Section 1 Example: Animal Inventory

Current Meat Animal Inventory: Inventory of animals (in confinement housing or open lots) fed for meat production or replacements.

Information in Columns a-e is required for the permit application.					Information in Columns f-n will improve estimate of manure nutrient excretion.								
a. Species and Group	b. Describe Confinement and Location	c. Maximum One-Time Capacity (# of animals)	Average Weight (lbs.) d. Begin	Average Weight (lbs.) e. End	f. Average Days on Feed	g. Turns per Year	Daily Feed Intake h. Feed (lbs./day)[1]	Daily Feed Intake i. Moisture Basis	Feed Composition[1] j. % CP	Feed Composition[1] k. % P	Feed Composition[1] l. % K	Feed Composition[1] m. Moisture Basis	n. Fat Free Lean Index[2]
Example: Pigs/Finish	*Slatted floor barn…Barn 1*	*1,000*	*45*	*250*	*110 days*	*3*	*5,350 lbs.*	☒ As Fed ☐ Dry	*17%*	*0.6%*	*1%*	☐ As Fed ☒ Dry	
1. Beef Cattle	*Open Lot*	*2,500*	*745*	*1250*	*163*	*2*	*385,000*	☐ As Fed ☒ Dry	*18.7*	*0.49*	*1.3*	☐ As Fed ☒ Dry	
2.								☐ As Fed ☐ Dry				☐ As Fed ☐ Dry	
3.								☐ As Fed ☐ Dry				☐ As Fed ☐ Dry	

1. Both daily feed intake and feed composition should be measured on the same moisture basis (e.g. both on an "As Fed" basis).
2. Fat Free Lean Index is needed only for market hog. This measure should be available for market hogs at the time of slaughter.

Future Expansion Plans: No current plans for expanding animal number or open lot size.

Section 2 Example: Land Resources Inventory

Field ID: Pivot Field Size: 128 useable acres

Location: ____ ____ ____ ____ ☐ E ☐ W Pierce

¼ Section Township Range E or W County

Other Manure Sources: Is livestock manure from another facility applied to this site? ☐ YES ☒ NO
If yes, attach manure production information from the other facility.

Ownership: ☒ Own ☐ Rent ☐ Neighbor Is there a site agreement? ☐ YES ☒ NO

Cropping Practices: Planned rotation: Corn | Soybean | | | |

Five year average yields: 170 | 60 | | | |

Source of yield values: ☒ FSA verified yields or other ____

Environmental Considerations:

Is there a USDA approved conservation plan for this site? ☒ YES ☐ NO

Current Conservation Practices: Field is no-tilled planted following both corn and soybeans. Corn stalks are chopped in late winter.

Soil Type: Series & texture | Slope (avg.)

Primary Soil: Hord Hobbs Silt loam 0-7 %

Secondary Soil[1]: Crofton-Nora Silt Loam 7 to 11 %

Irrigated[1] ☐ No ☐ Flood ☒ Sprinkler 128 Acres

Depth to groundwater:[1] 80 feet

Distance to Nearest Body of Water: ____ feet

Does field contain:	YES	NO
Highly Erodible Land?	☐	☒
Perennial Stream?	☐	☒
Intermittent Stream?	☒	☐
Concentrated Flow?	☒	☐
Flooding/Overflow Potential?	☐	☒
Designated Wetlands?	☐	☒

Acres of wetlands: 0 acres.

Soil Phosphorus Levels[1]

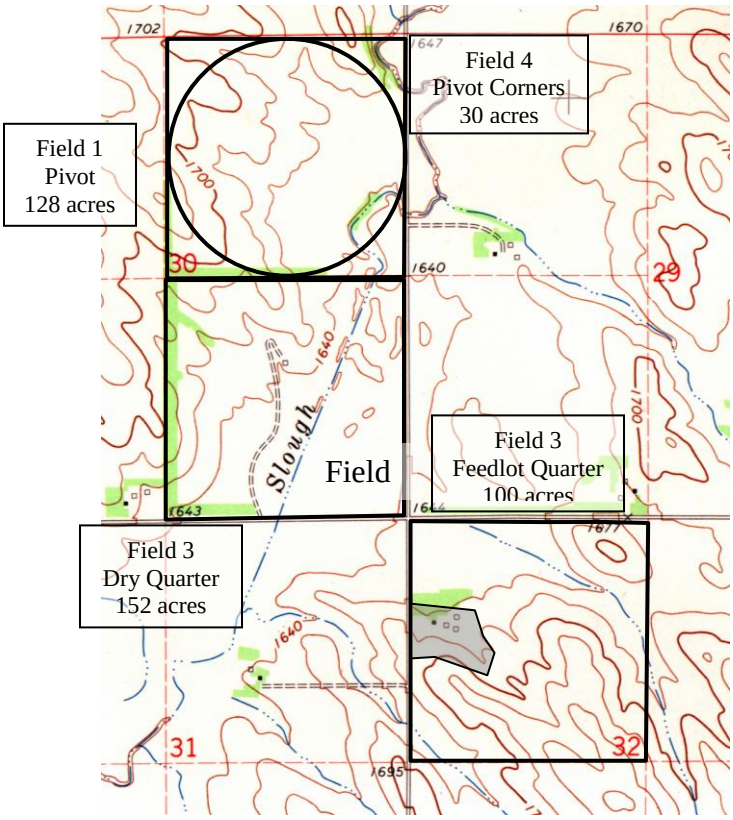
Management Areas		Soil Test	
Name/ID	Acres	P (ppm)	Method*
NE	35	27	Bray
SE	35	89	Bray
SW	35	60	Bray
NW	35	21	Bray

Sample Depth 8 inches Taken 11/20/2005

* B =Bray I, weak acid
M = Mehlich III
O = Olsen (sodium bicarbonate).
Write in test name if not one of these.

[1] Not required for NDEQ permit application.

Topographic map with 20 foot elevations (top map) and aerial map with soil types (bottom map) for available cropland managed by Beef Case Study Farm.



