Integrated Dairy Farm Economic and Environmental Assessment of Management Strategies

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Objectives

1. Characterize Wisconsin organic, grazing, and conventional (alike) dairy farm systems

2. Perform whole dairy farm integrated evaluations

3. Find best management practices that concurrently increase profit and decrease environmental impacts

Materials and Methods

1. Collect comprehensive dairy farm information
2. Analyze, synthesize, and adjust data collected
3. Apply the Integrated Farm System Model (IFSM)

The Survey

<u>9 Sections</u>

1) Farm business structure and decision makers
2) People working on the farm
3) Dairy herd and management
4) Feeding management
5) Pasture management
6) Land management and cropping operation
7) Manure and nutrient management
8) Economic information; and
9) Assessment of farm management and satisfaction.


Feeding Strategies on Wisconsin Dairy Farms: Economic, Production, and Environmental Outcomes

Participation in the study is **voluntary**. All answers to questions in this survey will be kept ***strictly confidential***, and the results will only be used in statistical summaries. Individual farm information will not be identified in any publication. University of Wisconsin-Madison, Social and Behavioral Sciences, IRB Protocol Number SE-2009-0401.

Consent forms need to be signed prior to the start of the interview

We welcome your comments and suggestions
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Contact: Brad Barham 608-265-3090 barham@aae.wisc.edu

ENUMERATOR:

DATE OF SURVEY:

SURVEY STARTING TIME: SURVEY ENDING TIME:

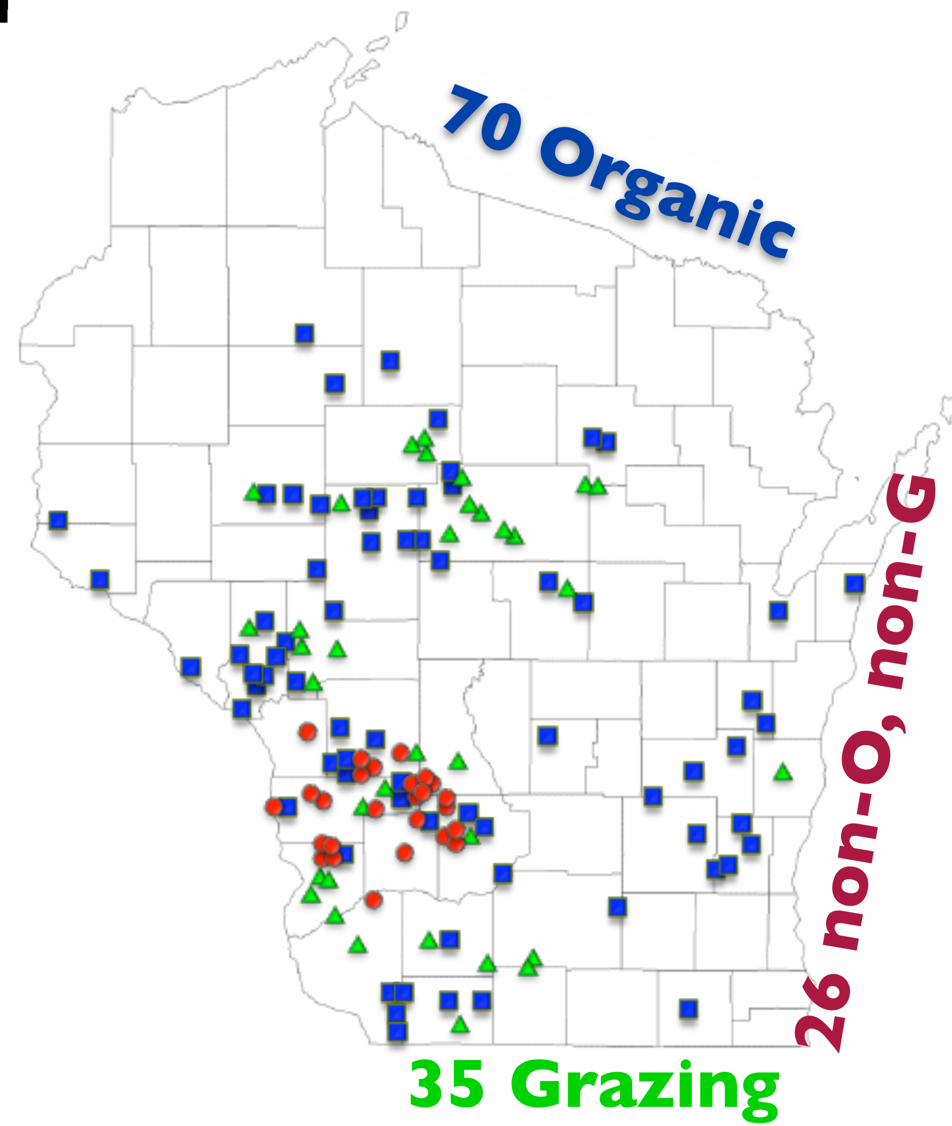
FARMER ID#:

