PASTURE PROJECT WEBINAR

Larger-Herd, Low-Overhead Dairy Grazing: Financial and Environmental Analysis

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PRESENTATION OUTLINE

Profitable agriculture from permanent vegetative cover

- **Basics of dairy farm financial analysis**
- **Dairy sector context**
- **Larger-herd, low-overhead dairy grazing**
- **Take-away points:**
  - Need a viable alternative to current trend
  - Investment/debt causes cashflow to trump profitability
  - LODG system efficiencies: Feed, Labor, Capital
  - NFI/cwt 4x greater than MN-WI avg ($3.64 vs $0.88/cwt)
  - Win-Win: More profitable system with env and social benefits

DAIRY FARM FINANCIAL ANALYSIS: BASICS

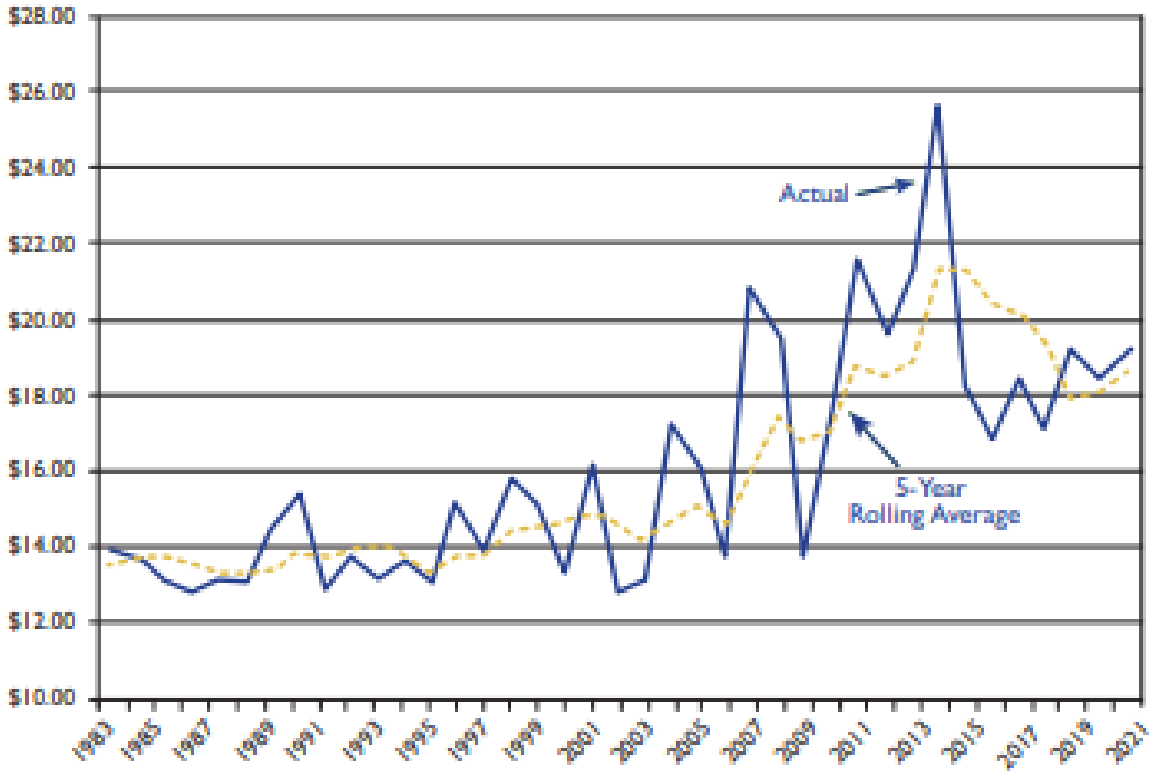
- **Cashflow Statement:**
  - Can you pay your bills?
  - Includes principal payments, but not depreciation
- **Income Statement (Profit & Loss):**
  - Net Farm Income from Operations (NFIFO)
  - Accrual acct'ing, incl. depreciation, but not principal
- **Balance Sheet:**
  - What you own, owe, and the difference (net worth)
  - Necessary for return on assets (ROA)
    - Efficiency of farm's assets at producing profit

DAIRY FARM FINANCIAL ANALYSIS: BASICS (CONTINUED)

- **Direct Costs:**
  - Result directly from producing milk.
  - Grain, fuel, fertilizer, etc.
- **Overhead Costs:**
  - Costs of maintaining and running the farm.
  - Buildings, machinery, equipment, etc.

INCREASING VARIABILITY IN MILK PRICE RECEIVED

Farm Milk Prices Per Cwt.



