Farm Nutrient Management Scheme (Northern Ireland) 2005

Farm Nutrient Production and Storage Workbook FNMS 4

Department of
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Farm Nutrient Production And Storage Workbook

This workbook has been designed to assist applicants estimate the volumes of slurry and dirty water produced, existing storage capacity and additional storage capacity required to comply with the requirements of the Scheme.

All dirty water must be collected. Farmers are therefore advised to minimise production of dirty water. Storage of dirty water in separate tanks will help maximise slurry storage capacity.

Applicants are advised to use this workbook to make maximum use of funding available under this Scheme.

Farm Nutrient Production and Storage Workbook

These worksheets are for your own use. Do not return them with your application form.

Complete these worksheets to help you **estimate** your existing slurry and manure storage capacity and the amount of additional storage capacity required to comply with the requirements of the Farm Nutrient Management Scheme (Northern Ireland) 2005.

'dirty water' means a low dry matter waste made up of water contaminated by manure, urine, effluent, milk and cleaning materials; it should have a Biochemical Oxygen Demand (BOD) no greater than 2,000 mg/litre; dirty water that is stored together with livestock manure is classified as livestock manure and rules applicable to livestock manure shall apply;

'farmyard manure' means a mixture of bedding material and animal excreta in solid form arising from the housing of cattle, sheep and other livestock excluding poultry;

'slurry' means (a) excreta produced by livestock whilst in a yard or building or (b) a mixture consisting wholly or mainly of such excreta, bedding, rainwater and washings from a building or yard used by livestock or any combination of these, of a consistency that allows it to be pumped or discharged by gravity at any stage in the handling process; it excludes dirty water;

All dirty water must be collected. Farmers should provide sufficient dirty water storage capacity to enable them to spread dirty water in accordance with the Codes of Good Agricultural Practice for the Prevention of Pollution of Water and the Nitrates Directive Action Programme (2005).

The minimum slurry storage requirement for cattle and sheep enterprises is 22 weeks. This is calculated using actual animal numbers. Where sheep are housed, the storage capacity required will be determined by the actual housing period.

The minimum slurry storage requirement for pig and poultry enterprises is 26 weeks. This is calculated using actual numbers of pigs and poultry.

As conditions vary widely on farms your knowledge of your farm will help you to determine actual storage requirements.

You must be able to demonstrate that you have a minimum of 22 weeks (26 weeks for pig and poultry enterprises) slurry storage for all animals kept on the farm during the storage period (where sheep are housed, the storage capacity required will be determined by the actual housing period), and a minimum of 26 weeks storage for poultry litter and 22 weeks storage capacity for spent mushroom compost when works grant-aided under the Farm Nutrient Management Scheme (Northern Ireland) 2005 have been completed.

Livestock numbers on the farm during the winter storage period

Table 1a Cattle and sheep

Please enter the numbers of various cattle and sheep (excluding out-wintered sheep) **kept on the farm** on the 1st day of each month during the winter storage period in the table below. The figures for each month are then totalled, and the total divided by 5 (number of months in the winter storage period) to calculate average cattle and sheep numbers on the farm during the winter period.

Livestock Type		01 Oct a	01 Nov b	01 Dec c	01 Jan d	01 Feb e	Total a+b+c+d+e	Average no. of livestock =Total ÷5
Cattle								
Dairy cow	550kg							
Suckler Cow	500kg							
Cattle > 2 years	500kg							
Cattle 1– 2years	400kg							
Cattle 0.5–1 years	180kg							
Calf	100kg							
Sheep								
Adult ewe	65kg							
Fattening Lamb	35kg							

Table 1b Pigs and Poultry

Please enter the numbers of pigs and poultry **kept on the farm** on the 1st day of each month during the winter storage period in the table below. The figures for each month are then totalled, and the total divided by 6 (number of months in the winter storage period) to calculate average pig and poultry numbers on the farm during the winter period.

Livestock Type		01 Sep f	01 Oct g	01 Nov h	01 Dec i	01 Jan j	01 Feb k	Total f+g+h +i+j+k	Average no. of livestock =Total ÷6
Pigs									
Gilt	90–130kg								
1 Sow & litter	130–225kg								
1 Weaner (Stage 1)	7–18kg								
1 Grower (Stage 2)	18–35kg								
1 Finisher meal fed (Stage 3)	35–105kg								
1 Finisher liquid fed (Stage 3)	35–105kg								
Poultry									
1000 laying hens									

Part 1 Estimating Slurry and Dirty Water Production and Storage

Table 1 Calculate the volume of undiluted slurry produced per week by cattle, sheep, pigs and poultry

