Cornell University

NMSP Nutrient Management Spear Program

Cornell Nutrient Management Spear Program Mass Nutrient Balance Calculator Input Sheet

N, P and K imports and exports: 1/1/2024 to 12/31/2024

Producer Contact Information		Data Collection	
Producer name		By	
Farm name		Email	
Address			
County and State			
Phone			
E-mail		Balance year	2024

Farm Information		Watershed	
Total farm acres		Primary watershed	
All tillable owned and rented crop and pasture acres		Secondary watershed	
Legume acres (perennial and annual) >10% legume		**Soil Type**	
Acres receiving manure (crop and pasture)		Primary soil type	
Milk marketing co-operative		Secondary soil type	

Have you completed a Cornell Dairy Farm Business Summary (DFBS) for the balance year? ☐

Have you completed a Farm Credit Business Summary for the balance year? ☐

Are you a Certified Organic producer? ☐

Intensive grazing (grazed at least 3 months/yr, moved to a new pen every 3 days or more)? ☐

Do you have a Comprehensive Nutrient Management Plan (CNMP) for the balance year? ☐

Do you have a Cropware plan for the balance year? ☐

Average number and weight of farm livestock				If animals are raised off farm:				*GHGs only*
Animal Group		**Number**	**Weight (lbs/head)**	**Period of time**	**Number**	**Do you: (Y/N)**		**Max pen stocking density (%)**
						Supply feed?	Handle manure?	
Cattle	Lactating cows					☐	☐	
	Dry cows					☐	☐	
	Heifers 1-2 year					☐	☐	
	Heifers <1 year					☐	☐	
	Calves					☐	☐	
	Bulls and steers					☐	☐	
Other livestock					**Dairy cow breed(s)**			
					Cull rate (%)			
					Average SCC			
					Notes:			

FARM CROP PRODUCTION

Crop name and type*	% legume	Area (acres)	Manure applied	CP (% DM)	P (% DM)	K (% DM)	% NDF	Yield (t/a)	DM (%)	Inventory (as fed tons)	
										Beginning year	**Ending year**
			☐								
			☐								
			☐								
			☐								
			☐								
			☐								
			☐								
			☐								

* Crop type = "Forage", "Grain" or "Bedding"

What homegrown feeds were fed in the assessment year? *GHGs only**					
Crop name**	**Total Amount Fed**	**CP (% DM)**	**% NDF**	**DM (%)**	**Feed given to:**
					Lactating _____ % Dry _____ % Heifers: breeding to calving _____ % Heifers: weaning to breeding _____ % Calves _____ % Other _____ %
					Lactating _____ % Dry _____ % Heifers: breeding to calving _____ % Heifers: weaning to breeding _____ % Calves _____ % Other _____ %
					Lactating _____ % Dry _____ % Heifers: breeding to calving _____ % Heifers: weaning to breeding _____ % Calves _____ % Other _____ %
					Lactating _____ % Dry _____ % Heifers: breeding to calving _____ % Heifers: weaning to breeding _____ % Calves _____ % Other _____ %
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					Lactating _____ % Dry _____ % Heifers: breeding to calving _____ % Heifers: weaning to breeding _____ % Calves _____ % Other _____ %
					Lactating _____ % Dry _____ % Heifers: breeding to calving _____ % Heifers: weaning to breeding _____ % Calves _____ % Other _____ %

* Representative diets may also be submitted

** Please input homegrown feed data fed for the assessment year

IMPORTS

Feeds (purchased)	Tons/ year	% DM	CP (%DM)	P (%DM)	K (%DM)	% NDF	Distance transported/ purchase location	% of import fed to each group*
								GHGs only
								Lactating _____% Dry _____% Heifers 1-2yr _____% Heifers <1yr _____% Calves _____% Other _____%
								Lactating _____% Dry _____% Heifers 1-2yr _____% Heifers <1yr _____% Calves _____% Other _____%
								Lactating _____% Dry _____% Heifers 1-2yr _____% Heifers <1yr _____% Calves _____% Other _____%
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								Lactating _____% Dry _____% Heifers 1-2yr _____% Heifers <1yr _____% Calves _____% Other _____%
								Lactating _____% Dry _____% Heifers 1-2yr _____% Heifers <1yr _____% Calves _____% Other _____%
								Lactating _____% Dry _____% Heifers 1-2yr _____% Heifers <1yr _____% Calves _____% Other _____%