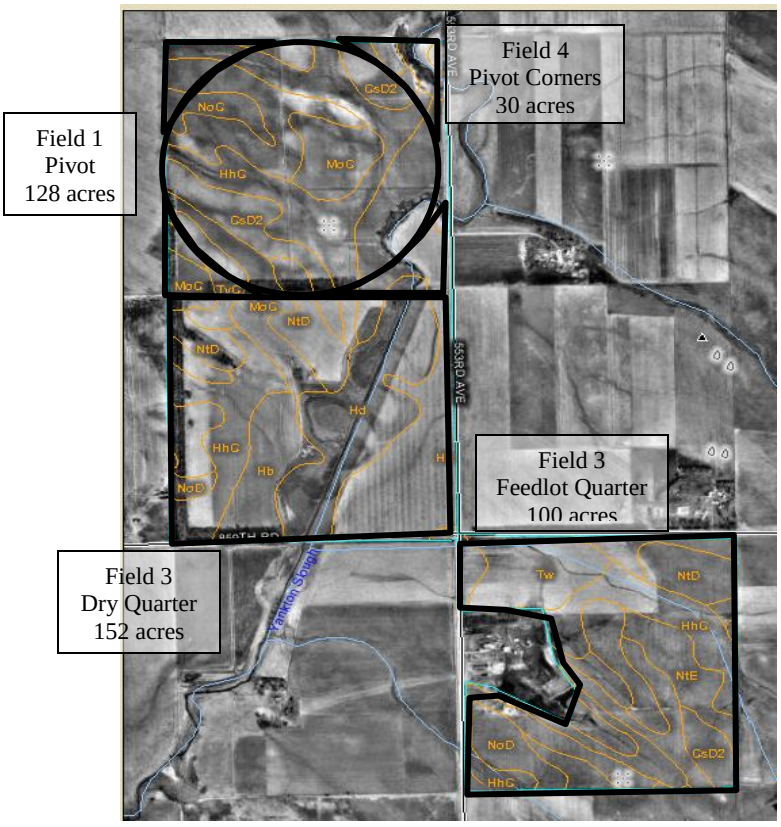


Table listing soil types, slope, acres and percentage in each soil type.

Pierce County, Nebraska (NE139)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BcC	Bazile soils, 1 to 7 percent slopes	18.4	4.0%
CsC2	Crofton-Nora silt loams, 1 to 7 percent slopes, eroded	2.0	0.4%
CsD2	Crofton-Nora silt loams, 7 to 11 percent slopes, eroded	79.6	17.2%
CsE2	Crofton-Nora silt loams, 11 to 17 percent slopes, eroded	0.7	0.2%
Hb	Hobbs silt loam	83.6	18.1%
Hd	Hobbs silt loam, occasionally flooded	42.2	9.1%
HhC	Hord-Hobbs silt loams, 0 to 7 percent slopes	91.4	19.8%
MoC	Moody silty clay loam, 1 to 7 percent slopes	41.8	9.0%
NoC	Nora silt loam, 1 to 7 percent slopes	7.1	1.5%
NoD	Nora silt loam, 7 to 11 percent slopes	22.9	5.0%
NtD	Nora-Thurman complex, 7 to 11 percent slopes	27.4	5.9%
NtE	Nora-Thurman complex, 11 to 17 percent slopes	12.2	2.6%
Sy	Silty alluvial land	4.4	0.9%
TnD	Thurman fine sandy loam, 7 to 11 percent slopes	0.8	0.2%
TvC	Thurman and Valentine soils, 1 to 7 percent slopes	7.6	1.6%
Tw	Trent silty clay loam	20.2	4.4%
W	Water	0.1	0.0%
Totals for Area of Interest (AOI)		462.3	100.0%

Section 3 Example: Land Application Equipment Inventory

Equipment Description

a. Equipment Description	b. Type of Equipment	c. Includes Incorporation Attachment?	d. Capacity	e. Typical Total Daily Application Rate	f. Time to haul or pump manure produced	g. Ownership of Land Application Equipment [1]	h. Manure Storage System Served by this Equipment
20 ton Truck mounted box spreader – rear discharge	☒ST ☐SS ☐CP ☐OS ☐FI ☐TH	☐ YES ☒ NO	20 ☒ tons/load ☐ gallons/min. ☐ gallons/load	600 ☒ tons/day ☐ gallons/day ☐ acre-in./day	10 days	☒ O ☐ L ☐ CA	Solids from open lots and solids settling bass
Big Gun Applicator	☐ST ☐SS ☐CP ☒OS ☐FI ☐TH	☐ YES ☒ NO	450 ☐ tons/load ☒ gallons/min. ☐ gallons/load	324,000 ☐ tons/day ☒ gallons/day ☐ acre-in./day	10 days for 25-yr, 24-hr storm event. 12 days for average annual runoff	☒ O ☐ L ☐ CA	Holding pond

Time Required for Land Application:

Solids: We collect between 5,000 and 6,000 tons of manure solids annually. With our current equipment, we spend approximately 10 days spreading manure solids. Manure is typically spread on corn land in December and on alfalfa immediately after first cutting in May.

Liquids: We collect less than 4 million gallons annually in our runoff holding pond. It requires approximately 20 days of 10-hour operating periods to land apply the liquids. Depending upon pond level, our preference is to use the water on alfalfa from April through September. However, if pond levels approach the marker level indicating that capacity needed for the 25-year, 24-hour storm, we apply liquid to alfalfa as soon as the soil has the ability to absorb the added liquid. At least part of the feedlot quarter is maintained in alfalfa in all years to provide a site for emergency application.

A 25-yr, 24-hr storm event is expected to produce approximately 3 million gallons of runoff. We can pump 324,000 gallons per day in a 12 hour per day pumping period. At this pumping rate, this storm event can be land applied in less than 10 days. If necessary, the 12 hour per day pumping period can be extended.

Type of Equipment: slurry tank…check "ST"; solids spreader…check "SS"; center pivot…check "CP"; other sprinkler…check "OS"; flood irrigation…check "FI"; towed hose tractor unit…check "TH"

Who owns this land application equipment? If Owned by livestock operation…check "O"; If Leased by livestock operation…check "L"; If equipment belongs to a Custom Applicator… check "CA

Section 4 Example: Manure Nutrient Production and Land Needs

Animal Performance Inputs

		Units
Live Weight of Cattle….		
Entering Feedlot (lbs.):	745	lb
Exiting Feedlot (lbs.):	1,250	lb
Targeted Grade for Marketed Beef:	Choice	
Number of Cattle (Single Turn):	2,500	beef feeder
Number of Cattle Finished per Year:	5,000	beef feeder
Average Days on Feed	163	days
Average Daily Gain	3.1	lb gain/day
Feed Use Efficiency	7.1	lb feed / lb gain

Animal Ration Inputs

Days on Feed	Feed Intake (lb dry wt./head/day)	Dry Matter Digestibility (% DB)	Organic Matter Digestibility (% DB)	Ash[2] (% Dry Basis)	Dietary Crude Protein (% Dry Basis)	Dietary Phosphorus (% Dry Basis)
163	22.00	80.0%	83.0%	4.0%	18.7%	0.49%

Nutrient Excretion by Livestock Summary

Feedlot	488,874	lbs. N/yr		76,256	lbs. P/yr

Nutrients Remaining After Storage Losses

	Amount Retained		% Retained	Amount Retained		% Retained
Feedlot	244,437	lbs. N/yr	50%	72,444	lbs. P/yr	95%
Collected Runoff	24,444	lbs. N/yr	5%	3,813	lbs. P/yr	5%

