

# Estimating a Whole Farm Nutrient Balance

## Spreadsheet Instructions

The purpose of the *Whole Farm Nutrient Balance Spreadsheet* is to estimate an individual farm's nutrient balance by identifying the sources of nutrient inputs and outputs. This measure provides an "environmental yardstick" for measuring nutrient performance of a livestock or poultry farm.

**Animal Manure Management Workgroup**  
**University of Nebraska-Lincoln**  
*<http://water.unl.edu/web/manure/contacts>*

**Contact:**  
**Amy Millmier Schmidt**  
**Department of Biological Systems Engineering**  
**University of Nebraska-Lincoln**  
**Lincoln, NE 68583-0726**  
**[aschmidt@unl.edu](mailto:aschmidt@unl.edu)**  
**(402) 472-0877**

**The most current version of the spreadsheet is available at:**  
***<http://go.unl.edu/wfnb>***

February 2013



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## Acknowledgment

The workgroup would like to acknowledge Julie S. Paschold and Rick K. Koelsch for their contributions in developing this spreadsheet and publication.

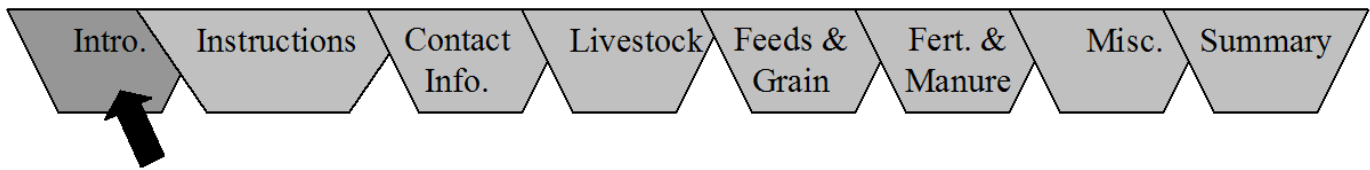
## Computing Requirements

The *Estimating a Whole Farm Nutrient Balance* spreadsheet was developed for Microsoft Excel® 97 or later. The file is about 600 kb in size.

## Resources

For other titles in this nutrient management spreadsheet series, visit the UNL Animal Manure Management (AMM) website at [manure.unl.edu](http://manure.unl.edu) or the UNL Extension publications Web site at <http://extension.unl.edu/publications>.

# Introduction Worksheet Instructions



## Purpose

The purpose of the *Whole Farm Nutrient Balance Spreadsheet* is to estimate an individual farm's nutrient balance by identifying the sources of nutrient inputs and outputs. This measure provides an "environmental yardstick" for measuring nutrient performance of a livestock or poultry farm. It can evaluate alternative nutrient strategies for their ability to achieve an environmentally sustainable farm.

This balance measures nutrients that cross the border of the farm and is not concerned with nutrients recycled within the farm. The boundary of the farm includes all owned or rented land that is farmed (not rented to others) and all livestock production facilities. By measuring only nutrients that enter and exit the farm, the resulting balance defines the degree of nutrient concentration (or accumulation) within the farm borders. The greater the accumulation of nutrients within a farm, the greater the environmental risk.

## Why Should I Complete This?

An analysis of whole farm nutrient balance allows a producer to answer the following questions:

1. *Is my farm concentrating (or accumulating) nutrients at a rate that may create an environmental concern?* This tool provides a "yardstick" for measuring your farm's efficiency in utilizing nitrogen and phosphorus. Inefficiencies suggest an environmental risk.
2. *What nutrient strategy will have the greatest benefit to improving my farm's nutrient balance?* Strategies such as more efficient use of manure to replace commercial fertilizers, transferring manure to off-farm users, or modifications to feeding programs can improve a whole farm nutrient balance. These alternatives can be reviewed to determine which has the greatest value.

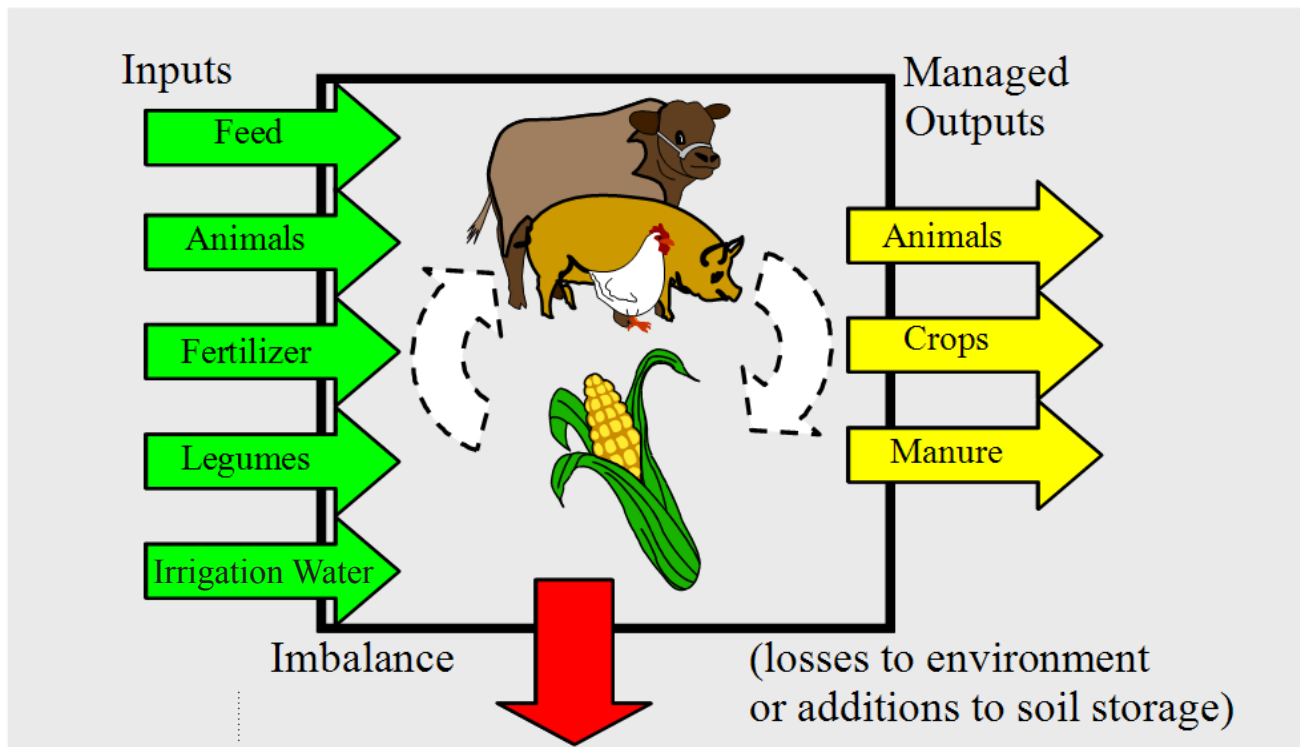


Figure 1. The *Whole Farm Nutrient Balance* spreadsheet records nutrient inputs and outputs for a given farm to estimate a farm's nutrient balance and the degree of nutrient accumulation within the farm borders.