* Representative diets may also be submitted

Feeds (purchased)	Tons/ year	% DM	CP (%DM)	P (%DM)	K (%DM)	% NDF	Distance transported/ purchase location	% of import fed to each group*
								Lactating _____% Dry _____% Heifers 1-2yr _____% Heifers <1yr _____% Calves _____% Other _____%
								Lactating _____% Dry _____% Heifers 1-2yr _____% Heifers <1yr _____% Calves _____% Other _____%
								Lactating _____% Dry _____% Heifers 1-2yr _____% Heifers <1yr _____% Calves _____% Other _____%
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								Lactating _____% Dry _____% Heifers 1-2yr _____% Heifers <1yr _____% Calves _____% Other _____%
								Lactating _____% Dry _____% Heifers 1-2yr _____% Heifers <1yr _____% Calves _____% Other _____%
								Lactating _____% Dry _____% Heifers 1-2yr _____% Heifers <1yr _____% Calves _____% Other _____%
								Lactating _____% Dry _____% Heifers 1-2yr _____% Heifers <1yr _____% Calves _____% Other _____%
								Lactating _____% Dry _____% Heifers 1-2yr _____% Heifers <1yr _____% Calves _____% Other _____%

GHGs only	
Feed Additives	**Amount fed (grams/lactating cow/day)**
Monensin/Rumensin	
3-NOP	
Other (specify): _____	

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Purchased fertilizers	Tons/year	% N	% P₂O₅	% K₂O	*GHGs only* Distance transported/ purchase location
		%	%	%	
		%	%	%	
		%	%	%	
		%	%	%	
		%	%	%	
		%	%	%	
		%	%	%	
		%	%	%	
		%	%	%	
		%	%	%	

Purchased animals	Type*	Description	Number	Weight/hd (lbs)	*GHGs only* Distance transported/ purchase location

* Type = "Dairy", "Beef", "Swine", "Poultry", "Goats", "Sheep" or "Horses"

Purchased bedding, manure and miscellaneous imports	Amount	Units*	% DM (% solids)	N	P	K	Units** (as sampled)	*GHGs only* Distance transported/ Purchase location

* Units = "tons/year" or "gallons/year"

** Units = "%", "lbs/ton" or "lbs/1000 gallons"

EXPORTS

Milk sold (lbs/year)	Milk protein (%)	Milk fat (%)	Milk urea nitrogen (MUN) (mg/dl)

GHGs only			
Milking Information		**Distance to Milking Parlor**	
Milkings per day		**Vertical distance**	
Time out of pen/mliking		**Horizontal distance**	

Animals sold	Type*	Description	Number	Weight/hd (lbs)

* Type = "Dairy", "Beef", "Swine", "Poultry", "Goats", "Sheep" or "Horses"
List cull cows and bull calves as "Dairy"

Crops sold	Tons/year	%DM	CP (%DM)	P (%DM)	K (%DM)	Feed type*
TMR						**% forage**

* Feed type = "Grain", "Forage" or "TMR"

Exported manure, compost and other exports	Amount	Units*	% solids	N	P	K	Units** (as sampled)

* Units = "tons/year" or "gallons/year"
** Units = "%", "lbs/ton" or "lbs/1000 gallons" A manure analysis can be attached if this is easier

Manure analyses

Manure storage *	% solids	Total N	Ammonium N	P_2O_5	K_2O	Units* (as sampled)

* A manure analysis can be submitted.

** Units = "%", "lbs/ton" or "lbs/1000 gallons"

Manure applications

Crop applied to	Acres applied to	Manure storage	Application rate*	Units**	Application method***	Timing****

Fertilizer applications

% N	% P_2O_5	% K_2O	Crop applied to	Acres applied to	Rate*	Units**	Application method***	Timing****	Protected N source?***** State type

An <u>updated</u> nutrient management plan with <u>actual</u> manure and/or fertilizer applications can be submitted.

