



*Our aim is to protect, conserve and  
promote the natural and built  
environment for the benefit of present  
and future generations.*

Environment & Heritage Service  
Klondyke Building  
Cromac Avenue  
Gasworks Business Park  
Lower Ormeau Road  
Belfast BT7 2JA

[www.ehsni.gov.uk](http://www.ehsni.gov.uk)

**ISBN 978 1 85527 984 1**  
© Copyright 2007



An Agency within the Department of the  
**Environment**  
[www.doeni.gov.uk](http://www.doeni.gov.uk)



INVESTOR IN PEOPLE

# Guidance Workbook

For Northern Ireland Farmers on the Requirements of the  
Nitrates Action Programme (Northern Ireland)  
Regulations 2006 and the Phosphorus  
(Use in Agriculture) (Northern Ireland) Regulations 2006



Department of  
**Agriculture and  
Rural Development**  
[www.dardni.gov.uk](http://www.dardni.gov.uk)



**Environment &  
Heritage Service**  
[www.ehsni.gov.uk](http://www.ehsni.gov.uk)

Copies of this document can be made available on request in alternative formats, for example, in large print, Braille disc, audio cassette and other languages. If you wish to request the document in an alternative format contact details are provided in Annex T, page 97 in Guidance Booklet.

<b>Contents</b>	<b>Page</b>
<b>Part 1</b>	
<b>Calculating Livestock Manure Nitrogen Loading</b>	<b>3</b>
<b>Part 2</b>	
<b>Calculating the Amount of Nitrogen Applied to Grassland</b>	<b>18</b>
<b>Part 3</b>	
<b>Calculating the Amount of Nitrogen Applied to Crops other than Grass</b>	<b>22</b>
<b>Part 4</b>	
<b>Calculating Phosphorus Applications</b>	<b>26</b>
<b>Part 5</b>	
<b>Calculating Livestock Manure Storage</b>	<b>31</b>

**Please note:**

It is not a requirement to calculate the various limits such as the livestock manure nitrogen loading, chemical nitrogen and chemical phosphorus application rates and the number of weeks storage capacity on farm but without doing so, farmers may be unaware of their position and may be in breach of the Regulations. For further information refer to Guidance Booklet.



## Part 1

# Calculating Livestock Manure Nitrogen (N) Loading

**Refer to 1.5.4, page 17, for guidance and Annex P, page 47 for a completed example in the Guidance Booklet.**

To calculate the livestock manure nitrogen loading for your farm using this workbook:

- Complete the relevant worksheets in Section 1- Livestock Manure Nitrogen Worksheets.
- Transfer the relevant figures from Section 1 to Section 2 as directed.
- Complete Section 2 – Livestock Manure Nitrogen Loading Calculation.

Alternatively, you can access the 'Livestock Manure Nitrogen Loading Calculator' at [www.ruralni.gov.uk](http://www.ruralni.gov.uk).



## Part 1: Calculating Livestock Manure Nitrogen (N) Loading

### Section 1 - Livestock manure nitrogen worksheets

**Worksheet A - Livestock manure N produced by dairy cattle.** (Only complete this table if you keep these livestock).

1. Enter the number of dairy cattle on the farm on the first day of each alternate month.
2. Total each month and then divide by 6 or 3 as shown to determine the average per year. (Calves are divided by 3 as these livestock categories are only for a half year period).<sup>1</sup>
3. Multiply the average number by the N produced per head per year.
4. Total the N produced per year and insert in Box A. **Transfer your answer to Box A on page 16.**

Livestock Type	1 Feb	1 Apr	1 Jun	1 Aug	1 Oct	1 Dec	Total per year	Average per year =Total÷6	X	N produced/head/year (kg N)	=	N produced (kg N/year)	
<b>Dairy cattle</b>								÷ 6	No.	X	N	=	Answer
Dairy cows								÷ 6		X	91	=	
Dairy heifer (over 2 years)								÷ 6		X	54	=	
Dairy heifer (1-2 years)								÷ 6		X	47	=	
Breeding bull								÷ 6		X	54	=	
Dairy cattle <sup>1</sup> (0-1 year)								÷ 6		X	19	=	
Heifer calves <sup>1</sup> (6-12 months)								÷ 3		X	12	=	
Heifer calves <sup>1</sup> (0-6 months)								÷ 3		X	7	=	
<b>Total livestock manure nitrogen produced by dairy cattle (kg N/year)</b>												<b>A</b>	

<sup>1</sup> If keeping calves for part year use either 0-6 or 6-12 month categories.

### Part 1: Calculating Livestock Manure Nitrogen (N) Loading

**Worksheet B - Livestock manure N produced by beef cattle and sheep.** (Only complete this table if you keep these livestock).

1. Enter the number of beef cattle and/or sheep on the farm on the first day of each alternate month.
2. Total each month and then divide by 6 or 3 as shown to determine the average number per year. (Calves and lambs are divided by 3 as these livestock categories are only for a half year period).<sup>1</sup>
3. Multiply the average number per year by the N produced per head per year.
4. Total the N produced per year and insert in Box B. **Transfer your answer to Box B on page 16.**

Livestock Type	1 Feb	1 Apr	1 Jun	1 Aug	1 Oct	1 Dec	Total per year	Average per year =Total÷6	X	N produced/head/year (kg N)	=	N produced (kg N/year)
<b>Beef cattle</b>								÷ 6	No.	X	=	<b>Answer</b>
Suckler cows								÷ 6		X	=	54
Cattle (over 2 years)								÷ 6		X	=	54
Cattle (1-2 years)								÷ 6		X	=	47
Breeding bull								÷ 6		X	=	54
Bull beef <sup>1</sup> (0-13 months)								÷ 6		X	=	30
Beef cattle <sup>1</sup> (0-1 year)								÷ 6		X	=	19
Bull beef <sup>1</sup> (6-13 months)								÷ 3		X	=	23
Calves <sup>1</sup> (6-12 months)								÷ 3		X	=	12
Calves <sup>1</sup> (0-6 months)								÷ 3		X	=	7

