

**Manure Management Plan**  
**Nutrient Balance Worksheet User Guide**  
**Completing Nutrient Balance Worksheets for Manure Management Plans**

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The Manure Management Plan (MMP) must include manure application rates for each crop group on the operation. Farmers who want to determine rates that are more precise for their operation can use the MMP Nutrient Balance Worksheets instead of the rates provided in Appendix 1 – Manure Application Rate Tables.

This guide provides direction on how to complete the MMP Nutrient Balance Worksheets to determine a manure application rate for a crop group.

The MMP Nutrient Balance Worksheet format provides three options for a farmer to follow in order to determine appropriate manure and fertilizer application rates, taking into account the concerns relating to the application of nitrogen and phosphorus. All three options require that nitrogen not be applied above the amount that the crop will take up the given year, with phosphorus addressed by implementing one of the following options:

1. **P Removal** – Application rates based on phosphorus removal of the planned crop group. This option may be used for fields with no soil tests or soil test levels of greater than 200 ppm phosphorus.
2. **N Based** – Application rates based on the annual nitrogen requirements of the planned crop group. Soil tests for each field are required and the soil test levels must be less than 200 ppm phosphorus.
3. **P Index** – Application rates based on phosphorus removal or annual nitrogen requirements of the planned crops based on the guidance by the Pennsylvania Phosphorus Index. These rates must be determined by a certified nutrient management specialist.

Complete a worksheet for each crop group. The worksheet will need to list the fields covered by that worksheet. The same field is likely to appear on several worksheets for a particular farm, as there are various crops that may be grown on that field over the crop rotation for the farm.

# Manure Management Plan

## Nutrient Balance Worksheet

Crop Group	Yield	Fields where this crop group and manure group can be used.	
Manure Rate Planning Basis (check planning option)	OPTION 1 P Removal	OPTION 2 N Based	OPTION 3 P Index
	<ul style="list-style-type: none"> <li>Crop Phosphorus Removal Rates</li> <li>No soil tests required or</li> <li>Fields with soil tests &gt; 200 ppm P</li> </ul>	<ul style="list-style-type: none"> <li>Nitrogen Based Rates</li> <li>Soil tests required</li> <li>Fields with soil test &lt; 200 ppm P</li> </ul>	<ul style="list-style-type: none"> <li>P Removal or N Based Rates</li> <li>Soil tests required</li> <li>Determined by required P Index evaluation of each field</li> </ul>
	(Use the P <sub>2</sub> O <sub>5</sub> column to determine acceptable rate)	(Use the N column to determine acceptable rate)	(Use appropriate column based on the P Index to determine acceptable rate)
Manure Group	Application Season		Incorporation Timing

Completion of N column required for all options; P<sub>2</sub>O<sub>5</sub> column is optional for N based rates; K<sub>2</sub>O is optional for all rates.

	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
<b>A) Recommendation or Removal (lb/A)</b> N – Soil Test or Tables 1 & 2 (AG Table 1.2-5;1.2-7) P <sub>2</sub> O <sub>5</sub> & K <sub>2</sub> O – Soil Test or Table 3 (AG Table 1.2-8)			
<b>B) Fertilizer Applied (lb/A)</b> (Regardless of Manure e.g. Starter)			
<b>C) Other Organic Sources Applied (lb/A)</b> (e.g. Biosolids, Other Manure)			
<b>D) Residual Manure N (lb/A)</b> Table 4 (AG Table 1.2-14B)			
<b>E) Previous Legume N (lb/A)</b> Table 5 (AG Table 1.2-6) or Soil Test Report			
<b>F) Net Nutrient Requirement (lb/A)</b> (A – B – C – D – E)			
<b>G) Manure Nutrient Content (lb/ton or lb/1000gal)</b> Table 6 (AG Table 1.2-13) or Manure Analysis Report			
<b>H) Nitrogen Availability Factor</b> Table 7 (AG Table 1.2-14A)			
<b>I) Available Nitrogen (lb/ton or lb/1000gal)</b> (G x H)			
<b>J) Balanced Manure Rate (tons/A or gallons/A)</b> For N: (F ÷ I) For P: (F ÷ G)			
<b>K) Planned Manure Rate (tons/A or gallons/A)</b> Must be less than or equal to the appropriate Balanced Rate for the Manure Rate Planning Basis being used			

The “Nutrient Balance at Planned Rate” below is used to determine additional fertilizer needs at the planned manure rate. The N column must be completed to determine additional nitrogen (N) fertilizer needs. Completion of the P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O columns is optional and should be used to determine additional P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O fertilizer needs **ONLY** if soil test recommendations were used in (Row A).

