

# FARM INCOME STATEMENT ANALYSIS

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AAE 320

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# Goal

- Overview accounting Income Statement as it pertains to agricultural operations
- How to prepare and/or read one
- How to use one to calculate rates of return

# Income Statement

- Income Statement: Record of revenues and expenses over a period of time
  - Remember: Balance Sheet is statement of assets, liabilities and equity at a point in time
- Other names for an income statement
  - Operating Statement
  - Profit and Loss Statement (P & L)
- $\text{Income} = \text{Revenue} - \text{Costs}$
- Question it answers:

Did you make money last year?

# Income Statement

- $\text{Income} = \text{Revenue} - \text{Costs}$
- Revenue consists of Cash Revenue and Non-Cash Revenue
- Costs consist of Cash Costs and Non-Cash Costs

# Cash Revenue

- Account for all business revenue earned during the period: cash and non-cash
- Cash Revenue
  - Crop sales
  - Feeder livestock sales
  - Crop and Livestock product sales
  - Government program payments, including crop insurance and disaster payments
- **Anything you sell!**
- Will generally have a record for checks received

# Non-Cash Revenue

- Will not always have records for these revenues
- Inventory Changes for commodities ready for sale
  - Grain, feeder livestock
  - Accrual basis: value of ending inventory minus value of beginning inventory
- Accounts Receivable: ending balance minus beginning balance
- Miscellaneous: Non-cash payments in kind, trades, custom harvest arrangements, etc.

# Revenue: Special Agricultural Cases

- Gain/Loss from sale of culled breeding livestock or milk cows
  - Treat as Cash Revenue, a normal part of production process
  - Typically do not treat it as gain/loss from sale of a capital asset
- Change in value of raised breeding livestock or milk cows (calf to heifer, heifer to cow)
  - Treat the increase in value of raised livestock as an increase in revenue
  - Like inventory changes: Use the book value for each animal type, then do ending value minus beginning value for herd

# Revenue: Special Agricultural Cases

- Gains or Losses on Sales of Capital Assets are treated as revenue
- Land: Selling Price minus Selling Costs
  - Revenue changes only due to price changes
  - Selling costs: often there are deferred taxes due
- Depreciable Assets: Selling Price minus “Book” Value” (value according to your depreciation schedule)
  - Revenue changes due to price changes and errors in estimating depreciation
  - This adjusts revenue for “errors” in depreciation, which are very common



# Cash Expenses

- Account for all business expenses incurred during the period: cash and non-cash
- Purchased inputs: fertilizer, seed, fuel, chemicals, feeder livestock, feed, etc.
- Labor and services
- Repairs and maintenance
- Property taxes, insurance, etc.
- **Everything you buy for the farm!!!**
- Will generally have a record for checks written

# Non-Cash Expenses

- Will not always have records for these expenses
- Depreciation
  - All capital assets (buildings, tractors, etc.)
  - Breeding livestock, milk cows, perennial crops
  - Cost of production to account for, even if you don't pay cash
- Accounts Payable
  - Ending accounts payable balance minus beginning accounts payable balance

# Prepaid Expenses

- Expenses paid in previous tax period for production during the current tax period
- Common examples: fertilizer, seed, feed etc. bought in previous tax year for this crop year
- Goal: to put expenses into the year they were used to produce crops/livestock
- Expenses for This Year = Prepaid Expense Last Year – Prepaid Expense This Year
- Main idea: put expenses into the crop year the purchased inputs are used

# Accrued Expenses

- Cash interest paid
  - Add accrued interest owed
  - Subtract interest prepaid
- Property taxes paid
  - Add accrued taxes owed
  - Subtract taxes prepaid
- Income taxes owed
  - Should estimate, but that very difficult
  - Do Income Statement as pre-tax income
  - Do after-tax Income Statement later after pay taxes

# Income Statement

- Main Idea
  - Revenue – Expenses = Net Farm Income from Operations
  - Include unpaid labor & management & net gains from sale of capital assets = Net Farm Income
- Trying to separate income from production activities versus income from investment activities
- This is the general idea, many variations due to differences in the non-cash costs and non-cash revenues included