Nutrients Remaining After Field Application Losses

	Amount Retained		% Retained Org -N	% Retained NH_4-N	Amount Retained		% Retained
Feedlot	100,281	lbs. N/yr	50%	5%	72,444	lbs. P/yr	100%
Collected Runoff	12,711	lbs. N/yr	70%	50%	3,813	lbs. P/yr	100%

Crop Land Requirements if Manure Nutrients are Distributed According to Crop Nutrient Removal Rates

Land Base Identified	Nitrogen Available	Utilized	Remaining	P_2O_5 Available	Utilized	Remaining
3,670 ac	100,281 lb	100,281 lb	0 lb	165,896 lb	165,896 lb	0 lb
	850	acres to utilize N		3,670	acres to utilize P	

Crop Land Requirements if Runoff Nutrients are Distributed According to Crop Nutrient Removal Rates

Land Base Identified	Nitrogen Available	Utilized	Remaining	P_2O_5 Available	Utilized	Remaining
111 ac	12,711 lb	12,711 lb	0 lb	8,731 lb	8,731 lb	0 lb
	111	acres to utilize N		161	acres to utilize P	

Conclusion: Farm currently owns/manages 400 acres of crop land and will need to identify at least 560 acres in manage manure nitrogen immediately and an up to 3400 acres to manage manure phosphorus.

Section 5 Example: Manure Transfer Plan

1. Manure nutrients to be transferred to off-farm users.
The Beef Case Study farm will initiate a manure transfer program with the goal of moving 3,500 tons of manure per year to neighboring crop producers. During our first year, these products will be applied at no cost to the crop producer and applied at a rate designed to meet the crops nitrogen requirements. Side by side demonstration comparing commercial fertilizer and manure will be set up on at least three crop farm sites with an end of year comparison of yields.

The Beef Case Study farm will establish a nutrient management plan for each neighboring crop producer field receiving manure. It will also maintain records to document its implementation. All planning and record keeping will follow the same procedures as currently used on land owned by the beef case study.

If these demonstrations are successful, the beef case study farm will negotiate future prices for manure transfer with neighboring crop producers.

	a. Annual Quantity of Manure Transferred	N Transferred Off-Farm		P_2O_5 Transferred Off-Farm	
		b. Concentration From Manure Analysis	c. Total Annual Transfer (lbs.) [a x b]	d. Concentration From Manure Analysis	e. Total Annual Transfer (lbs.) [a x d]
f. Excess Manure Nitrogen			70,000		
Off-Farm Users: Crop Producers	3,500 ☒ Tons ☐ Gallons ☐ Acre-in	20 lb/ton	70,000 lb N	28 lb P_2O_5 / t	98,000 lb P_2O_5
h. Unused Manure Nitrogen *[Row f – Row g]*			0		

2. Services to be offered in support of manure transfer to off-farm users.

a. Handling and application services to be included with manure.

☒ Loading of manure ☒ Transport of manure to site
☒ Land application of manure ☐ Incorporation of manure

Describe: Animal feeding operation will load, haul and land apply manure according to a nitrogen rate specified in an NMP

b. Agronomic services to be included for assisting users in agronomic applications of manure.

☒ Calibration of manure applicator ☐ Soil testing
☒ Manure analysis ☐ Consulting agronomist
☒ Customer report following application of manure nutrient rates

Describe: Crop producer is responsible for collecting soil samples.

c. Nuisance avoidance services to be included with transfer of manure to off-farm user:

☐ Incorporation of manure ☐ Application setback from homes:_____
☐ Composting of manure ☒ Application setback from surface water: 100 ft
☐ Composting
☐ Notification of neighbors ☐ Other setbacks:
☐ Notification of local government ☐ Timing to limit nuisance:

Section 6 Example: Emergency Response Plan

Date: 11/20/XXXX

Farm Name and Location: Beef Case Study Farm

Potential Cause of Discharge. Possible situations which may require an *Emergency Response Plan*:

☐ Power failure ☐ Storm/extended wet period ☐ Accident

☒ Equipment failure Failure of berm or other facility component:

Describe: **Big Gun irrigator becomes stuck or delivery hose breaks**

In Case of an Emergency:

1. *Implement the following first response or containment steps:*

   a. Determine if any people have been hurt and, if so, call 911 and treat injured persons needs.

   b Cut power to pumping unit at the holding pond.

2. *Assess the extent of the emergency and determine required help. Collect the following information:*

☒ Description of emergency ☒ Quantity of manure/effluent released ☒ Required help

☒ Obvious damage: employee injury, fish kill, property damage ☒ Containment actions in progress

☒ Other: Identify if any manure has the potential for reaching Yankton Slough

3. Contact the farm's emergency response team leader: Joe Manager

Name: Joe Manager Phone: (402) XXX-YYYY

Name: Jane Owner Phone: (402) XXX-YYYY

4. Give the team leader the following information:

a. Your Name b. Spill/emergency location c. Information collected in *Step 2*

5. Available equipment/supplies for responding to emergency:

Equipment/Supplies	Contact Person	Phone Number
Square hay bales for containing spill	Feed storage area	
Township road grader	Jack Township	(402) XXX-YYYY
Feedlot tractor with blade		
Portable manure pump & tanker	Jim Neighbor	(402) XXX-YYYY

6. Contacts to be made by farm's emergency response team leader (discharge should be reported to NDEQ as soon as possible, but in no case less than within 24 hours of discovery):

Organization	Contact Person	Phone Number
NDEQ		(402) 471-2186
County contact (sheriff or other)	County Emergency Response Officer	(402) XXX-YYYY

7. Additional containment measures, corrective measures, or property restoration measures.

Build dyke around spill to minimize its movement toward Yankton Slough
Rover pooled manure with tanker and land apply on dry land.
Spread hay to absorb unrecoverable liquid

8. Will written report of accident or spill be submitted to NDEQ? ☒ Yes ☐ No

(Written report must be filed with NDEQ within five days.)

Section 7 Example: Estimating Crop Nutrient Requirements and Credits

Crops Grown: Corn, Soybeans, Alfalfa

Corn Nitrogen Need (lb/ac) = 35 + (1.2 × EY) - (8 × NO_3-N ppm) - (0.14 × EY × OM) (1)
- other N credits

Corn Phosphorus Need (lb/ac) = Removal Rate x EY x Years - P Credits (2)

EY = expected yield (bu/ac) = most recent 3-year yield average x 1.05 (3)
NO_3-N ppm = average nitrate-nitrogen concentration in the root zone (2 to 4 ft. depth) in parts per million,
OM = percent organic matter.
Years = Number of years crop P needs to be met by a single manure application
Other N credits = Legume Credits + Past Manure Credits (4)
+ Commercial Fertilizer Credit + irrigation water.
Other P credits = Past Manure Credits + Commercial Fertilizer Credit. (5)

Removal Rates	Units	N	P_2O_5
Corn	**lbs/bu**	**---**	**0.31**

Nutrient need for legume crops (pounds). Assumes 60% of legume fixed N is from manure.