### 3. How is my nutrient balance changing with time?

By completing this analysis for a one-year period and then repeating the analysis two or three years later, you can establish a trend in efficiency of utilizing nutrients. The analyses can be used to evaluate the value of new practices implemented to address nutrient issues.

For additional information on whole farm nutrient balance and strategies for correcting an imbalance, see Module A on Whole Farm Nutrient Planning of the national *Livestock and Poultry Environmental Stewardship* curriculum. This resource is available by contacting the Midwest Plan Service (MWPS), 122 Davidson Hall, Iowa State University, Ames, IA 50011-3080 or calling 800-562-3618, or on the Web at [www.extension.org/sites/default/files/w/f/f3/LES\\_02.pdf](http://www.extension.org/sites/default/files/w/f/f3/LES_02.pdf).

## Spreadsheet Page Review

The spreadsheet estimates nutrient inputs from five sources and three forms of managed nutrient outputs. Each can be corrected for changes in the nutrient inventory during the year (*Table 1*).

For estimating nutrient inputs and outputs, information is required on the total commodity (feeds, forages, crops, and fertilizers) weight and nutrient content. If a nutrient concentration is unknown, select a representative feed, forage, or fertilizer value from the reference tables. All estimates are made for a one-year period.

**Table 1. Summary of nutrient inputs, managed outputs, and inventory corrections that can be made by the user.**

<i>Worksheet</i>	<i>Nutrient Input</i>	<i>Managed Output</i>	<i>Inventory Correction</i>
Contact Info.	Producer and Advisor Contact Information		
Livestock	Purchased Livestock & Poultry (Table I.A)	Sold Livestock & Poultry (Table I.B) Milk, Eggs, and Wool Sold (Table I.C)	Change in Herd/Flock Size (Table I.D)
Feeds & Grain	Purchased Feeds, Forages, & Grains (Table II.A)	Sold Feeds, Forages, and Grains (Table II.B)	Change in Inventory of Feeds, Forages, & Grains (Table II.C)
Fertilizer & Manure	Purchased Fertilizers and other Nutrient Sources	Manure or Compost Sold (Table III.C)	Change in Fertilizer or Manure Inventory (Table III.C)
Miscellaneous	Legume Fixed Nitrogen (Table IV.A) Nitrogen in Irrigation Water (Table IV.B)		

To accomplish this, eight Excel worksheets are available. They can be accessed by clicking on the appropriate tab at the bottom of each worksheet. The purpose of these worksheets are:

<b>Intro.</b>	Opening worksheet for describing purpose
<b>Instruction</b>	Basic instructions for using worksheet
<b>Contact Info</b>	Producer and advisor contact information
<b>Livestock</b>	Estimates the livestock and poultry inputs and outputs
<b>Feed&amp;Grain</b>	Estimates the feeds, forages, grains, and other crop inputs and outputs
<b>Fert&amp;Manure</b>	Estimates inputs and outputs of fertilizer, manure, and other crop nutrient products
<b>Misc.</b>	Estimates inputs as legume fixed nitrogen and nitrogen in irrigation water
<b>Summary</b>	Summarizes the results of all previous worksheets

Figure 2. Eight Excel® worksheets are used to develop the whole farm nutrient balance.

### Caution

**Recognize that many factors affect nutrient balances. The estimates contained within this spreadsheet represent a reasonable estimate for a typical situation but may not be representative of a specific individual situation. Lesson 2 on Whole Farm Nutrient Balance of the national *Livestock and Poultry Environmental Stewardship* curriculum is the primary reference.**

## Computing Requirements

The spreadsheet was developed with Microsoft Excel® 97. The file is about 600 kb in size.

## Instructions

1. First, make a copy with a new name. Click on “File” and “Save As.” In the “File Name” box, replace “#1-Whole Farm Balance” with a new name (e.g. “John Doe’s Farm Balance”). This file should be saved periodically as each worksheet is completed to prevent loss from unexpected computer difficulties.
2. To maximize the viewing area, select “View” from the menu bar and then “Full Screen.” The unnecessary tool bars should disappear.
3. For some worksheets, including the *Introduction* worksheet, the entire contents will not appear on screen. Additional screen information can be viewed by clicking on the “Up” and “Down” arrows on the scroll bar at the right side of the screen and the “Left” and “Right” arrows at the bottom right corner of the screen, or scroll wheel on mouse, if available. To move from cell to cell, use the arrow keys on your keyboard or hit “enter” or “tab” after typing in the current aqua cell.
4. Producer information is entered in cells colored aqua in the spreadsheet. All non-aqua cells are protected and can not be changed by the user.
5. For each worksheet, the table may be cleared before beginning and printed after completion by clicking on the appropriate buttons.
6. Move to *Instructions* worksheet by clicking on “Next Page ➡” button or by clicking on “Instructions” tab on the bottom of page.
7. Move to *Contact Info* worksheet by clicking the “Contact Info” tab on the bottom of page.