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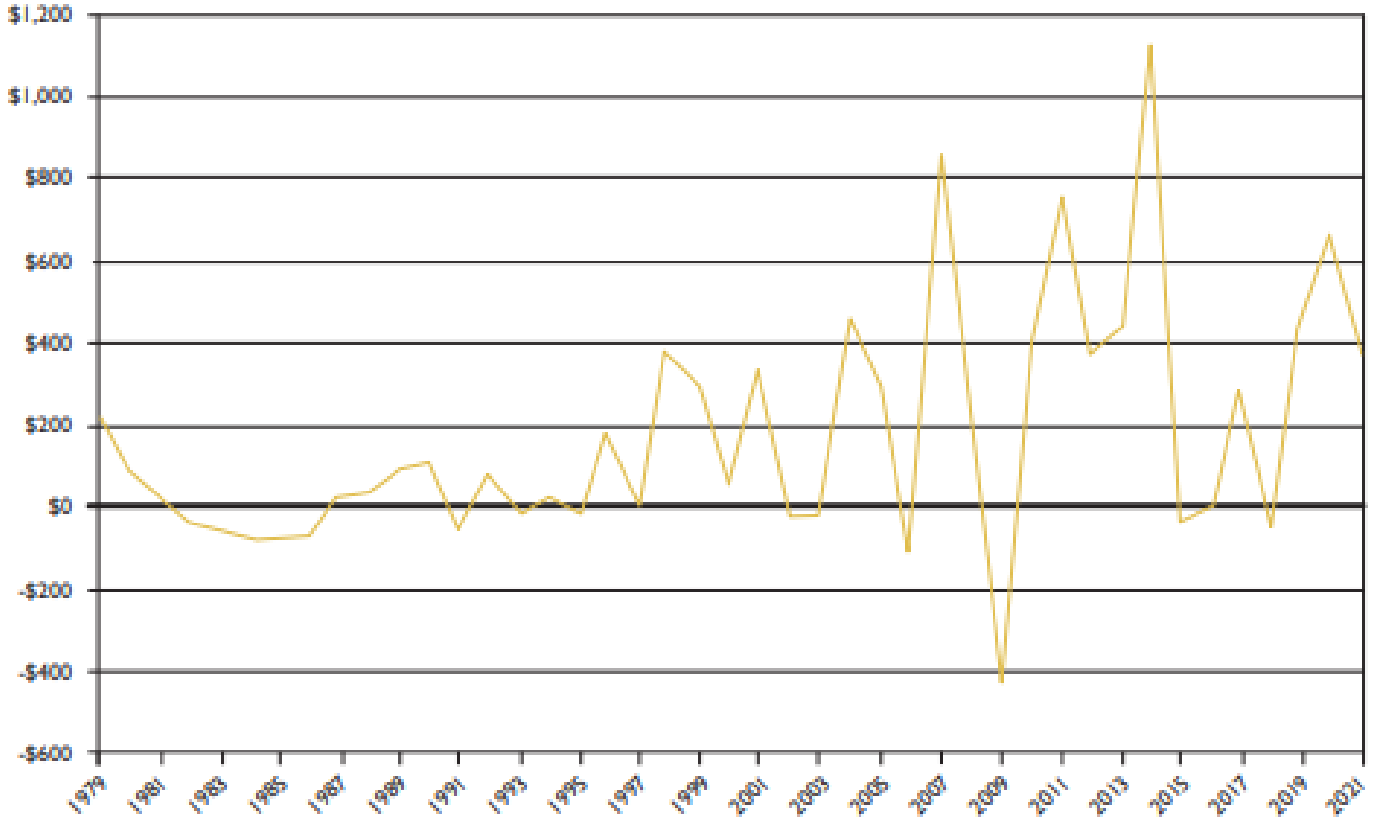
INCREASING VARIABILITY IN PROFITABILITY

Net Earnings Per Cow 1979-2021



THE OVERHEAD COST DILEMMA FOR TRADITIONAL DAIRY FARMS

A lot of $ in buildings and equipment

Relatively high debt

Limited herd space

High overhead costs per cow

Max milk/cow required for cashflow

Not conducive to grazing

Cashflow trumps profitability

Cashflow needs can prohibit profitable decisions

LARGE MODERN CONFINEMENT DAIRY PRODUCTION

- **Efficiency**
  - Maximize output from given level of inputs
- **Economies of scale (capital efficiency)**
  - Spread costs over maximum cwts milk
- **Very impressive operations, but…..**
- **Multi-faceted tightrope:**
  - Animal physiology
  - Labor
  - Environmental
  - Financial

LOW-OVERHEAD DAIRY GRAZING

How do you reduce overhead cost per cow (and per cwt)?

- **Find an efficient way to increase herd size:**
  - High throughput milking system
  - Efficient feeding system
- ***Maximize ratio of cows+land to bldgs.+machinery***
  - Cost-effective animal housing choices
  - Minimize buildings and machinery costs per cow+cwt

LODG: Reduce total cost (direct and overhead)/cwt.