Livestock type	1 Feb	1 Apr	1 Jun	1 Aug	1 Oct	1 Dec	Total per year	÷ 6	Average per year = Total ÷ 6	X	N produced/ head/year (kg N)	=	N produced (kg N/year)
<b>Sheep</b>								÷ 6	No.	X	N	=	Answer
Ewe (over 1 year)								÷ 6		X	9	=	
Ram (over 1 year)								÷ 6		X	9	=	
Lamb <sup>1</sup> (0-1 year)								÷ 6		X	4.4	=	
Lamb <sup>1</sup> (6-12 months)								÷ 3		X	3.2	=	
Lamb <sup>1</sup> (0-6 months)								÷ 3		X	1.2	=	
<b>Total livestock manure nitrogen produced by cattle and sheep (kg N/year)</b>													<b>B</b>

<sup>1</sup> If keeping calves/lambs for part year use either 0-6 or 6-12 month categories.



\* Select the Nitrogen figure depending on the weaning age and approximate sale weight of pigs on your unit.

	Approximate Sale weight	N Produced/head (kg N)
Weaned at 3-4 weeks	18kg (7½ weeks)	0.26
	35kg (11 weeks)	0.71
	105kg (23 weeks)	3.40
Weaned at 7 weeks	35kg (11 weeks)	0.46
	105kg (23 weeks)	3.15

**Example:**

Select 3.40 (kg N) if the weaning age is four weeks and approximate sale weight is 105kg.

**Growing and Finishing Farms only – select the weight range for your finishing system**

Livestock type	Growing and Finishing Farms Only												N produced/ head/year (kg N)	N produced (kg N/year)		
	1 Feb	1 Apr	1 Jun	1 Aug	1 Oct	1 Dec	Total per year	Average per year =Total÷6	X	N	=	Answer				
<b>Pigs</b>								No.								
18kg - 35kg							+ 6			X			0.46	=		
18kg - 105kg							+ 6			X			3.15	=		
35kg - 105kg							+ 6			X			2.69	=		
<b>Total livestock manure nitrogen produced by pigs (kg N/year)</b>														<b>C</b>		

## Part 1: Calculating Livestock Manure Nitrogen (N) Loading

**Worksheet D: Livestock manure N produced by poultry per year.** (Only complete if you keep poultry).

1. Depending on the poultry type, enter either the number on your farm throughout the calendar year or the capacity of the unit.
2. Multiply the number of birds by the N produced per 1000 birds.
3. Total the N produced by poultry per year and insert in Box D. **Transfer your answer to Box D on page 16.**

Livestock type	No. of birds produced per year		N produced/1000 birds (kg N)	N produced (kg N/year)
<b>Poultry</b>	<b>No.</b>	<b>X</b>	<b>N</b>	<b>= Answer</b>
Broilers (1000's) <sup>3</sup>		X	38.6	=
Male turkeys (1000's) <sup>4</sup>		X	611	=
Female turkeys (1000's) <sup>5</sup>		X	363	=
Fattening ducks (1000's) <sup>6</sup>		X	139	=

Livestock Type	Unit capacity (No. of birds)	No. weeks occupancy per	N produced/1000 birds per week	N produced (kg N/year)
<b>Poultry</b>	<b>No.</b>	<b>No.</b>	<b>N</b>	<b>= Answer</b>
Broiler breeders <sup>7</sup> (1000s) 0-18 wks	X		5.9	=
Broiler breeders <sup>8</sup> (1000s) 18-60 wks	X		20.8	=
Broiler breeders <sup>9</sup> (1000s) 0-60 wks	X		18.6	=
Pullets (1000s) <sup>10</sup>	X		5.7	=
Layers (1000s) <sup>11</sup>	X		11.7	=
<b>Total livestock manure nitrogen produced by poultry (kg N/year)</b>				<b>= D</b>

- 3 Broilers (1000), data based on 255kg N/year, output per 6.6 crops/year, 40 day cycle (73% occupancy).**
- 4 Male turkeys (1000), data based on 1284kg N/year, output per 2.1 crops/year, 140 day cycle (80% occupancy).**
- 5 Female turkeys (1000), data based on 871kg N/year, output per 2.4 crops/year, 120 day cycle (80% occupancy).**
- 6 Fattening ducks (1000), data based on 834kg N/year, output per 6 crops, 50 day cycle (85% occupancy).**
- 7 Broiler breeders (1000), 0 – 18 weeks data based on 142kg N/year, output per 18 week cycle (46% occupancy).**
- 8 Broiler breeders (1000), 18 – 60 weeks data based on 945kg N/year, output per 42 week cycle (87.5% occupancy).**
- 9 Broiler breeders (1000), 0 – 60 weeks data based on 878kg N/year, output per 60 week cycle (91% occupancy).**
- 10 Pullets (1000), data based on 113kg N/year, output per 17 week cycle (38% occupancy).**
- 11 Layers (1000), data based on 607kg N/year, (98% occupancy).**



## Part 1: Calculating Livestock Manure Nitrogen (N) Loading

**Worksheet E – Livestock manure N produced by deer and goats per year.** (Only complete if you keep these livestock).

1. Enter the number of deer and/or goats on the farm on the first day of each alternate month.
2. Total each month and then divide by 6 to determine the average number per year.
3. Multiply the average number per year by the N produced per head per year.
4. Total the N produced per year and insert in Box E. **Transfer your answer to Box E in on page 16.**