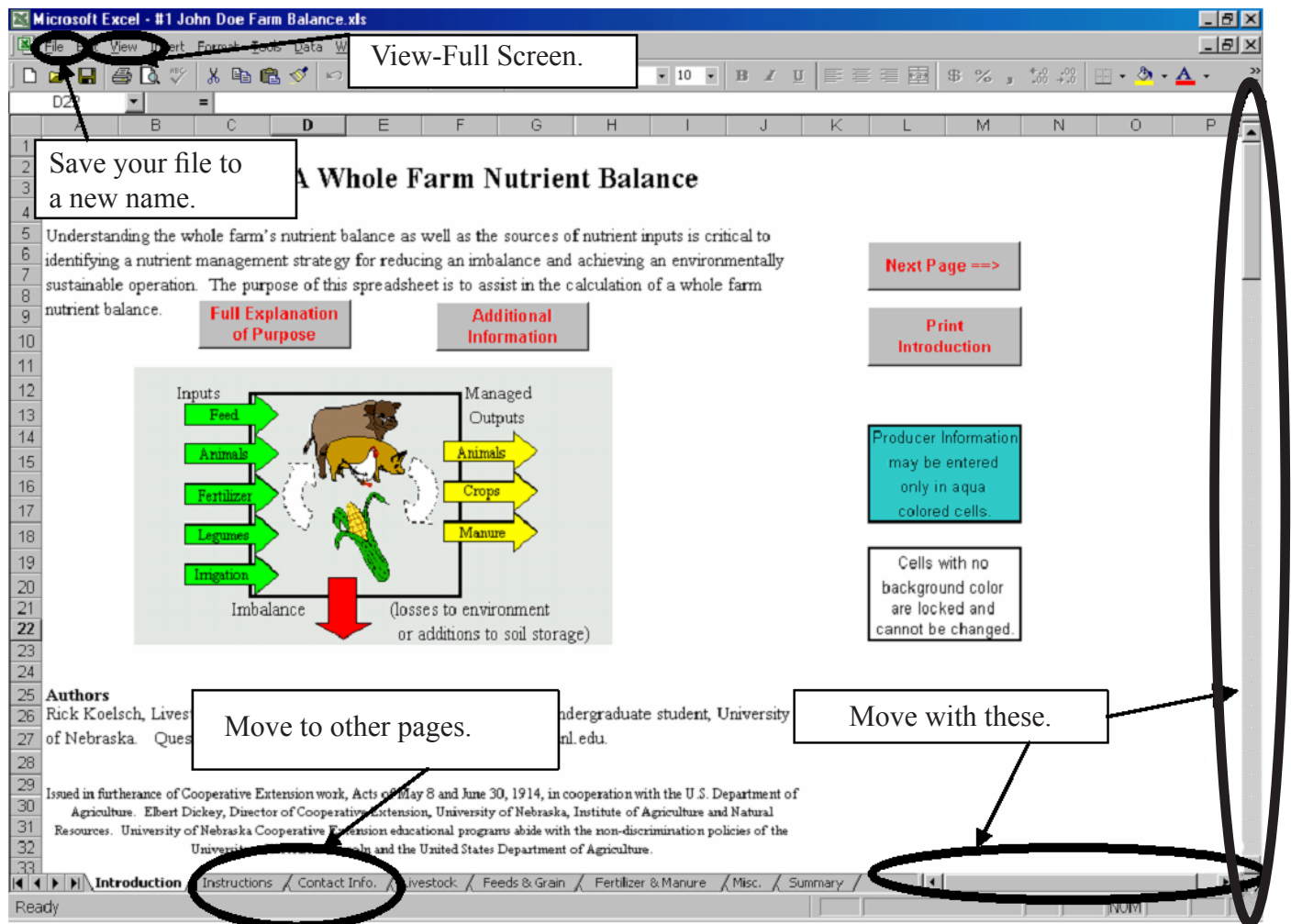
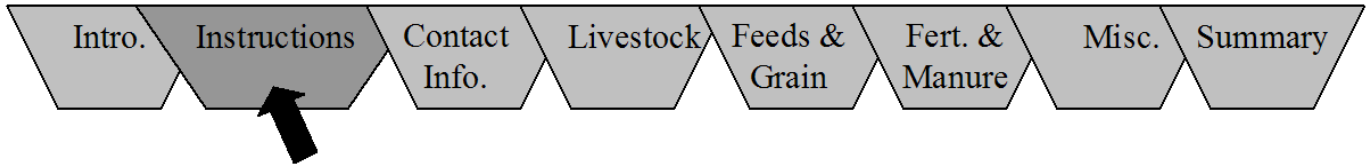


Figure 3. The first step in using this spreadsheet is to save the file with a new name representing your operation.

# Instruction Worksheet



## Purpose

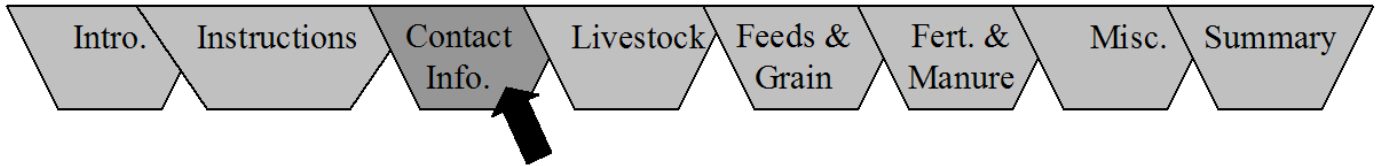
This spreadsheet gives basic information regarding filling out this worksheet.

These instructions may be printed by clicking on the appropriate button or may be referred to periodically during the process by clicking on the “Instructions” tab

at the bottom of the page. You also can refer to these instructions for more detailed information regarding completion of the *Whole Farm Nutrient Balance* worksheet.

Move to the *Contact Info* worksheet by clicking on a “Next Page ➡” or “Contact Info” tab at the bottom of the page.

# Contact Information Worksheet Instructions



## Purpose

This spreadsheet provides a space to include basic information regarding the producer and advisor completing this analysis.

1. If aqua cells are not empty or are incorrect, clear cells by clicking on the “Clear Contact Information” button.
2. Producer information including name (cell D7), address (cells D8, D9, and D10), farm name (cell
3. After checking the information entered, you are ready to move to the next worksheet. Click on the “Livestock” worksheet tab or click on the “Next Page ➡” button.

G7), phone (cell G8), fax (cell G9), and e-mail address (cell G10) may be added as available. The contact person who completed this worksheet, if different from the producer, may include name (cell D12) and phone number (cell G12).

**1. Clear information.**

**Producer and Advisor Contact Information**

Step 2. Enter contact information about your farm and the advisor completing this analysis. Information can be entered only in aqua colored cells.

Producer's Name:	John Producer	Farm Name:	Swine Farm
Address:	Route 2	Phone:	402-444-4444
Address:	Box 200	Fax:	402-444-4445
Town, State, Zip:	Anytown, NE 60000	e-mail:	jproducer@share.com
Advisor's Name:	Julie S. Paschold	Phone:	402-472-7954

**Clear Contact Information**

**Next Page ==>**

**<== Previous Page**

Producer Information may be entered only in aqua colored cells.

Cells with no background color are locked and cannot be changed.

Include Producer's phone, fax, address, and email. Include Advisor's phone.

Figure 4. Example of a completed *Contact Information* worksheet.

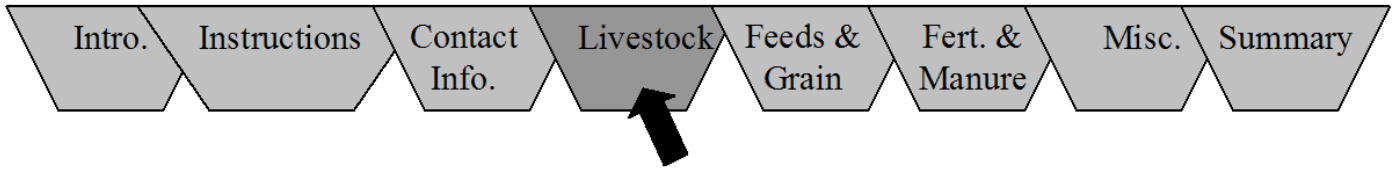


**Example:** To illustrate the use of this spreadsheet, an example livestock farm will be used. John Producer is the manager of a livestock farm that finishes pigs. Information entered in the *Start* worksheet includes:

Producer's Name:	John Producer
Address:	Route 2
Address:	Box 200
Town, State, Zip:	Anytown, NE 60000
Farm Name:	Swine Farm
Phone:	402-444-4444
Fax:	402-444-4445
e-mail:	jproducer@share.com

See *Figure 4* to see a *Start* worksheet with the appropriate information entered into the highlighted cells.

