

Economic Evaluation

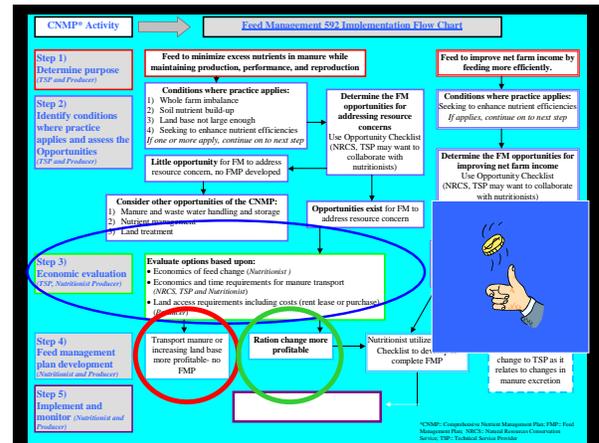
Comparing a Ration Change
Vs
Manure Transport

Step 3





A Key Ingredient in Livestock and Poultry Nutrition Management



Economic Evaluation

Is it more profitable to change diet or spread manure further?

- Economics of feed change (*Nutritionist*)
- Economics and time requirements for manure transport (*NRCS, TSP, and Nutritionist*)
- Land access requirements including costs (*Producer*) (*Rent, lease, or purchase*)



Introduce Tool

Software Name: FNMPS

Purpose: Develop farm specific evaluation of economics related to nutrient management as impacted by feed management.



Model Inputs:

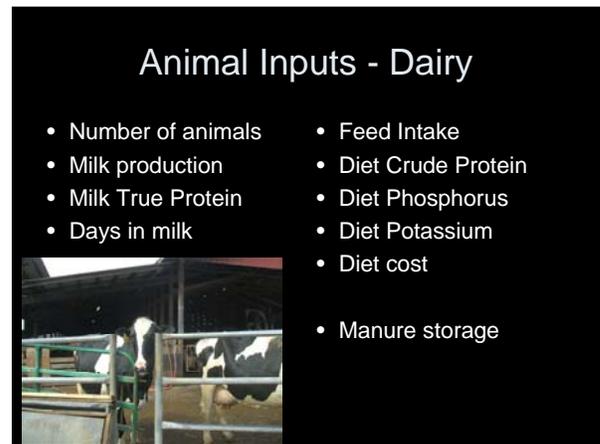
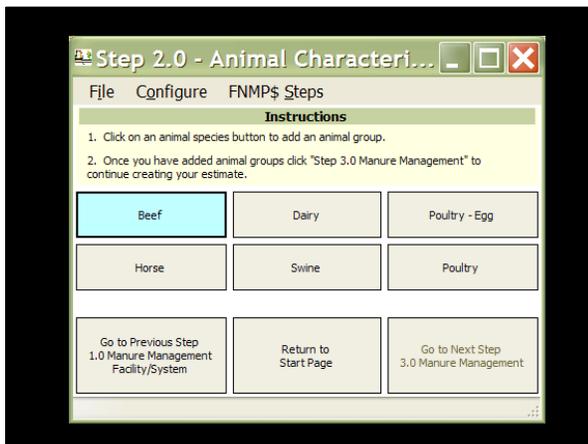
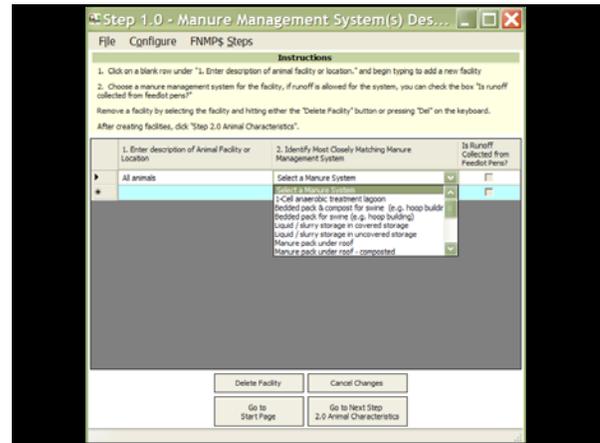
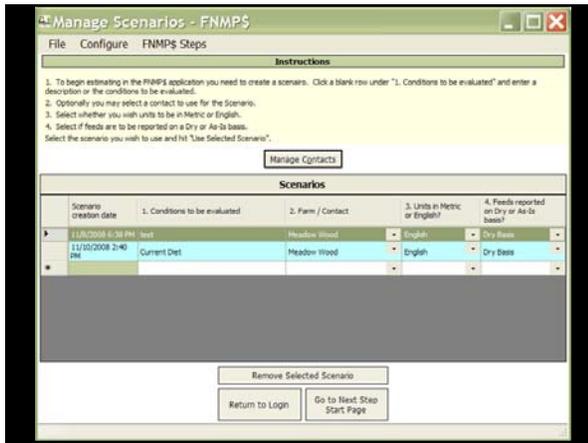
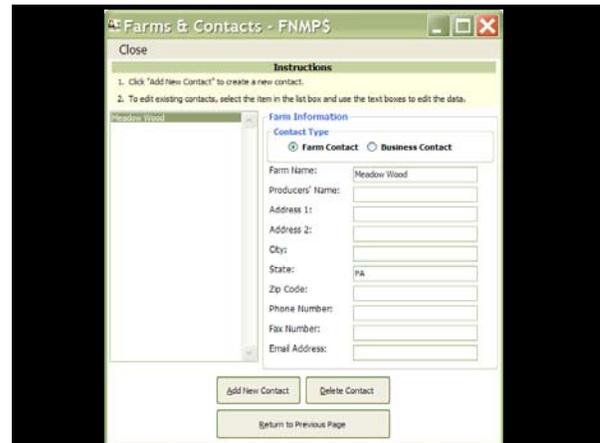