LOW-OVERHEAD DAIRY GRAZING: STRIVING FOR EFFICIENCY

- **Feed efficiency:**
  - Goal - Minimize feed cost per cwt milk shipped
  - How - Max nutrient intake from grazing, smart supplementation
- **Labor efficiency:**
  - Goal - Maximize milk shipped per worker
  - How – high through-put milking parlor and seasonal calving
- **Capital efficiency:**
  - Goal - Maximize rate of rate of return on assets (ROA)
  - How - Minimize overhead costs per cwt.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LOW-OVERHEAD DAIRY GRAZING: REPRESENTATIVE FARM FINANCIALS

Farm Description:

- Developed with expert panel
- 240 cows on *rented* farm with 360 acres ($78K/yr)
  - Borrowed $285K for cows at 7% for 5 years
- Borrowed $240K to retrofit farm with:
  - Swing-20 parlor and holding area
  - Drive-by covered feed bunk, 2-sided
  - Bedded pack for emergencies
- Owns $270K worth of machinery; 50% debt financed
- Total Assets = $1.25 million; $5,197/cow or $35/cwt.
  - Typical dairy farms range from $10K to $22K/cow

LOW-OVERHEAD DAIRY GRAZING: REPRESENTATIVE FARM FINANCIALS

Farm Operation:

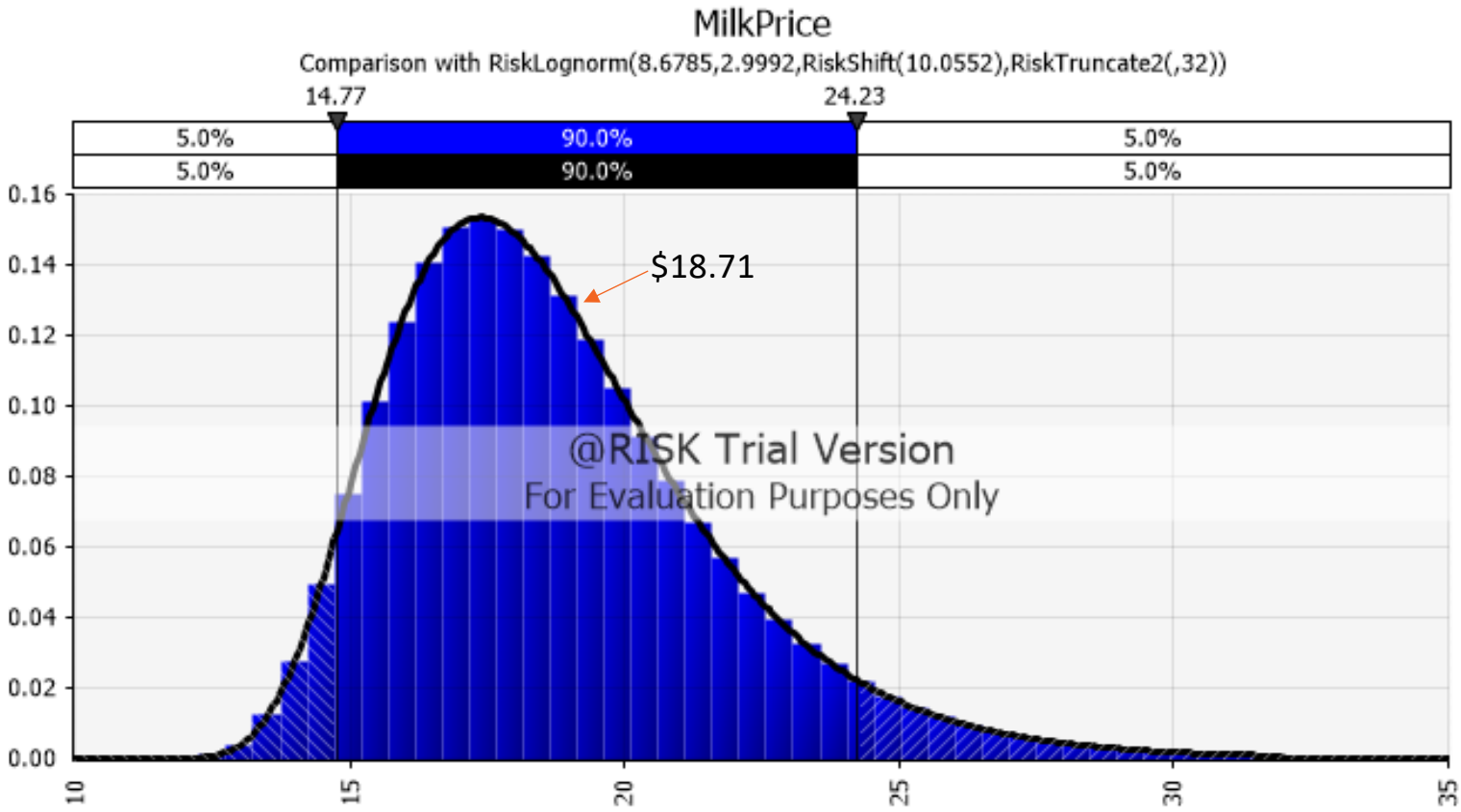
- Medium-framed cows, 15,000 lbs milk/cow
- Spring calving, seasonal, dry in Jan-Feb
- Ration:
  - 12 lbs grain, 6 lbs DM CS + pasture (grazing season)
  - 12 lbs grain, 12 lbs DM CS, 17 lbs DM hay/balage (non-grazing season)
- 18% cull rate; raise replacements, sell extras
- 2.5 workers: 1 owner/manager, 1.5 hired