# Livestock Worksheet Instructions



## Purpose

This worksheet will estimate the quantity of nutrients entering and exiting the farm as livestock and poultry and their products (milk and eggs).

## Instructions

1. **Table 1.A. Animal Inputs.** For all livestock and poultry purchased or added to the farm by other arrangements, enter the following:
  - a. Livestock or Poultry Group (*Column B*) by clicking on the arrow button and selecting the appropriate choice.
  - b. Number of animals purchased or acquired (*Column C*).
  - c. Average live weight of those animals in pounds (*Column D*).
2. **Table 1.B. Animal Outputs.** For all meat animals sold or removed from the farm by other arrangements, enter the following:
  - a. Livestock or Poultry Group (*Column B*) by clicking on the arrow button and selecting the appropriate choice.
  - b. Number of animals sold or transferred off-farm (*Column C*).
  - c. Average live weight of those animals in pounds (*Column D*).
3. **Table 1.C. Animal Product Outputs.** For all livestock and poultry products sold (milk, eggs, and wool), enter the pounds of product sold (*Column C*). If the crude protein of the milk or eggs sold is known, enter the percent as a fraction in *Column D* (e.g. 3 percent would be entered as “0.03”). If the crude protein of the milk or eggs sold is unknown, the table will assume 3.2 percent and 12 percent for milk and eggs, respectively.
4. **Table 1.D. Change in Animal Inventory.** For all livestock or poultry groups where the inventory of animals has changed (e.g. herd or flock expansion), enter the following:
  - a. Livestock or Poultry Group (*Column B*) by clicking on the arrow button and selecting the appropriate choice.
  - b. Number of animals in inventory at the beginning of the year (*Column C*).
  - c. Average live weight of those animals in pounds (*Column D*).
  - d. Number of animals in inventory at the end of the year (*Column E*).
  - e. Average live weight of those animals in pounds (*Column F*).

See examples of a completed *Livestock* worksheet in *Figures 5* and *6*.
5. After reviewing all tables, move to the *Feeds and Grains* worksheet by clicking on the “Next Page ►” button or the “Feeds & Grains” tab at the bottom of the page.

Microsoft Excel - #1 Whole Farm Balance for John Doe.xls

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D24

### I. LIVESTOCK AND POULTRY PRODUCTS

**I.A. Animal Inputs:** For a one year period, indicate the number of animals purchased and their average live purchase weight (include custom fed animals).

Livestock or Poultry Group	Number of Animals Purchased	Average Purchase Weight (lbs)	Nitrogen		Phosphorus	
			Fraction	Total Weight (1,000 lbs)	Fraction	Total Weight (1,000 lbs)
Ex: Beef Cattle (< 1,000 lbs)	3,000	600	0.027	48.6	0.0073	13.1
1. Swine (<100lbs)	12,000	60	0.025	18.0	0.0056	4.0
2.						
3.						
4.						
5.						
TOTAL						

**I.B. Animal Outputs:** For a one year period, indicate the number of animals sold and average live weight (include custom fed animals, culls).

Livestock or Poultry Group	Number of Animals Sold	Average Sell Weight (lbs)	Nitrogen		Phosphorus	
			Fraction	Total Weight (1,000 lbs)	Fraction	Total Weight (1,000 lbs)
1. Swine (100 to 300 lbs)	11,820	260	0.024	74	0.0047	14
2.						
3.						
4.						
5.						
TOTAL				74		14

**I.C. Animal Products Output:** For a one year period, indicate the quantity of animal products sold.

Animal Product	Pounds Sold	Crude Protein*	Nitrogen		Phosphorus	
			Fraction	Total Weight (1,000 lbs)	Fraction	Total Weight (1,000 lbs)
1. Milk			0.005			
2. Eggs			0.019			
3. Wool			0.120			
TOTAL						

\* If crude protein is known, enter your value. Table assumes 3.2% and 12% crude protein in milk and eggs, respectively.

**I.D. Change in Animal Inventory:** (beginning vs. end of year). For those livestock groups that have changed in numbers fed from the beginning to the end of the year, indicate that change in inventory below.

Livestock or Poultry Group	1-Jan		31-Dec		Nitrogen		Phosphorus	
	Number of Animals	Average Weight (lbs)	Number of Animals	Average Weight (lbs)	N Fraction	Total Weight (1,000 lbs)	P Fraction	Total Weight (1,000 lbs)
Ex: Cattle	1,000	920	1,700	920	0.027			
1.								
2.								
3.								
4.								
5.								
Total for Decreasing Inventory								
Total for Increasing Inventory								

Instructions

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Clear Livestock Poultry Table

Print Livestock & Poultry Table

Producer information may be entered only in aqua colored cells.

Cells with no background color are locked and cannot be changed.

Figure 5. Enter animal input data for all livestock and poultry purchased or added to the farm and output data for all animals sold or transferred off the farm.

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D19 = Average Sell Weight (lbs)

### I. LIVESTOCK AND POULTRY PRODUCTS

**I.C. Animal Products Output:** For a one year period, indicate the quantity of animal products sold.

Animal Product	Pounds Sold	Crude Protein*	Nitrogen		Phosphorus	
			Fraction	Total Weight (1,000 lbs)	Fraction	Total Weight (1,000 lbs)
1. Milk			0.005			
2. Eggs			0.019			
3. Wool			0.120			
TOTAL						

\* If crude protein is known, enter your value. Table assumes 3.2% and 12% crude protein in milk and eggs, respectively.

**I.D. Change in Animal Inventory:** (beginning vs. end of year). For those livestock groups that have changed in numbers fed from the beginning to the end of the year, indicate that change in inventory below.

Livestock or Poultry Group	1-Jan		31-Dec		Nitrogen		Phosphorus	
	Number of Animals	Average Weight (lbs)	Number of Animals	Average Weight (lbs)	N Fraction	Total Weight (1,000 lbs)	P Fraction	Total Weight (1,000 lbs)
Ex: Cattle	1,000	920	1,700	920	0.027			
1.								
2.								
3.								
4.								
5.								
Total for Decreasing Inventory								
Total for Increasing Inventory								

3. Enter pounds of products sold and crude protein, if desired.

4. If herd or flock size has changed, enter livestock group and number of animals and average weight at beginning and end of year.

Figure 6. Enter animal product outputs and changes in animal inventory.