- Feed and animal performance
- Housing and manure storage
- Land available for manure application
- Manure handling equipment
- Economic variables

Model Outputs:



- Farm specific nutrient production.
- Land required for nutrient spreading.
- Time requirements for manure application.
- Cost and Value of manure application.



Dairy Cattle Animal & Feed Management Characteristics

Instructions

- Enter a group description, selecting the manure management facility/system the group is housed at, and choose the type of dairy cattle.
- Enter the following animal characteristics and click "Return to Dairy Summary" to save changes.

For lactating dairy cattle, choose the type of equation to use for estimating nitrogen and phosphorus excretion.

View Results

Group Description: **Default Values**

Manure Management Facility/System:

Type of Dairy Cattle:

Average Body Weight (lb):

Average Milk Production (lb/day/animal):

Average Milk True Protein (%):

Average Number of Animals in Group:

Feed Intake (lb dry wt./head/day):

Feed Moisture Content (%):

Dietary Crude Protein (% Dry Basis):

Dietary Phosphorus (% Dry Basis):

Dietary Potassium (% Dry Basis):

Portion Manure Collected (%):

Feed Cost (\$/head/day):

Lactating Cow Estimate Type
For estimating nitrogen and phosphorus excretion of lactating cows, do you prefer

Regression Equation Estimate
 Mass Balance Estimate

Step 2.2.0 - Dairy - Summary - FNMP5

File Configure FNMP5 Steps View Report

Group Description	Manure Management Facility/System	Dairy Cattle Type	Average Milk Production (lb/day/animal)	Average Number of Animals in Group	Feed Intake (lb dry wt./head/day)	Dietary Crude Protein (% Dry Basis)	Dietary Phosphorus (% Dry Basis)	Dietary Potassium (% Dry Basis)	Feed Cost (\$/head/day)	Total Feed Cost (\$/head)
Lactating Cows	Main (Multi-cell anaerobic treatment lagoon)	Lactating Cows	90.00	110	50.00	17.7	0.39	1.28	56.25	\$210,000
Cows in dry off	Main (Multi-cell anaerobic treatment lagoon)	Lactating Cows	42.00	43	40.00	16.5	0.38	1.28	48.00	\$107,070
Heifers <1220lb	Main (Multi-cell anaerobic treatment lagoon)	Lactating Cows	115.00	100	36.50	17.7	0.39	1.28	36.25	\$360,830
High group	Main (Multi-cell anaerobic treatment lagoon)	Lactating Cows	105.00	100	345.00	17.7	0.39	1.28	66.25	\$228,125
Bedded Pack	Bedded Pack (Manure pack under roof)	Lactating Cows	75.00	27	40.00	16.5	0.38	1.28	45.00	\$95,145
Lactating Cows	Main (Multi-cell anaerobic treatment lagoon)	Lactating Cows	90.00	100	47.00	17.7	0.39	1.28	60.25	\$228,125
Heifers 400-1050lb	Main (Multi-cell anaerobic treatment lagoon)	Heifers	0.00	80	17.00	16	0.37	1.17	40.00	\$40,800
Heifers 1050-1400lb	Main (Multi-cell anaerobic treatment lagoon)	Heifers	0.00	50	22.00	16	0.37	1.04	42.00	\$26,300
Heifers 1400-1800lb	Bedded Pack (Manure pack under roof)	Heifers	0.00	40	20.00	16.5	0.38	1.1	41.00	\$21,900
Dry Cows	Bedded Pack (Manure pack under roof)	Dry Cows	0.00	20	27.00	16	0.37	1.4	44.00	\$44,800
Age 0-90 days	Bedded Pack (Manure pack under roof)	Dry Cows	0.00	30	27.00	12	0.34	1.30	43.00	\$63,675