Type of livestock		Slurry produced per animal per week (m^3)(i)		Average number of livestock on farm during the winter storage period (ii)		Volume of slurry produced per week (m^3)
Cattle		**V**	**x**	**No.**	**=**	**Answer = V x No.**
Dairy cow	550kg	0.37	x		=	
Suckler Cow	500kg	0.23	x		=	
Cattle > 2 years	500kg	0.23	x		=	
Cattle 1 – 2 years	400kg	0.18	x		=	
Cattle 0.5 – 1 years	180kg	0.09	x		=	
Calf	100kg	0.05	x		=	
Sheep (only include numbers of housed sheep)						
Adult ewe	65kg	0.03	x		=	
Fattening Lamb	35kg	0.01	x		=	
Total undiluted cattle and sheep slurry production per week					=	_____ m^3 **(A)**
Pigs		**V**	**x**	**No.**	**=**	**Answer = V x No.**
Gilt	90–130kg	0.05	x		=	
1 Sow & litter	130–225kg	0.08	x		=	
1 Weaner (Stage 1)	7–18kg	0.01	x		=	
1 Grower (Stage 2)	18–35kg	0.02	x		=	
1 Finisher meal fed (Stage 3)	35–105kg	0.03	x		=	
1 Finisher liquid fed (Stage 3)	35–105kg	0.05	x		=	
Poultry		**V**	**x**	**No.**	**=**	**Answer = V x No.**
1000 laying hens		0.81	x		=	
Total undiluted pig and poultry slurry production per week					=	_____m^3 **(B)**

(i) The standard figures for slurry produced by animals do not include water for cleaning buildings.

(ii) Please use the livestock numbers calculated in Tables 1a and 1b.

Table 2 Calculate the volume of rainfall falling on yards where slurry is produced and the volume of rainfall entering unroofed slurry tanks per week

Enter volumes of dirty water produced in the relevant column of the table below.
Enter cattle/sheep areas in the grey column and pig/poultry areas in the green column.

Area	Description	Length l (m)	Breadth b (m)	Rainfall/ week r (m)[(i)]	Volume for existing cattle/sheep facilities (l x b x r) (m^3)	Volume for existing pigs/poultry facilities (l x b x r) (m^3)
Rainfall falling on unroofed yards where slurry is produced						
1				0.025		
2				0.025		
3				0.025		
4				0.025		
5				0.025		
6				0.025		
7				0.025		
8				0.025		
9				0.025		
10				0.025		
Rainfall entering unroofed rectangular tanks, unroofed middens and earth bank lagoons						
1				0.025		
2				0.025		
3				0.025		
4				0.025		
5				0.025		
6				0.025		
7				0.025		
8				0.025		
9				0.025		
10				0.025		
Rainfall entering unroofed above ground circular stores						
Tank	Description	Radius *rad* (m)	Area a (m^2) (3.14 x *rad* x *rad*)	Rainfall/ week r (m)	Volume for existing cattle/sheep facilities = a x r	Volume for existing pigs/poultry facilities = a x r
1				0.025		
2				0.025		
3				0.025		
4				0.025		
5				0.025		
6				0.025		
Total volume of rainfall collected as slurry per week					**_____ m^3 (C)**	**_____ m^3 (D)**

(i) Rainfall/week is the Northern Ireland average over the winter months (October – March).

Total cattle and sheep slurry production per week using existing facilities
= (A)_____ + (C)_____ = _____m^3 (E)

Total pig and poultry slurry production per week using existing facilities
= (B)_____ + (D)_____ = _____m^3 (F)

Table 3 Calculate the volume of dirty water produced per week

Area	Description	Length l (m)	Breadth b (m)	Rainfall/ week r (m)	Volume for existing cattle/sheep facilities (l x b x r) (m^3)	Volume for existing pigs/poultry facilities (l x b x r) (m^3)
Water from clean yards and roofs entering tanks						
1				0.025		
2				0.025		
3				0.025		
4				0.025		
5				0.025		
6				0.025		
7				0.025		
8				0.025		
9				0.025		
10				0.025		
Other yard water, surface run-off from open silos and washings						
1				0.025		
2				0.025		
3				0.025		
4				0.025		
5				0.025		
6				0.025		
7				0.025		
8				0.025		
9				0.025		
10				0.025		
Dairy parlour washings (m^3) (i)		No. of cows: _____		x 0.13		
Building washings – poultry (ii)		No. of batches: _____ x	Floor area (m^2) _____	x 0.007		
Building washings – pigs (iii)		No. of pigs moved out of pens per week _____		x 0.002		
Building washings – cattle (iv) (excludes parlour washings)		Insert actual volume of water used				
Building washings – sheep (iv)		Insert actual volume of water used				
Total volume of dirty water produced per week					**_____ m^3 (G)**	**_____ m^3 (H)**

(i) For quantity of dairy parlour washings use 0.13m^3 per cow per week. If your milking plant is significantly different use the actual amount.