Legume Manure N Need (lb/ac) = 0.6 x Removal Rate x EY - Other Credits (6a)

Legume Manure P Need (lb/ac) = Removal Rate x EY x Years - Other Credits (6b)

Removal Rates	Units	N	P_2O_5
Soybean	**lbs/bu**	**3.5**	**0.79**
Alfalfa	**Lbs/T.**	**46.2**	**9.3**

Commercial Fertilizer Credit (N and P): All commercial fertilizers applied are credited at rates equal to the full N and P values.

Irrigation Water Nitrate Credit:

Irrigation credit (lbs. N/ac.) = Inches applied X ppm Nitrate-N X 0.227 (7)

Legume Nutrient Credit (N only):

Previous Crop	Nitrogen Fertilizer Credits (lbs./acre)	
	Medium/Fine Soils	Sandy Soils
Soybeans	45	45
Soybeans < 30 bu./ac. due to season-long stress	1.0 lb./bu.	1.0 lb./bu.
Sugar beet tops, followed by dry beans	100	100
Alfalfa (70-100% stand, >4 plants/ft^2)	150	100
Alfalfa (30-69% stand, 1.5 to 4 plants/ft^2)	120	70
Alfalfa (0-29% stand, <1.5 plants/ft^2)	90	40

Past Manure Application Credit (N only):

Organic N Credit = Manure Application Rate x Organic-N content x Factor (8)
Factor for Next Year: 0.15
Factor for 2 Years From Now: 0.07
Factor for 3 Years From Now: 0.04

Section 8 Example: Estimating Manure Nitrogen Application Rates

Calculations:

N-Based Application Rate = Net Crop Nutrient Requirement / Crop Available Manure Nitrogen (9)

Crop Available Manure N (first year) = (NH4-N x Availability factor) + (Org-N x Availability factor) (10)

Example for surface applied solid beef manure with no incorporation:

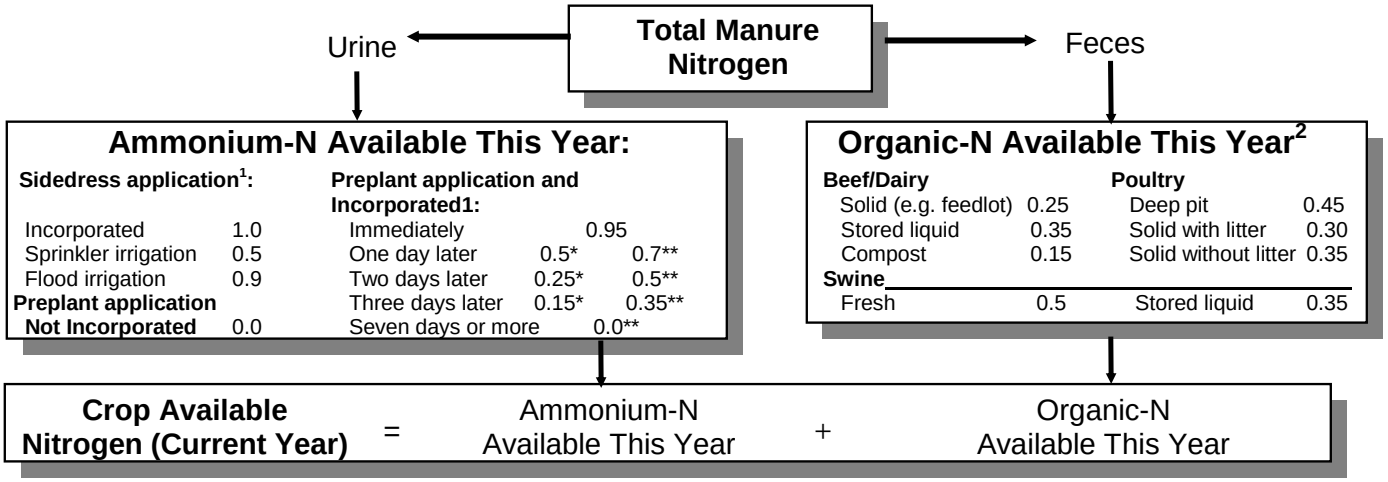
Crop Available Manure N (first year) = [4 x 0.0] + [14.5 x 0.25] = 3.6 lbs of crop available N/ton

Example for runoff holding pond liquid application through pivot:

Crop Available Manure N (first year) = [46 x 0.5] + [6 x 0.35] = 25 lbs of crop available N/acre-inch

Assumes manure sample for solids show 4 lbs NH_3-N/ton and 14.5 lbs Org.-N/ton and for holding pond water shows 46 lbs NH_3-N/ton and 6 lbs Org.-N/ton

Assumptions:



[1] Incorporation can be accomplished by tillage or by a 0.50 inch or greater rainfall.

2 Organic-N availability assumes spring seeded crops such as corn and soybeans. For winter or spring manure application prior to planting small grains, multiply organic-N availability factor by 0.7. For late summer or fall manure application prior to planting small grains, use the organic N values shown in Figure 1.

***Solid Manure; **Liquid Manure**

Section 9 Example: Estimating Manure Phosphorus Application Rates

Calculations:

P-Based Application Rate = Corn Phosphorus Need (2) / Manure P Content (11)

Corn Phosphorus Need was calculated previously in equation 2

Manure P Content is representative concentration of manure P from manure analysis

P-Index Interpretation: The Nebraska P-Index developed by the University of Nebraska (2006) will be used for analysis. The P Index risk value is the sum of the erosion and runoff components. The interpretation of risk and recommended manure application risk fall into one of four levels:

Low (0-2). Current practices keep water quality impairment low due to agricultural P pollution. Manure can be applied at rates sufficient to meet crop P needs.

Medium (2-5). Delivery of agricultural P many cause some water quality impairment and consideration should be given to alternative conservation and P management practices. Manure can be applied at rates sufficient to meet crop N needs.

High (5-15). Phosphorus loss from the field causes much water quality impairment. Remedial action, such as alternative conservation measures or P management practices, is required. Manure can be applied, but applied P should not exceed crop P removal. Crop P removal can be the sum of single year crop P removal over 5 years with no manure application during the next four years to this same field.

Very High (> 15). Impairment of water quality is extreme and remedial action is urgently required. Phosphorus application should be discontinued. Improved conservation measures should be implemented.

Requirements for application of a phosphorus-based manure rate to a field include:

a. No single manure application shall exceed the nitrogen-based rate of the planned crop receiving the particular manure application.
b. Phosphorus in manure should be considered 100 percent available unless soil phosphorus concentrations are below optimum levels for crop production. In that case, values suggested in State University extension publication PM 0000, “Managing Manure Nutrients for Crop Production” will be used.
c. If the actual crop schedule differs from the planned crop schedule, then any surplus or deficit of phosphorus shall be accounted for in the subsequent manure application.