<b>L) Nutrients Applied at Planned Rate (lb/A)</b> For N: (K x I) For P & K: (K x G)			
<b>M) Nutrient Balance at Planned Rate (lb/A)</b> (F - L) (Indicate short or excess)			

# Completing Nutrient Balance Worksheets

## Completing the Information Section

Three types of information need to be recorded in section at the top of the worksheet:

1. **Crop & Field Information** – List the crop group, yield, and fields that will grow this crop over the rotation.
2. **Manure Rate Planning Basis** – Check which option will be used to determine the manure application rate.
3. **Manure & Application Management** – List the manure to be applied, the season of application, and whether the manure will be incorporated and, if so, how quickly.

## Completing the Manure Application Rate Section

Before completing this part of the worksheet, determine which of the three nutrient columns (N, P<sub>2</sub>O<sub>5</sub> or K<sub>2</sub>O) will be completed. The N column must be completed on all worksheets. The P<sub>2</sub>O<sub>5</sub> column is optional for N based rates and the K<sub>2</sub>O column is optional for all rates. If soil test recommendations will be used as the basis of determining the manure rate, the nutrient balance numbers (Row M) are valuable in determining supplemental fertilizer needs. However, if crop removal figures are used as the starting point, the nutrient balance numbers are not a reliable indicator of additional fertilizer needs.

### Row A – Recommendation or Removal

- The recommendations are obtained from soil test reports. Crop removal figures come from Tables 1, 2 or 3. Soil test reports, if available, should be used instead of the nutrient removal tables.

### Row B – Fertilizer Applied

- The fertilizer nutrients listed here are from fertilizer, such as starter or herbicide carrier that will be applied regardless of the amount of manure nutrients applied.

### Row C – Other Organic Sources Applied

- In this row list the amount of nutrients from other sources such as other manure applications, biosolid applications, or uncollected manure on pastures.

### Row D – Residual Manure N

- This is an estimate of how much nitrogen will be available to the crop from previous manure applications. Use Table 4 to determine this value in the N column.

### Row E – Previous Legume N

- This is an estimate of how much nitrogen will be available to the crop following a previous legume crop. Use Table 5 to determine this value in the N column.

### Row F – Net Nutrient Requirement

- To obtain these values subtract the nutrient amounts from rows B, C, D and E from the recommendations in Row A.

### Row G – Manure Nutrient Content

- If available, list the manure analysis values or use Table 6 to obtain average book values of the manure being applied.

#### Row H – Nitrogen Availability Factor

- Only a portion of the total nitrogen is available to the crop in the year the manure is applied. Use Table 7 to select an N availability factor and list it in the N column. The table considers four aspects to determine this factor: the crop, season of application, application management with respect to incorporation, and the manure type use.

#### Row I – Available Nitrogen

- Multiply the nitrogen content of the manure (Row G) by the nitrogen availability factor (Row H) to obtain this number and list it in the N column.

#### Row J – Balanced Manure Rate

- Use the appropriate column to determine this manure rate. For P removal rates use the  $P_2O_5$  column. For N requirement rates use the N column.
- For nitrogen divide the net N requirement (Row F) by the available nitrogen (Row I) and place in the N column.
- For  $P_2O_5$  divide the net  $P_2O_5$  requirement (Row F) by the  $P_2O_5$  content of the manure (Row G) and place in  $P_2O_5$  column.
- The balance rate is the maximum amount of this manure type that can be applied for the nutrient being considered.

#### Row K – Planned Manure Rate

- This is the actual planned manure rate. The planned rate cannot exceed the balanced rate. It should be based on the application equipment capabilities determined by calibration.

#### Row L – Nutrients Applied at Planned Rate

- For nitrogen multiply the planned rate (Row K) by the available nitrogen (Row I).
- For  $P_2O_5$  and  $K_2O$  multiply the planned rate (Row K) by the manure nutrient content (Row G).

#### Row M – Nutrient Balance at Planned Rate

- Subtract the nutrients applied at the planned rate (Row L) from the net nutrients required (Row F).
- This will indicate if more fertilizer or other sources of nutrients are required to meet crop production (yield) goals. **Note:** Nutrient balances for  $P_2O_5$  and  $K_2O$  based on crop removal (Row A) should not be used to determine additional fertilizer needs. Only recommendations based on soil tests should be used for this purpose.

#### Transfer Planned Rate to Manure Management Plan Summary

The rate for each crop group should be listed in the “Planned Application Rate” column with NBS listed following the rate.

#### MMP Nutrient Balance Worksheet Examples

Following the tables are three examples of completed MMP Nutrient Balance Worksheets.