(ii) For poultry house washings use 6.8 litres (0.007m^3) per m^2 per batch. If your washing system is significantly different use your own actual figures.

(iii) For pig house washings use 1.8 litres (0.002m^3) per pig moved out of pens. If your washing system is significantly different use your own actual figures.

(iv) For cattle and sheep house washings use your own actual figures.

Total volume of slurry and dirty water produced per week by cattle and sheep using existing facilities
= (E) (from p6) _____ + (G)_____= _____ m^3 (I)

Total volume of slurry and dirty water produced per week by pigs and poultry using existing facilities
= (F) (from p6) _____ + (H) _____ = _____ m^3 (J)

Table 4 Calculate the storage capacity of rectangular tanks and concrete lagoons

Tank	Description	Length l (m)	Breadth b (m)	Adjusted Depth d (m) (Depth – freeboard)(i)	Volume of existing facilities for cattle/ sheep slurry (l x b x d) (m^3)	Volume of existing facilities for pig/ poultry slurry (l x b x d) (m^3)
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
Total capacity of rectangular tanks and concrete lagoons					_____m^3 (K)	_____m^3 (L)

Table 5 Calculate the storage capacity of earth bank lagoons used for slurry storage

Lagoon	Description	Average Length l (m)	Average Breadth b (m)	Adjusted Depth d (m) (Depth – freeboard)(i)	Volume of existing facilities for cattle/ sheep slurry (l x b x d) (m^3)	Volume of existing facilities for pig/ poultry slurry (l x b x d) (m^3)
1						
2						
3						
4						
5						
Total capacity of earth bank lagoons					_____m^3 (M)	_____m^3 (N)

Table 6 Calculate the storage capacity of above ground circular stores

Tank	Description	Radius *rad* (m)	Adjusted height h (m) (Height – freeboard)(i)	Volume of existing facilities for cattle/sheep slurry (3.14 x *rad* x *rad* x h) (m^3)	Volume of existing facilities for pig/ poultry slurry (3.14 x *rad* x *rad* x h) (m^3)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
Total capacity of above ground circular stores				_____m^3 (O)	_____m^3 (P)

(i) Freeboard is the term given to the unfilled depth (safety margin) at the top of a slurry or effluent tank or compound. Freeboard allowances are 750mm for earth bank lagoons and 300mm for all other structures. Freeboard is not a legal requirement for structures which are exempt under the SSAFO Regulations (structures completed before 1st December 2003). It is, however, considered best management practice to adhere to freeboard requirements in all structures.

Calculate weeks slurry and dirty water storage capacity for cattle and sheep

(K)_____ + (M) _____ + (O) _____ = Existing total tank capacity _____ m³ (Q)

Existing total tank capacity for cattle and sheep	÷	Total slurry and dirty water production per week by cattle and sheep	=	Existing weeks storage capacity
_____ m³ (Q)		_____ m³ (I from page 7)		_____ weeks (R)

How much additional storage capacity is needed for cattle and sheep?

Weeks of storage capacity required (minimum 22 weeks)		=	_____ (S)
Extra weeks storage capacity required	(S)_____ – (R)_____	=	_____ (T)
Extra storage capacity required	(T)_____ x (I)_____	=	_____ m³

Calculate weeks slurry and dirty water storage capacity for pigs and poultry

(L)_____ + (N) _____ + (P) _____ = Existing total tank capacity _____ m³ (U)

Existing total tank capacity for pigs and poultry	÷	Total slurry and dirty water production per week by pigs and poultry	=	Existing weeks storage capacity
_____ m³ (U)		_____ m³ (J from page 7)		_____ weeks (V)

How much additional storage capacity is needed for pigs and poultry?

Weeks of storage capacity required (minimum 26 weeks)		=	_____ (W)
Extra weeks storage capacity required	(W)_____ – (V)_____	=	_____ (X)
Extra storage capacity required	(X)_____ x (J)_____	=	_____ m³

Assuming livestock numbers remain unchanged, the required weeks of storage can be achieved by either:

1. Reducing the quantity of slurry produced or;
2. Reducing the volume of rainfall collected in slurry tanks or;
3. Providing additional slurry storage facilities or;
4. Providing additional dirty water storage facilities or;
5. A combination of some or all of the above measures.

Part 2 Estimating Solid Manure Production and Storage

(Only complete if you are considering the construction of either a new midden(s) or roofing an existing midden(s)).