Instructions

Add a new group by clicking the Add New Dairy Group button.

Update a group by either selecting the item in the Animal Summary grid and clicking Update Dairy Group, or clicking Update on the item in the Animal Summary grid.

Remove a group by selecting the item in the Animal Summary grid and either clicking Delete on the toolbar or clicking Remove Dairy Group.

After creating your groups, click "Go to Step 3.0 Manure Management" to set up your manure systems.

- ## Manure Outputs
- Nutrient Excretion
 - N P K
 - Nutrients Harvested
 - N P K after storage loss
 - Manure Mass
 - Volume (if liquid)

Step 3.0 - Excreted and Harvested Manure Nutrients and Solids

File Configure FNMP5 Steps View Report

Instructions

- Update the manure management factors for your manure management facilities/systems, select one of them below and click "Update Manure Management Factors".
- After updating the manure management factors for each manure management facility/system, click "Step 4.0 Crop System".

You can view a detailed report of excreted manure by animal species by clicking "View as Excreted Manure".

Current Facilities in Scenario

Manure Management Facility/Sys	Manure Nitrogen Excreted (lb)	Nitrogen Harvested (lb)	Nitrogen Excreted (\$/year)	Nitrogen Harvested (\$/year)	Manure Phosphorus Excreted (lb)	Phosphorus Harvested (lb)	Phosphorus Excreted (\$/year)	Manure Potassium Excreted (lb/year)	Manure Potassium Excreted (\$/year)	Dry Weight of Manure Excreted	Total Harvested Manure (1,000 gallons/yr)	Manure Volume (1,000 gallons/yr)
Main (Multi-cell anaerobic treatment lagoon)	425,686	42,569	\$36,353	\$3,635	93,020	32,557	\$37,411	87,590	\$61,313	5,073	15,100	3,438
Bedded Pack (Manure pack under roof)	28,742	20,120	\$17,102	\$3,850	3,850	3,850	\$4,427	14,342	\$10,040	282	685	0

- ## Additional Manure inputs
- Nutrient and solids retention
 - Bedding additions
 - Manure moisture content
- 

Step 3.1 - Manure Manage...

Close

Current Manure Management Facility/System: Main (Multi-cell anaerobic treatment lagoon)

Nitrogen, Phosphorus, and Potassium **Solids**

Nitrogen to be managed annually after losses from housing, storage, and land application

Manure Nitrogen Excreted (lb/yr): **Default Values**

Available Nitrogen after housing and storage loss

Available after storage (%):

Amount Retained from Storage (lb/yr):

Phosphorus and potassium to be managed annually after losses from housing, storage, and land application

Manure Phosphorus Excreted (lb/yr): **Default Values**

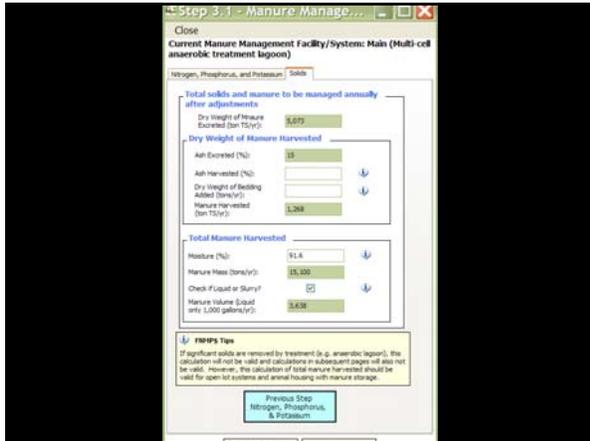
Available Phosphorus after housing and storage loss

Available after storage (%):

Amount Retained from Storage (lb/yr):

Potassium

Excreted (lb/yr):



End here or continue with crops?