FINANCIAL ANALYSIS: MONTE CARLO SIMULATION

- Milk and feed price data from 2011-2021
  - Avg milk price = $18.71(+1.50), avg grain price = $230/ton
  - Averages less meaningful due to large variability
- Monte Carlo simulation
  - Analysis is run 10,000 times
  - Pulls milk price and feed price each time
  - Pulls milk production level (14,000 to 16,000 lbs/cow)
  - Calculates 10,000 sets of outputs
  - Can see probability of any given outcome

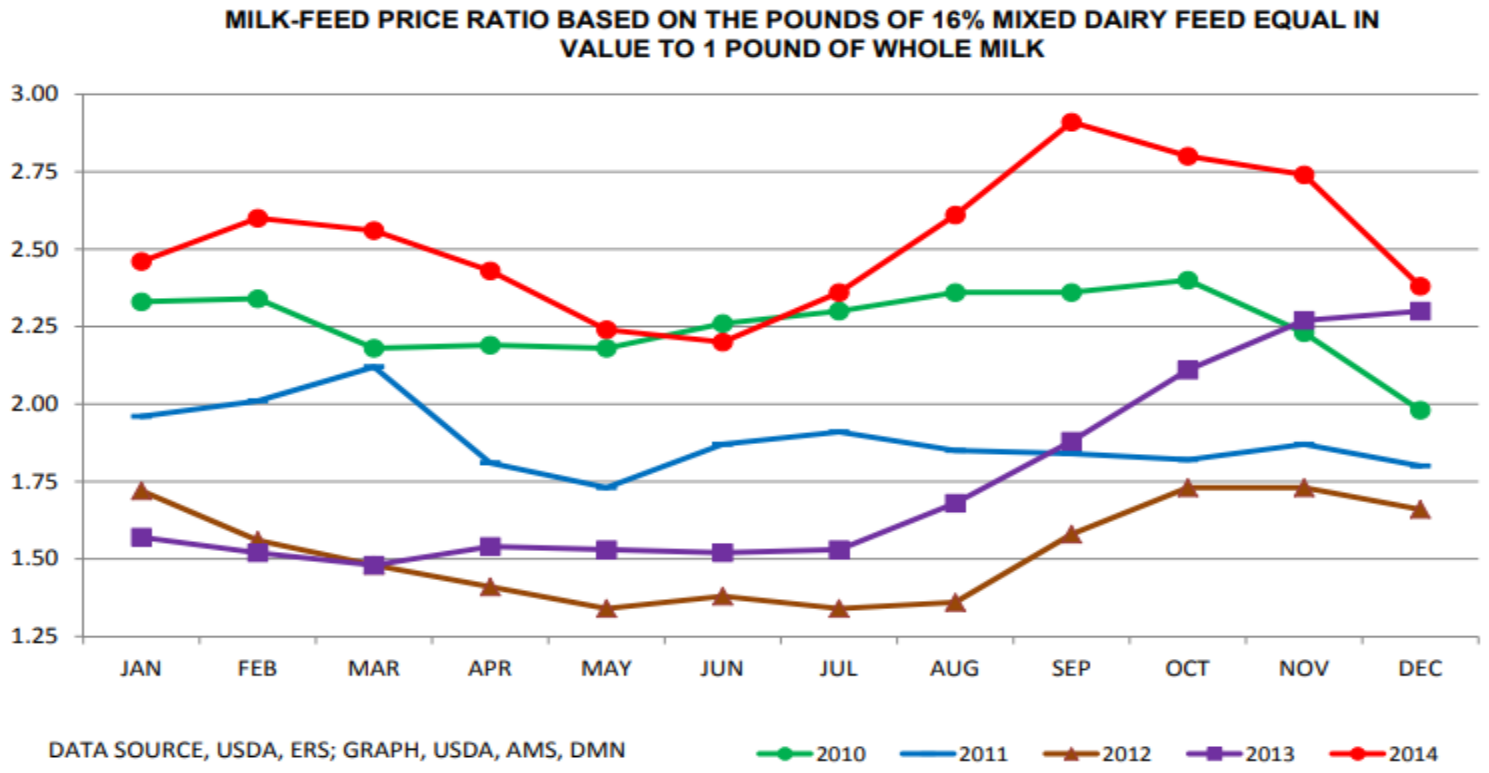
FINANCIAL ANALYSIS: MILK PRICE DISTRIBUTION

Average milk price = $18.71+$1.50 premiums



FINANCIAL ANALYSIS: MILK:FEED PRICE RATIO

Monte Carlo results: Milk:Feed price ratio avg = 1.68 (1.16 to 2.25)