Livestock type	1 Feb	1 Apr	1 Jun	1 Aug	1 Oct	1 Dec	Total per year	Average per year =Total÷6	N produced/ head/year (kg N)	N produced (kg N/year)
<b>Deer</b>							÷ 6	<b>No.</b>	<b>N</b>	<b>=</b> <b>Answer</b>
Deer (red) 6 months - 2 years							÷ 6		13	=
Deer (red) over 2 years							÷ 6		25	=
Deer (fallow) 6 months - 2 years							÷ 6		7	=
Deer (fallow) over 2 years							÷ 6		13	=
Deer (sika) 6 months - 2 years							÷ 6		6	=
Deer (sika) over 2 years							÷ 6		10	=
<b>Goats</b>							÷ 6	<b>No.</b>	<b>N</b>	<b>=</b> <b>Answer</b>
Goats							÷ 6		9	=
<b>Other livestock</b>							÷ 6			=
<b>Total livestock manure nitrogen produced by deers and goats (kg N/year)</b>										<b>=</b> <b>E</b>

## Part 1: Calculating Livestock Manure Nitrogen (N) Loading

### Worksheet F - Livestock manure N from slurry and manure imported onto the farm.

1. Only complete this part if slurry or manure is imported onto your farm.
2. Select the type of slurry/manure and dry matter (DM) and insert the volume/quantity imported. Typical DM is 6% for cattle slurry and 4% for pig slurry.
3. Multiply the N produced per m<sup>3</sup>/tonne by the volume/quantity imported.
4. Total the N imported per year and insert in Box F. **Transfer your answer to Box F on page 16.**

Slurry Type	Volume (m <sup>3</sup> )		Nitrogen content (kg N/m <sup>3</sup> )		N Imported (kg N/year)
	<b>V</b>	<b>X</b>	<b>N</b>	<b>=</b>	<b>Answer</b>
Beef cattle slurry – 2% DM		X	1	=	
<b>Beef cattle slurry – 6% DM</b>		X	2.3	=	
Beef cattle slurry – 10% DM		X	3.5	=	
Dairy cattle slurry – 2% DM		X	1.5	=	
<b>Dairy cattle slurry – 6% DM</b>		X	3	=	
Dairy cattle slurry – 10% DM		X	4	=	
Pig slurry – 2% DM		X	3	=	
<b>Pig slurry – 4% DM</b>		X	4	=	
Pig slurry – 6% DM		X	5	=	
Separated slurry		X	3	=	
Other		X		=	

Manure Type	Quantity (tonnes)		Nitrogen content (kg N/tonne)		N Imported (kg N/year)
	<b>t</b>	<b>X</b>	<b>N</b>	<b>=</b>	<b>Answer</b>
Broiler/turkey manure – 60% DM		X	30	=	
Cattle/sheep FYM – 25% DM		X	6	=	
Duck manure – 25% DM		X	6.5	=	
Layer manure – 30% DM		X	16	=	
Pig FYM – 25% DM		X	7	=	
Other		X		=	
<b>Total livestock manure nitrogen from imported slurry and manure (kg N/year)</b>				<b>=</b>	<b>F</b>

(1m<sup>3</sup>= 220 gallons)

## Part 1: Calculating Livestock Manure Nitrogen (N) Loading

### Worksheet G - Livestock manure N from slurry and manure exported from the farm.

1. Only complete this part if slurry or manure is exported from your farm.
2. Select the type of slurry/manure and dry matter (DM) and insert the volume/quantity exported. Typical DM is 6% for cattle slurry and 4% for pig slurry.
3. Multiply the N produced per m<sup>3</sup>/tonne by the volume/quantity exported.
4. Total the N exported per year and insert in Box G. **Transfer your answer to Box G on page 16.**

Slurry Type	Volume (m <sup>3</sup> )		Nitrogen content (kg N/m <sup>3</sup> )		N Exported (kg N/year)
	<b>V</b>	<b>X</b>	<b>N</b>	<b>=</b>	<b>Answer</b>
Beef cattle slurry – 2% DM		X	1	=	
<b>Beef cattle slurry – 6% DM</b>		X	2.3	=	
Beef cattle slurry – 10% DM		X	3.5	=	
Dairy cattle slurry – 2% DM		X	1.5	=	
<b>Dairy cattle slurry – 6% DM</b>		X	3	=	
Dairy cattle slurry – 10% DM		X	4	=	
Pig slurry – 2% DM		X	3	=	
<b>Pig slurry – 4% DM</b>		X	4	=	
Pig slurry – 6% DM		X	5	=	
Separated slurry		X	3	=	
Other		X		=	

Manure Type	Quantity (tonnes)		Nitrogen content (kg N/tonne)		N Exported (kg N/year)
	<b>t</b>	<b>X</b>	<b>N</b>	<b>=</b>	<b>Answer</b>
Broiler/turkey manure – 60% DM		X	30	=	
Cattle/sheep FYM – 25% DM		X	6	=	
Duck manure – 25% DM		X	6.5	=	
Layer manure – 30% DM		X	16	=	
Pig FYM – 25% DM		X	7	=	
Other		X		=	
		X		=	
<b>Total livestock manure nitrogen from exported slurry and manure (kg N/year)</b>				<b>=</b>	<b>G</b>

(1m<sup>3</sup>= 220 gallons)

## Part 1: Calculating Livestock Manure Nitrogen (N) Loading

### Section 2 - Livestock manure nitrogen loading calculation

#### Step 1: Nitrogen from livestock manure

Transfer the answers from the relevant worksheets and enter the amount of livestock manure N from each of the enterprises on your farm. Adjust for any slurry imported or exported and total to give the Total livestock manure N produced on the farm.

Dairy cattle livestock manure N (kg/year)	<b>A</b>		←	Transfer answer from Worksheet A on page 5.
	+	+		
Beef cattle and sheep livestock manure N (kg/year)	<b>B</b>		←	Transfer answer from Worksheet B on page 6.
	+	+		
Pig livestock manure N (kg/year)	<b>C</b>		←	Transfer answer from Worksheet C on page 8.
	+	+		
Poultry livestock manure N (kg/year)	<b>D</b>		←	Transfer answer from Worksheet D on page 10.
	+	+		
Deer and goat livestock manure N (kg/year)	<b>E</b>		←	Transfer answer from Worksheet E on page 13.
	+	+		
Imported slurry/manure N (kg/year)	<b>F</b>		←	Transfer answer from Worksheet F on page 14.
	-	-		
Exported slurry/manure N (kg/year)	<b>G</b>		←	Transfer answer from Worksheet G on page 15.
	=	=		
<b>Total livestock manure N (kg/year)</b> <b>(A + B + C + D + E + F - G)</b>	<b>H</b>			

## Step 2: Land area

Calculate the total area (ha) which you control.