# Cash Accounting and Accrual Adjustments

- Most farms use cash accounting for taxes
- Problems: Prepaid expenses and sales in following tax year are common
- Buy many inputs (seed, fertilizer, chemicals, feed, fuel) in one year, but use them the next year
- Harvest crops and livestock born/raised in one year, but sell in next year
- Tax management: buy inputs and make sales to reduce taxable income – cannot use tax accounting to determine profitability of specific enterprises
  - Do not use costs and revenue from 2017 taxes to calculate your profits from the 2017 corn crop
- Accrual Adjustments: put costs and revenues into the right year to determine profitability

# Accrual Adjustment of Cash Basis Income Statement

- Accrual accounting: the business standard: GAAP
  - Accrual accounting: more accurate and useful for decision making: puts costs and revenue in the right years
  - Cash accounting simple and has tax advantages
- Farms end up with two sets of accounting records if do it “right”: cash for taxes, accrual for decisions
- Farms must create cash accounting records for tax purposes, then can develop an accrual adjusted cash basis income statement from them
- Farm accountants work out the details

# Simple Example to Illustrate Cash versus Accrual Accounting

- If 2017 a high revenue year, to lower 2017 taxes
  - Increase prepaid expenses: Buy more than usual inputs in 2017 for 2018 (fertilizer, seed, feed, fuel)
  - Sell 2017 grain after Dec 31, 2017 so less 2017 income
  - Just “kicks the can down the road” but eventually a low income year happens and you can “catch up”
- To calculate profits from growing corn in 2017
- Do not include revenue from corn grown in 2016 and sold in 2017, but do include revenue from corn sold in 2018 and grown in 2017
- Include costs paid in 2016 for inputs used in 2017, but not costs paid in 2017 for inputs used in 2018



# Uses for Income Statement

- See if made a business had a profit or a loss, but really want to know profitability
  - Profitability: normalize for size to see if there is efficient use of resources to produce income
  - Five Measures commonly used
    - Net Farm Income from Operations
    - Net Farm Income
    - Rate of Return on Assets
    - Rate of Return on Equity
    - Operating Profit Ratio
- } Should be Accrual Adjusted

# Calculating Farm Income: Revenue

- You decide what non-cash sources to include and whether it's accrual adjusted or not
- 1) Selling things: self explanatory
- 2) Capital Gains: Selling of capital (non-current) assets for prices different than their basis
  - Sell land for different price than original cost
  - Depreciable assets: selling for price different than remaining basis

# Calculating Farm Income: Cost

- 1) Operating Costs: You decide what non-cash costs to include and whether to use accrual adjustments
- 2) Interest: separate it out as operating expense
  - Need to account for interest in some measures
- 3) Unpaid Labor and Management: how much you “pay yourself” for labor and management
  - Need to account for in some measures

# Net Farm Income from Operations (NFIfO)

- $\text{NFIfO} = \text{Revenue} - \text{Operating Costs} - \text{Interest}$
- NFIfO = Income made by farm operation
- Does not include investment income from capital asset sales: depreciation should already be included as a non-cash expense
- Does not include paying the operator/manager for time and labor

# Net Farm Income (NFI)

- $NFI = \text{Revenue} - \text{Operating Costs} - \text{Interest} - \text{Unpaid Labor \& Management} + \text{Capital Gains}$
- Income generated by farm business after paying all expenses (operation & investment activities)
- Includes net gain from sale of capital assets
- Includes paying for owner/operator's time and management
- $NFI = NFIfO - \text{Unpaid Labor \& Management} + \text{Capital Gains}$

# NFIfO vs NFI

- A farm is a mix of different activities: labor, management, investment, financing, etc.
- NFIfO: trying to get at the crop growing and livestock part of the operation, not investment or management
- NFI: tries to get at all the farm business: pay yourself for management, plus investment earnings included

# Return on Assets (ROA)

- $ROA = \text{Revenue} - \text{Operating Costs} - \text{Unpaid Labor \& Mngmt} + \text{Capital Gains}$
- $ROA = \text{NFI} + \text{Interest}$
- Income generated by all Farm Assets, including investment income
- Don't Subtract Interest
  - Interest = cost of using someone else's money so your farm can have more assets than just what you can own with your equity
  - ROA wants to calculate income generated by all assets, yours and other people's
- Other terms: Return to Capital

