Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada



The Canadian Agricultural Dynamic MicroSimulation Model

"A Tool for Farm Level Analysis to Enhance Policy Responses to Stakeholder Issues"

21 PACIOLI Workshop
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Canada

Purpose

- To provide an overview of the CADMS Model
- To provide examples of the different types of farm level analysis that are possible using CADMS and illustrate how we have used it to enhance policy response to stakeholder issues

The Unique Dual Nature of the CADMS Model has Many Benefits

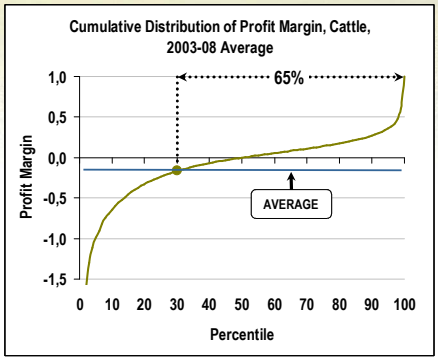
- Rich Historical Database
  - CADMS utilizes information from a variety of sources such as the Farm Financial Survey, Taxfiler, Census of Agriculture and program administrative tax data (CAIS, AgriStability and AgriInvest)
    - The Farm Financial Survey is a cross-sectional data set that is one of the few sources of detailed information on demographics, assets, liabilities, capital investments and non-farm incomes
    - Program administrative tax data provides very detailed revenue, expense and inventory data for participants, but no information about other aspects of the farming operation
  - The historical database can be used for a variety of tasks, such as assessing farm structure, historical performance, ex post program response, etc.
- Powerful Forecasting and Scenario Analysis Tool
  - CADMS has been used to disaggregate and enrich the Aggregate Farm Income Forecast since 2007
    - It is used to produce short-term (2 year) forecasts of farm-level income, wealth and financial indicators
  - It can also be used to forecast and conduct sensitivity and scenario analysis related to proposed program development and/or market conditions

An Overview of the CADMS Forecasting Model

- Aggregate forecasts while valuable, provide information on the overall farm income and financial situation at the national and provincial level, but it does not provide a comprehensive understanding of the various situations facing producers
- The agricultural sector is diversified (various farm types, sizes, and regions), and as such, access to disaggregated information is essential for decision making (i.e. Financial information on hog farms in Manitoba).
- The CADMS model utilizes individual producer performance and historic variability to forecast farm-level revenues, expenses, and balance sheets, for the farm-level farm income forecast that AAFC produces
  - Farm-level forecast results are published by province, farm type and revenue classes

Disaggregated farm level data are essential in providing a more complete picture of the sector's performance

- Cumulative distributions can be used to observe distributional differences in farm performance indicators which is not possible by looking at averages only
- While the average net market income is -$0.15 per dollar revenue for all cattle farms, more than 65% of farms are exceeding the average profit margin



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CADMS Overview

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CADMS Provides Essential Information for a Variety of Analysis

- CADMS is capable of carrying out scenarios and analysis on myriad measures of performance and can be used to inform policy design and development
- Data and analysis from CADMS has been used for the department's BRM Strategic Review and was also used for GF2 policy analysis
- Examples of analysis that are possible using CADMS include:
  - Impact of Program Payments using Break-Even Analysis
  - Importance of Program Payments by Farm Size
  - A Scenario of the potential impact of rising feed prices on hog producers

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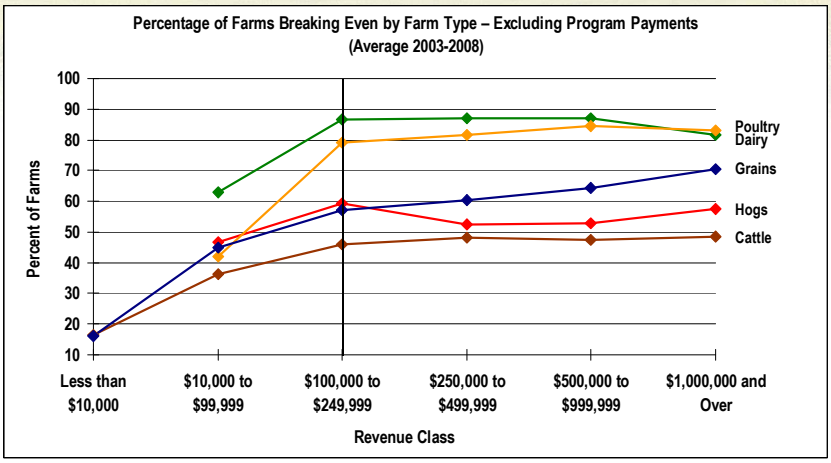
Farms With Sales Greater Than $100K are More Likely to be Profitable