LOW-OVERHEAD DAIRY GRAZING: PROFIT & LOSS STATEMENT

Hypothetical Low-Overhead Dairy Grazing Retrofit						Cows	CWTs
Somewhere, MN or WI	Profit & Loss Statement					240	35,404
	Year 1 2022	Year 2 2023	Year 3 2024	Year 4 2025	Year 5 2026	Year 5 Avg Per Cow	Year 5 Avg Per CWT
REVENUES							
Farm cash receipts							
Milk sales (1)	$658,104	$682,767	$704,500	$715,420	$715,420	$2,981	$20.21
Cull cow sales (2)	$42,000	$36,961	$30,240	$30,240	$30,240	$126	$0.85
Cull heifer sales	$8,652	$8,972	$9,463	$9,690	$9,690	$40	$0.27
Calf sales	$12,096	$12,544	$13,230	$13,548	$13,548	$56	$0.38
Farm-raised replacement sales	$34,720	$31,360	$44,800	$50,400	$53,760	$224	$1.52
TOTAL REVENUES	$755,572	$772,604	$802,233	$819,297	$822,657	$3,428	$23.24
EXPENSES							
Purchased concentrates (3)	$148,380	$149,290	$151,597	$153,563	$154,159	$642	$4.35
Purchased hay	$80,800	$81,024	$82,012	$83,105	$83,526	$348	$2.36
Purchased corn silage	$47,511	$47,511	$47,511	$47,511	$47,511	$198	$1.34
Labor and mngmnt ind benefits (4)	$126,381	$128,909	$131,487	$134,117	$136,799	$570	$3.86
Bedding	$12,000	$12,240	$12,485	$12,734	$12,989	$54	$0.37
DHIA testing	$6,240	$6,240	$6,240	$6,240	$6,240	$26	$0.18
Semen/breeding	$6,000	$6,000	$6,000	$6,000	$6,000	$25	$0.17
Farm Rent	$78,000	$78,000	$78,000	$78,000	$78,000	$325	$2.20
Milk marketing (6)	$0	$0	$0	$0	$0	$0	$0.00
Repairs (7)	$12,000	$12,000	$12,000	$12,000	$12,000	$50	$0.34
Vet/medicine (8)	$8,400	$8,400	$8,400	$8,400	$8,400	$35	$0.24
Parlor supplies	$8,400	$8,568	$8,739	$8,914	$9,092	$38	$0.26
Utilities	$12,000	$12,240	$12,485	$12,734	$12,989	$54	$0.37
Insurance	$9,600	$9,792	$9,988	$10,188	$10,391	$43	$0.29
Fertilizer (9)	$10,800	$11,016	$11,236	$11,461	$11,690	$49	$0.33
Seed/spray (9)	$7,200	$7,344	$7,491	$7,641	$7,794	$32	$0.22
Custom hire	$15,000	$15,300	$15,606	$15,918	$16,236	$68	$0.46
Truck and fuel	$10,000	$10,000	$10,000	$10,000	$10,000	$42	$0.28
Fence/water	$0	$0	$0	$0	$0	$0	$0.00
Other expenses	$7,200	$7,200	$7,200	$7,200	$7,200	$30	$0.20
Depreciation: Machinery (10)	$39,294	$39,294	$39,294	$39,294	$39,294	$164	$1.11
Depreciation Bldgs Machinery (10)	$0	$563	$0	$0	$0	$0	$0.00
Depreciation Bldgs Machinery (10)						$0	$0.00
Interest (11)	$44,324	$39,642	$34,632	$29,272	$23,536	$98	$0.66
TOTAL EXPENSES	$689,530	$690,572	$692,402	$694,292	$693,848	$2,891	$19.60
NET FARM INCOME	**$66,041**	**$82,032**	**$109,830**	**$125,005**	**$128,809**	$536.71	$3.64