# Return on Assets (ROA)

- Estimate cost of Unpaid Labor and Management
  - What it would cost to hire someone to do all the currently unpaid labor and management?
  - What would you/family make at your next best alternatives (opportunity costs)?
- Removing Unpaid Labor and Management arbitrary, but important
  - Whatever value you choose changes estimated ROA
- If ignore unpaid labor and management (many do), will get higher ROA
- Know these issues before you compare with other businesses and with market returns



# Rate of Return on Assets (ROROA)

- ROA compared to size of business
  - How much income is the farm generating relative to the amount of assets used?
- $\text{ROROA} = (\text{ROA} / \text{Average Assets}) \times 100$
- Average Assets = average of assets over the time period of the Income Statement
  - Go to Balance sheet and use average of total assets (current and non-current) at start and end of period
  - Rates of return are why Balance Sheet and Income Statement go together

# Rate of Return on Assets (ROROA)

- $ROROA = (ROA / \text{Average Assets}) \times 100$
- Average Assets = “size” of business during the accounting period
- Which basis for asset valuation: cost or market?
  - Market basis to compare farms and to compare to liquidating and getting market rates of return on financial investments
  - Use cost basis to look at your trend over years
- Compare ROROA only if done in same way, especially asset valuation
- Do not include non-farm assets and income

# Return on Equity (ROE)

- ROE = Revenue – Operating Costs – Interest – Unpaid Labor and Management + Capital Gains
  - ROE = ROA – Interest
  - ROE = NFI
- Of all the income generated by the Farm Assets, the part that goes to you as holder of equity in the business
  - Return on your equity invested in the farm

# Rate of Return on Equity (ROROE)

- $ROROE = (ROE / \text{Average Equity}) \times 100$
- Average Equity = average of equity at the beginning and end of the period
  - Obtain from Balance Sheet
- Like ROROA, except use ROE, not ROA
- ROE removes Interest from ROA
  - Interest is farm income to pay for debt equity
  - Interest is the “ROE” for the bank, and the Interest Rate is roughly the bank’s “ROROE”

# ROROA, ROROE and Interest Rate

- Interest the only difference between ROE and ROA
- If Rate of Return on Assets  $>$  Interest Rate,  
Rate of Return on Equity  $>$  Rate of Return on Assets
- If Rate of Return on Assets  $<$  Interest Rate,  
Rate of Return on Equity  $<$  Rate of Return on Assets
- If ROROA  $>$  Interest Rate, then extra generated from use of external funds goes to increase ROROE

# Operating Profit Margin Ratio (“Profit Margin”)

- Operating profit as percent of Revenue
- Operating profit = Return on Assets
- Operating Profit Margin Ratio  
=  $ROA / \text{Total Revenue}$
- Of all revenue generated by the business, how much does the business keep?
- Low Profit Margin: improve ratio first (by lowering costs) before expansion
- High Profit Margin: expansion may make sense

# Summary of Farm Income Definitions

- Net Farm Income from Operations (NFIfO) = Revenue – Operating Costs – Interest
- Net Farm Income (NFI) = Revenue – Operating Costs – Interest – Unpaid Labor Mngmt + CapGains
  - $NFI = NFIfO - \text{Unpaid Labor Mngmt} + \text{CapGains}$
- Return on Assets (ROA) = Revenue – Operating Costs – Unpaid Labor Mngmt + CapGains
  - $ROA = NFIfO + \text{Interest} - \text{Unpaid Labor Mngmt} + \text{CapGains}$
  - $ROA = NFI + \text{Interest}$
- Return on Equity (ROE) = Revenue – Operating Costs – Interest – Unpaid Labor Mngmt + CapGains
  - $ROE = ROA - \text{Interest}$
  - $ROE = NFI$