Sample

1. Random sample from list of all dairy producers in Southwest

2. Purposeful sample of grazing dairy producers

3. All certified dairy cattle organic producers



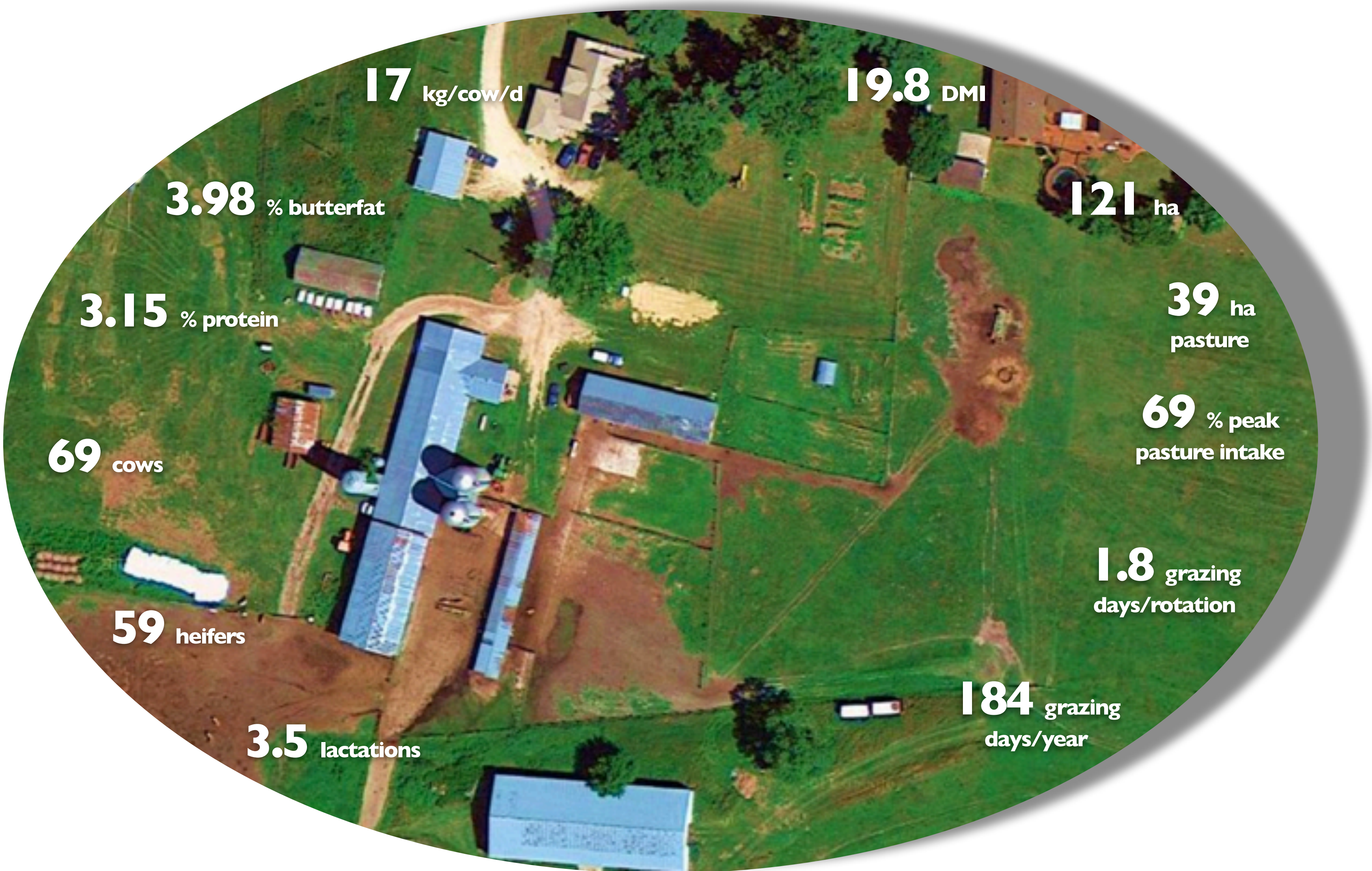
The Interview


Face-to-face interviews

- 5 hours on average
- Collected 2011and 2012
- Monthly data for 2010
- Observations: 131 farms

- PhD Student
  Marion Dutreuil 
- MS Student
  Claudia Hardie 

An organic WI dairy farm



A grazing WI dairy farm

The Integrated Farm System Model (IFSM)

- A whole-farm simulation for crop, dairy, and beef production
- Performs simulations over many years of weather to determine long-term performance, environmental impacts and economics
- Simulates major process of crop production, harvest, storage, feeding, milk production, manure handling, nutrient balances, and gasses emissions