**Example:** Swine Farm finishes pigs. He buys 12,000 swine per year at an average weight of 60 pounds and sells 11,820 swine each year at an average weight of 260 pounds (difference represents mortality). No change in animal inventory between beginning and end of year has occurred. Information entered in the *Livestock* worksheet includes:

Table 1.A. Animal Inputs

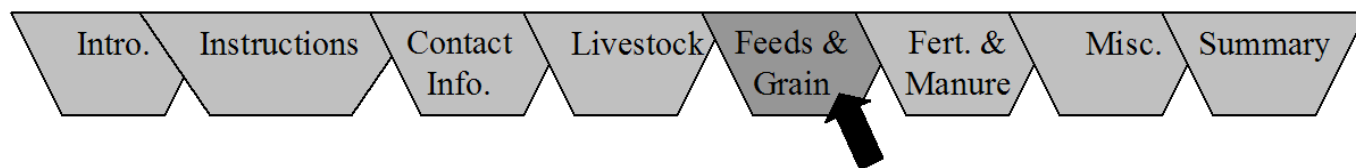
Livestock Group:	Swine (<100 lbs)
Number of Animals Purchased:	12,000
Average Purchase Weight:	60 lbs

Table 1.B. Animal Outputs

Livestock Group:	Swine (100 to 300 lbs)
Number of Animals Sold:	11,820
Average Purchase Weight:	260 lbs

This results in the following total N and P for Table I.A.: 18.0 and 4.0, respectively. Total N and P for Table I.B. are 74 and 14, respectively.

# Feeds, Forages, Grains, and Other Crops Worksheet Instructions



## Purpose

This worksheet will estimate the quantity of nutrients entering and exiting the farm as feeds, forages, grains, other crops, minerals, supplement, or bedding.

## Instructions

1. **Table II.A. Feed Inputs.** For all feeds and crops purchased or supplied from off-farm sources, enter the following:

- a. Each purchased feed product (*Column B*) by clicking on the arrow button to the right of the column and selecting the appropriate choice from the list provided.
- b. Whether “wet” or “dry” basis is used for measuring product and concentration (*Column C*).
- c. Amount of feed product purchased (*Column D*).
- d. Units of measure for feed product (*Column E*) by using the choices provided after clicking on the arrow button in the column.
- e. (Optional) Individual farm values for crude protein as a fraction, if known (*Column F*).
- f. (Optional) Individual farm values for phosphorus as a fraction, if known (*Column I*).

See *Figure 7* for sample worksheet.

2. **Table II.B. Feed Outputs.** For all feeds and crops sold, enter the following:
  - a. Each sold feed product (*Column B*) by clicking on the arrow button to the right of the column and selecting the appropriate choice from the list provided.
  - b. Whether “wet” or “dry” basis is used for measuring product and concentration (*Column C*).

- c. Amount of feed product sold (*Column D*).
- d. Units of measure for feed product (*Column E*) by using the choices provided after clicking on the arrow button in the column.
- e. (Optional) Individual farm values for crude protein as a fraction, if known (*Column F*).
- f. (Optional) Individual farm values for phosphorus as a fraction, if known (*Column I*).

See *Figure 7* for sample worksheet.

3. **Table II.C. Change in Inventory.** For all feeds, forages, grains, and other crops stored on your farm and that have changed in inventory between January 1 and December 31, indicate the following:
  - a. Each feed product (*Column B*) by clicking on the arrow button to the right of the column and selecting the appropriate choice from the list provided.
  - b. Whether “wet” or “dry” basis is used for measuring product and concentration (*Column C*).
  - c. Amount of feed product on January 1 and December 31 (*Column D*).
  - d. Units of measure for feed product (*Column E*) by using the choices provided after clicking on the arrow button in the column.
  - e. (Optional) Individual farm values for crude protein and phosphorus as a fraction, if known (*Columns F and I*, respectively).

See *Figure 9* for sample worksheet.

4. After checking the information entered, you are ready to move to the next worksheet. Click on “Fertilizer and Manure” worksheet tab or click on the “Next Page ➡” button.

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A7 List Feeds, Forages, Grains or Supplements Purchased or Brought Onto Farm

## II. FEEDS, FORAGES, GRAINS

**II.A Inputs:** For a one year period, enter all grain, supplement, forage purchased and nutrient content must both be entered on same.

All Purchased Feeds				Protein			Phosphorus		
List Feeds, Forages, Grains or Supplements Purchased or Brought Onto Farm	Wet or Dry Weight Basis*	Amount Purchased	Units	Your Value	Book Value	Total N (1,000 lbs)	Your Value	Book Value	Total P (1000 lbs)
Example: Soybean meal - 44%	Wet	1,000,000				71			6
Corn Dry Grain 56 lb/bu	Wet	1,572	tons	086	43		0027		9
Soybean Meal - 44	Wet	820	tons	444	117		0063		10
Dicalcium Phosphate	Wet	41	tons	-	-		1872		15
TOTAL						160			34

**II.B Outputs:** For the same one year period, indicate all grain, supplement, hay, silage, bedding, and m...

All Feeds, Grains, or Forages Sold				Nitrogen			Phosphorus		
List Feeds, Forages, Grains or Supplements Sold or Transferred Off-Farm	Wet or Dry Weight Basis*	Amount Sold	Units	Fraction Crude Protein	Total N (1,000 lbs)	Fraction Crude Phosphorus	Total P (1000 lbs)		
Alfalfa Hay Mid bloom	Wet	135	tons	155	7	0022	1		

For both tables, enter feed type, wet or dry weight basis, amount purchased or sold, and measurement units used.

Enter fraction crude protein and phosphorus, if desired.

Cells with no background color are locked and cannot be changed.

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Clear Feeds & Grains Table  
Print Feeds & Grain Table

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Figure 7. Enter feed inputs and feed outputs for all feeds and crops.

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A7 List Feeds, Forages, Grains or Supplements Sold or Transferred Off-Farm

## III. CHANGE IN INVENTORY

**III.C Change in Inventory:** (beginning vs end of year). If any previously mentioned crop or feed stored on-farm has changed in inventory, indicate that change below.

All Feeds, Grains, or Forages Sold				Nitrogen			Phosphorus		
List Feeds, Forages, Grains or Supplements Sold or Transferred Off-Farm	Wet or Dry Weight Basis*	Inventory	Units	Fraction Crude Protein	Total N (1,000 lbs)	Fraction Crude Phosphorus	Total P (1000 lbs)		
January 1 Inventory									
1.					-		-		
2.					-		-		
3.					-		-		
December 31 Inventory									
1.					-		-		
2.					-		-		
3.					-		-		
Total for Increasing Inventory					-		-		

For change in inventory, enter feed type, wet or dry weight basis, amount of feed type at beginning and end of year, units used, and crude protein and phosphorus, if desired.

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Figure 8. Enter amounts for inventory changes during the year for all feeds, forages, grains and other crops stored on your farm.