# Farm Income: Final Comment

- When you do your accounting, or pay some one to do it, and you calculate your farm income
  - You decide how you want to deal with non-cash costs, non-cash revenues, depreciation, inventory changes, accrued expenses, prepaid expenses, accrual adjustments and unpaid labor and management costs for yourself and your family
- When you compare yourself to other farmers, know how they deal with these same things and make adjustments if the comparison is important



# Summary

- How to develop an Income Statement
  - Accrual Accounting
  - Accrual Adjusted Cash Accounting
- Measures from Income Statement
  - Net Farm Income
  - Net Farm Income from Operations
  - Return on Assets and Rate of Return on Assets
  - Return on Equity and Rate of Return on Equity
  - Profit Margin
- Look at example rates and margins
- Look at example income statement

# Rates of Return in Dairy

- UW Center for Dairy Profitability

<http://cdp.wisc.edu/pdf/02bench.pdf>

<http://cdp.wisc.edu/Financial%20Benchmarks.htm>

- Two methods
- Assets at Cost Basis with Tax Depreciation
- Assets at Market Basis with Economic Depreciation
- **Does NOT include cost of unpaid labor and management or opportunity cost of owner equity**

# Average Profitability in WI Dairy

## Cost Basis and Tax Depreciation

	<u>2002</u>	<u>2001</u>	<u>2000</u>
ROROA	4.00%	10.01%	7.91%
ROROE	-1.69%	16.15%	9.07%
Profit Margin	4.99%	12.38%	10.25%

## Market Value and Economic Depreciation

	<u>2002</u>	<u>2001</u>	<u>2000</u>
ROROA	2.17%	5.65%	4.24%
ROROE	0.05%	4.82%	2.34%
Profit Margin	5.79%	13.31%	10.52%

# ROROA in WI Dairy: AgFA Farms

Year	ROROA	Year	ROROA	2002 Range of ROROA	
				<u>Range</u>	<u>% Farms</u>
1995	5.57%	2005	6.77%	< 0%	35.5%
1996	5.36%	2006	3.25%	0% - 2.5%	20.1%
1997	5.42%	2007	8.39%	2.5% - 5%	16.3%
1998	9.20%	2008	6.49%	5% - 7.5%	14.0%
1999	7.56%	2009	-1.65%	7.5% - 10%	7.1%
2000	4.24%			> 10%	7.1%
2001	5.65%				
2002	2.17%				