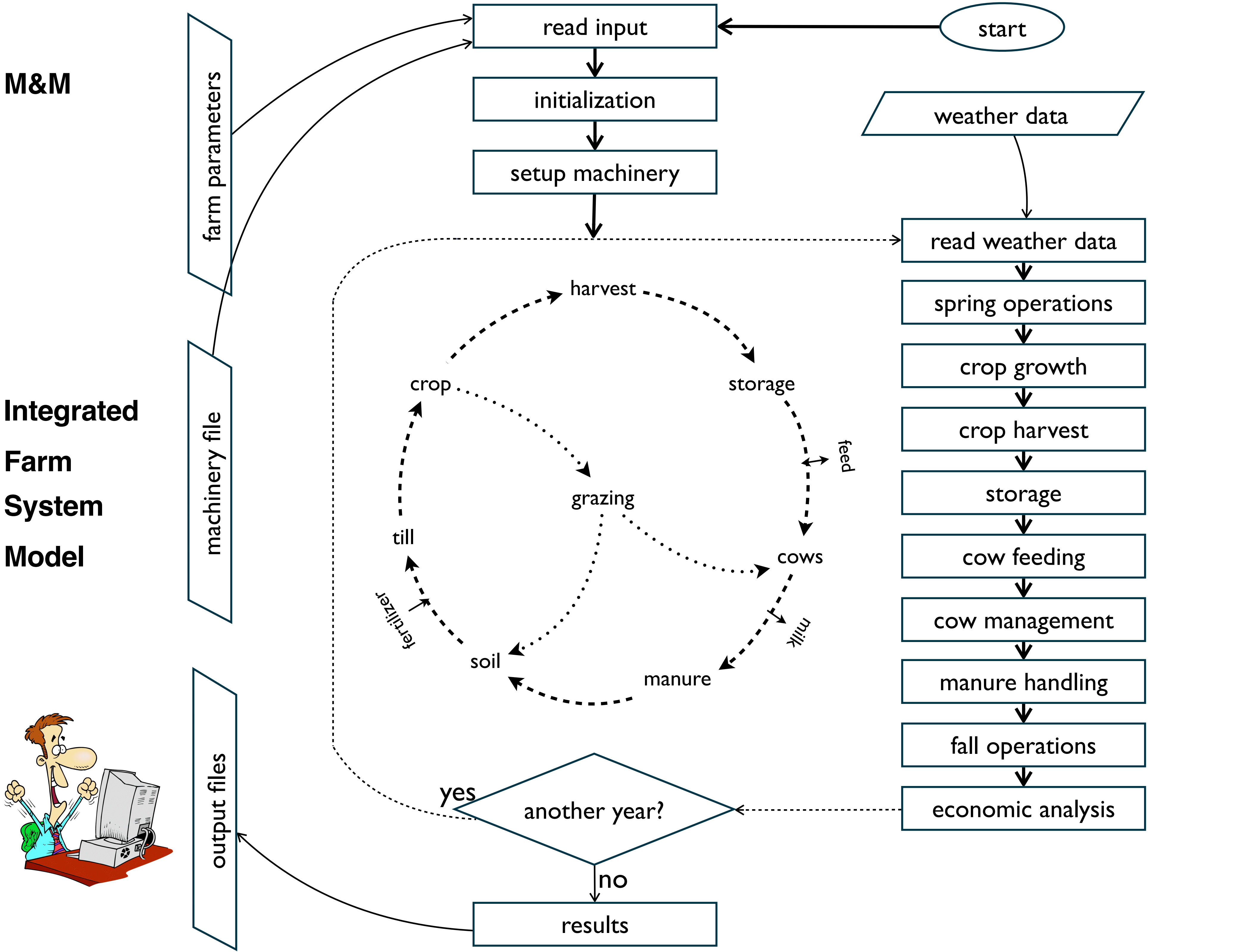
M&M

Integrated

Farm

System

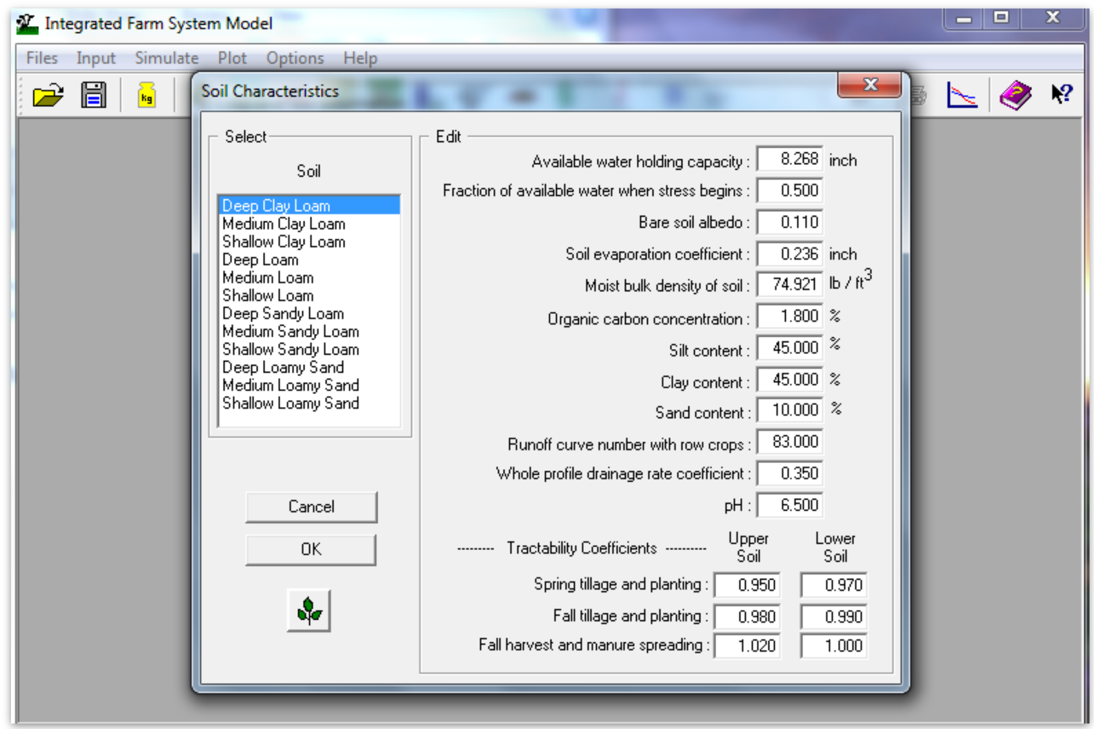
Model



IFSM inputs

10 Sections

1) Crop and soil
2) Grazing
3) Machinery
4) Tillage and planting
5) Crop harvest
6) Feed storage
7) Herd and feeding
8) Manure and nutrient
9) Economics
10) Weather



IFSM CROP inputs

- Alfalfa: acreage, standing life, fertilization, irrigation
- Grass: acreage, standing life, fertilization, grasses and legumes %.
- Corn: plant population, fertilization, irrigation.