Land owned <sup>12</sup> (ha)	I	
	+	+
Land taken <sup>12</sup> (ha)	J	
	-	-
Land let out <sup>12</sup> (ha)	K	
	=	=
<b>Total area (ha)</b> <b>(I + J – K)</b>	<b>L</b>	

<sup>12</sup> Exclude non-agricultural areas, including farm roads, paths, buildings, woodland, rivers, ponds and quarries.

## Step 3: Livestock manure nitrogen (N) loading

Calculate the annual livestock manure nitrogen loading for your farm by dividing the total livestock manure nitrogen by the total area controlled.

Total livestock manure N (kg)	H		←	Transfer answer from Step 1 on page 16.
	÷	÷		
Total area (ha)	L		←	Transfer answer from Step 2 above.
	=	=		
Livestock manure nitrogen loading (kg/ha/year) ( H ÷ L)	M		←	Is your figure below 170kg N/ha/year.

If your livestock manure nitrogen loading is above the 170kg N/ha/year limit, taking additional land, exporting livestock manure or reducing stock will help reduce the N/ha/year.

## Part 2 Calculating the Amount of Nitrogen (N) Applied to Grassland

Refer to 1.5.6, page 18, for guidance and Annex F, page 62 for a completed example in the Guidance Booklet.

<b>Column (A)</b>	Enter the total area of grassland.
<b>Column (B)</b>	Enter the maximum nitrogen requirement for your grassland area. Choose either 'Dairy Farm' or 'Other Livestock Farm' nitrogen limit (see 1.5.6).
<b>Column (C)</b>	Enter the type(s) of organic manure applied. <b>Do not include livestock manure.</b> (see 1.5.6).
<b>Column (D)</b>	Enter the amount of this organic manure applied to the grassland area.
<b>Column (E)</b>	Enter the available nitrogen content of these organic manures (the total N content can be derived from the import licence) by calculating the % availability that is 30%, 35%, 40% according to the year applied. For example, sewage sludge with a total nitrogen of 3kg of N per m <sup>3</sup> has 0.9kg N available nitrogen per m <sup>3</sup> .
<b>Column (F)</b>	Multiply columns D and E to give total available nitrogen applied in organic manures.
<b>Column (G)</b>	Enter the type(s) of fertiliser sown on grassland during the year.
<b>Column (H)</b>	Enter the total amount of fertiliser product applied for each fertiliser type(s).
<b>Column (I)</b>	Calculate the amount of N applied for all type(s) of fertiliser applied. For example, if 25000kgs of 27:0:0 is applied, Kg of N applied = $27 \times 25000 \div 100 = 67500$ kg of nitrogen.
<b>Column (J)</b>	Add column (F) and (I) to give total nitrogen applied.
<b>Column (K)</b>	Divide total in (J) by whole area of grassland (A). Application to be less than requirement in column (B)

(1 hectare = 2.47 acres)







## Part 3 Calculating the Amount of Nitrogen (N) Applied to Crops other than Grass

Refer to 1.5.7, page 19, for guidance and Annex J, page 70 for a completed example in the Guidance Booklet.

In contrast to grassland all organic manures must be taken into consideration including livestock manures.

Column (A)	Enter crop type from Guidance Booklet Annex I, page 67.
Column (B)	Enter the whole area for this crop on the farm.
Column (C)	Enter the maximum nitrogen requirement for your crop (Annex I, page 67) taking into consideration Soil Nitrogen Supply (Guidance Booklet Annex H, page 65)
Column (D)	Enter the type(s) of organic manure applied, including livestock manure (see 1.5.6).
Column (E)	Enter in the amount of manure applied to the whole area of crop.
Column (F)	Enter the amount of nitrogen available in m <sup>3</sup> or t of the applied manure (Guidance Booklet Annex E, page 61).
Column (G)	Multiply columns E and F to give total available nitrogen applied in organic manures.
Column (H)	Enter the type(s) of fertiliser sown.
Column (I)	Enter the total amount of fertiliser product applied for each fertiliser type(s)
Column (J)	Total up the amount of nitrogen applied for all type(s) of fertiliser applied.  For example, if 800kg of 24:6:12 was applied, Kg of N applied = 24 x 800 ÷ 100 = 192kg of nitrogen.
Column (K)	Add column (G) and (J) to give total nitrogen applied to the whole crop area. (If applying several types of chemical N fertiliser, ensure that the N in organic manures (column G), is only included once).
Column (L)	Divide total in (K) by whole area of crop (B). Application to be less than requirement in column (C).

(1 hectare = 2.47 acres)







## Part 4 Calculating the Phosphorus Applications

Refer to 1.5.10, page 21, for guidance and Annex L page 74 for a completed example in the Guidance Booklet.