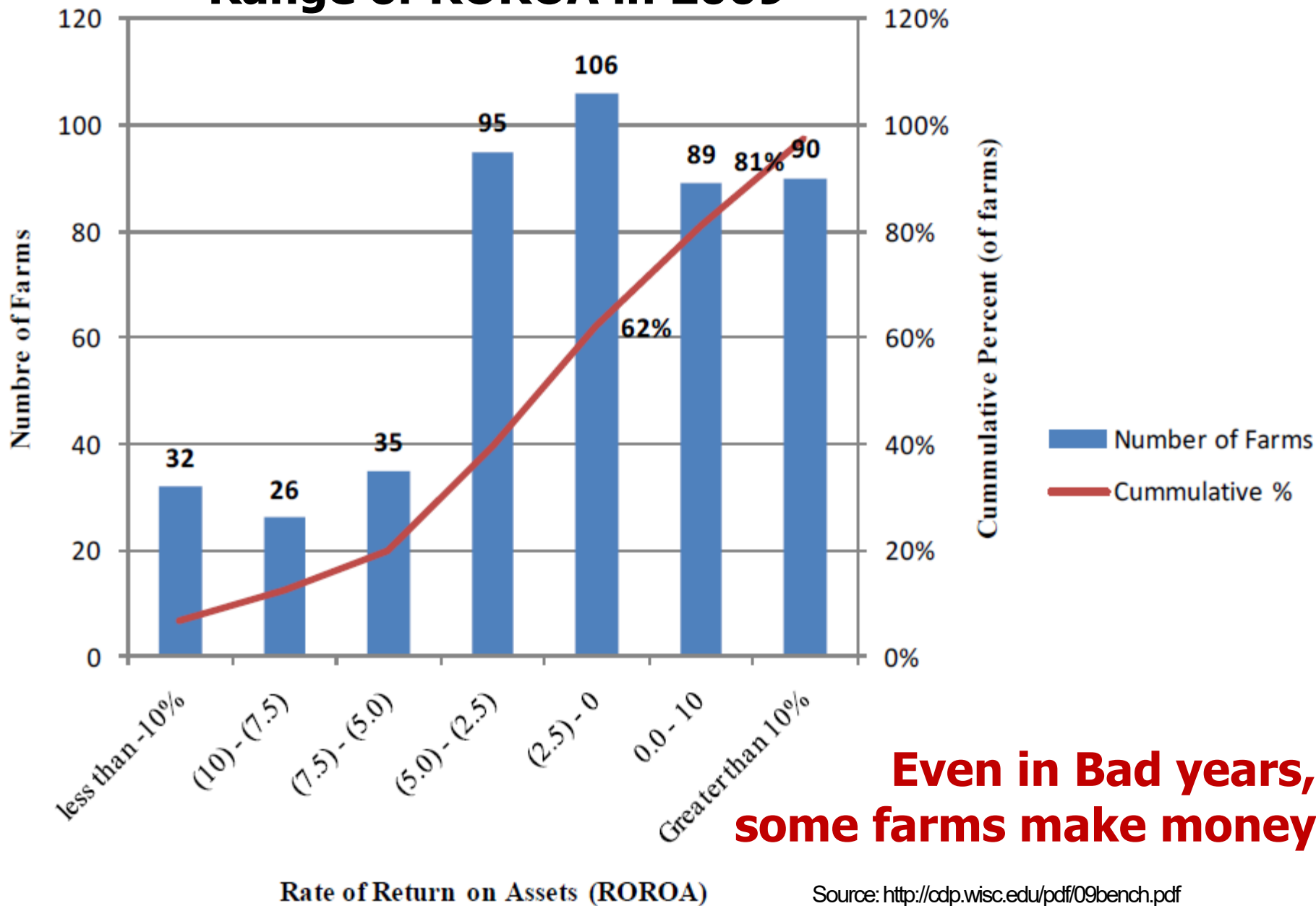
\* Assets at Market Value and Economic Depreciation

# 2009: A Bad Year for Dairy

- 473 AgFA farms in 2009

	NFI	ROROA	ROROE
• Top 40%:	\$77,098	3.32%	2.63%
• The Rest:	-\$23,794	-7.84%	-2.83%

# Range of ROROA in 2009



# More Recent WI Dairy Data

250 famers for 2014-2016

Herd Size	ROA	Profit Margin	Debt to Asset
<50	0.5%	3.5%	15.6%
50-99	1.6%	8.9%	25.5%
100-199	2.4%	8.7%	45.6%
200-499	4.0%	10.6%	59.1%
500-999	4.9%	12.4%	62.0%
>1,000	6.8%	13.3%	62.2%
All	2.2%	9.0%	

Source: [https://cdp.wisc.edu/wp-content/uploads/Profitability-14\\_15\\_16-C-1.pdf](https://cdp.wisc.edu/wp-content/uploads/Profitability-14_15_16-C-1.pdf)

- Larger farms have higher ROA, but more leveraged, so means they don't capture as much of the ROA
- Write-up does not explain asset valuation method, non-cash costs used and unpaid labor and management assumptions

# More Recent WI Dairy Data

## Distribution of ROA by Herd Size

Herd Size	top 10%	top 25%	median	bottom 25%	bottom 10%
<50	4.6%	1.9%	0.5%	-1.5%	-3.8%
50-99	9.1%	4.2%	1.6%	-0.6%	-3.2%
100-199	9.6%	5.7%	2.4%	0.1%	-2.5%
200-499	12.3%	8.1%	4.0%	1.2%	-2.0%
500-999	14.1%	9.6%	4.9%	2.0%	-0.9%
>1,000	15.4%	9.0%	6.8%	2.4%	0.4%

Source: [https://cdp.wisc.edu/wp-content/uploads/Profitability-14\\_15\\_16-C-1.pdf](https://cdp.wisc.edu/wp-content/uploads/Profitability-14_15_16-C-1.pdf)

- Even in good years, some farms lose money
- Even in bad years, some farms make money