- Small grain: type, double cropped, fertilization, irrigation
- Soybeans: plant population, fertilization, irrigation.

IFSM HARVEST inputs

- SMALL GRAINS:
  - Dates for harvesting as silage, high moisture grain or grain
  - Use on the farm
  - Use of straw for bedding

- SOYBEANS:
  - Starting date for harvesting
  - Use on the farm
  - Cost for roasting

IFSM HARVEST inputs

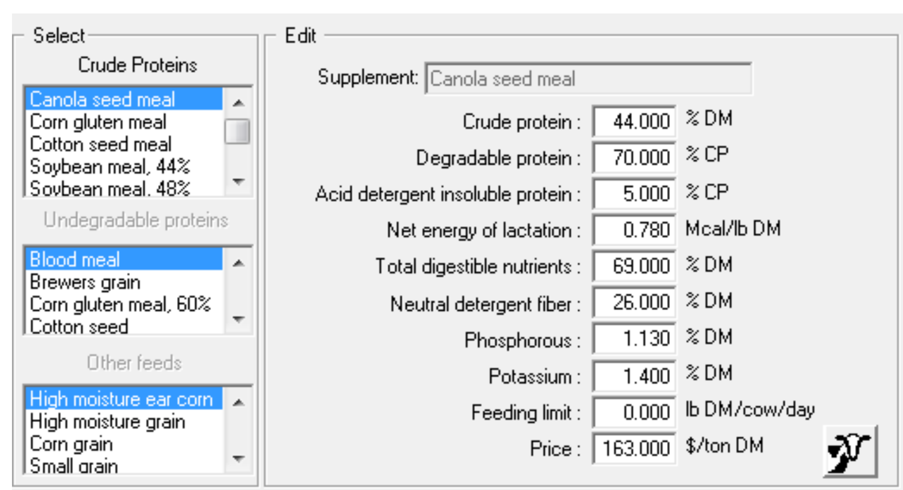
- ALFALFA AND GRASS:
  - Up to 5 cuts.
  - Type of harvest, starting date and NDF content indicated for each cut.
  - Time available each day for harvesting can be adjusted.

- CORN:
  - Dates for harvesting as silage, high moisture corn or dry corn
  - Corn silage cutting height
  - Corn silage processing
  - Type of high moisture corn

IFSM HERD inputs

- Breed, number of lactating cows, number of young stock over one year, number of young stock under one year, target milk production, proportion of first lactation animal in the herd, calving strategy.