The first example is for **Option 1, Manure Rates Based on P Removal.**

The second and third examples are for **Option 2, Manure Rates Based on N Required.**

**Table 1. Nitrogen recommendations for agronomic crops.** (Table 1.2-5, Penn State Agronomy Guide)

These are base recommendations and should be adjusted for previous crop, previous manure history, and planned manure applications (see “Manure Nutrient Management” section).

Crop	Recommendation (lb N/unit* of expected yield)	Comments
Corn grain (bu/A)*	1	For better N efficiency, delay application of the nitrogen until the corn is between 10 and 20 inches tall. If the field has a history of manure and/or legumes, delay all of the N. If there is no history of manure and/or legumes, split the N, applying one-third near to planting and delaying the balance. Adjust this recommendation for any previous legume in the rotation (see Table 1.2-7) and for residual N from previous manure applications (see Tables 1.2-14 or 1.2-15). The PSNT or chlorophyll meter test can be used to refine N recommendations for corn, especially where manure is a major nutrient source.
Corn silage (ton/A)*	7	For better N efficiency, delay application of the nitrogen until the corn is between 10 and 20 inches tall. If the field has a history of manure and/or legumes, delay all of the N. If there is no history of manure and/or legumes, split the N, applying one-third near to planting and delaying the balance. Adjust this recommendation for any previous legume in the rotation (see Table 1.2-7) and for residual N from previous manure applications (see Tables 1.2-14 or 1.2-15). The PSNT or chlorophyll meter test can be used to refine N recommendations for corn, especially where manure is a major nutrient source.
Grain sorghum (bu/A)*	0.75	Adjust this recommendation for any previous legume in the rotation (see Table 1.2-7) and for residual N from previous manure applications (see Tables 1.2-14 or 1.2-15).
Forage sorghum (ton/A)*	7	Adjust this recommendation for any previous legume in the rotation (see Table 1.2-7) and for residual N from previous manure applications (see Tables 1.2-14 or 1.2-15).
Oats (bu/A)*	0.8	Apply the N with any other fertilizer before planting. Adjust this recommendation for any residual N from previous manure applications (see Tables 1.2-14 or 1.2-15).
Wheat/Rye (bu/A)*	1.0	If plants did not tiller well, apply N by mid-March; otherwise, apply any time up to growth stage 5. Adjust this recommendation for any residual N from previous manure applications (see Tables 1.2-14 or 1.2-15).
Barley (bu/A)*	0.8	If plants did not tiller well, apply N by mid-March; otherwise, apply any time up to growth stage 5. Adjust this recommendation for any residual N from previous manure applications (see Tables 1.2-14 or 1.2-15).
Small grain silage (ton/A)*	17	Apply at greenup in the spring.
Grass hay (ton/A)*	50	Split the nitrogen recommendation and apply it based on the expected yield for each cutting. For grass-legume mixtures, if the legume is more than 50% of the stand, the field should be managed as a legume; thus, no nitrogen is recommended. Adjust this recommendation for any residual N from previous manure applications (see Tables 1.2-14 or 1.2-15).

**Table 2. Nitrogen removal by legumes.** (Table 1.2-7, Penn State Agronomy Guide)

<b>Legume crop (no nitrogen application recommended)</b>	<b>Pounds of N removed/unit* of yield</b>	<b>Comments</b>
Alfalfa (ton/A)*	50	Although legumes will use N from manure and other sources, applying N may increase the competition from weeds and grasses. If you apply manure, limit it to an application rate that balances the crop's P requirement.
Clover (ton/A)*	40	Although legumes will use N from manure and other sources, applying N may increase the competition from weeds and grasses. If you apply manure, limit it to an application rate that balances the crop's P requirement.
Trefoil (ton/A)*	50	Although legumes will use N from manure and other sources, applying N may increase the competition from weeds and grasses. If you apply manure, limit it to an application rate that balances the crop's P requirement.
Soybeans (bu/A)*	3.2	Although legumes will use N from manure and other sources, applying N may increase the competition from weeds and grasses. If you apply manure, limit it to an application rate that balances the crop's P requirement.