**Example:** Mr. Producer buys 1,572 tons of corn grain (56 lb/bu), 820 tons of soybean meal (44%), and 41 tons of dicalcium phosphate. He sells 135 tons of alfalfa hay (mid-bloom). All weights are based on a wet weight basis. No change in feed or grain inventory has occurred between the beginning and end of year. Information entered in the *Feeds and Grain* worksheet includes:

Table II.A. Inputs

Feed, Forage, or Grain:	Corn Dry Grain — 56 lb/bu
Wet or Dry weight basis:	wet
Amount Purchased:	1,572
Units:	tons
Feed, Forage, or Grain:	Soybean Meal — 44%
Wet or Dry weight basis:	wet
Amount Purchased:	820
Units:	tons
Feed, Forage, or Grain:	Dicalcium Phosphate
Wet or Dry Weight Basis:	wet
Amount Purchased:	41
Units:	tons

Table II.B. Outputs

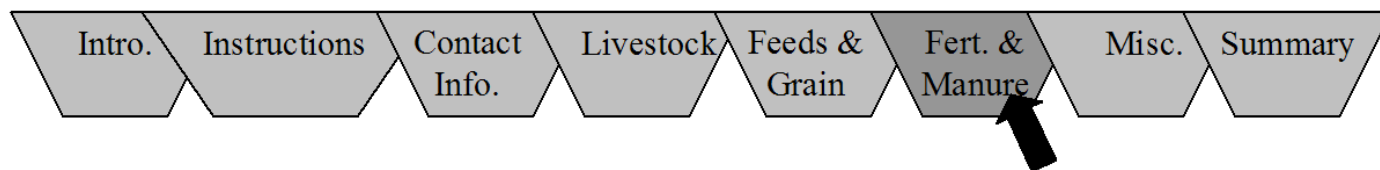
Feed, Forage, or Grain:	Alfalfa Hay Mid-Bloom
Wet or Dry Weight Basis:	wet
Amount Sold:	135
Units:	tons

The resulting total N and P for Table II.A. are 160 and 34, respectively. The total N and P for Table II.B. are 7 and 1, respectively.



# Fertilizer, Manure, and Other Crop Nutrient Products

## Worksheet Instructions



### Purpose

This worksheet will estimate the quantity of nutrients entering and exiting the farm as fertilizer, manure, and other crop nutrient products.

### Instructions

1. **Table III.A. Fertilizer Inputs.** For all crop nutrient sources (e.g. fertilizer, manure, biosolids) purchased or supplied to the farm from off-farm sources, enter the following:
  - a. Each crop nutrient source purchased or supplied to the farm (*Column B*) by selecting the appropriate choice from the list provided after clicking on the arrow button in the column.
  - b. Amount purchased or acquired (*Column C*).
  - c. Units of measure for the crop nutrient products (*Column D*) by selecting the appropriate choice from the list provided after clicking on the arrow button in the column.
  - d. Individual farm values (Rows “17” and “18”) for nitrogen (*Column E*) and phosphorus (*Column F*), if using a crop nutrient source not listed. Table will use default values for all crop nutrient sources on list provided after clicking on the arrow button.

See *Figure 9* for example worksheet.

2. **Table III.B. Fertilizer Outputs.** For all crop nutrient sources (e.g. fertilizer, manure, biosolids) sold, enter the following:
  - a. Each crop nutrient source transferred off-farm (*Column B*).
  - b. Amount sold (*Column C*).
  - c. Units of measure for the crop nutrient products (*Column D*) by selecting the appropriate choice from the list provided after clicking on the arrow button in the column.
  - d. Individual farm values for nitrogen (*Column E*) and phosphorus (*Column F*) and their units of measure (*Column G*).

See *Figure 9* for example worksheet.

3. **Table III.C. Change in Inventory.** For all crop nutrient sources (e.g. fertilizer, manure, biosolids) stored on the farm and that have changed in inventory between January 1 and December 31, enter the following:
  - a. Each crop nutrient source (*Column B*) by selecting the appropriate choice from the list provided after clicking on the arrow button in the column or entering your own nutrient source if not listed.
  - b. Amount in farm’s inventory on January 1 (*Column C*) and December 31 (*Column D*).
  - c. Units of measure for the crop nutrient products (*Column E*) by selecting the appropriate choice from the list provided after clicking on the arrow button in the column.
  - d. Individual farm values for nitrogen (*Column F*) and phosphorus (*Column G*), if using a crop nutrient source not listed (Rows 50-52 or Numbers 4-6). Table will use default values for all crop nutrient sources on list provided after clicking on the arrow button.

See *Figure 10* for sample worksheet.

4. After checking the information entered, you can move to the next worksheet. Click on “Miscellaneous Worksheet” tab and click on it or click on the “Next Page ➡” button.

### Caution

**Manure generated on-farm and used in the farm’s cropping program should not be listed as an input or output. This manure did not cross the farm’s boundary. Only manure that is transferred off-farm (outputs) or generated by animals from an off-farm source and used on-farm (inputs) are considered in a Whole Farm Nutrient Balance.**



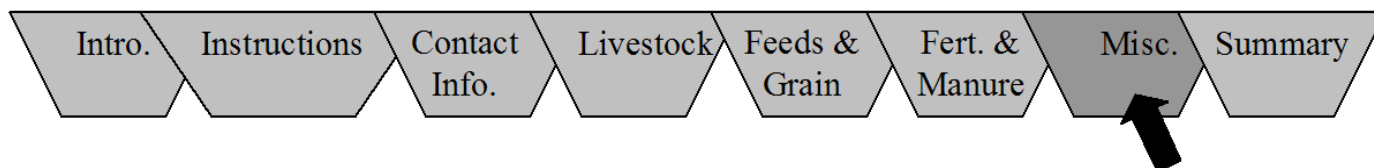


**Example:** Mr. Producer uses 22 tons of anhydrous ammonia and 10 tons of concentrated superphosphate. Information entered in the *Fertilizer and Manure* worksheet includes:

Table III.A. Inputs	
Fertilizer Type:	Anhydrous Ammonia
Amount Purchased:	22
Units:	tons
Fertilizer Type:	Concentrated Superphosphate
Amount Purchased:	10
Units:	tons

Total N and P results for Table III.A. are 36 and 4, respectively.

# Miscellaneous Nitrogen Sources Worksheet Instructions



## Purpose

This worksheet will estimate the quantity of nitrogen entering the farm as legume-fixed nitrogen and irrigation water.

## Instructions

### 1. Table IV.A. Inputs as Legume-Fixed Nitrogen.

Legume crops grown on non-manured soils fix atmospheric nitrogen into organic nitrogen and serve as a source of additional nitrogen input to a farm. A non-manured crop is one that has not been manured in the past two years. To account for this nitrogen source, enter the following information:

- All non-manured legume crops (*Column B*) from list provided after clicking on arrow button in column.
- Acreage of crop produced (*Column C*).
- Average yield (*Column D*) on a wet weight basis.
- Units of measure for yield (*Column E*).

- (Optional) Individual farm values for crude protein on a wet weight basis entered as a fraction (*Column F*), if known. If crude protein is unknown, the table will use a default value.