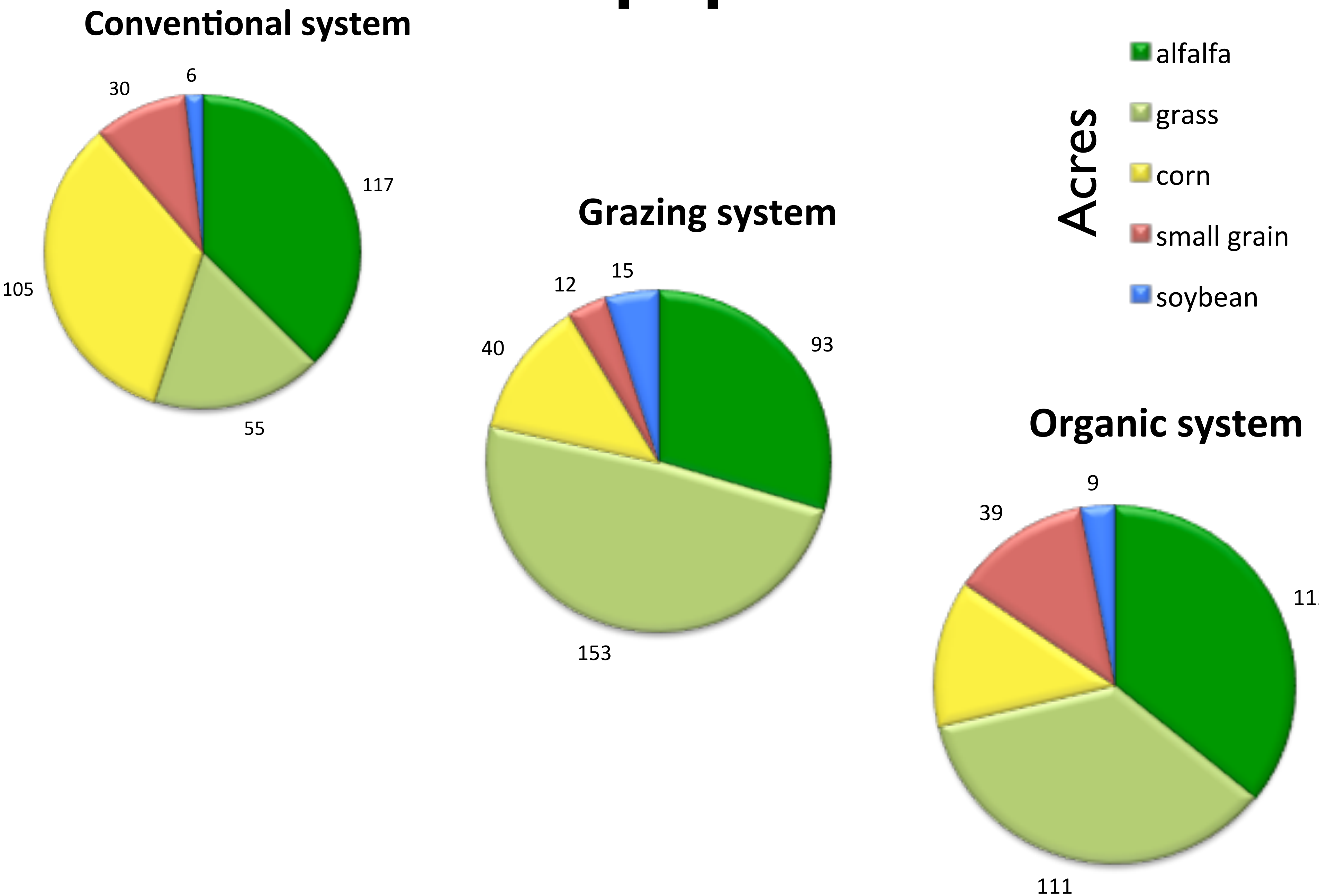
- FEEDING:
  - Feeding method for grain, silage and hay
  - Ration constituents: % hay, % phosphorus, % protein, forage to grain ratio, protein and energy supplement.
  - Feed characteristics can be adjusted