* Application rate = total applied to crop, or amount/acre

** Units = "tons", "kgal", "lbs/acre", "gal/acre"

*** Application method = "Broadcast/surface applied/No incorporation", "Incorporated within 24 hours", "Injected/subsurface"

 **** Timing = "Spring", "Summer", "Fall", "Winter", "Planting", "Sidedress"

 ***** Enhanced efficiency fertilizer, e.g. nitrification inhibitors, urease inhibitors, slow release fertilizer

GHGs only								
Crop rotation 1.		**Total acres:**						
Year of rotation	**Crop**	**Most intensive tillage practice***	**% Cover cropped**	**Cover crop type**	**Cover crop height**	**Cover crop cover**	**Termination date**	**Termination method**
1								
2								
3								
4								
5								
6								
7								
8								
9								

GHGs only								
Crop rotation 2.*		**Total acres:**						
Year of rotation	**Crop**	**Most intensive tillage practice***	**% Cover cropped**	**Cover crop type**	**Cover crop height**	**Cover crop cover**	**Termination date**	**Termination method**
1								
2								
3								
4								
5								
6								
7								
8								
9								

* Tillage practices = "conventional", "reduced" or "no till"

** Please fill out if multiple crop rotations

GHGs only		
Land use change in the last 20 years		
Previous land use*	**Current land use****	**Number of acres**

* Previous land use: "Woodland/forest", "Cropland", "Permanent grassland/pasture/rangeland"

** Current land use: "Woodland/forest", "Cropland", "Permanent grassland/pasture/rangeland"

GHGs only			
Energy and fuel use			
Source	**Amount used**	**Amount Exported**	**Units**
Electricity (grid)			
Electricity (solar)			
Electricity (wind)			
Electricity (hydro)			
Gasoline			
Diesel			
Natural gas			
Heating oil			
Other (_____)			
Other (_____)			

GHGs only – complete one copy of this page for each manure handling system on your farm

A. Represents pen number(s) or name(s):

B. Pen type (select one)	**Comment:**	
☐ Tiestall		
☐ Freestall		
☐ Open lot[1]	Harrowing frequency:	Clean-out date(s): _____
☐ Bedded pack[2]	Active mixing: Yes ☐ No ☐ Composted: Yes ☐ No ☐ No. times per week tilled/mixed: _____	Clean-out date(s): _____
☐ Other _____		

C. Typical no. of animals		**D. % animals grazing**	**E. Grazing days/year**	**F. Grazing hours/day**
Lactating cows				
Dry cows				
Heifers: breeding to first calving				
Heifers: weaning to breeding				
Calves (pre-weaning)				

G. Cleaning method:	☐ Manual scraping	☐ Automatic alley scraper	☐ Flush system
Comment:			

H. Bedding type(s):

Sawdust or shavings: _____tons	Straw: _____tons	Manure solids: _____tons	Other (specify):_____ _____ tons

Comment:	

I. Manure treatment/storage:	**J. Removal/emptying timing:**	**Comment:**
☐ Liquid manure storage, no cover		
☐ Liquid manure storage, cover		
☐ Liquid manure storage, cover and flare		
☐ Solid storage		
☐ Daily spread	N/A	
☐ Composting		☐ Static ☐ Active windrow ☐ Passive windrow
☐ Solid/liquid separation[1]	N/A	Type: Solids: ☐ Spread ☐ Bedding ☐ Exported ☐ Composted
☐ Anaerobic digester[2]		Type: Age:
☐ Other (specify):_____		

K. Which manure treatment/storage does the milking parlor waste go to?:	

Manure handling, manure storage/treatment, and grazing

Manure grouping guidelines

Pens on the farm can be condensed into "groups" and reported on the group sheet, rather than reporting information for each pen individually. Multiple pens can be combined into a single group sheet *if all pens meet the following criteria:*

1. The pens are of the **same type** (freestall, tiestall, open lot, etc.).
2. Animals in these pens have the **same grazing management** (if applicable), e.g. days with grazing access and hours per day on pasture.
3. Pens are bedded with the **same type of bedding**.
4. **Manure** from the pens is **managed in the same way**, e.g., you <u>cannot</u> combine two lactating pens where one pen's manure is daily spread, and the other goes to liquid storage.

In other words, if the responses on the group sheet are *the same for multiple pens,* you can combine those pens into a single group sheet (just remember to update animal totals!)

Example: A barn contains 6 pens:

Pen name	Pen type	Animal type	Bedding	Manure
Transition pen	Deep-bedded pack	Lactating	Sawdust; 1 ton/month	Scraped out to compost
High lactating	Freestall	Lactating	Sand	Flushed to slurry storage
Late lactating	Freestall	Lactating	Sand	Flushed to slurry storage
Hospital pen	Deep-bedded pack	Lactating	Sawdust; 2 tons/month	Scraped out to compost
Bred heifers	Freestall	Heifers >1 year	Sand	Flushed to slurry storage

The transition pen and hospital pen can be combined into one manure management group/sheet. The high lactating, late lactating and heifer pen can be combined into another manure management group/sheet. All four lactating pens **cannot** be combined into one group/sheet because they have <u>different beddings</u> and <u>different manure removal/management</u>. The number of lactating cows vs. heifers in the combined group would need to be given.