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LOW-OVERHEAD DAIRY GRAZING: EXPENSES AND NET FARM INCOME

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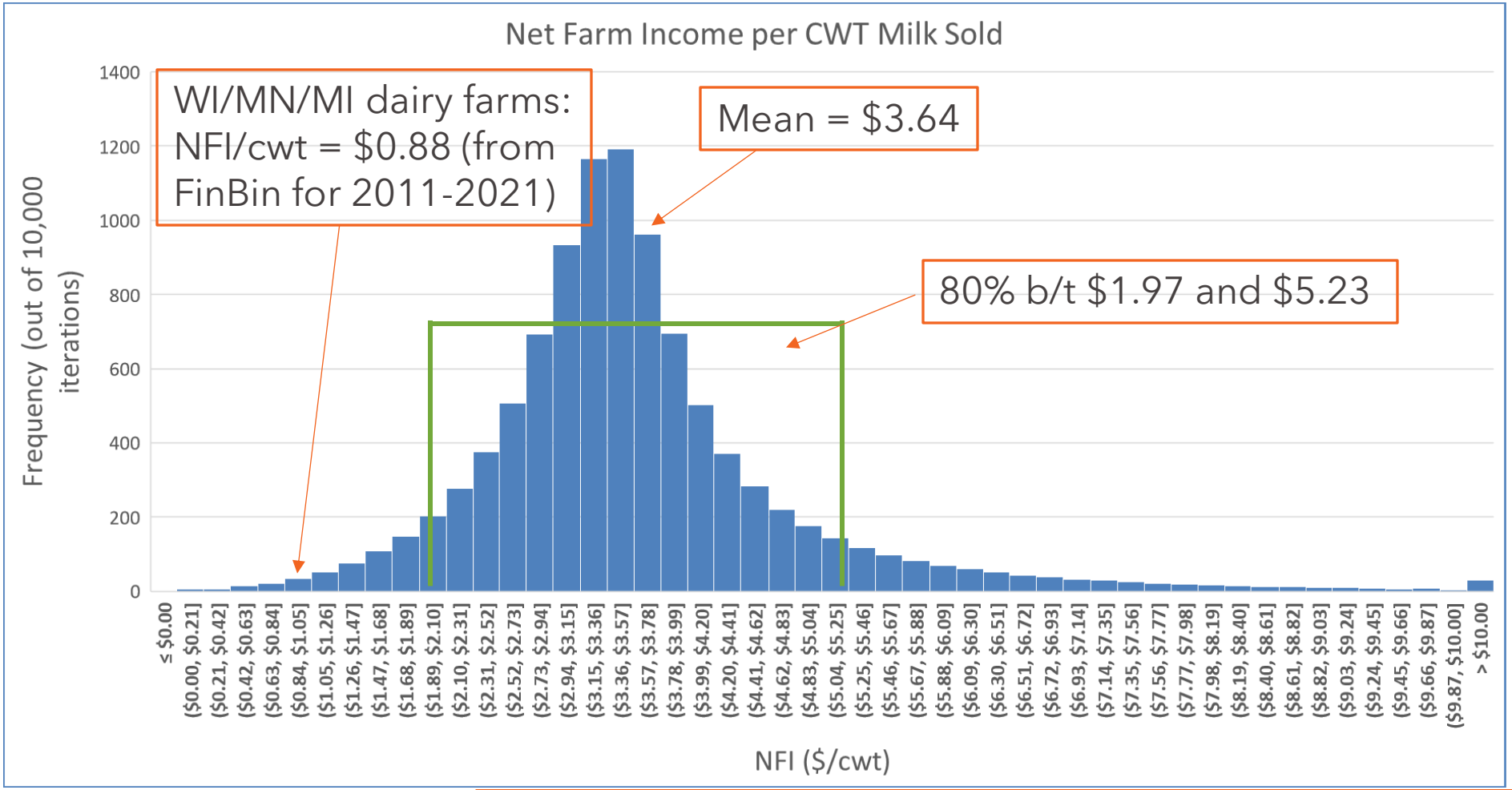
LOW-OVERHEAD DAIRY GRAZING: REPRESENTATIVE FARM FINANCIALS

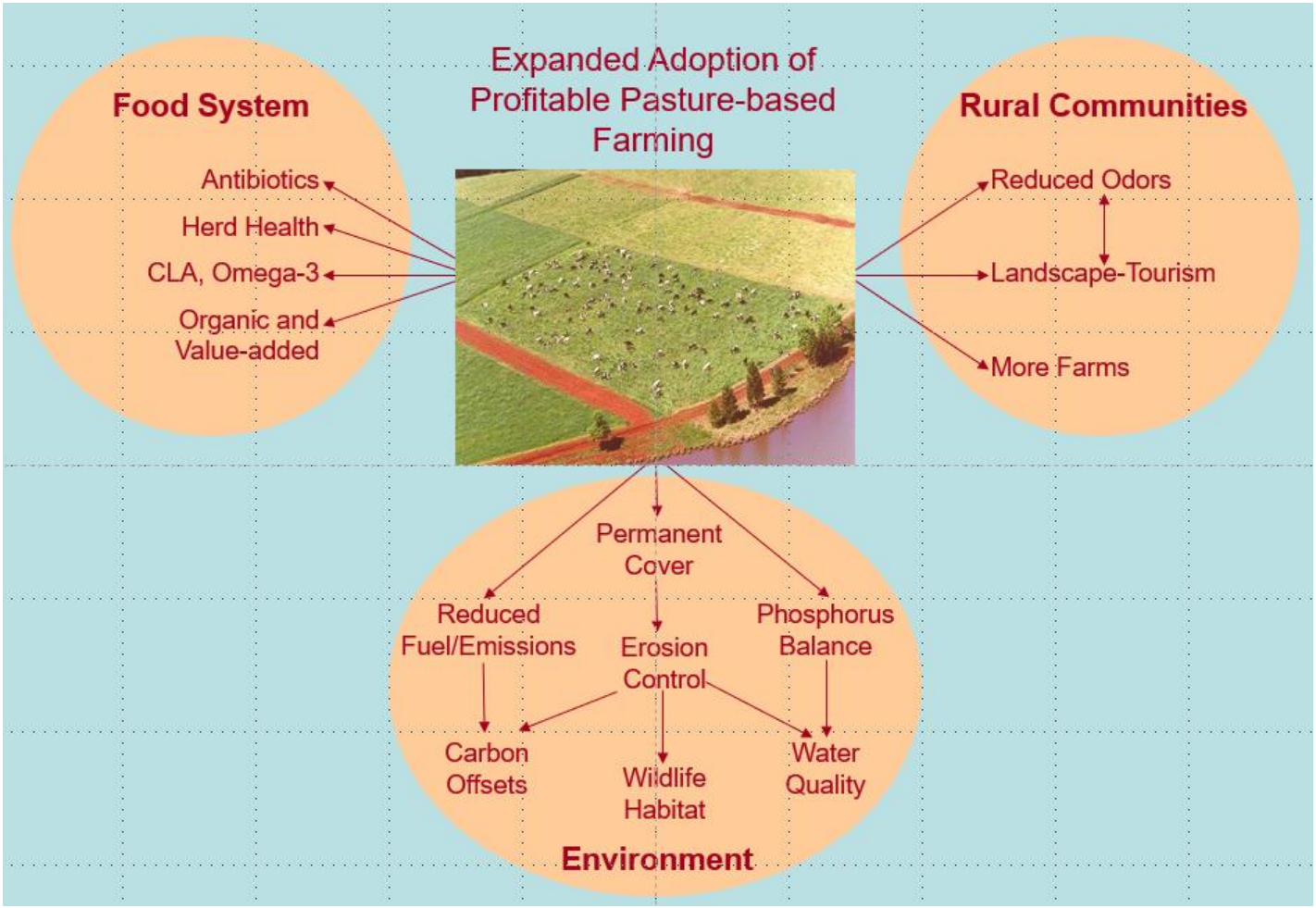
Average Results:

- Full cost = $19.60/cwt
- Net Farm Income from Operations (NFIFO) = $128,809
  - After paying owner labor and management
  - NFIFO/cow=$536, NFIFO/cwt=$3.64
- ROA=12.2%
- Profit margin=15.7%
- Total feed costs/cwt milk = $8.05
- 1.4 million lbs milk shipped/FTE

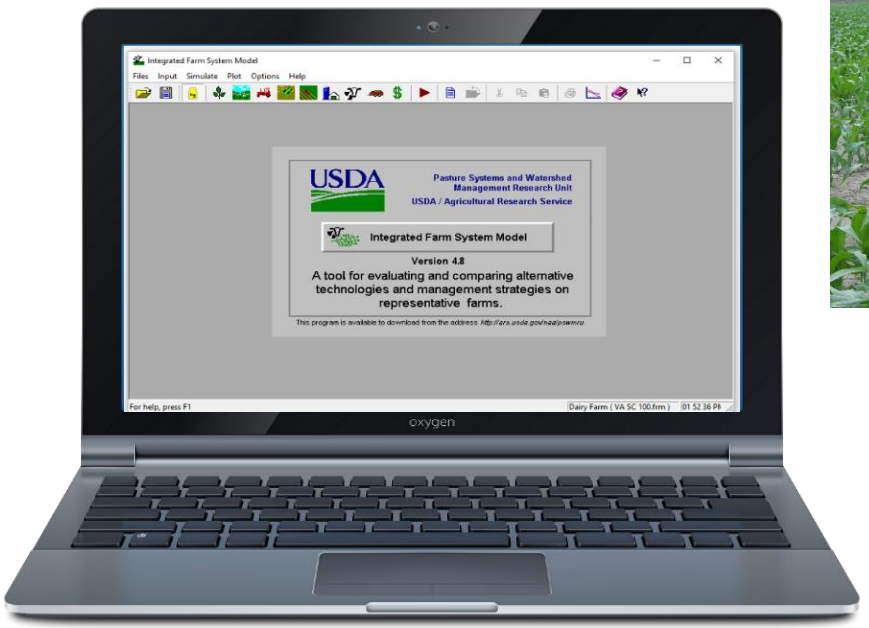
LOW-OVERHEAD DAIRY GRAZING: NET FARM INCOME PER CWT MILK SOLD



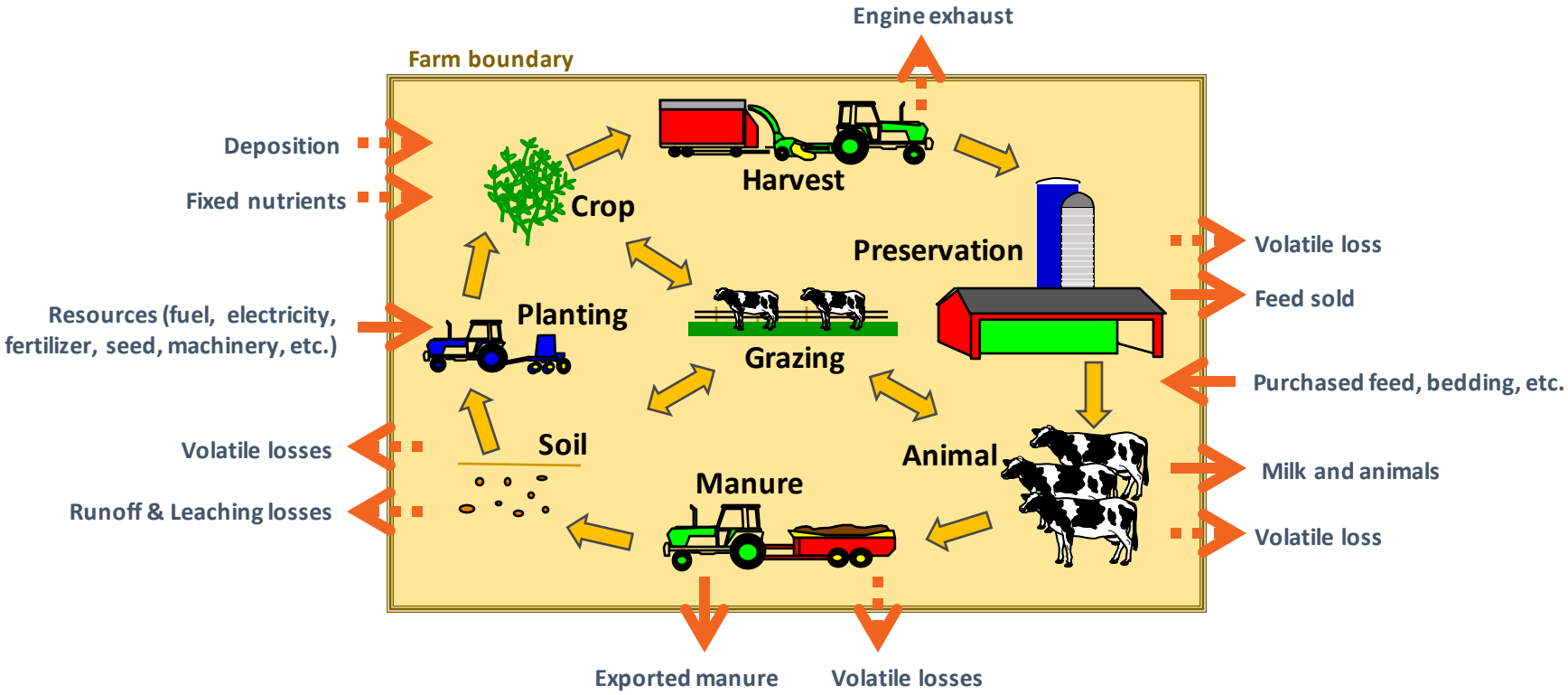
MULTIPLE BENEFITS OF WELL-MANAGED GRAZING



Integrated Farm System Model (IFSM)



IFSM: Process-Level Simulation



ENVIRONMENTAL COMPARISON USING IFSM LODG VS CONFINEMENT

Same farm footprint (size, soils, topography):

- 360 acres, clay loam, gently sloping
- Confinement (Conf)
  - 130 cows
  - 24,000 lbs/cow
  - Corn silage, ear corn, hay
- Low-overhead dairy grazing (LODG)
  - 240 cows
  - 15,000 lbs/cow
  - All pasture/hay

ENVIRONMENTAL COMPARISON LODG VS CONFINEMENT

Phosphorus Loss:

- P loss (lbs/acre): Conf=0.7, LODG=0.2 (71% reduction)

Nitrogen Loss:

- Nitrate leaching/runoff (lbs/acre): Conf=10.9, LODG=4.1 (62% reduction)
- Reactive N footprint (lbs/cwt): Conf=0.89, LODG=0.66 (26% reduction)

Net GHG Emissions (MT CO2e):