Farm profiles

	Conventional	Grazing	Organic
Farmland, ac	313		
Cows	85		
Heifers	75	70	73
Milk production, lb/cow/yr	22,341	16,508	14,012
Milk price, $/cwt	15.82	16.49	24.70
Alfalfa, ac	117	93	112
Corn, ac	105	40	41
Soybean, ac	6	15	9
Oats, ac	30	12	39
Grass, ac	55	153	111

Crop profiles



Management strategies

Conventional	Grazing & Organic
Allow **grazing** to lactating cows	Decrease **forage:grain** ratio
Incorporate manure same day of application	Add a 6-month **manure storage** facility
Suppress commercial fertilizers	**Increase** milk production by **30%**

Results: Base

	Conventional	Grazing	Organic
Net return, $/yr	**105,008**	**101,360**	**151,342**
GHGE total (lb CO_2 eq./**cow** per yr)	14,636	10,140	10,398
GHGE total (lb CO_2 eq./**lb milk**)	**0.66**	**0.61**	**0.74**
GHGE **housing**, %	45.3	37.2	38.0
GHGE **manure**, %	14.5	0	0
GHGE **feed** product., %	14.8	19.3	17.3
GHGE **grazing**, %	4.2	29.9	29.3
GHGE **fuel**, %	4.3	3.4	4.4
GHGE **secondary**, %	16.9	10.2	11.0

Results: Conventional

	Base	Grazing lactating cows	Incorporate manure same day	Suppress commercial fertilizers
Net return, \$/yr	105,008	**113,330**	105,103	**113,755**
GHGE total (lb CO_2 eq./**cow** per yr)	14,636	12,067	14,691	14,436
GHGE total (lb CO_2 eq./**lb milk**)	0.66	**0.54**	0.66	0.65
GHGE **housing**, %	45.3	29.9	45.2	45.9
GHGE **manure**, %	14.5	13.1	14.5	14.6
GHGE **feed** product., %	14.8	16.1	15.0	14.3
GHGE **grazing**, %	4.2	18.5	4.2	4.2
GHGE **fuel**, %	4.3	4.4	4.2	4.3
GHGE **secondary**, %	16.9	18.0	16.9	16.7