### 2. Table IV.B. Inputs as Nitrogen in Irrigation Water.

Irrigation water containing nitrates (not including effluent from lagoons or feedlot runoff holding ponds) is a source of nitrogen input to a farm. Enter the following information:

- Individual well identifying information (*Column B*).
  - Water nitrate level in ppm (*Column C*).
  - Amount of water pumped in acre-inches (*Column D*) or average well pumping rate in gallons per minute (*Column F*) and number of hours per year in use (*Column G*).
- After checking the information entered, you can move to the next worksheet. Click on "Summary" worksheet tab or click on the "Next Page ➡" button.

Example: Mr. Producer does not manure 45 acres of second year hay that yields an average of 3 tons/acre. He has two pivots whose irrigation water has 9 ppm nitrate and he pumps an average of 1,560 acre-inches per year on each pivot. Information entered in the *Miscellaneous* worksheet includes:

Table IV.A. Inputs as Legume Fixed Nitrogen

Non-Manured Legume Crop:	2nd year hay (>90% Legumes)
Acres not manured:	45
Average Yield:	3
Units:	tons/ac

Table IV.B. Inputs as Nitrogen in Irrigation Water

Well Name:	Pivot 1	Pivot 2
PPM Nitrate-N:	9	9
Ac-inches:	1,560	1,560

Total N for Tables IV.A. and IV. B. are 3.9 and 6.4, respectively.

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**IV. MISCELLANEOUS NITROGEN SOURCES**

**IV.A. Inputs as Legume Fixed Nitrogen:** For all legumes not manured within the past two years, indicate crop grown, acres grown, yield, and crude protein content (wet weight basis).

Legume Crop Data				Nitrogen	
Non-Manured Legume Crops	Acres not manured	Average yield Units	Fraction Crude Protein** Your Value Book Value	Total Nitrogen (1,000 lbs)	
1st year hay (> 90% Legumes)	100	4 tons/ac	0.15		
2nd year hay (> 90% Legumes)	45	3 tons/ac	0.15		
<b>TOTAL</b>				<b>3.9</b>	

\*\* Enter crude protein content on a wet weight basis (or as fed).

**IV.B. Inputs as Nitrogen in Irrigation Water:** List all irrigation wells, quantity of fresh water pumped, and nitrate-N concentration, if known. Do not include effluent from lagoon or feedlot runoff control.

Well Data				Nitrogen		
Well	PPM Nitrate-N	Amount Pumped		Flow Rate (gpm)	Annual Use (hrs/yr)	Total Nitrogen (lbs)
		Ac- inches	OR			
Example: Home Well	15	1700				5.6
1. Pivot 1	9	1,560				3.2
2. Pivot 2	9	1,560				3.2
3.						
4.						
5.						
6.						

Instructions

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Print Misc. N Sources Table

Producer may be entered only in aqua colored cells

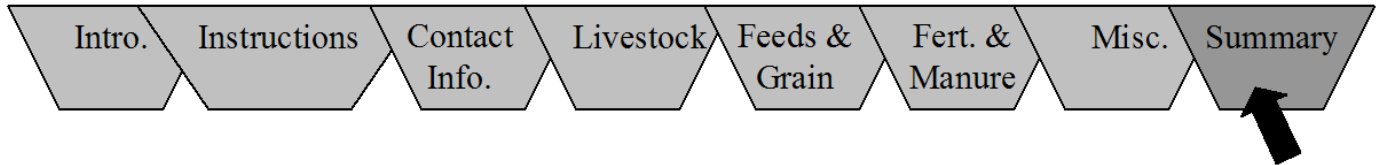
1. Enter non-manured legume crop type, number of acres, average yield, and units used. If desired, include fraction crude protein.

2. Enter well name, ppm nitrate-N, and amount pumped in acre-inches OR flow rate and hours per year.

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Figure 11. Enter nitrogen inputs as legume fixed nitrogen and as nitrogen in irrigation water.

# Summary Worksheet Instructions



## Purpose

This worksheet summarizes the results of the previous seven worksheets. A copy of this *Summary* worksheet and all previous worksheets can be printed while viewing this worksheet.

## Instructions

1. A copy of the *Summary* worksheet or all worksheets including the *Summary* worksheet can be printed by clicking on the appropriate button in the right column.