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Assessment completed in 2007

Field	P-Index Value	Application Rate
Field 1 – Pivot	0.7	N-Based rate
Field 2 – Feedlot Quarter	1.2	N-Based rate
Field 3 – Dry Quarter (West)	10.3	P-Based rate – 4 year P supply for single application
Field 3 – Dry Quarter (East)	6.6	P-Based rate– 4 year P supply for single application

Nebraska Phosphorus Index

USDA NRCS Natural Resources Conservation Service

Nebraska Lincoln EXTENSION

Prepared by: ***Jane Doe***

Prepared for: ***Joe Farmer***

County	Pierce	Pierce	Pierce
Field	Field 1 - Pivot	Field 2 - Feedlot Qtr	Field 3 -Dry Qtr (West)
Option			
Erosion, S&R	2.0	1.0	7.6
Filter width	20-35 ft.	0-10 ft	20-35 ft.
Enrichment	Tillage	Perennial Forage and Grass	Tillage
Land use	Conservation Till without contou	Perennial Forage, Grass, or Hay	Conservation Till with contou
	High Residue Crop/Low residue	Meadow/grass hayland (non gra	Row crop High Residue/Low
Soil type	Hord-Hobbs silt loams, 0 to 7 pe	Nora silt loam, 7 to 11 percent sl	Nora silt loam, 7 to 11 percer
Soil P (ppm)	13.0	55.0	250.0
Applied P lbs	250.0	100.0	150.0
	Surface Application, No Incorpor	Incorporate or Inject Within 24 H	Select the application methoc
Irrigation	Sprinkler	Sprinkler	None
Rate gpm			
Furrow slope%			
Manure	7	0	5
P-Index Value	0.7	1.2	10.3

County	Pierce
Field	Field 3 -Dry Qtr (East)
Option	
Erosion, S&R	4.3
Sediment trap	None
Field radius	0.0
Filter width	20-35 ft.
Enrichment	Tillage
Land use	Conservation Till without contouring
	High Residue Crop/Low residue Crop - mt
Soil type	Hord-Hobbs silt loams, 0 to 7 percent slopes
Soil P (ppm)	278.0
Applied P lbs	150.0
	Surface Application, No Incorporation
Irrigation	None
Rate gpm	
Furrow slope%	
Manure	5
P-Index Value	6.6

0.4	0.4

P -Index Value 0 to 2 = Low risk, 2 to 5 = Medium risk, 5 to 15 = High risk, 15+ = Very high risk

IANR

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Section 10 Example: Protocols for Manure and Soil Sampling

Soil Sampling

	Field 1 – Pivot (Corn /soybean rotation)	Field 2 – Feedlot Quarter (3 yr alfalfa and 1 yr corn rotation)	Field 3 – Dry Quarter (Corn /soybean rotation)
Frequency and Soil Sampling for N and P	Pooled 8-inch deep soil samples will be collected every five years at a minimum. Field will be divided into quarters will soil samples collected from pivot irrigated areas. Four deep soil sample will be collected each year prior to corn production.	Pooled 8-inch deep soil samples will be collected every five years at a minimum. Field will be divided into three areas from which soil samples collected. Three deep soil sample will be collected each year.	Pooled 8-inch deep soil samples will be collected every five years at a minimum. Three samples will be collected from area west of Yankton Slough and one from area east of slough.. Four deep soil sample will be collected each year prior to corn production.
Sampling Procedures for N and P: (e.g. no. of cores / area, depth, acres / sample area, etc.)	Nebguide G91-1000-A, Guidelines for Soil Sampling, will be used as a basis for all procedures		
Sample Analysis Procedures for N and P:	☒ Soil nitrate ☒ Bray 1 for P ☐ Olsen for P Lab:_____ ☐ Melich III for P ☐ Other:_____		
Source (e.g. UNL) of Nitrogen and Phosphorus Recommendations	UNL Recommendations		

Additional Crop Nutrient Status Measurements

(e.g., other soil nitrate tests, irrigation water tests, chlorophyll meter readings, corn stalk nitrate test)

Test:	Separate stalk nitrate tests will be conducted for irrigated and dryland corn. Tests will be completed every third year

Timing of Selected Activities. Check appropriate months when practice should occur.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
8-inch samples											X	X
Deep soil Samples			X	X								

Manure Sampling

	Manure Handling System: Feedlot Manure Solids	Manure Handling System: Runoff Holding Pond Water
Manure Sampling Frequency:	Two samples taken annually associated with timing of each pen clean out period (typically May and November).	Annually
Sample Collection Procedures: (see publications No. 4 and 7, pg. 40)	Sample associated with May cleanout should be taken from stock piles just prior to land application. Sample associated with November cleanout should be taken at time of spreader loading (typically as pens are cleaned). Procedures defined in NebFact 02-507 "Manure Testing: What to Request?" and Nebguide G02-1450 "A Sampling Manures for Nutrient Analysis" will be followed.	One sample will be collected annually, typically during first pump out event in spring. Procedures defined in NebFact 02-507 "Manure Testing: What to Request?" and Nebguide G02-1450 "A Sampling Manures for Nutrient Analysis" will be followed.
Analysis to be Completed	☒ Total nitrogen (required) ☒ Ammonium nitrogen (required) ☒ Organic nitrogen (recommended) ☒ Phosphorus (recommended) ☒ Potassium ☒ Trace minerals ☒ Moisture or solids content (recommended) ☒ pH ☒ Electrical conductivity (recommended*) ☐ Other: _____	☒ Total nitrogen (required) ☒ Ammonium nitrogen (required) ☒ Organic nitrogen (recommended) ☒ Phosphorus (recommended) ☒ Potassium ☒ Trace minerals ☒ Moisture or solids content (recommended) ☒ pH ☒ Electrical conductivity (recommended*) ☐ Other: _____
Other: (e.g. laboratory used)		

Timing of Selected Activities. Check appropriate months when sampling should occur.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Manure sampling												
Solids at pen cleanout											X	
Solids from stockpiles							X					
From holding pond water			X									

Section 11 Example: Producer Instructions and Adjustments

Crop Nutrient Requirement Calculations

- All calculations are repeated annually based upon updated information on yields, previous crops, previous years manure applications, and commercial fertilizer application plans.

Application Rates

- Manure analysis is completed at least annually.
- Each field application rate is adjusted annually based on crop nutrient requirements, the results of the most recent P-Index, manure analysis, and the method of application.

Timing of Manure Application. Manure applications timing shall be adjusted to match a crop production year starting and ending in November for row crops. Timing will be adjusted to consider:

- Soil moisture conditions. Manure application timing may be adjusted if soil moisture levels present a risk for runoff or tile drains are flowing.
- Weather conditions and forecast. Forecasted precipitation suggests a potential for significant field runoff.
- Planned crop rotation is modified.