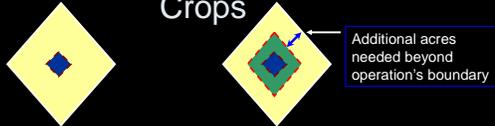
Use outputs for estimated manure amount and nutrient content

Input: Crop Information

- Crop
- Yield
- Estimated OR your value for crop requirements
- Additional fertilizers applied
- Fertilizer value



Crops



Minimal inputs:

- Crops in region
- Crop yields
- Manure application methods

Outputs:

- Estimated amount of total acres needed

Detailed inputs:

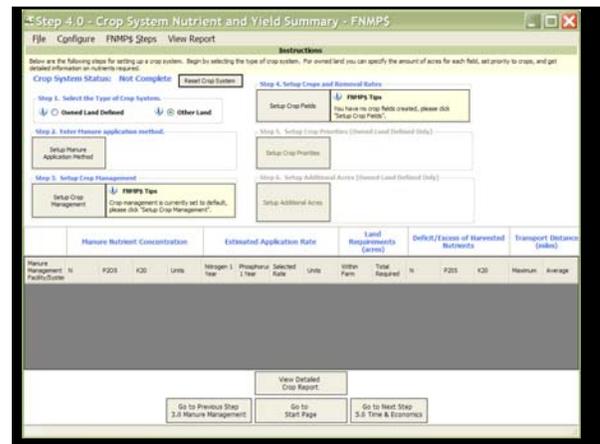
- Defined acreage
- Crop type and yield
- Manure application methods

Outputs:

- Estimated excess/deficiency of nutrients

Other Inputs

- Equipment type and costs*
 - Driving distance
 - Fuel costs
 - Labor
- Manure nutrient availability

Application information

Step 4.1.2 - Manure Application Method / Distance to Crops - FN...

Close **Instructions**

1. For each of your facilities below, select the manure application method.
 2. After setting the application method, you can adjust the amount of Organic Nitrogen, Ammonium Nitrogen, and Phosphorus Availability to Crop.

Manure Management Facility/System	Application Method	Application Days to Incorporation (Broadcast Only)	Soil Conditions (Broadcast Only)
Manure P245 (off-animal treatment)	Broadcast Incorporation		
Bedded Pack Manure (pack under roof)	Surface Broadcast	1	Cool Soils

Nitrogen Availability to Crop **Default Values**

Organic Nitrogen (%):

Ammonium Nitrogen (%):

Crop Available Nitrogen (lb/yr):

Phosphorus Availability to Crop **Default Values**

Phosphorus Availability to Crop (%):

Crop Available Phosphorus (lb-P/yr):

Save Cancel

Step 4.1.3 - Crop Management ...

Close **Instructions**

1. Enter the following crop management information and click "Save / Return to Crop System Summary".
 2. Placeholder about manure application rates.

What is the total amount of acres available within the farm, owned / rented / leased land? acres

What is the basis for determining manure application rates?

For estimation of transport distance please select the closest manure management facility/system to the crops, or select "Equal distance".
 Enter fertilizer prices:

Default Values

Nitrogen (\$ per [lb] of N):

Phosphorus (\$ per [lb] of P2O5):

Potassium (\$ per [lb] of K2O):

Save Cancel

Current Crops

Instructions

1. Enter the following information about crop fields, you can either use the text boxes, or the table below.
 1. Enter information about crops receiving manure.