(Only relevant if chemical P has been applied)

Complete the Phosphorus field record sheet on page 75 by performing the following steps

<b>Column (A)</b>	Identify the crop grown. A list of the main crops and their requirements are listed in Guidance Booklet Annex K, page 73.
<b>Column (B)</b>	Enter area of field.
<b>Column (C)</b>	Enter soil P index from soil analysis.
<b>Column (D)</b>	According to the soil index found on soil analysis results enter the phosphorus requirement in kg/ha from Guidance Booklet Annex K, page 73.
<b>Column (E)</b>	Enter the type(s) of livestock manure applied to these areas as per Guidance Booklet Annex E, page 61.
<b>Column (F)</b>	Enter in the amount of manure applied after soil sample taken in m <sup>3</sup> or t.
<b>Column (G)</b>	Enter the P (P <sub>2</sub> O <sub>5</sub> ) content of the manure applied from Guidance Booklet Annex E, page 61.
<b>Column (H)</b>	Multiply columns (F) and (G) to give total P (P <sub>2</sub> O <sub>5</sub> ) applied in organic manures.
<b>Column (I)</b>	Enter the type of fertiliser applied.
<b>Column (J)</b>	Enter the total amount of fertiliser applied.
<b>Column (K)</b>	Enter the amount of chemical phosphorus applied. For example, type of fertiliser applied was 26:5:5, this contains 5% P (P <sub>2</sub> O <sub>5</sub> ). If 1600kg was applied per ha then the amount of P (P <sub>2</sub> O <sub>5</sub> ) would be 5 x 1600 ÷ 100 = 80kg.
<b>Column (L)</b>	Add column (H) and (K) to give total phosphorus applied and divide by the area of the field (B) to get the application rate per ha. Column (L) to be less than column (D)

(1 hectare=2.47 acres)









## Part 5

# Calculating Livestock Manure Storage

Refer to 1.6 to 1.10, pages 22 to 31, for guidance and Annex P, page 80 for a completed example in the Guidance Booklet.

This is divided into 4 Sections:

**Section 1** – Allowances when calculating storage requirements

**Section 2** – Livestock manure storage worksheet

**Section 3** – Livestock manure storage calculation

**Section 4** – Poultry litter production worksheet

To calculate the livestock manure storage for your farm using this workbook:

- Only complete Section 1 if you intend to avail of storage allowances by out-wintering or bedding livestock.
- Complete Section 2.
- Transfer the relevant figures from Section 2 to Section 3 as directed.
- Complete Section 3.
- Only complete Section 4 if you produce poultry litter on your farm.

Alternatively, you can access the 'Livestock Manure Storage Calculator' at [www.ruralni.gov.uk](http://www.ruralni.gov.uk).

## Part 5: Calculating Livestock Manure Storage

### Section 1: Allowances when calculating storage requirement

1) Out-wintering livestock. Only complete if you require storage allowance for out-wintered livestock. (Follow instructions on page 33).

Table 1

Livestock Type	1 Feb	1 Oct	1 Dec	Total over winter	Average over winter =Total ÷3		N produced/head/year (kg N)		N produced (kg N)
<b>Sheep</b>				<b>No.</b>	<b>No.</b>	<b>X</b>	<b>N</b>	<b>=</b>	<b>Answer</b>
Ewe/ram (over 1 year)						X	9	=	
Lambs (6-12 months)						X	3.2	=	
Lambs (0-6 months)						X	1.2	=	
<b>Deer</b>									
Deer (red) (over 2 years)						X	25	=	
Deer (red) (6 months - 2 years)						X	13	=	
Deer (fallow) (over 2 years)						X	13	=	
Deer (fallow) (6 months - 2 years)						X	7	=	
Deer (sika) (over 2 years)						X	10	=	
Deer (sika) (6 months - 2 years)						X	6	=	
<b>Goats</b>									
Goat						X	9	=	
<b>Total livestock manure nitrogen produced by out-wintered sheep, deers and goats (kg N)</b>								<b>=</b>	<b>V</b>
Livestock Type	1 Feb	1 Oct	1 Dec	Total over winter	Average over winter =Total ÷3		N produced/head/year (kg N)		N produced (kg N)
<b>Cattle</b>				<b>No.</b>	<b>No.</b>	<b>X</b>	<b>N</b>	<b>=</b>	<b>Answer</b>
Suckler cow						X	54	=	
Cattle (over 2 years)						X	54	=	
Cattle (1-2 years)						X	47	=	
Cattle (0-1 year)						X	19	=	
Calves (6 months -1 year)						X	12	=	
Calves (0 - 6 months)						X	7	=	
<b>Total livestock manure nitrogen produced by out-wintered cattle (kg N)</b>								<b>=</b>	<b>W</b>

## Part 5: Calculating Livestock Manure Storage

1. Check potential to out-winter livestock in Table 2. Refer to the Livestock Manure Nitrogen Loading, page 17 for your annual loading kg N/ha/year (stocking rate).

**Table 2**

Livestock type	Annual stocking rate (kg N/ha/year)
Sheep, deer and goats	<b>Must be below 170kg</b>
Cattle only (excluding dairy cows)	<b>Must be below 140kg</b>
Cattle and sheep, deer and goats	<b>Must be below 140kg</b>

If you meet the annual stocking rate limit, continue completing this section.

If you do not meet the annual stocking rate limit, you cannot avail of storage allowances for out-wintered livestock and these livestock must be included when calculating storage requirements.

2. Enter the number of livestock to be out-wintered on the farm on the first day of the months indicated.
3. Total each month and divide by 3 as shown to determine the average number.
4. Multiply the average number over the winter period by the N produced per head.
5. Total the N produced by sheep, deer and goats and insert in Box V. **Transfer your answer to Box V in Table 3 below.**
6. Total the N produced by cattle and insert in Box W. **Transfer your answer to Box W in Table 3 below.**
7. If out-wintering cattle and sheep, deer and goats, total the N produced by these livestock and insert in Box X.
8. Enter the area of land to be used for out-wintering in Box Y.
9. Divide the livestock manure N by the land area to calculate the stocking rate.