Solid Manure Spreader Calibration

$$\text{Rate per acre (T/ac)} = \frac{\text{Spreader Capacity T} \times 43560}{(\text{Width}^* \times \text{Travel Distance})}$$

* Distance moved over in field with each pass through field.

Example: 20 ton manure solids spreader makes a pass every 6 30”corn rows (15 feet) and empties spreader in 2400 feet is applying 24 tons per acre.

$$\textit{Rate per acre} = \frac{\textit{20 ton} \times \textit{43560}}{\textit{(15‘} \times \textit{2400’)}} = \textit{24 ton /acre}$$

Irrigation Application Calibration

a. Estimate pumping time: _____ hours
b. Estimate water flow rate: _____ gallons per minute
c. Estimate acres covered: _____ acres
d. Estimate application rate:

$$\text{Inches (or ac–in/ac)} = \frac{\text{Pumping Time} \times \text{Flow Rate}}{\text{Acres} \times 450} = \frac{\times}{\times\ 450} = \_\_\_\_\_ \text{ in.}$$

Records for cropping system nutrient plan

- Records are to be maintained which summarize verifiable yields, the results of the P-Index, previous crops, previous manure applications, and commercial fertilizer applied for all fields that will potentially receive manure.
- Records of manure analysis and the method of application on each field receiving manure shall also be maintained.

Recommended Records, Inspections, Logs	Sample Record
Strategic Plans/Records	
Standard operating procedures for: Soil testing Manure sample collection P Index Results	Section 6 of Strategic Plan
Annual or Continuously Updated Records Most items should be completed for each field or management area	
Field Nutrient Balance: a. Crop Available manure nutrient credit b. Annual pre-season plan for field-specific nitrogen and phosphorus balance summarizing planned crops, yields, nutrient credits for all nutrient sources). c. Post-season summary of crops grown, actual yields and nutrient balance	Part A, B, and C Of Annual Plan (Sect. 7, 8, and 9) or Annual Pre-Season Plan and Post-Season Summary for N and P (Heartland[1] – pg 26-27)
Application Plan for equipment operator: a. Annual application plan identifying location, rate, form, method, and timing for manure and fertilizer. b. Post season summary of manure and fertilizer application rate	Equipment Operators Nutrient Applicators Plan (Heartland[1] – pg 29)
Field specific nutrient application record: a. Date, rate, method and weather conditions (24 hours prior and following application) for manure application. b. Date and rate of fertilizer application c. Irrigation water use and nitrate analysis	Solid Manure And Irrigation Field Application Record (Heartland[1] – pg 30 & 32)
Testing and monitoring a. Field specific soil test results b. Manure source specific test results	Attach Lab Summary & Enter into Part B, Crop Available Nutrients (pg 6)
Application equipment records a. Application equipment calibration results b. Irrigation equipment checklist for backflow protection c. Irrigation equipment maintenance log	Solid Manure Spreader Calibration & Maintenance (Heartland[1] – pg 35-36, 39-40)
Report of all manure spills resulting from land application to permitting authority (phone notification in 24 hours and written report within 5 days…check with your permitting authority for possible differences in reporting times for your individual state.	Livestock Waste Discharge Notification (Heartland[1] – pg 21-22)
Annual Report (Submitted to permitting authority by January 31 of each year) a. Total number of acres of land that are covered by this facility's nutrient management plan b. Total number of acres of land where manure, litter, or process wastewater generated at this facility was spread. Include only land application areas that are under the control of this CAFO facility. c. Is the facility's nutrient management plan developed or approved by a certified nutrient management planner? d. Amount of manure, litter, and process wastewater that were generated at the facility in the 12 month period covered by this report.	Annual NPDES Report (Heartland[1] – pg 45-47)

[1] Heartland refers to Heartland Regional Water Quality project publication "Records Checklist and Samples for Animal Feeding Operations" found at http://www.heartlandwq.iastate.edu/ManureManagement/recordkeeping/checklistandforms/planrecordschecklist.

Section 12 Example: Annual Plan - Individual Field Expected Yields and Nutrient Requirements

Sample Calculations	Expected Yield (2007)	N Requirement (2007)	P_2O_5 Requirement (2007)
Field 1 – Pivot	[(163 + 158 + 166)/3] x 1.05 = 170	35 + (1.2 x EY) - (8 x 5) - (0.14 x 170 x 2) = 191	0.31 x 170 x 1 yr - 0 = 53
Reference:	Strategic Plan (equation 5)	Strategic Plan (equation 1)	Strategic Plan (equation 2)

Nitrogen Annual Field Plan

Field or Management Area: Field 1 – Pivot **Soil Organic Matter:** Yr.: 2006, 2.0 %. Yr.:____, ___.%

If irrigated: Acre-inches / year (for Col. h):6 **NO_3-N conc. of irrigation water:** Yr.: 2007, 9 ppm. Yr.:___, ____ ppm.

a. Year	b. Previous Crop	c. Planned Crop	d. Actual Yield / Expect-ed Yield bu./ac.	e. Soil Test Nitrate-N (average ppm)	f. Total Nitrogen Need or Removal (Ref. *Table R-5 to R-17)* (lbs./acre)	Nitrogen Credits (lbs./acre)			j. Fertilizer Nitrogen Credit (Starter, etc.) (lbs./ac.)	k. Net N Need Before Manure Applica-tion *(Cols. f–g – h – i – j)* (lbs./ac.)	l. Manure Applic. Option (write line no. from *Form 17, Col. a*)	m. Planned Manure Application Rate *(Form 17, Col. c)* (tons/ac, gal./ac, or in./ac.)	n. Rate of Manure Nitrogen Available *(Form 17, Col. j)* (lbs./ac.)	o. Extra Nitrogen Needed as Fertilizer *(Cols. k-n)* (lbs./ac.)
						g. Manure N from Past Years (*Form 17, Col. k-m*) (lbs./ac.)	h. Irrigation Water N (ppm x 0.227 x Ac.-in.) (lbs./ac.)	i. Legume / Green Man. N *(Ref. Table R-4)* (lbs./ac.)						
2004	soybean	corn	163											
2005	soybean	corn	158											
2006	corn	soybeans	166											
2007	soybean	corn	170	5	151	30	12	45	0	64	B	20 t/ac	73	0
2008	corn	soybeans												
2009														
2010														
2011														