Field Description:
 Identify Crop in the Area:

Crop Yield (Dry Basis): Typical Yield Units Dry Matter %

Acres:

2. Estimated Crop Nutrient Uptake ([lb] of nutrient/acre) **Estimated Value**

Nitrogen:

Phosphorus:

3. Crop Nutrient Credits from Non Manure Sources ([lb] nutrient/acre)

Nitrogen:

Phosphorus:

Add Crop Delete Crop

Description of Field	Identify Crop in the Area	Acres	Yield	Nitrogen Crop Nutrient Requirement (lb of N)	Phosphorus Crop Nutrient Requirement (lb of P)	Nitrogen Credit	Phosphorus Credit
Field A	H Moisture Forages - Corn	300	7	180.0	64.0		
Field B	H Moisture Forages - Corn	200	7	180.0	64.0		
Field C	H Moisture Forages - Alfalfa	110	5	100.0	50.0		
Field D	Grasses/Perch	100	6	161.0	83.0		

Acres cropped and available manure nutrients

	Current	Needed
Acres	710	336
Lbs P	35,557	-14,253
Lbs N	38,312	79,778

Determining Additional Crops needed

Step 4.1.6 - Additional Crops - FNMP5

Close **Instructions**

1. Identify additional crops found in the area around manure spreading operation.
 1. Enter the following information about crops found in the area around manure spreading operation.
 What is the average field size of crops in the area?
 What is the portion of crop land to which your animal feeding operation has access for spreading manure? (%)
 What is the portion of land in the region that is cropped (exclude land area in water, pasture, forest, and DDT)? (%)

2. Identify additional crops near your manure sources.

Identify Crop in the Area:

Percent of Total Crops: Typical Yield Units Dry Matter %

Crop Yield (Dry Basis):

3. Estimated Crop Nutrient Uptake ([lb] of nutrient/acre) **Estimated Value**

Nitrogen:

Phosphorus:

4. Crop Nutrient Credits from Non Manure Sources ([lb] nutrient/acre)

Nitrogen:

Phosphorus:

Add Crop Delete Crop

Crop	Field	Crop Represents what Percent of Total Crops?	Nitrogen Crop Nutrient Requirement (lb of N)	Phosphorus Crop Nutrient Requirement (lb of P)
H Moisture Forages - Corn Silage	7.50	75	180,000	64,000
Grasses/Perch - Alfalfa	4.50	50	100,000	50,000

- ## \$\$\$ Economics \$\$\$
- Distance and application time
 - Cost of equipment and application costs
 - Fertilizer value of manure
 - Diet costs
- 

Step 5.1 - Spreader Application - FNMP5

File Configure FNMP5 Steps View Report

Application rate (lb/acre):

Manure Management Facility/Type(s)

Select Facility

Manure Application Information

Type of manure:

Average calculated distance to field:

Equipment Characteristics for Manure Application

Equipment selection:

Average field speed (mph):

Average field swath width (ft):

Number of application rigs:

Equipment Characteristics for Horse Tanks or Trucks

Horse tank/truck loads manure to bag?

Horse tank/truck selection:

Number of horse tank/truck rig:

Equipment Operating Characteristics

Calculated discharge rate:

Calculated time to empty spreader (hrs):

Cost Assumptions

Aggregation Results

Average field size:

Portion of field that is available:

Manure Application Rate:

Total Land Required (acres):

Number of Pads/Trails:

Average holding distance (miles):

Summary of Economics for Land Application of Manure

Single Pad Application

Total Time (Hours):

Loading time (Hours):

Road travel time (Hours):

Field time (Hours):

Setup time (Hours/acre):

Total distance driven:

Actual application time:

Application duration:

All Pads Application Time - Horse Tanks

Total Time (Hours):

Road travel time (Hours):

Economic Results (\$/Ton/dry)

Net value of manure:

Total annual cost:

Total annual Net value of manure:

Total value of P2O5:

Total value of P2O5:

Total value of CD:

Buttons:

Step 5.1 - Spreader Application - FNMP5

File Configure FNMP5 Steps View Report

Type of manure:

Average calculated distance to field:

Equipment Characteristics for Manure Application

Equipment selection:

Average field speed (mph):

Average field swath width (ft):

Number of application rigs:

Equipment Characteristics for Horse Tanks or Trucks

Horse tank/truck loads manure to bag?