**Table 3**

Livestock manure N from out-wintered sheep, deer and goats (kg)	<b>V</b>		←	Complete section in Table 1 to calculate figure
	+	+		
Livestock manure N from out-wintered cattle (kg)	<b>W</b>		←	Complete section in Table 1 to calculate figure
	=	=		
Total livestock manure N from out-wintered cattle and sheep, deer and goats (kg) <b>(V+W)</b>	<b>X</b>			
	÷	÷		
Out-wintered land area (ha)	<b>Y</b>			
	=	=		
<b>Stocking rate on out-wintered area (kg N/ha) (X ÷ Y)</b>	<b>Z</b>		←	<b>See Table 4 on page 34 to check if you can out-winter livestock</b>

## Part 5: Calculating Livestock Manure Storage

**Table 4: Can I avail of the out-wintering allowance?**

Livestock type	Stocking rate limit on out-wintered area (kg N/ha)
Sheep, deer and goats	Must be below 130kg N/ha
Cattle only	Must be below 85kg N/ha
Cattle, sheep, deer and goats	If N from cattle is <b>more than</b> N from sheep/deer and goats the stocking rate must be below 85kg N/ha
Cattle, sheep, deer and goats	If N from cattle is <b>less than</b> N from sheep/deer and goats the stocking rate must be below 130kg N/ha

If you are below the out-wintered stocking rate limit(s) you can avail of storage allowances for out-wintered livestock and these livestock can be excluded when calculating storage requirements.

If you do not meet the out-wintered stocking rate limit(s) you cannot avail of storage allowances for out-wintered livestock and these livestock must be included when calculating storage requirements.

## Part 5: Calculating Livestock Manure Storage

### Section 1: Allowances when calculating storage requirements

#### 2) Bedded accommodation

(Only complete if you require storage allowance for bedded livestock).

1. Enter the number of livestock to be bedded on the farm on the first day of the months indicated.
2. Total each month and then divide by 3 as shown to determine the average number over the winter.

**Table 5**

Livestock Type	1 Feb	1 Oct	1 Dec	Total over winter		Average over winter=Total ÷3
				No.	÷ 3	No.
<b>Cattle</b>					÷ 3	
Dairy cow					÷ 3	
Suckler cow					÷ 3	
Cattle over 2 years					÷ 3	
Cattle 1-2 years					÷ 3	
Calves 6 months - 1 year					÷ 3	
Calves 0-6 months					÷ 3	
<b>Sheep</b>						
Ewe/ram (over 1 year)					÷ 3	
Lamb (6-12 months)					÷ 3	
Lamb (0-6 months)					÷ 3	
<b>Deer</b>						
Deer (red) over 2 years					÷ 3	
Deer (red) 6 mths - 2 years					÷ 3	
Deer (fallow) over 2 years					÷ 3	
Deer (fallow) 6 mths - 2 years					÷ 3	
Deer (sika) over 2 years					÷ 3	
Deer (sika) 6 mths - 2 years					÷ 3	
<b>Goats</b>						
Goat					÷ 3	
<b>Pigs</b>						
Pigs					÷ 3	

## Part 5: Calculating Livestock Manure Storage

### Section 2: Livestock manure storage worksheet

**Table A: Calculate volume of undiluted slurry per week**

1. Enter the number of livestock kept on the first day of the months indicated. Exclude livestock numbers if they meet the out-wintering and/or bedded eligibility. For pigs and poultry, enter the average number on the unit.
2. Total each month and divide by 3 as shown to determine the average number.
3. Multiply the average number over the winter period by the volume of slurry produced per animal per week.
4. Total the volume of slurry produced by cattle and sheep insert in Box A. **Transfer your answer to Section 3, Box A on page 42.**
5. Total the volume of slurry produced by pigs and poultry and insert in Box B. **Transfer your answer to Section 3, Box B on page 42.**

Livestock Type	1 Feb	1 Oct	1 Dec	Total over winter	Average over winter =Total		Slurry/ animal/ week (m <sup>3</sup> /week)		Slurry produced/ week (m <sup>3</sup> /week)
<b>Cattle</b>				<b>No.</b>	<b>No.</b>	<b>X</b>	<b>V</b>	<b>=</b>	<b>Answer</b>
Dairy cow						X	0.37	=	
Suckler cow						X	0.23	=	
Cattle over 2 years						X	0.23	=	
Cattle 1-2 years						X	0.18	=	
Calves 6 months -1 year						X	0.09	=	
Calves 0-6 months						X	0.05	=	
<b>Sheep</b>									
Adult ewe/ram						X	0.03	=	
Fattening Lamb						X	0.01	=	
<b>Total volume undiluted cattle and sheep slurry per week (m<sup>3</sup>/week)</b>								<b>=</b>	<b>A</b>
<b>Pigs</b>					<b>Average No. on unit</b>	<b>X</b>	<b>V</b>	<b>=</b>	<b>Answer</b>
Maiden gilt 90-130kg						X	0.05	=	
1 Sow and litter 130-225kg						X	0.08	=	
1 Weaner (stage 1) 7-18kg						X	0.01	=	
1 Grower (stage 2) 18-35kg						X	0.02	=	
1 Finisher meal fed (stage 3) 35-105kg						X	0.03	=	
1 Finisher liquid fed (stage 3) 35-105kg						X	0.05	=	
<b>Poultry</b>									
1000 Laying hens						X	0.81	=	
1000 Ducks						X	0.81	=	
<b>Total volume undiluted pig and poultry slurry per week (m<sup>3</sup>/week)</b>								<b>=</b>	<b>B</b>

## Part 5: Calculating Livestock Manure Storage

**Table B: Calculate volume of rainfall falling on yards where slurry is produced plus the volume of rainfall entering unroofed tanks per week.**

1. Enter the dimensions of the yards and/or tanks and multiply them by the rainfall per week.
2. Total the volume produced by cattle and sheep and insert in Box C. **Transfer your answer to Section 3, Box C on page 42.**
3. Total the volume produced by pigs and poultry and insert in Box D. **Transfer your answer to Section 3, Box D on page 42.**

Rainfall falling on unroofed yards where slurry is produced						
Area	Description	Length (m)	Breadth (m)	Rainfall per week (m) <sup>1</sup>	Volume Cattle & Sheep (m <sup>3</sup> )	Volume Pigs & Poultry (m <sup>3</sup> )
		<b>l</b>	<b>b</b>	<b>R</b>	<b>l x b x R</b>	<b>l x b x R</b>
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		
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		
Rainfall entering unroofed above ground circular stores						
Area	Description	Radius (m)	Rainfall per week (m) <sup>1</sup>	Volume Cattle & Sheep (m <sup>3</sup> )	Volume Pigs & Poultry (m <sup>3</sup> )	
		<b>r</b>	<b>R</b>	<b>(r x r x 3.14 x R)</b>	<b>(r x r x 3.14 x R)</b>	
1			0.025			
2			0.025			
3			0.025			
4			0.025			
<b>Total volume of rainfall collected as slurry per week (m<sup>3</sup>)</b>				<b>C</b>	<b>D</b>	

<sup>1</sup> Rainfall/week is the Northern Ireland average over the winter months (October-March).