Phosphorus Annual Field Plan

a. Crop Year	Manure Phosphorus Availability					Crop Phosphorus Balance								
	b. Manure Handling System	c. Planned Manure Application Rate	d. Manure Phosphorus (P_2O_5) Concentration from Analysis	e. Phos. Availability Factor (0.7 or 1.0)	f. Phosphorus Manure Credit (c x d x e) (lb./ac.)	Planned Crop g. Name	Planned Crop h. Expected Yield	i. Soil Test Phosphorus (ppm) & Method	j. Phosphorus (P_2O_5) Recommendation (lb./ac.)	k. P Fertilizer Application (P_2O_5) (lbs./ac.)	Crop P (P_2O_5) Removal (use only if no soil test is available) l. Factor *(See Table R-1)*	Crop P (P_2O_5) Removal (use only if no soil test is available) m. Total P Removed (h x l)	n. P_2O_5 Balance (Cols. f + k - m) (lbs./ac)	o. Potential Soil P_2O_5 Increase or Decrease (n ÷ 20) (ppm)
2004		☒ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac	☒ lbs./ton ☐ lbs./1000 gal ☐ lbs./ac-in		lbs./acre				lbs./acre			lbs./acre	lbs./acre	
2005		☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac	☐ lbs./ton ☐ lbs./1000 gal ☐ lbs./ac-in		lbs./acre				lbs./acre			lbs./acre	lbs./acre	
2006		☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac	☐ lbs./ton ☐ lbs./1000 gal ☐ lbs./ac-in		lbs./acre				lbs./acre			lbs./acre	lbs./acre	
2007	Beef open lot	20 ☒ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac	18.7 ☒ lbs./ton ☐ lbs./1000 gal ☐ lbs./ac-in	0.7	262 lbs./acre	Corn	170	13	- lbs./acre	0	0.31	53 lbs./acre	- 117 lbs./acre	6
2008		☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac	☐ lbs./ton ☐ lbs./1000 gal ☐ lbs./ac-in		lbs./acre				lbs./acre			lbs./acre	lbs./acre	
2009		☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac	☐ lbs./ton ☐ lbs./1000 gal ☐ lbs./ac-in		lbs./acre				lbs./acre			lbs./acre	lbs./acre	
2010		☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac	☐ lbs./ton ☐ lbs./1000 gal ☐ lbs./ac-in		lbs./acre				lbs./acre			lbs./acre	lbs./acre	
2011		☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac	☐ lbs./ton ☐ lbs./1000 gal ☐ lbs./ac-in		lbs./acre				lbs./acre			lbs./acre	lbs./acre	

Section 13 Example. Annual Plan - Crop Available Nutrients

Sample Calculations

	N – Current Year (2007)	N – Next Year (2007)	N – 2 yrs from now (2007)	N – 3 yrs from now (2007)	P_2O_5 Available (2007)
Scraped Solids from Pens:	30 x (4 x 0.0 + 14.5 x 0.25) = 109	30 x 14.5 x 0.15 = 65	30 x 14.5 x 0.07 = 30	30 x 14.5 x 0.04 = 17	
Reference:	Strategic Plan (equation 7)	Strategic Plan (equation 8)	Strategic Plan (equation 9)	Strategic Plan (assumption i)	

Results

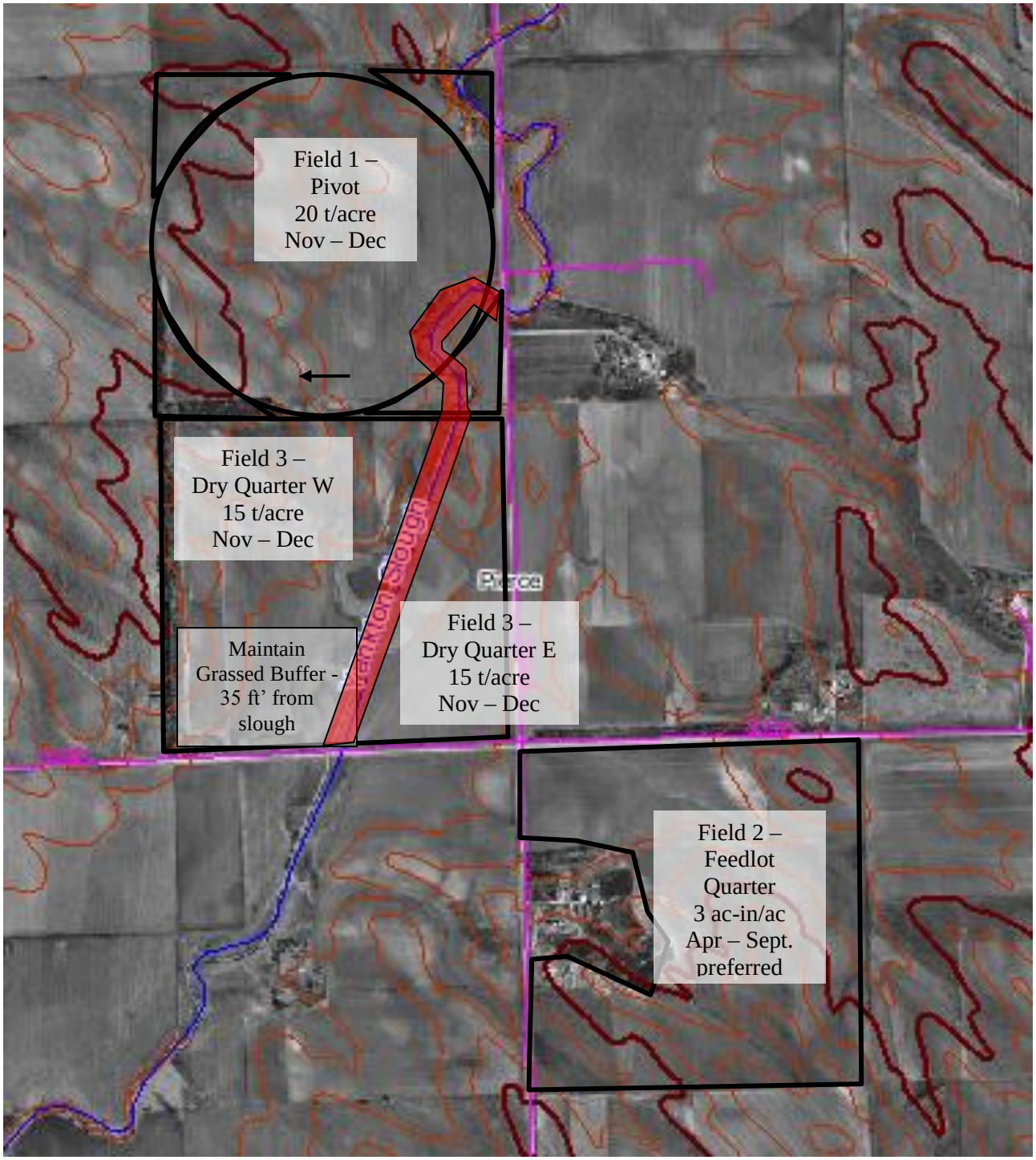
Manure Application Options				**Ammonium-N Available This Year**				**Organic-N Available This Year**				**j. This Year's Total N Available** (f + i) (lbs./ac)	**Organic-N Available**		
a. Option #	b. Manure Source, Season of Application, and Incorporation	c. Planned Application Rate		d. Ammonium-N Content ("as is" basis)		e. Available Factor (see *Figure 1*)	f. Available NH_4-N (c x d x e) (lbs./ac.)	g. Organic-N Content ("as is" basis)		h. Available Factor (see *Figure 1*)	i. Available Organic-N (c x g x h) (lbs./ac.)		k. Next Year (c x g x 0.15) (lbs./ac)	l. 2 Years from Now (c x g x 0.07) (lbs./ac.)	m. 3 years from Now (c x g x 0.04) (lbs./ac)
A	Beef feedlot manure solids, not incorporated	30	☒ tons/ac ☐ 1000 gal/ac ☐ ac-in/ac	4	☒ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in	0.0	0	14.5	☒ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in	0.25	109	109	65	30	17
B	Feedlot manure solids, not incorporated	20	☐ tons/ac ☐ 1000 gal/ac ☐ ac-in/ac	4	☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in	0.0	0	14.5	☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in	0.25	73	73	44	20	12
C	Feedlot manure solids, not incorporated	15	☐ tons/ac ☐ 1000 gal/ac ☐ ac-in/ac	4	☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in	0.0	0	14.5	☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in	0.25	54	54	33	15	9
D			☐ tons/ac ☐ 1000 gal/ac ☐ ac-in/ac		☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in				☐ Lbs./ton ☐ Lbs./1000 gal ☐ Lbs./ac-in						
E			☐ tons/ac ☐ 1000 gal/ac ☐ ac-in/ac		☐ tons/ac ☐ 1000 gal/ac ☐ ac-in/ac				☐ tons/ac ☐ 1000 gal/ac ☐ ac-in/ac						