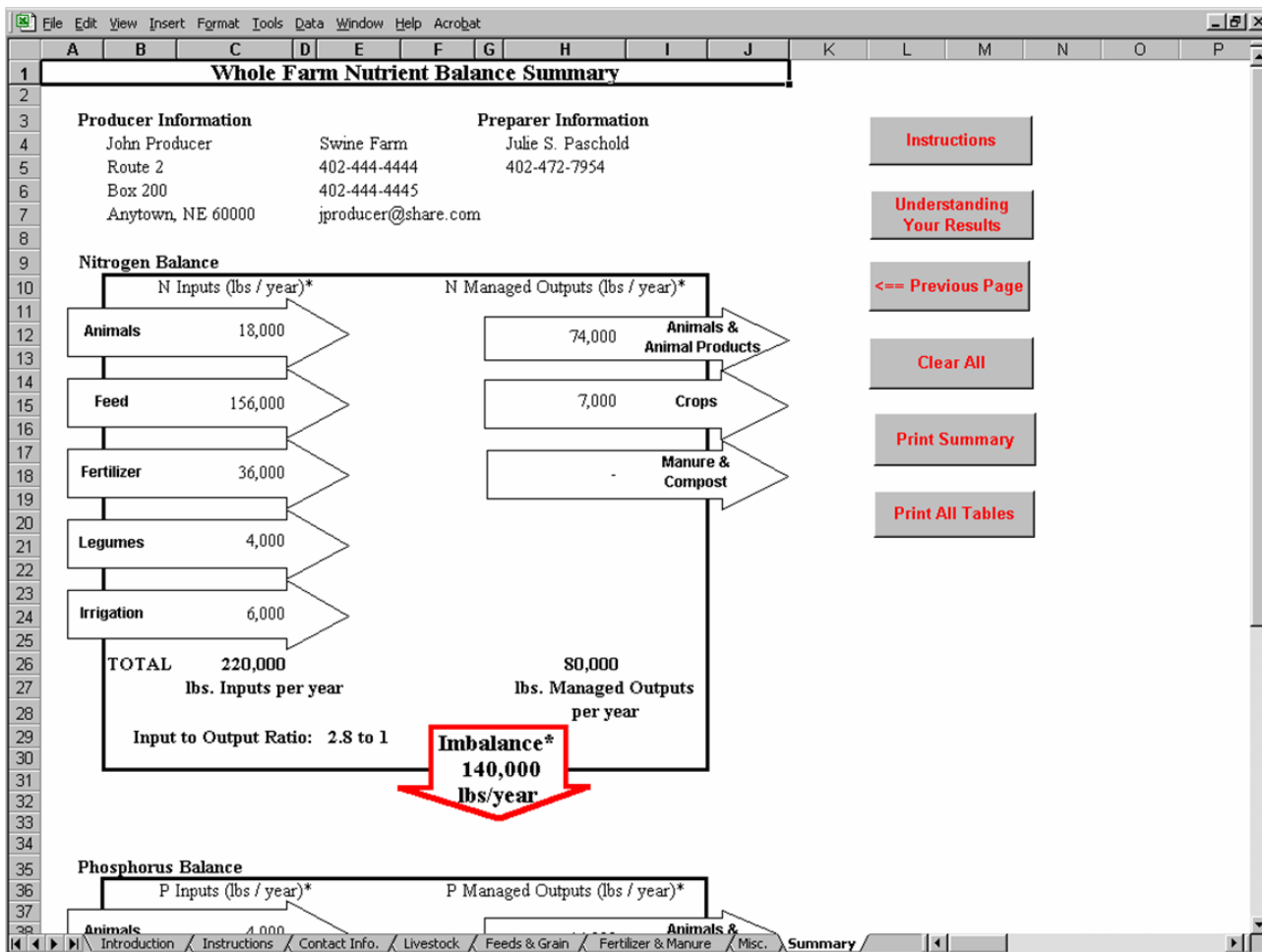


Figure 12. Example worksheet showing the nitrogen balance section of the *Whole Farm Nutrient Balance Summary*.

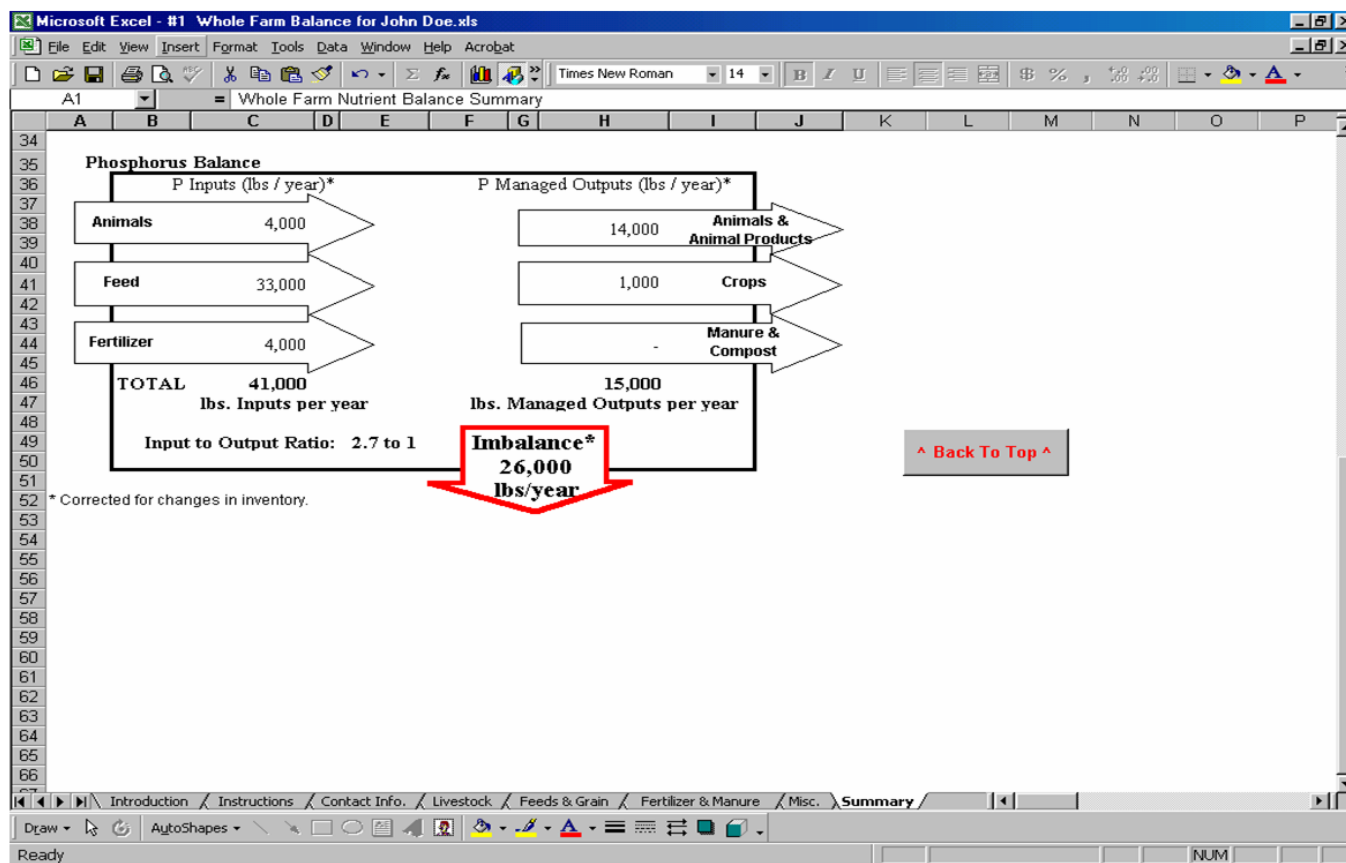


Figure 13. Example worksheet showing the phosphorus balance section of the *Whole Farm Nutrient Balance Summary*.

## Target Nutrient Balance

A desirable Phosphorus Input to Managed Output target is 1 to 1. A ratio of less than 1.5 to 1 for phosphorus is likely to be acceptable. If a ratio is greater than 1.5 to 1, you may want to explore options that reduce this imbalance. Some of the more common strategies include:

- Exporting manure or compost to off-farm users of these products (increases managed nutrient outputs).
- More efficient utilization and accurate crediting of manure nutrients in a cropping program for the purpose of reducing purchased commercial fertilizer use (reduces fertilizer inputs).
- Reduced feed nutrient purchases through alternative feed rations or alternative cropping strategies to increase the on-farm production of feed nutrients (reduces feed nutrient inputs).
- Treatment technologies that conserve manure nutrients for use in crop production or sale to off-farm users.

A desirable Nitrogen Input to Managed Output target is difficult to define. Most manure management systems lose ammonia nitrogen through volatilization which is a difficult loss to control. Some sample targets for nitrogen use efficiency (Input: Output ratio) might include:

- Open lot production system: 2.5 to 1
- Confinement barn with anaerobic lagoon: 3 or 4 to 1
- Confinement barn with manure storage: 1.5 to 1

For additional information on whole farm nutrient balance and strategies for correcting an imbalance, refer to Module A on Whole Farm Nutrient Planning of the national *Livestock and Poultry Environmental Stewardship* curriculum. This resource is available from Midwest Plan Service (MWPS), 122 Davidson Hall, Iowa State University, Ames, IA 50011-3080 or 800-562-3618 or on the Web at [http://extension.org/pages/Livestock\\_and\\_Poultry\\_Environmental\\_Stewardship/Curriculum\\_Lessons](http://extension.org/pages/Livestock_and_Poultry_Environmental_Stewardship/Curriculum_Lessons).