# IA 1990-1998 by Type and 2000-2006

IA 1990-1998	ROROA	ROROE	Profit Margin
Grain	7.3%	6.0%	22.3%
Hog	7.4%	6.3%	20.9%
Fed Beef	6.0%	4.6%	23.1%
Cow-Calf	4.5%	2.6%	16.0%
Dairy	7.6%	7.5%	21.1%

IA 2000-2006	ROROA	ROROE	Profit Margin	Current Ratio	Debt to Asset
Top 20%	12.8%	15.1%	22.9%	3.45	0.41
Upper 20-40%	11.4%	12.7%	20.1%	3.44	0.37
Middle 20%	7.9%	8.1%	17.0%	2.50	0.37
Lower 20-40%	9.2%	11.5%	16.7%	1.87	0.36
Lowest 20%	4.4%	2.9%	9.0%	1.62	0.44

# IL and MN 2004

IL 2004	ROROA	ROROE
Grain	6.2%	7.1%
Hog	13.4%	19.2%
Beef	2.9%	2.6%
Dairy	9.6%	11.2%

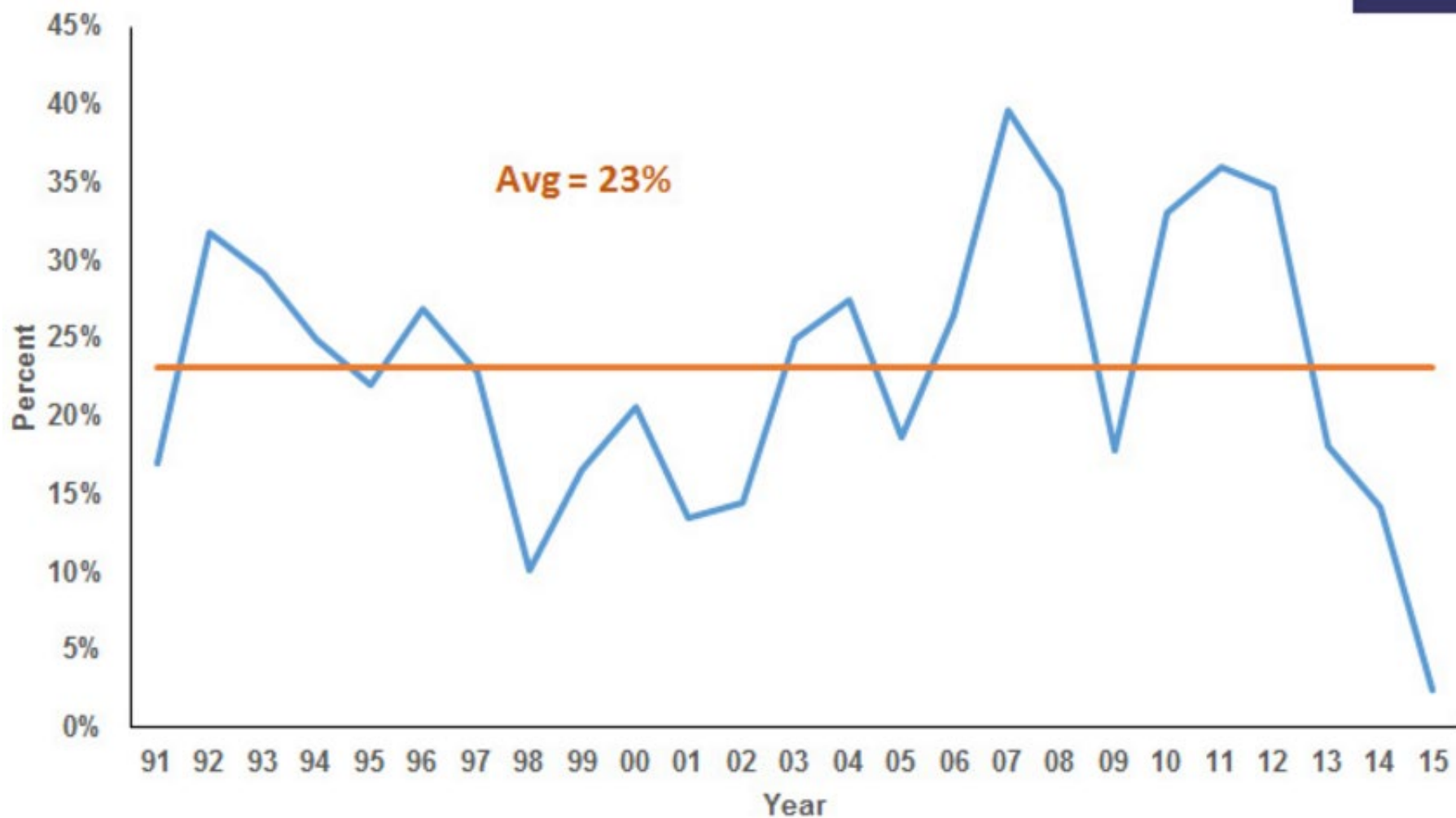
MN 2004	ROROA	ROROE	Profit Margin
Average	8.0%	10.9%	17.6%
Top 20%	13.4%	20.8%	26.0%
Btm 20%	-2.7%	-18.0%	-8.0%