**Table 3. Typical crop nutrient removal for phosphorus and potassium.** (Table 1.2-8, Penn State Agronomy Guide)

Crop (units)	Per unit of yield		Typical yield/A	Removal for given yield	
	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O		P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
Corn (bu)	0.4	0.3	150 (bu)	60	45
Corn silage (T) <sup>1</sup>	5.0	11.0	25 (T)	125	275
Grain sorghum (bu)	0.6	0.8	125 (bu)	75	100
Forage sorghum (T) <sup>1</sup>	3.0	10.0	15 (T)	45	150
Sorghum/sudangrass <sup>1</sup>	7.0	7.0	15 (T)	105	105
Alfalfa (T) <sup>2,3</sup>	15.0	50.0	5 (T)	75	250
Red Clover (T) <sup>2,3</sup>	15.0	40.0	3.5 (T)	55	140
Trefoil (T) <sup>2,3</sup>	15.0	40.0	3.5 (T)	55	140
Cool-season grass (T) <sup>2,3</sup>	15.0	50.0	4 (T)	60	200
Bluegrass (T) <sup>2,3</sup>	10.0	30.0	2.5 (T)	25	75
Wheat/rye (bu) <sup>4</sup>	1.0	1.8	60 (bu)	60	110
Oats (bu) <sup>4</sup>	0.9	1.5	80 (bu)	70	120
Barley (bu) <sup>4</sup>	0.6	1.5	75 (bu)	45	110
Soybeans (bu)	1.0	1.4	50 (bu)	50	70
Small grain silage (T) <sup>1</sup>	7.0	26.0	6 (T)	40	160

1. 65 percent moisture.

2. For legume-grass mixtures, use the predominant species in the mixture.

3. 10 percent moisture.

4. Includes straw.

**Table 4. Manure nitrogen availability factors for use in determining manure application rates based on planning conditions.** (Table 1.2-14B, Penn State Agronomy Guide)

**B. Historical Frequency of Manure Application on the Field**

To use this table, determine the frequency of manure application and move to the right in the row to determine the amount of residual N that is available from past manure applications. Deduct this amount of residual N from the basic N recommendation before determining any additional fertilizer or manure application rates.

	<b>Pounds N available to a Summer Crop (corn, grass hay, oats, etc)</b>	<b>Pounds N available to a Winter Crop (wheat, barley, rye, etc.)</b>	<b>Pounds N available to the Winter Crop in a Double Crop System</b>	<b>Pounds N available to the Summer Crop in a Double Crop System</b>
<b>Rarely received manure in the past (&lt;2 out of 5 years)</b> NOTE: If a field only received manure once out of 5 years, but this application was made the previous year, use the frequent credit for the following year.	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Frequently received manure (2–3 out of 5 years)</b>	<b>20</b>	<b>7</b>	<b>7</b>	<b>13</b>
<b>Continuously received manure (4–5 out of 5 years)</b>	<b>35</b>	<b>11</b>	<b>11</b>	<b>24</b>



**Table 5. Residual nitrogen contributions from legumes.** (Table 1.2-6 Penn State Agronomy Guide)

Previous crop <sup>1</sup>	Percent stand	High-productivity fields (Soil productivity group 1) <sup>2</sup>	Moderate-productivity fields (Soil productivity groups 2 & 3) <sup>2</sup>	Low-productivity fields (Soil productivity groups 4 & 5) <sup>2</sup>
<b>Nitrogen credit (lbs/A)</b>				
<b>First year after alfalfa</b>	>50 stand	120	110	80
	25–49 stand	80	70	60
	<25 stand	40	40	40
<b>First year after clover or trefoil</b>	>50 stand	90	80	60
	25–49 stand	60	60	50
	<25 stand	40	40	40
<b>First year after soybeans harvested for grain</b>	1 lb N/bu soybeans			

1. When a previous legume crop is checked on the Penn State soil test information sheet, the residual nitrogen for the year following the legume is calculated and given on the report. This credit should be deducted from the N recommendation given on the soil test report.
2. See Agronomy Guide Table 1.1-1 in the basic soils section for information on soil productivity groups.

