ₅ (kg/ha)	Total K ₂ O (kg/ha)	Available K ₂ O (kg/ha)	Total SO ₃ (kg/ha)	Total MgO (kg/ha)
60	36	75	68	28	22

Financial Value

Crop available N (£/ha)	Total P ₂ O ₅ (£/ha)	Total K ₂ O (£/ha)	Total (£/ha)
£39	£59	£46	£143



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Application 2 – Spring application of poultry manure prior to establishment of spring barley.

Application date	05/05/2024
Application rate (t/ha)	5
Application method	Broadcast spreader – Ploughed in within 4–6 hours

Nutrients applied

		Nitrogen losses (kg/ha)			Crop Available N (kg/ha)		
Total N (kg/ha)	Mineralised N (kg/ha)	Nitrate-N	Ammonia-N	Denitrified-N	Current Crop	Following Crop year 2	N Use Efficiency
95	11	0	4	4	53	4	56

Total P ₂ O ₅ (kg/ha)	Available P ₂ O ₅ (kg/ha)	Total K ₂ O (kg/ha)	Available K ₂ O (kg/ha)	Total SO ₃ (kg/ha)	Total MgO (kg/ha)
60	36	75	68	15	14

Financial Value

Crop-available N (£/ha)	Total P ₂ O ₅ (£/ha)	Total K ₂ O (£/ha)	Total (£/ha)
£51	£59	£46	£156



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