## Part 5: Calculating Livestock Manure Storage

**Table C: Calculate the total volume of dirty water collected as slurry per week**

1. Enter the dimensions of the yards and/or tanks and multiply them by the rainfall per week.
2. Total the volume produced by cattle and sheep and insert in Box E. **Transfer your answer to Section 3, Box E on page 42.**
3. Total the volume produced by pigs and poultry and insert in Box F. **Transfer your answer to Section 3, Box F on page 42.**

Water from clean yards and roofs entering tanks						
Area	Description	Length (m)	Breadth (m)	Rainfall per week (m) <sup>1</sup>	Volume Cattle & Sheep (m <sup>3</sup> )	Volume Pigs & Poultry (m <sup>3</sup> )
		<b>l</b>	<b>b</b>	<b>R</b>	<b>l x b x R</b>	<b>l x b x R</b>
1				0.025		
2				0.025		
3				0.025		
4				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		
Dairy parlour washings (m <sup>3</sup> ) <sup>2</sup>	No. of cows _____			0.13		N/A
Building washings - poultry <sup>3</sup>	No. of batches _____ X floor area _____ m <sup>2</sup>			0.007	N/A	
Building washings - pigs <sup>4</sup>	No. of pigs moved out of pens/week _____			0.02	N/A	
Building washings - cattle <sup>5</sup> (excludes parlour washings)	Insert actual volume of water used per week					N/A
Building washings - sheep <sup>5</sup>	Insert actual volume of water used per week					N/A
<b>Total volume of dirty water collected as slurry per week (m<sup>3</sup>)</b>					<b>E</b>	<b>F</b>

<sup>1</sup> Rainfall/week is the Northern Ireland average over the winter months (October-March).

<sup>2</sup> For volume of dairy parlour washings use 0.13m<sup>3</sup> per cow per week. If your milking plant is significantly different use the actual amount.

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

<sup>4</sup> For pig house washings, use 1.8 litres (0.002m<sup>3</sup>) per pig moved out of pens. If your washing system is significantly different use your own actual figures.

<sup>5</sup> For cattle and sheep house washings, use your own actual figures.

## Part 5: Calculating Livestock Manure Storage

**Table D: Calculate the total volume of separated solids from slurry per week**

1. Enter the type of slurry separated (cattle and sheep only).
2. Enter the volume of this slurry type produced per week. (Refer to Table A, page 36 for the relevant figure).
3. Multiply the volume by the % reduction figure. The maximum volume reduction allowed is 20%.
4. Total volume of separated slurry per week and insert in Box G. **Transfer your answer to Section 3, Box G on page 42.**

Slurry Type	Volume of slurry produced per week		% reduction by separation		Volume of separated solids per week
	v	x	%	=	(m <sup>3</sup> )
		x		=	
		x		=	
		x		=	
<b>Total volume of separated solids per week (m<sup>3</sup>)</b>				=	<b>G</b>

**Table E: Calculate the total volume of slurry exported to processing per week**

1. Enter the type of slurry exported to processing.
2. Enter the volume of slurry produced and exported over the winter period. Divide by 22 for cattle and sheep slurry and 26 for pig and poultry slurry, to calculate the volume exported per week.
3. Total the volume produced by cattle and sheep and insert in Box H. **Transfer your answer to Section 3, Box H on page 42.**
4. Total the volume produced by pigs and poultry and insert in Box I. **Transfer your answer to Section 3, Box I on page 42.**

Slurry Type	Volume of slurry exported (m <sup>3</sup> )			Volume of cattle & sheep slurry exported per week (m <sup>3</sup> )	Volume of pig & poultry slurry exported per week (m <sup>3</sup> )
	v	÷ 22 or ÷ 26	=	v	v
		÷ 22 or ÷ 26	=		
		÷ 22 or ÷ 26	=		
		÷ 22 or ÷ 26	=		
<b>Total volume of slurry exported to processing per week (m<sup>3</sup>)</b>			=	<b>H</b>	<b>I</b>



## Part 5: Calculating Livestock Manure Storage

**Table 6: Calculate the storage capacity of rectangular tanks, earth bank lagoons and above ground stores.**

1. Enter the dimensions of tanks, lagoons, and above ground stores and multiply them to determine the capacity.
2. Total the capacity for cattle and sheep and insert in Box L. **Transfer your answer to Section 3, Box L on page 42.**
3. Total the capacity for pigs and poultry and insert in Box M. **Transfer your answer to Section 3, Box M on page 42.**

Storage capacity of rectangular tanks, and concrete lagoons						
Area	Description	Length (m)	Breadth (m)	Adjusted depth (depth-freeboard) <sup>(i)</sup> (m)	Capacity Cattle & Sheep (m <sup>3</sup> )	Capacity Pigs & Poultry (m <sup>3</sup> )
		<b>l</b>	<b>b</b>	<b>h</b>	<b>l x b x h</b>	<b>l x b x h</b>
1						
2						
3						
4						
5						
6						
7						
Storage capacity of earth bank lagoons						
1						
2						
3						
4						
Storage capacity of above ground circular stores						
Area	Description	Radius (m)	Adjusted depth (depth-freeboard) <sup>(i)</sup> (m)	Capacity Cattle & Sheep (m <sup>3</sup> )	Capacity Pigs & Poultry (m <sup>3</sup> )	
		<b>r</b>	<b>h</b>	<b>(r x r x 3.14 x h)</b>	<b>(r x r x 3.14 x h)</b>	
1						
2						
3						
4						
<b>Total capacity of tanks, lagoons and stores (m<sup>3</sup>)</b>					<b>L</b>	<b>M</b>

<sup>(i)</sup> Freeboard is the term given to the unfilled depth (safety margin) at the top of a slurry or effluent tank or lagoon. 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

1 December 2003, unless substantially reconstructed). However, it is considered best management practice to adhere to freeboard requirements in all structures.