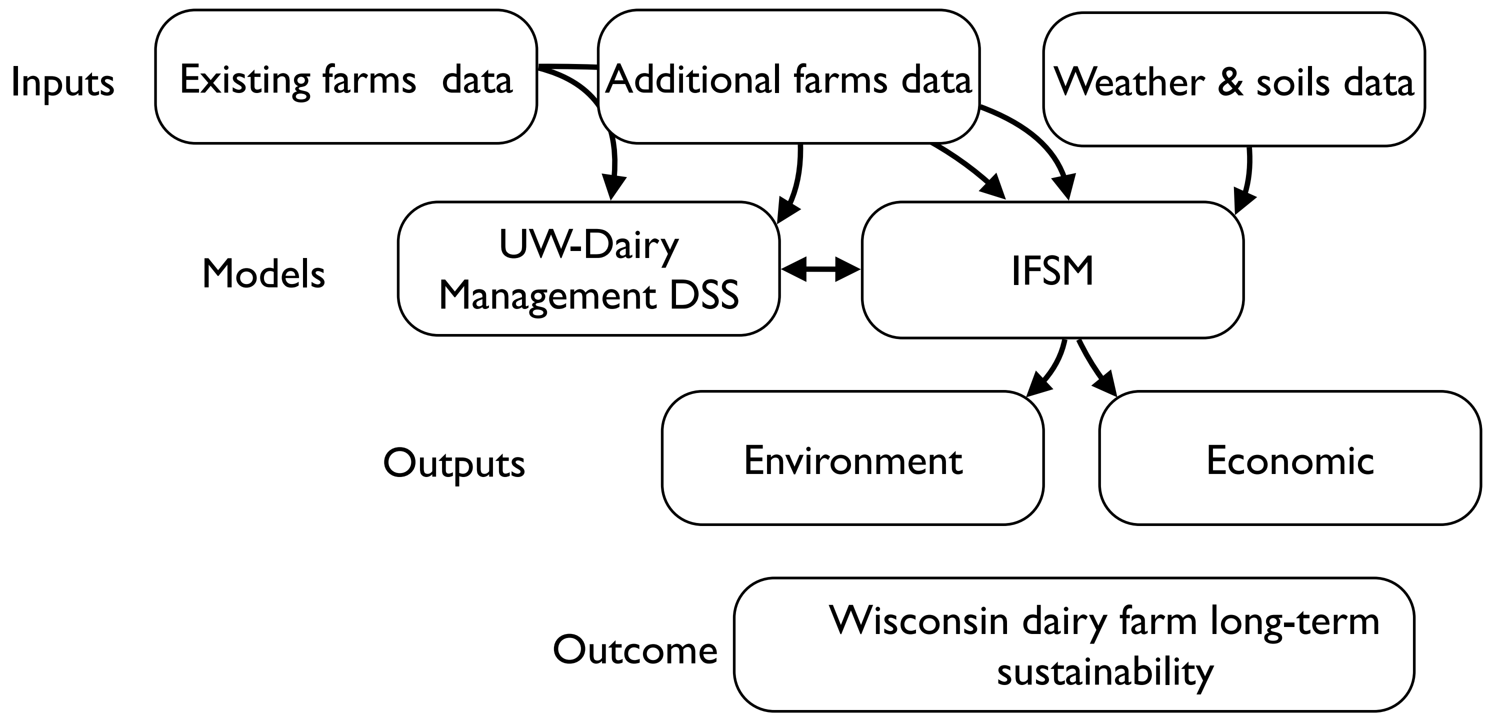
Results: Grazing

	Base	Decrease forage:grain	6-mo manure storage	Increase 30% milk prod.
Net return, $/yr	101,360	**79,859**	101,115	**146,477**
GHGE total (lb CO_2 eq./**cow** per yr)	10,140	7,852	10,628	10,660
GHGE total (lb CO_2 eq./**lb milk**)	0.61	**0.48**	0.64	**0.51**
GHGE **housing**, %	37.2	32.8	36.0	34.7
GHGE **manure**, %	0	0	3.1	0
GHGE **feed** product., %	19.3	17.1	18.6	18.3
GHGE **grazing**, %	29.9	23.9	29.0	28.4
GHGE **fuel**, %	3.4	3.0	3.3	3.1
GHGE **secondary**, %	10.2	23.2	10.0	15.5

Results: Organic

	Base	Decrease forage:grain	6-mo manure storage	Increase 30% milk prod.
Net return, $/yr	151,342	**126,732**	150,665	**216,249**
GHGE total (lb CO_2 eq./**cow** per yr)	10,398	7,961	10,782	10,736
GHGE total (lb CO_2 eq./**lb milk**)	0.74	**0.57**	0.77	**0.59**
GHGE **housing**, %	38.0	33.8	36.9	35.6
GHGE **manure**, %	0	0	2.9	0
GHGE **feed** product., %	17.3	15.0	16.6	16.3
GHGE **grazing**, %	29.3	24.5	28.5	27.6
GHGE **fuel**, %	4.4	3.5	4.3	4.1
GHGE **secondary**, %	11.0	23.2	10.8	16.4

Vision


Inputs
Existing farms data
Additional farms data
Weather & soils data
Models
UW-Dairy Management DSS
IFSM
Outputs
Environment
Economic
Outcome
Wisconsin dairy farm long-term sustainability

Acknowledgment

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USDA NIFA

United States Department of Agriculture
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Thanks
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