Group sheet instructions

Complete as many "group sheets" as needed based on the guidelines above.

A. Represents pen number(s) or name(s): Optional; list the names or IDs of pens that this group/sheet represents.

B. Pen type: Select the pen type that animals are housed in. For individual calf housing, select "Freestall".

- **"Open lot"**: State how many times <u>per week</u> the lot is harrowed (manure broken up and spread across lot surface to facilitate drying). State typical clean-out dates (e.g., manure is cleaned out of the pen on March 1st, June 15th, and October 31st).
- **Compost "bedded pack"**: State how many times <u>per week</u> the pack is tilled or mixed. State typical clean-out dates (e.g., the entire pack is cleaned out of the pen on January 1st and June 1st).

C. Typical number of animals: Give the typical or average number of animals housed in this group. If more than one animal type is included, <u>give the total number of each animal type</u> (e.g. 150 heifers and 50 dry cows).

D. % of animals grazing: For each animal type in the group, give the number <u>or</u> percent of animals that have grazing access (e.g. a group has 200 heifers, and 100 of them have grazing access, state 50% of heifers).

E. Grazing days per year: For each animal type in the group, give the number of days per year with grazing access.

F. Grazing hours/day: For each animal type in the group, state how many hours of the day they have grazing access during the grazing season.

G. Cleaning method: Select how manure is cleaned from this group. Select more than one if needed. Manual scraping includes use of a skid steer.

H. Bedding type: Select the bedding type used in this group. Give the amount used (e.g. tons/year). You can also give your bedding inventory allocation (e.g. 60% of total sand purchased). If more than one type of bedding is used, state in the comment box how the multiple bedding types are used (e.g., straw for 4 months in winter, sawdust for the rest of the year).

I. Manure treatment/storage: Select the manure treatment and/or storage that manure from this group is moved to. In the comment box, indicate the name/ID of the storage. If manure goes through multiple stages, label them in order or give details in the comment boxes.
- **Solid liquid separation**: Only select for mechanical-type separators (screw press, roller press, centrifuge, etc). Gravity-based separators (weeping walls, settling basins, etc.) should not be included. State the type of separator. If you have information on the solid removal rate, include this. State if separated solids are exported (e.g. sold), composted, field-applied (spread), or recycled as bedding.
- **Anaerobic digestion**: State **what type of digester** (continuous stirred tank reactor, plug flow, covered anaerobic lagoon, etc.), and the **approximate age of the digester** in years.

EXAMPLE:

I. Manure treatment/storage:	J. Removal/emptying timing:	Comment:
☒ Liquid manure storage, no cover – *stage 3*	*Pump down in April and October*	
☐ Liquid manure storage, cover		
☐ Liquid manure storage, cover and flare		
☐ Solid storage		
☐ Daily spread	N/A	
☐ Composting		☐ Static ☐ Active windrow ☐ Passive windrow
☒ Solid/liquid separation- *Stage 1*	N/A	Type: *Screw Press* Solids: ☐ Exported ☐ Composted ☒ Spread ☐ Bedding
☐ Anaerobic digester- *Stage 2*		Type: *CSTR* Age: *3yrs*
☐ Other (specify):_____		

If only some of the manure goes through the separator or digester (for example), make a note.

EXAMPLE:

I. Manure treatment/storage:	J. Removal/emptying timing:	Comment:
☒ Liquid manure storage, no cover – *stage 1, 30% + stage 3 (from digester)*	*Pumpdown in April and October*	
☐ Liquid manure storage, cover		
☐ Liquid manure storage, cover and flare		
☐ Solid storage		
☐ Daily spread	N/A	
☐ Composting		☐ Static ☐ Active windrow ☐ Passive windrow
☒ Solid/liquid separation- *stage 1, 70%*	N/A	Type: *Screw Press* Solids: ☐ Exported ☐ Composted ☒ Spread ☐ Bedding
☒ Anaerobic digester- *stage 2 (from separator)*		Type: *CSTR* Age: *3yrs*
☐ Other (specify):_____		

J. Removal: For each manure storage, state *when* during the calendar year manure is removed. E.g., a liquid storage is pumped down and field applied every 365 days on approximately May 1st; a liquid storage is pumped down every 6 months, on April 1st and October 1st; solid manure stacks are field applied every 3 months; compost is exported (sold) annually.