

**Ministry Protocols  
For  
Ontario Regulation  
Made under the  
Nutrient Management Act, 2002**

**Draft for Discussion Purposes Only**

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**Nutrient Units Protocol**

## Nutrient Units Instead of Livestock Units for Defining Farm Unit Sizes

The terms *Animal Unit (AU)*, and in more recent years, *Livestock Unit (LU)* have been around for at least 30 years in several jurisdictions as a means of describing the relative magnitude of size of an animal operation. Some jurisdictions base AU or LU on 1000 lbs of liveweight of animal, while others base it on the number of animals that produce enough nitrogen annually to fertilize an acre of corn for maximum production.

There are several reasons why OMAF is going to use a method different from *Livestock Units*:

- *Livestock Units* have been modified over the years for use in the Minimum Distance Separation as an odour indicator and no longer relate well to nutrient management issues.
- *Livestock Units* are not as equitable as they should be between animal species and systems.
- *Livestock Units* do not reflect that phosphorus, and not nitrogen is sometimes more limiting for manure application on cropland.
- *Livestock Unit* tables do not include some current types of animals and systems and are not flexible for adding new ones or adding other fertilizing materials such as municipal biosolids.
- *Livestock Units* do not currently reflect: the changing size of animals such as dairy or beef cows; different market weights of animals based on new marketing conditions such as finishing pigs, or chickens; or changes in feed efficiency.

Hence, OMAF is introducing a fairer, more flexible, and dynamic method of comparing Farm Unit size called a *Nutrient Unit (NU)*.

The Nutrient Management Protocol defines the Farm Unit as:

1. For agricultural operations that generate a prescribed nutrient:
  - Can be no smaller than a single deed, or
  - Can be no smaller than the landbase of a generating facility under a single continuous roof, or
  - Must include all land receiving nutrients generated on the deeded property, as required by the Nutrient Management Strategy and/or Plan; whether or not the land itself is on the same deed, and
  - Must include nutrient generating facilities on other deeds owned by the same person/corporation **if** the nutrients generated on these other deeds are utilized on the landbase of the first deed; and
  - If nutrients are generated in different locations on your overall operation and those nutrients are not spread on the same landbase, then these different locations can be two or more separate farm units.
2. For agricultural operations who do not generate, but use nutrients
  - The farm unit can be no smaller than a single field

The definition of a **Nutrient Unit (NU)** is:

- The number of animals housed, or pastured, at one time on a Farm Unit, that **generate** enough manure to fertilize the same area of crop landbase under the most limiting of either nitrogen or phosphorus as determined by OMAF's *Nutrient Management (NMAN)* software

Or, in the case where no animals are housed:

- The weight or volume of manure or other biosolids **used annually** on a Farm Unit, that fertilizes the same area of crop landbase under the most limiting of either nitrogen or phosphorus as determined by OMAF's *Nutrient Management (NMAN)* software

*Nutrient Units would* help ensure an 'apples to apples' comparison between sizes and types of Farm Units using the same set of input and output parameters; be a better reflection of environmental risk to ground and surface water based on nutrients produced and applied; and be more flexible to changes in the industry.

*Nutrient Units would not* be used to establish landbase requirements for a Farm Unit, since this would be based on the Farm Unit's specific, localized Nutrient Management Plan; and it would not be the same as Livestock Units currently used in calculating Minimum Distance Separation (MDS) setbacks.

The following table indicates the number of animals per *Nutrient Unit* on animal farms **generating** manure.

### Animals per Nutrient Unit for Livestock Operations

<b>Animal (based on highest design capacity of the barn(s) at one time</b>	<b># Animals per NU</b>
Dairy cow (large-frame, 1200-1400 lbs, milking or dry)	0.6
Dairy cow (medium-frame, 1000-1200 lbs, milking or dry)	0.7
Dairy cow (small-frame, 800-1000 lbs, milking or dry)	0.85
Dairy replacements (large-frame, 100-1150 lbs)	3.0
Dairy replacements (medium-frame, 85-1000 lbs)	3.5
Dairy replacements (small-frame, 70-725 lbs)	4.5
Beef cows (includes unweaned calf and replacements)	1.0
Beef shortkeepers (900-1300 lbs)	2.0
Beef backgrounders (575-900 lbs)	3.0
Beef feeders (575-1250 lbs)	3.0
SEW Sows (includes weaners to 15 lbs)	3.33
SEW Weaners (15-60 lbs)	20.0
Sow farrow-wean (lactating sows, including weaners to 60 lbs)	2.5
Finishing pigs (60-230 lbs)	6.0
Horses (mature to 1000 lbs)	1.0
Laying hens (after 2.9 lbs pullet stage, until end of laying period at about 3.75 lbs)	150