- Net GHGs: Conf=1,260, LODG=1,197 (5% decrease)
- Animal emissions: Conf=691, LODG=1,147 (66% increase)
  - Per cow: Conf=5.32, LODG=4.78 (10% decrease)
- Manure emissions: Conf=466, LODG=95 (79% decrease)
  - Per cow: Conf=3.58, LODG=0.39 (89% decrease)

OTHER CONSIDERATIONS LODG VS CONFINEMENT

Wildlife Habitat:

- Birds
- Pollinators
- Cold-water streams

Rural Community Health:

- Economic multiplier from more farms with profits
- Tourism impacts: cows grazing, reduced odors
- Farm safety, worker conditions, opportunity for ownership

Food System:

- Animals: longevity, reduced disease, reduced antibiotic use
- Food: increased CLA, Omega-3 fatty acid
- Easier transition to organic and grass-fed

TAKE-AWAY POINTS

- Ideally, business decisions are based on profitability (by reducing overhead/cwt), not on cashflow
  - When milk:grain price ratio is low, feed less grain
  - In sustained lulls, pivot towards beef
- LODG efficiencies: feed, labor, and capital
- NFI/cwt 4x greater than MN-WI avg ($3.64 vs $0.88/cwt)
- Win-Win: More profitable system with env and social benefits

CONTACT INFORMATION

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