Section 14 Example: Annual Plan - Action Plan

Year : 2007

Field ID	Manure Source	Planned Manure Application Rate		Incorporate Into Soil?	Manure Nutrient Applic. Rate (lbs./acre)		Suggested Timing of Manure Application	Commercial Fertilizer Rate (lbs./acre)		Application Instructions
					N	P_2O_5		N	P_2O_5	
Field 1 - Pivot	beef open lot solids	20	☒ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac	☐ Yes, ☒ No ___ days	73	170	☐J ☐F ☐M ☐A ☐M ☐J ☐J ☐A ☐S ☐O ☒N ☒D	0	0	35 ft. grass buffer on slough
Field 2 – Feedlot Quarter	holding pond liquid	3	☐ Ton/ac ☐ 1000 gal/ac ☒ ac-in/ac	☐ Yes, ☒ No ___ days	120	100	☐J ☐F ☐M ☒A ☒M ☒J ☒J ☒A ☐S ☐O ☐N ☐D As needed based upon storm events	0	0	
Field 3 – Dry Qtr (East)	beef open lot solids	15	☒ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac	☐ Yes, ☒ No ___ days	54	130	☐J ☐F ☐M ☐A ☐M ☐J ☐J ☐A ☐S ☐O ☒N ☒D	0	0	35 ft. grass buffer on slough
Field 3 – Dry Qtr (West)	beef open lot solids	15	☒ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac	☐ Yes, ☒ No ___ days	54	130	☐J ☐F ☐M ☐A ☐M ☐J ☐J ☐A ☐S ☐O ☒N ☒D	0	0	35 ft. grass buffer on slough
			☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac	☐ Yes, ☐ No ___ days			☐J ☐F ☐M ☐A ☐M ☐J ☐J ☐A ☐S ☐O ☐N ☐D			
			☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac	☐ Yes, ☐ No ___ days			☐J ☐F ☐M ☐A ☐M ☐J ☐J ☐A ☐S ☐O ☐N ☐D			
			☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac	☐ Yes, ☐ No ___ days			☐J ☐F ☐M ☐A ☐M ☐J ☐J ☐A ☐S ☐O ☐N ☐D			
			☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac	☐ Yes, ☐ No ___ days			☐J ☐F ☐M ☐A ☐M ☐J ☐J ☐A ☐S ☐O ☐N ☐D			
			☐ Ton/ac ☐ 1000 gal/ac ☐ ac-in/ac	☐ Yes, ☐ No ___ days			☐J ☐F ☐M ☐A ☐M ☐J ☐J ☐A ☐S ☐O ☐N ☐D			

Fields Owned or Managed by Beef Case Study Feeding Operation



Manure Nutrient Excretion Estimator. Total nutrients excreted by a livestock based on feed ration inputs.

This worksheet only considers feed intake and not feed disappearance. If excess feed ends up in the manure, then the amount of excess feed and its nutrients needs to be added to the nutrient excreted values for an accurate estimation.

Date:_____

I. Feed Nutrient Intake

Animal Group	A. Daily Feed Intake (lbs DM/day)	B. Feed Nutrient Concentration			C. Total Nutrient in Feed (lbs) = A X B	
		Protein	N[a]	P	N (lbs)	P (lbs)
Beef Example	*27,000*	*0.135*	*0.0216*	*0.0035*	*583*	*94.5*

II. Nutrients Retained

a. **Animal**

Animal Group	D. Number of Animals	E. Average Daily Gain	F. Live Weight Nutrient Concentration		G. Nutrients Retained by Animal (lbs) = D x E x F	
			N	P	*N (lbs*	P (lbs)
Beef Example	*1,000*	*4.08*	*0.016*	*0.0070*	*65.3*	*28.6*
Beef			0.016	0.0070		
Dairy			0.012	0.0070		
Pork			0.023	0.0072		
Hens			0.022	0.0060		
Broilers			0.026	0.0060		
Turkeys			0.021	0.0060		

b. **Animal Products**

Animal Product	H. Production (lbs/day)	I. Animal Products Nutrient Concentration		J. Nutrients Retained by Animal Products (lbs) = H x I	
		N	P	N (lbs)	P (lbs)
Milk[b]		0.0050	0.0010		
Eggs[b]		0.0166	0.0021		

III. Nutrients Excreted

Animal Group	K. Days Fed per Year	L. Animal Nutrient Excreted in Elemental Form = K x (C - G) or = K x (C - J)		
		N (lbs/yr)	P (lbs/yr)	P_2O_5[c] (lbs/yr)
Beef Example	*350*	*181,195*	*23,065*	*52,358*

CALCULATION SPACE

[a] N in feed = Protein ÷ 6.25

[b] N in milk = Protein ÷ 6.28; N in eggs = Protein ÷ 6.25; Assumes 3.2% and 10.4% protein in milk and eggs, respectively.

[c] lbs P_2O_5 = lbs P x 2.29