Table 7 Calculate volume of farmyard manure/poultry manure/spent mushroom compost produced per week

Type of livestock	Straw used per week (tonnes) [i] *st*	Manure produced per week (tonnes) *m*	Volume of FYM produced per week (m^3) *v*	Average number of livestock on farm during the winter period [ii] *no.*	Volume solid manure produced per week (m^3) *v x no.*
Cattle and Sheep (only include housed sheep)					
Dairy cow – 550kg	0.02	0.37	0.52		
Suckler cow	0.02	0.23	0.38		
Cattle > 2 years	0.02	0.23	0.38		
Cattle 1 – 2 years	0.02	0.18	0.33		
Cattle 0.5 – 1 years	0.02	0.09	0.24		
Calves	Estimated volume of FYM produced (m^3)				
Calving pens	Estimated volume of FYM produced (m^3)				
Sheep housing	Estimated volume of FYM produced (m^3)				
Lambing pens	Estimated volume of FYM produced (m^3)				
Breeding horses	Estimated volume of FYM produced (m^3)				
Other	Estimated volume of FYM produced (m^3)				
Other	Estimated volume of FYM produced (m^3)				
Pigs					
Sows	Actual volume of FYM produced (m^3)				
Other	Actual volume of FYM produced (m^3)				
Total farmyard manure production per week					_____ **m^3 (1)**

Poultry Manure	*v*	*no.*	*v x no.*
1000 broilers & litter	0.41		
1000 broiler breeders	1.38		
1000 replacement pullets	0.39		
1000 turkeys (male) & litter	1.10		
1000 turkeys (female) & litter	0.53		
1000 ducks	2.02		
Other	Estimated volume produced (m^3)		
Other	Estimated volume produced (m^3)		
Total poultry manure production per week			_____ **m^3 (2)**

Spent Mushroom Compost			
Average quantity of compost (Phase 2, 2.5 or 3) purchased per week (tonnes) [iii]	_____ x 2.35	=	m^3
Total spent mushroom compost production per week			_____ **m^3 (3)**

(i) Please adjust figures if additional bedding material is used.

To calculate volume of FYM produced per week please use the following formula:

(st x 7.5) + m = Volume of FYM produced per week (v)

(ii) Please use the livestock numbers calculated in Tables 1a and 1b. Do not include livestock wintered on a slurry system.

(iii) Assumes that weight of compost purchased is equal to the weight of spent mushroom compost.

Table 8 Capacity of existing middens

Enter cattle/sheep/pig middens in the grey column, poultry middens in the dark green column and spent mushroom compost in the light green column

Midden No.	Location	Length l (m)	Breadth b (m)	Depth d (m)	Volume of existing facilities for farmyard manure (l x b x d) (m^3)	Volume of existing facilities for poultry manure/spent mushroom compost (l x b x d) (m^3)	
						Poultry	Mushroom
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
Total capacity of middens					_____m^3 (4)	_____m^3 (5)	_____m^3 (6)

Calculate weeks storage capacity of existing cattle/sheep/pig farmyard manure middens

Total capacity of existing middens	÷	Volume of farmyard manure produced per week	=	Existing weeks storage capacity
_____ m^3 (4)		_____ m^3 (1 from page 10)		_____ weeks (7)

How much additional farmyard manure storage capacity is needed?

Weeks of storage required		=	_____ (8)
Extra weeks storage required	(8)_____ – (7)_____	=	_____ (9)
Extra storage capacity required	(9)_____ x (1)_____	=	_____ m^3

Calculate weeks storage capacity of existing poultry manure middens

NB. Minimum of 26 weeks storage capacity required for poultry manure

Total capacity of existing middens	÷	Volume of manure produced per week	=	Existing weeks storage capacity
_____ m^3 (5)		_____ m^3 (2 from page 10)		_____ weeks (10)

How much additional storage capacity is needed for poultry manure?

Weeks of storage required (minimum 26 weeks)		=	_____ (11)
Extra weeks storage required	(11)_____ – (10)_____	=	_____ (12)
Extra storage capacity required	(12)_____ x (2)_____	=	_____ m^3

Calculate weeks storage capacity of existing spent mushroom compost middens
NB. Minimum of 22 weeks storage capacity required for spent mushroom compost

Total capacity of existing middens	÷	Volume of spent compost produced per week	=	Existing weeks storage capacity
_____ m³ (6)		_____ m³ (3 from page 10)		_____ weeks (13)

How much additional storage capacity is needed for spent mushroom compost?

Weeks of storage required (minimum 22 weeks)			=	_____ (14)
Extra weeks storage required	(14)_____	– (13)_____	=	_____ (15)
Extra storage capacity required	(15)_____	x (3)_____	=	_____ m³

Assuming livestock numbers and housing patterns remain unchanged, the required weeks of storage can be achieved by either:

1. Providing additional storage facilities or
2. Reducing the quantity of manure produced or
3. A combination of both.

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