**Table 6. Average daily production and total content of manure.** (Table 1.2-13 Penn State Agronomy Guide)

Animal type	Daily production	Manure % dry matter	Analysis units	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Comments
<b>Dairy cattle</b>							
Lactating cows, liquid	13 gal/AU/day	<5	lb/1,000 gal	28	13	25	Production does not include dilution. Analysis includes dilution to approximately 5% solids.
Lactating cows, solid	111 lb/AU/day	12	lb/ton	10	4	8	No bedding included in production or analysis figures. Use these analyses for estimating nutrients deposited on pastures by dairy cows, dairy dry cattle, and dairy young cattle.
Dry cow	51 lb/AU/day		lb/ton	9	3	7	
Heifer	60 lb/AU/day		lb/ton	10	3	7	
Calf	80 lb/AU/day		lb/ton	10	3	4	
<b>Veal</b>	7 gal/AU/day	2	lb/1,000 gal	19	13	25	Production does not include dilution. Analysis includes dilution.
<b>Beef cattle</b>							
Cow	90 lb/AU/day	12	lb/ton	11	7	10	No bedding included in production or analysis figures. Use these analyses for estimating nutrients deposited on pastures by a beef cow and calf, beef calves, and steers.
Calf	90 lb/AU/day	12	lb/ton	11	7	10	
Finishing cattle	65 lb/AU/day	8	lb/ton	14	5	8	
<b>Swine</b>							
Farrow to wean (includes sows)	11 gal/AU/day	2.5	lb/1,000 gal	18	18	11	Production includes a typical amount of in-barn dilution water but not rainfall for an outdoor storage, except for farrow to wean which also includes rainfall. Analysis includes dilution to approximately the % dry matter indicated.
Nursery	14 gal/AU/day	1.5	lb/1,000 gal	19	8	14	
Wean to finish	5.5 gal/AU/day	4	lb/1,000 gal	37	23	21	
Grow-finish	7 gal/AU/day	4	lb/1,000 gal	31	24	22	
<b>Swine, anaerobic lagoon</b>							These figures apply only to a treatment lagoon.
Supernatant	—	0.25	lb/1,000 gal	2.9	0.6	3.2	
Sludge	—	7.6	lb/1,000 gal	25	23	63	
<b>Sheep/Goats</b>	40 lb/AU/day	25	lb/ton	23	8	20	No bedding included in production or analysis figures. Use these analyses for estimating nutrients deposited on pastures by sheep.
<b>Horse</b>	55 lb/AU/day	20	lb/ton	12	5	9	No bedding included in production or analysis figures. Use these analyses for estimating nutrients deposited on pastures by horses.

Animal type	Daily production	Manure % dry matter	Analysis units	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Comments
<b>Poultry</b>							
Layer (364 d) <sup>1</sup>	26 lb/AU/day	41	lb/ton	37	55	31	
Pullet (126 d) <sup>1</sup>	48 lb/AU/day	35	lb/ton	43	46	26	
Light broiler (44 d) <sup>1</sup>	22 lb/AU/day	66	lb/ton	79	62	42	Production and analysis figures include litter.
Heavy broiler (57 d) <sup>1</sup>	20 lb/AU/day	75	lb/ton	66	63	47	Production and analysis figures include litter.
Turkey (tom) (123 d) <sup>1</sup>	13 lb/AU/day	60	lb/ton	52	76	42	Production and analysis figures include litter.
Turkey (hen) (88 d) <sup>1</sup>	11 lb/AU/day	65	lb/ton	73	88	46	Production and analysis figures include litter.
Duck (dry)	110 lb/AU/day	27	lb/ton	21	26	15	No bedding included in production or analysis figures.
Duck (wet)	13 gal/AU/day	5	lb/1000 gal	33	23	16	Production does not include dilution. Analysis includes dilution to approximately 5% solids.

Note: When possible, have manure analyzed. Actual values may vary over 100 percent from averages in the table.

1. Typical production days.

**Table 7. Manure nitrogen availability factors for use in determining manure application rates based on planning conditions.** (Table 1.2-14A, Penn State Agronomy Guide)

**A. Current Year**

To use this table find the *planned manure application season* in the left column, then move to the right in that row and select the *target crop utilization*. Continue to the right in that row to find the *nitrogen availability factor* for the *planned manure application management*. The manure nitrogen availability factor is the fertilizer equivalence of the manure N or the lb of fertilizer N equivalent per pound of total manure N. For example, if the N Availability Factor = 0.50, effectively there is the equivalent of 0.50 lb of fertilizer N for every pound of total N in the manure.

Planned manure application season	Planned manure target crop utilization	Application management	Nitrogen availability factor <sup>1</sup>		
			Poultry manure	Swine manure	Other manure
Spring or summer	Spring utilization by grass hay and small grains. Summer utilization by corn, other summer annuals, and grass hay.	Incorporation the same day	0.75	0.70	0.50
		Incorporation within 1 day	0.50	0.60	0.40
		Incorporation within 2–4 days	0.45	0.40	0.35
		Incorporation within 5–7 days	0.30	0.30	0.30
		Incorporation after 7 days or no incorporation	0.15	0.20	0.20
Early fall <sup>2,3</sup>	Early spring utilization by small grains, small grain silage, and grass hay, including the winter crop in a double crop system.	Incorporated less than 2 days	0.50	0.45	0.40
		Incorporated 3-7 days	0.30	0.30	0.30
		Incorporated more than 7 days or no incorporation	0.15	0.20	0.20
Early fall Additional N available to the summer crop in a double crop system from manure applied in the fall for the winter crop (above) <sup>2,4</sup>	Summer utilization by the second crop, corn or other summer annuals in a double crop system.	All methods of incorporation	0.15	0.20	0.20
Early fall with a cover crop not harvested and used as a green manure <sup>2</sup>	Summer utilization by corn, other summer annuals, and grass hay.	Incorporated less than 2 days	0.45	0.40	0.35
		Incorporated 3-7 days	0.25	0.25	0.25
		Incorporated more than 7 days or no incorporation	0.15	0.20	0.20