Horse tank/truck selection:

Number of horse tank/truck rig:

Equipment Operating Characteristics

Calculated discharge rate:

Calculated time to empty spreader (hrs):

Cost Assumptions

Fuel (gallons):

Labor (Hours):

Insurance and Taxes (Hours):

Lubrication (% of Fuel):

Equipment Cost - Power Component:

Equipment Cost - Application Component:

Aggregation Results

Average field size:

Portion of field that is available:

Manure Application Rate:

Total Land Required (acres):

Number of Pads/Trails:

Average holding distance (miles):

Summary of Economics for Manure Application

Single Pad Application

Total Time (Hours):

Loading time (Hours):

Road travel time (Hours):

Field time (Hours):

Setup time (Hours/acre):

Total distance driven:

Actual application time:

Application duration:

All Pads Application Time - Horse Tanks

Total Time (Hours):

Road travel time (Hours):

Economic Results (\$/Ton/dry)

Net value of manure:

Total annual cost:

Total annual Net value of manure:

Total value of P2O5:

Total value of P2O5:

Total value of CD:

Buttons:

Reports

Step 6.0 - Report Summary - FNMP5

File Configure FNMP5 Steps

FNMP5 Report Configuration

Select a report from the navigation bar to left to view a list of fields and options for the report.

Report Name: Summary of Economics for Land Application of Manure

Description: Single Economic Report

Options:

Print Report Header:

Print Report Footer:

Write to HTML in report footer:

Available Fields:

Type of Application Estimate:

Manure Management Facility/Cluster:

Manure Price (\$ per lb. of P2O5):

Protein Price (\$ per lb. of P2O5):

Total annual Net value of manure:

Total value (\$/ton @ 1,000 gal):

Total (\$/head capacity):

Total annual cost:

Total Cost (\$/ton @ 1,000 gal):

Total Cost (\$/head capacity):

Net value of manure:

Net value (\$/ton @ 1,000 gal):

Net value (\$/head capacity):

Buttons:

Economic Report

- Fertilizer value
- Application cost
- Net value of manure
- Feed costs

Summary of Economics for Land Application of Manure

Manure Description:

Man Name:

Unit	Manure	Manure Price (\$/lb. of P2O5)	Protein Price (\$/lb. of P2O5)	Manure Price (\$/ton @ 1,000 gal)	Protein Price (\$/ton @ 1,000 gal)	Total Annual Net Value of Manure	Total Annual Cost	Total Value of P2O5	Total Value of P2O5	Total Value of CD
Manure	13.533	0.20	0.00	2,706.60	0.00	36,719.40	1,239.00	1,045,229.00	1,949.00	1,076,138.00
Manure	13.533	0.20	0.00	2,706.60	0.00	36,719.40	1,239.00	1,045,229.00	1,949.00	1,076,138.00

Output: Application Rates and Acres Needed

- Application rates
- Nutrient requirements

Crop Summary by Field

Field	Crop	Manure Price (\$/lb. of P2O5)	Protein Price (\$/lb. of P2O5)	Manure Price (\$/ton @ 1,000 gal)	Protein Price (\$/ton @ 1,000 gal)	Total Annual Net Value of Manure	Total Annual Cost	Total Value of P2O5	Total Value of P2O5	Total Value of CD
Field 1	Corn	0.20	0.00	2,706.60	0.00	36,719.40	1,239.00	1,045,229.00	1,949.00	1,076,138.00
Field 2	Alfalfa	0.20	0.00	2,706.60	0.00	36,719.40	1,239.00	1,045,229.00	1,949.00	1,076,138.00
Field 3	Orchardgrass	0.20	0.00	2,706.60	0.00	36,719.40	1,239.00	1,045,229.00	1,949.00	1,076,138.00

Output: Different Scenarios

- Change application rate
- Diet inputs
- Animal numbers
- Crop selection
- Manure storage
- Application method




Take Home Message

- FNMP\$ Integrates all major areas of nutrient management
including feed management
- Can be used as a decision tool
- Have to consider changes in diet costs \$\$

Creators:

- Ray Massey:
University of Missouri
- Rick Koelsch, Virgil Bremer and Galen Erickson:
University of Nebraska



Debut information ...

- We will send out email to workshop participants
- Sign up for WSU Livestock Nutrient Management Home Newsletter
<http://www.puyallup.wsu.edu/dairy/joeharrison/default.asp>