<b>Animal (based on highest design capacity of the barn(s) at one time</b>	<b># Animals per NU</b>
Layer pullets (day-old pullets placed, raised to 2.9 lbs)	500
Chicken broiler floor growing space (total square feet, regardless of quota cycle)	267 sq.ft
Turkey broiler/hen/tom growing space (total square feet, regardless of finishing weight)	267 sq.ft
Chicken broiler breeder growers (day-old females and males placed)	300
Chicken broiler breeder layers (hens and roosters)	100
Sheep, for meat (# of breeding ewes; includes lambs, replacements and rams)	8.0
Sheep, milk-producing (# of milking-aged ewes; includes lambs, replacements and rams)	6.0
Goats, dairy (# of milking-aged goats; includes kids, replacements and bucks)	8.0
Milk-fed, or grain-fed veal calves	6.0
<b>Several more animals will be added, including mink, quail, rabbits, fish, etc. as more information is available, plus typical liveweights of animals housed at one time, for situations that do not 'fit' the table well. Also, choose the most appropriate figures where weights do not match your situation exactly.</b>	

The following table indicates the weight or volume of manure per *Nutrient Unit* on farms that **use** manure produced on other farm units.

### Weights and Volumes of Manure Per Nutrient Unit

<b>Manure Type (based on weights or volumes used annually)</b>	<b># of tons per NU</b>
Dry-bedded, chicken or turkey manure (tons of manure)	2.5
Dry-bedded, beef cattle manure (tons of manure)	10.0
Dry-bedded, horse manure (tons of manure)	20.0
<b>More manures &amp; biosolids to be added such as anaerobic, liquid municipal biosolids, etc</b>	

**Farm Units** that **generate** manure are divided into four (4) categories of size based on the total number of **Nutrient Units** of animals housed at one time, at the highest design capacity of the facilities:

### Farm Unit Categories For Livestock Generators

<b>Animal Sector Examples (based on highest design capacity of barns)</b>	<b>Category I &lt; 30 NU</b>	<b>Category II 30 – 150 NU</b>	<b>Category III 150 – 300 NU</b>	<b>Category IV &gt; 300 NU</b>
Large-framed, milking-aged dairy cows (1200-1400 lbs; inc. dry, calves, heifers)	< 15	15 – 75	75 – 150	> 150

<b>Animal Sector Examples (based on highest design capacity of barns)</b>	<b>Category I &lt; 30 NU</b>	<b>Category II 30 – 150 NU</b>	<b>Category III 150 – 300 NU</b>	<b>Category IV &gt; 300 NU</b>
Medium-framed, milking-aged dairy cows (1000-1200 lbs; inc. dry, calves, heifers)	< 18	18 – 90	90 – 180	> 180
Small-framed, milking-aged dairy cows (800-1000 lbs; inc. dry, calves, heifers)	< 21	21 – 105	105 – 210	> 210
Beef cows (inc. unweaned calf, repl'ment)	< 30	30 – 150	150 – 300	> 300
Beef shortkeepers (900-1300 lbs) (# of feedlot spaces)	< 60	60 – 300	300 – 600	> 600
Beef backgrounders (575-900 lbs) (# of feedlot spaces)	< 90	90 – 450	450 – 900	> 900
Beef feeders (575-1250 lbs) (# of feedlot spaces)	< 90	90 – 450	450 – 900	> 900
SEW Sows (lactating-aged sows) (includes weaners to 15 lbs)	< 100	100 – 500	500 – 1,000	> 1,000
SEW Weaners (15-60 lbs) (# of weaners spaces)	< 600	600 – 3,000	3,000 – 6,000	> 6,000
Sow farrow-wean (lactating-aged sows) (includes weaners to 60 lbs)	< 75	75 – 375	375 – 750	> 750
Finishing pigs (60-230 lbs) (# of spaces in barn)	< 180	180 – 900	900 – 1,800	> 1,800
Horses (mature at 1000 lbs) (# of spaces in barn)	< 30	30 – 150	150 – 300	> 300
Laying hens (# of layer spaces in barn)	< 4,500	4,500 – 22,500	22,500 – 45,000	> 45,000
Layer pullets (# of pullet spaces in barn)	< 15,000	15,000 – 75,000	75,000 – 150,000	> 150,000
Chicken broilers (total sq.ft of usable barn floor area)	< 8,000 sq.ft	8,000 – 40,000 sq.ft	40,000 – 80,000 sq.ft	> 80,000 sq.ft
Turkey broilers/hens/toms (total sq.ft of usable barn floor area)	< 8,000 sq.ft	8,000 – 40,000 sq.ft	40,000 – 80,000 sq.ft	> 80,000 sq.ft
Chicken broiler breeder growers (# of day-old females <u>and</u> males)	< 9,000	9,000 – 45,000	45,000 – 90,000	> 90,000
Chicken broiler breeder layers (# of hens <u>and</u> roosters)	< 3,000	3,000 – 15,000	15,000 – 30,000	> 30,000