Planned manure application season	Planned manure target crop utilization	Application management	Nitrogen availability factor <sup>1</sup>		
			Poultry manure	Swine manure	Other manure
Early fall with no cover crop <sup>2</sup>	Summer utilization by corn, other summer annuals, and grass hay.	All methods of incorporation	0.15	0.20	0.20
Late Fall or Winter <sup>3</sup>	Spring utilization by small grains and grass hay.	All situations	0.50	0.45	0.40
	Following summer utilization by corn or other summer annuals.	No cover crop	0.15	0.20	0.20
		Cover crop harvested for silage	0.15	0.20	0.20
		Cover crop used as green manure	0.50	0.45	0.40
Grazing	Late spring through early fall grazing	Manure deposited more or less continuously by grazing cattle	----	----	0.20
	Year-round grazing	Manure deposited more or less continuously by grazing cattle	----	----	0.30

1. Multiply this factor times the manure N content to estimate the manure N available for the planning conditions.
2. Early fall would be when it is still warm enough for plant growth and microbial activity to continue (soil temperature >50°F at 2").
3. When manure is applied in the early fall to the winter crop in a double crop system, use these factors to determine the N available to the winter crop.
4. Use these factors to determine the N available from the fall application in a double crop system to the summer crop. These factors would be applied to the same manure application that was used for the winter crop (See footnote 3 above).
5. Late fall and winter is when it is so cold that there is no plant growth or microbial activity (soil temperature <50°F at 2 inches).

# Manure Management Plan

## Nutrient Balance Worksheet

Crop Group		Yield	Fields where this crop group and manure group can be used.	
<b>Corn Silage</b>		<b>21 T/A</b>	<b>All Fields</b>	
<b>Manure Rate Planning Basis</b> (check planning option)	<b>OPTION 1</b> P Removal	<b>X</b>	<b>OPTION 2</b> N Based	<b>OPTION 3</b> P Index
	<ul style="list-style-type: none"> <li>Crop Phosphorus Removal Rates</li> <li>No soil tests required or</li> <li>Fields with soil tests &gt; 200 ppm P</li> </ul>		<ul style="list-style-type: none"> <li>Nitrogen Based Rates</li> <li>Soil tests required</li> <li>Fields with soil test &lt; 200 ppm P</li> </ul>	<ul style="list-style-type: none"> <li>P Removal or N Based Rates</li> <li>Soil tests required</li> <li>Determined by required P Index evaluation of each field</li> </ul>
	(Use the P <sub>2</sub> O <sub>5</sub> column to determine acceptable rate)		(Use the N column to determine acceptable rate)	(Use appropriate column based on the P Index to determine acceptable rate)
<b>Manure Group</b>		<b>Application Season</b>		<b>Incorporation Timing</b>
<b>Dairy Liquid</b>		<b>Spring</b>		<b>No Incorporation</b>

Completion of N column required for all options; P<sub>2</sub>O<sub>5</sub> column is optional for N based rates; K<sub>2</sub>O is optional for all rates.

	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
<b>A) Recommendation or Removal (lb/A)</b> N – Soil Test or Tables 1 & 2 (AG Table 1.2-5;1.2-7) P <sub>2</sub> O <sub>5</sub> & K <sub>2</sub> O – Soil Test or Table 3 (AG Table 1.2-8)	<b>147</b>	<b>105</b>	<b>231</b>
<b>B) Fertilizer Applied (lb/A)</b> (Regardless of Manure e.g. Starter)	<b>10</b>	<b>20</b>	<b>10</b>
<b>C) Other Organic Sources Applied (lb/A)</b> (e.g. Biosolids, Other Manure)	<b>0</b>	<b>0</b>	<b>0</b>
<b>D) Residual Manure N (lb/A)</b> Table 4 (AG Table 1.2-14B)	<b>35</b>		
<b>E) Previous Legume N (lb/A)</b> Table 5 (AG Table 1.2-6) or Soil Test Report	<b>0</b>		
<b>F) Net Nutrient Requirement (lb/A)</b> (A – B – C – D – E)	<b>102</b>	<b>85</b>	<b>221</b>
<b>G) Manure Nutrient Content (lb/ton or lb/1000gal)</b> Table 6 (AG Table 1.2-13) or Manure Analysis Report	<b>28</b>	<b>13</b>	<b>25</b>
<b>H) Nitrogen Availability Factor</b> Table 7 (AG Table 1.2-14A)	<b>.2</b>		
<b>I) Available Nitrogen (lb/ton or lb/1000gal)</b> (G x H)	<b>5.6</b>		
<b>J) Balanced Manure Rate (tons/A or gallons/A)</b> For N: (F ÷ I) For P: (F ÷ G)	<b>NA</b>	<b>6539</b>	
<b>K) Planned Manure Rate (tons/A or gallons/A)</b> Must be less than or equal to the appropriate Balanced Rate for the Manure Rate Planning Basis being used	<b>6400 Gallons/Acre</b>		

The “Nutrient Balance at Planned Rate” below is used to determine additional fertilizer needs at the planned manure rate. The N column must be completed to determine additional nitrogen (N) fertilizer needs. Completion of the P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O columns is optional and should be used to determine additional P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O fertilizer needs **ONLY** if soil test recommendations were used in (Row A).