## Part 5: Calculating Livestock Manure Storage

### Section 3 – Livestock manure storage calculation

#### Step 1: Volume of slurry produced per week

Enter the volume of slurry and dirty water collected as slurry produced on the farm in the relevant boxes.

Volume produced per week (m <sup>3</sup> )	Cattle & sheep		Pigs & poultry			
Undiluted slurry produced	A		B		←	Complete Section 2, Table A on page 36 to calculate figure
	+	+	+	+		
Rain on yards where slurry is produced and rain entering open tanks	C		D		←	Complete Section 2, Table B on page 37 to calculate figure
	+	+	+	+		
Dirty water collected as slurry	E	2.25	F		←	Complete Section 2, Table C on page 38 to calculate figure
	-	-	-	-		
Separated solids from cattle and sheep slurry	G				←	Complete Section 2, Table D on page 39 to calculate figure
	-	-	-	-		
Slurry exported to processing	H		I		←	Complete Section 2, Table E on page 39 to calculate figure
	=	=	=	=		
<b>Total volume of slurry produced per week (m<sup>3</sup>)</b>	<b>J</b>		<b>K</b>			

#### Step 2: Tank capacity

To calculate the information required for Step 2, complete Table 6 in Section 2 on page 41 and transfer your answer to the relevant box(es) below.

	Cattle & sheep		Pigs & poultry			
<b>Storage capacity of tanks, stores and lagoons on the farm (m<sup>3</sup>)</b>	<b>L</b>		<b>M</b>		←	Transfer answer from Table 6, on page 41.

## Part 5: Calculating Livestock Manure Storage

### Step 3: Weeks Storage Capacity

Divide the total storage capacity of tanks, stores and lagoons by the volume of slurry and dirty water to be collected per week.

Volume produced per week (m <sup>3</sup> )	Cattle & sheep		Pigs & poultry			
Storage capacity of tanks, stores and lagoons on the farm	L		M		←	Transfer answer, from Step 2, page 42
	÷	÷	÷	÷		
Total volume of slurry and dirty water to be collected per week	J		K		←	Transfer answer, from Step 1, page 42
	=	=	=	=		
<b>Weeks storage capacity</b>	O		P		←	Do you have enough storage?

### Do you have enough storage?

Livestock Type	Weeks storage required
Cattle and sheep	22
Pigs – <b>less than</b> 10 breeding sow places or 150 finishing pig places	22
Pigs – <b>more than</b> 10 breeding sow places or 150 finishing pigs places	26
Poultry - <b>less than</b> 500 poultry places	22
Poultry - <b>more than</b> 500 poultry places	26
Mixed enterprise – pig/poultry and other livestock	22 (other livestock) 26 (pigs/poultry)

## Part 5: Calculating Livestock Manure Storage

### Section 4 - Poultry Litter Production and Storage Worksheet

**Table A: Volume of poultry litter produced per week**

1. Enter the average number of birds on the unit at any one time.
2. Multiply the average number by the quantity of manure produced per 1000 birds per week.
3. Total the quantity of litter produced and insert in Box A. **Transfer your answer to Table C Box A on page 45.**

Livestock Type	Average number on the unit		Quantity of litter produced per week (t)		Total quantity of litter produced per week (t)
	No.	X	v	=	vm
1000 broilers and litter		X	0.41	=	
1000 broiler breeders		X	0.38	=	
1000 replacement pullets		X	0.39	=	
1000 turkeys (male) and litter		X	1.10	=	
1000 turkeys (female) and litter		X	0.53	=	
1000 ducks		x	2.02	=	
Total volume of poultry litter produced per week (tonnes)				=	A

**Table B: Calculate the total volume of poultry litter exported to processing per week**

1. Enter the type of poultry litter exported to processing.
2. Enter the quantity of poultry litter produced and exported over the winter period and divide by 26 to calculate the quantity exported per week.
3. Total the volume exported and insert in Box B. **Transfer your answer to Table C Box B on page 45.**

Manure Type	Quantity of litter exported per year (tonnes)			Total quantity of poultry litter exported per week (m <sup>3</sup> )
	t	÷ 26	=	v
		÷ 26	=	
		÷ 26	=	
		÷ 26	=	
Total volume of poultry litter exported to processing per week (tonnes)			=	B

## Part 5: Calculating Livestock Manure Storage

**Table C: Calculate the quantity of poultry litter requiring storage**

Total quantity of poultry litter produced per week (tonnes)	<b>A</b>		←	Transfer answer from, Table A, Box A, page 44
	-	-		
Total quantity of poultry litter exported to process per week (tonnes)	<b>B</b>		←	Transfer answer from, Table B, Box B, page 44
	=	=		
Total quantity of poultry litter requiring storage per week (tonnes) <b>(A - B)</b>	<b>C</b>			

Until 31 December 2008, when the position will be reviewed, poultry litter may be stored in a midden or in the field where land application will take place until the next application, but for no longer than 180 days.

The poultry litter must be stored in a compact heap and covered with an impermeable membrane within 24 hours of placement in the field. It must not be stored in the same location of the field year after year.

Where poultry litter is stored in a midden adequate storage facilities with effluent collection must be provided prior to field storage. If the effluent containment facilities are new, or substantially enlarged or substantially reconstructed (after 1 December 2003), they must comply with the British Standards specified in the SSAFO Regulations regardless whether they were or were not grant funded by DARD.