<b>Animal Sector Examples (based on highest design capacity of barns)</b>	<b>Category I &lt; 30 NU</b>	<b>Category II 30 – 150 NU</b>	<b>Category III 150 – 300 NU</b>	<b>Category IV &gt; 300 NU</b>
Sheep, for meat (# of breeding ewes) (includes lambs, replacements and rams)	< 240	240 – 1200	1200 – 2400	> 2400
Sheep, dairy (# of milking-aged ewes) (includes lambs, replacements and rams)	< 180	180 – 900	900 – 1800	> 1800
Goats, dairy (# of milking-aged goats) (includes kids, replacements and bucks)	< 240	240 – 1200	1200 – 2400	> 2400
Milk or grain-fed veal (# of spaces)	< 180	180 – 900	900 – 1800	> 1800
<b>More animals &amp; systems to be added over time</b>				

### Sample Calculation

#### 1. Example A for calculating the number of Nutrient Units on a Farm Unit that generates manure

A dairy farmer has 72 Holstein cows (milking and dry, and considered as large-frame cows), with all 72 calves and heifers kept on the same farm. She also has two 40' x 300' x 2 story chicken broiler barns across the road. The entire operation is managed as one Farm Unit. How many *Nutrient Units* of manure does she generate?

$$\begin{array}{rcl}
 72 \text{ large-frame milking-aged cows} \div 0.6 \text{ animals/NU} & = & 120 \text{ NU} \\
 72 \text{ large-frame dairy replacements} \div 3.0 \text{ animals/NU} & = & 24 \text{ NU} \\
 48,000 \text{ square feet of chicken barn} \div 267 \text{ sq.ft/NU} & = & \frac{180 \text{ NU}}{324 \text{ NU}}
 \end{array}$$

Thus, this farm generates enough manure to place it into **Category IV**.

#### 2. Example B for calculating the number of Nutrient Units on a Farm Unit the generates manure

A farmer houses 1000 finishing pigs, 10000 laying hens, and 60 beef feeders raised from about <sup>a</sup>575 lbs to 1250 lbs. How many *Nutrient Units* of manure does he generate?

$$\begin{array}{rcl}
 1000 \text{ finishing pigs} \div 6 \text{ pigs/NU} & = & 167 \text{ NU} \\
 10000 \text{ laying hens} \div 150 \text{ hens/NU} & = & 67 \text{ NU} \\
 60 \text{ beef feeders} \div 3 \text{ beef feeders/NU} & = & \frac{20 \text{ NU}}{254 \text{ NU}}
 \end{array}$$

Thus, this farm **generates** enough manure to place it into **Category III**.

- a. Note that start and end weights may vary slightly from those in the table, since it is impossible to predict every situation. In these cases, choose the most appropriate figures.

**3. Example C for calculating the number of Nutrient Units on a Farm Unit that generates and uses manure**

A swine farmer houses 1500 finishing pigs and **generates** manure, but also **uses** 250 tons of dry-bedded chicken manure on his field crops. How many *Nutrient Units* does this farm **generate** and **use**?

$$\begin{array}{rcl} 1500 \text{ finishing pigs} \div 6 \text{ pigs/NU} & = & 250 \text{ NU} \\ 250 \text{ tons of dry-bedded chicken manure} \div 2.5 \text{ tons/NU} & = & \underline{100 \text{ NU}} \\ & & 350 \text{ NU} \end{array}$$

Thus, this farm both **generates** and **uses** enough manure to place it into **Category IV**.