<b>L) Nutrients Applied at Planned Rate (lb/A)</b> For N: (K x I) For P & K: (K x G)	<b>36</b>	<b>83</b>	<b>160</b>
<b>M) Nutrient Balance at Planned Rate (lb/A)</b> (F - L) (Indicate short or excess)	<b>66 short</b>	<b>2 short</b>	<b>61 short</b>

## Manure Management Plan Nutrient Balance Worksheet

Crop Group		Yield	Fields where this crop group and manure group can be used.		
<b>Corn Silage</b>		<b>21 T/A</b>	<b>All Fields</b>		
Manure Rate Planning Basis (check planning option)	OPTION 1 P Removal	OPTION 2 N Based	X	OPTION 3 P Index	
	<ul style="list-style-type: none"> <li>Crop Phosphorus Removal Rates</li> <li>No soil tests required or</li> <li>Fields with soil tests &gt; 200 ppm P</li> </ul>	<ul style="list-style-type: none"> <li>Nitrogen Based Rates</li> <li>Soil tests required</li> <li>Fields with soil test &lt; 200 ppm P</li> </ul>		<ul style="list-style-type: none"> <li>P Removal or N Based Rates</li> <li>Soil tests required</li> <li>Determined by required P Index evaluation of each field</li> </ul>	
	(Use the P <sub>2</sub> O <sub>5</sub> column to determine acceptable rate)	(Use the N column to determine acceptable rate)		(Use appropriate column based on the P Index to determine acceptable rate)	
Manure Group		Application Season		Incorporation Timing	
<b>Dairy Liquid</b>		<b>Spring</b>		<b>No Incorporation</b>	

Completion of N column required for all options; P<sub>2</sub>O<sub>5</sub> column is optional for N based rates; K<sub>2</sub>O is optional for all rates.

	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
<b>A) Recommendation or Removal (lb/A)</b> N – Soil Test or Tables 1 & 2 (AG Table 1.2-5;1.2-7) P <sub>2</sub> O <sub>5</sub> & K <sub>2</sub> O – Soil Test or Table 3 (AG Table 1.2-8)	<b>150</b>	<b>0</b>	<b>0</b>
<b>B) Fertilizer Applied (lb/A)</b> (Regardless of Manure e.g. Starter)	<b>10</b>	<b>20</b>	<b>10</b>
<b>C) Other Organic Sources Applied (lb/A)</b> (e.g. Biosolids, Other Manure)	<b>0</b>	<b>0</b>	<b>0</b>
<b>D) Residual Manure N (lb/A)</b> Table 4 (AG Table 1.2-14B)	<b>35</b>		
<b>E) Previous Legume N (lb/A)</b> Table 5 (AG Table 1.2-6) or Soil Test Report	<b>0</b>		
<b>F) Net Nutrient Requirement (lb/A)</b> (A – B – C – D – E)	<b>105</b>	<b>(20)</b>	<b>(10)</b>
<b>G) Manure Nutrient Content (lb/ton or lb/1000gal)</b> Table 6 (AG Table 1.2-13) or Manure Analysis Report	<b>28</b>	<b>13</b>	<b>25</b>
<b>H) Nitrogen Availability Factor</b> Table 7 (AG Table 1.2-14A)	<b>.2</b>		
<b>I) Available Nitrogen (lb/ton or lb/1000gal)</b> (G x H)	<b>5.6</b>		
<b>J) Balanced Manure Rate (tons/A or gallons/A)</b> For N: (F ÷ I) For P: (F ÷ G)	<b>18,750</b>	<b>NA</b>	
<b>K) Planned Manure Rate (tons/A or gallons/A)</b> Must be less than or equal to the appropriate Balanced Rate for the Manure Rate Planning Basis being used	<b>8800 Gallons/Acre</b>		

The “Nutrient Balance at Planned Rate” below is used to determine additional fertilizer needs at the planned manure rate. The N column must be completed to determine additional nitrogen (N) fertilizer needs. Completion of the P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O columns is optional and should be used to determine additional P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O fertilizer needs **ONLY** if soil test recommendations were used in (Row A).