**Table 1. Financial Performance of Grain Farms Enrolled in Illinois Farm Business Farm Management**

	Year						
	2009	2010	2011	2012	2013	2014	2015
<b>Efficiency</b>							
Operating expense ratio	71%	57%	55%	55%	69%	72%	81%
Depreciation expense ratio	7%	7%	7%	7%	10%	11%	13%
Interest expense ratio	3%	3%	2%	2%	2%	2%	3%
<b>Profitability</b>							
Net income from operations	18%	33%	36%	35%	18%	14%	3%
Return on farm assets	3.4%	8.4%	9.6%	3.8%	2.6%	1.6%	-0.6%
<b>Repayment Capacity</b>							
Term debt and capital lease ratio	1.64	3.67	4.67	4.57	1.57	1.38	0.44
<b>Liquidity</b>							
Current ratio	2.31	2.56	2.73	3.08	2.59	2.32	2.05
<b>Solvency</b>							
Debt-to-asset ratio	0.22	0.21	0.20	0.18	0.18	0.18	0.20

Source: Illinois Farm Business Farm Management as reported in Financial Benchmarks tool on farmdoc, <http://www.farmdoc.illinois.edu/finance/benchmarks.asp>.

## Figure 2. Net Farm Income from Operations



Source: <http://farmdocdaily.illinois.edu/2016/10/financial-performance-of-illinois-grain-farms.html>

# Farm Accounting Programs

## (from Jenny Vanderlin, UW CDP)

- AAIMS: Agricultural Accounting and Management Information System
  - UW CDP developed and CDP, UWEX supports, cheap (\$150) for dairy only
- AgManager by AgriSolutions
  - General farm accounting, Farm Credit Services
- Redwing sells CenterPoint and Perception
  - More expensive, used by ag accounting firms
  - CenterPoint is newer, more for farmers

# Farm Accounting Programs

## (from Jenny Vanderlin, UW CDP)

- Several Others: Farm Fund\$, PeachTree, QuickBooks, Quicken, MoneyWorks
- CDP and UWEX do presentations and workshops for farmers to learn more about these
  - Heart of the Farm, Annie's Project
  - UWEX as requested

# WI Farm Management Associations

- Fox Valley Farm Management
  - <http://fvfma.com/> in Appleton, WI with about 700 members
- Lakeshore Farm Management
  - <http://www.lakeshorefarmmanagement.com/> in Valders, WI with about 1,000 members
- Services provided to members
  1. Tax preparation, management and planning
  2. Computerized and hand record-keeping systems
  3. Scheduled "on the farm" consultations
  4. Yearly farm business summary and analysis
- Ag Lenders, UW Extension and UW CDP

# More Information

- Web pages I gave with Balance Sheets
  - UWEX Center for Dairy Profitability
  - FarmDOC IL Extension
  - Center for Farm Financial Management MN Ex
  - AgDecision Maker IA Extension
- Farm Financial Standards Council
- UW CDP soon to relase FARMBENCH to replace Agriculture Financial Advisor (AgFA)
  - Other states have comparable groups