<b>L) Nutrients Applied at Planned Rate (lb/A)</b> For N: (K x I) For P & K: (K x G)	<b>49</b>	<b>114</b>	<b>220</b>
<b>M) Nutrient Balance at Planned Rate (lb/A)</b> (F - L) (Indicate short or excess)	<b>56</b>	<b>(134)</b>	<b>(230)</b>

# Manure Management Plan

## Nutrient Balance Worksheet

Crop Group		Yield	Fields where this crop group and manure group can be used.	
<b>Corn Silage After Alfalfa</b>		<b>21 T/A</b>	<b>All Fields</b>	
<b>Manure Rate Planning Basis</b> (check planning option)	<b>OPTION 1</b> <b>P Removal</b>	<b>OPTION 2</b> <b>N Based</b>	<b>X</b>	<b>OPTION 3</b> <b>P Index</b>
	<ul style="list-style-type: none"> <li>Crop Phosphorus Removal Rates</li> <li>No soil tests required or</li> <li>Fields with soil tests &gt; 200 ppm P</li> </ul>	<ul style="list-style-type: none"> <li>Nitrogen Based Rates</li> <li>Soil tests required</li> <li>Fields with soil test &lt; 200 ppm P</li> </ul>		<ul style="list-style-type: none"> <li>P Removal or N Based Rates</li> <li>Soil tests required</li> <li>Determined by required P Index evaluation of each field</li> </ul>
	(Use the P <sub>2</sub> O <sub>5</sub> column to determine acceptable rate)	(Use the N column to determine acceptable rate)		(Use appropriate column based on the P Index to determine acceptable rate)
<b>Manure Group</b>		<b>Application Season</b>		<b>Incorporation Timing</b>
<b>Dairy Liquid</b>		<b>Spring</b>		<b>No Incorporation</b>

Completion of N column required for all options; P<sub>2</sub>O<sub>5</sub> column is optional for N based rates; K<sub>2</sub>O is optional for all rates.

	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
<b>A) Recommendation or Removal (lb/A)</b> N – Soil Test or Tables 1 & 2 (AG Table 1.2-5;1.2-7) P <sub>2</sub> O <sub>5</sub> & K <sub>2</sub> O – Soil Test or Table 3 (AG Table 1.2-8)	<b>150</b>	<b>0</b>	<b>0</b>
<b>B) Fertilizer Applied (lb/A)</b> (Regardless of Manure e.g. Starter)	<b>10</b>	<b>20</b>	<b>10</b>
<b>C) Other Organic Sources Applied (lb/A)</b> (e.g. Biosolids, Other Manure)	<b>0</b>	<b>0</b>	<b>0</b>
<b>D) Residual Manure N (lb/A)</b> Table 4 (AG Table 1.2-14B)	<b>35</b>		
<b>E) Previous Legume N (lb/A)</b> Table 5 (AG Table 1.2-6) or Soil Test Report	<b>40</b>		
<b>F) Net Nutrient Requirement (lb/A)</b> (A – B – C – D – E)	<b>65</b>	<b>(20)</b>	<b>(10)</b>
<b>G) Manure Nutrient Content (lb/ton or lb/1000gal)</b> Table 6 (AG Table 1.2-13) or Manure Analysis Report	<b>28</b>	<b>13</b>	<b>25</b>
<b>H) Nitrogen Availability Factor</b> Table 7 (AG Table 1.2-14A)	<b>.2</b>		
<b>I) Available Nitrogen (lb/ton or lb/1000gal)</b> (G x H)	<b>5.6</b>		
<b>J) Balanced Manure Rate (tons/A or gallons/A)</b> For N: (F ÷ I) For P: (F ÷ G)	<b>11,607</b>	<b>NA</b>	
<b>K) Planned Manure Rate (tons/A or gallons/A)</b> Must be less than or equal to the appropriate Balanced Rate for the Manure Rate Planning Basis being used	<b>8800 Gallons/Acre</b>		

The “Nutrient Balance at Planned Rate” below is used to determine additional fertilizer needs at the planned manure rate. The N column must be completed to determine additional nitrogen (N) fertilizer needs. Completion of the P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O columns is optional and should be used to determine additional P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O fertilizer needs **ONLY** if soil test recommendations were used in (Row A).

<b>L) Nutrients Applied at Planned Rate (lb/A)</b> For N: (K x I) For P & K: (K x G)	<b>49</b>	<b>114</b>	<b>220</b>
<b>M) Nutrient Balance at Planned Rate (lb/A)</b> (F - L) (Indicate short or excess)	<b>16</b>	<b>(134)</b>	<b>(230)</b>