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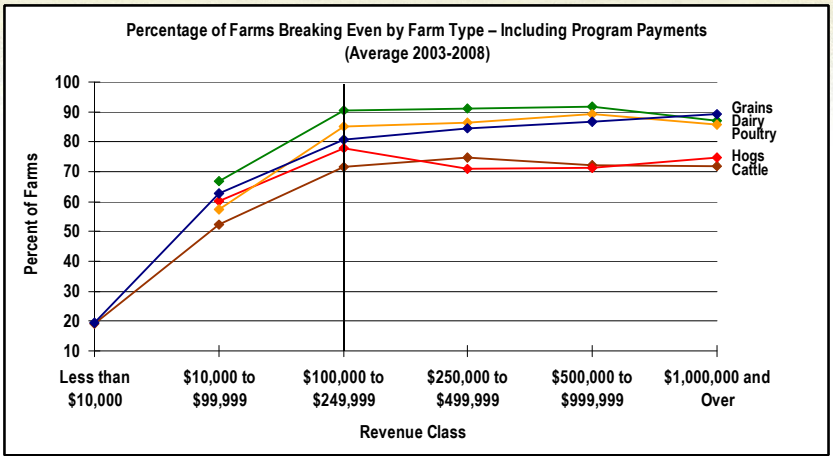
Program Payments Increase Likelihood that Farms are Profitable to Similar Levels of Supply Managed Farms



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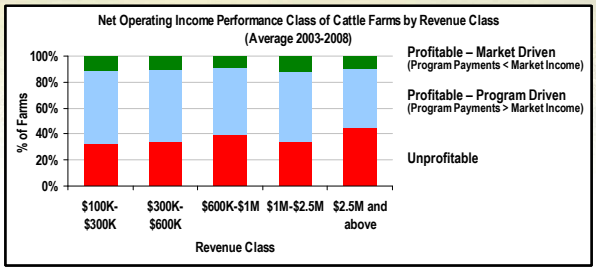
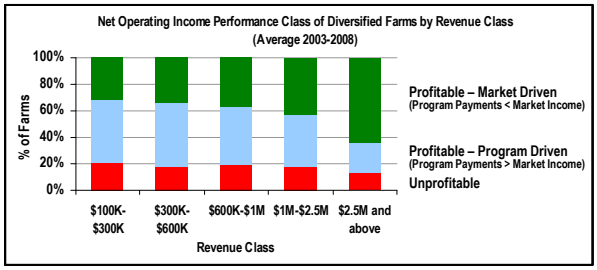
Large Diversified Farms Derive More Income From Market Than Their Specialized Counterparts

- For undiversified farm operations, a relatively consistent group of farms occupy each profitability class across all sale classes



- Profits for diversified farms are driven to a greater extent by market income as farm size increases



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A Scenario of the potential impact of rising feed prices on hog producers

- The recent US drought last year increased the cost of purchased feed for hog producers in Canada
- Farm-level data and CADMS was used to inform senior managers of the potential impact to hog producers:
  - Compare how trends in long-term performance could be impacted by the rise in feed costs.
  - Identify differences in farm structure which influences the severity of the impact of rising feed costs.
  - Identify characteristics of farms that are better able to manage rising feed costs.

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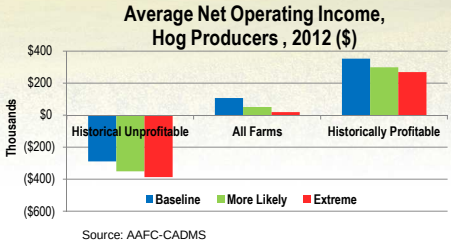
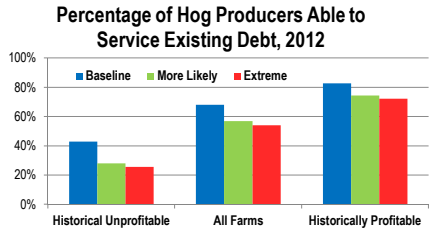
The short-term rise in feed costs did not alter historical differences in performance.

- Use longitudinal farm-level data to observe differences in historic performance.
- The results of two scenarios revealed that:
  - Historically *unprofitable* farms were unprofitable *before* rising feed costs.
  - Historically *profitable* hog producers remained profitable *after* rising feed costs and had a stronger debt servicing capacity.

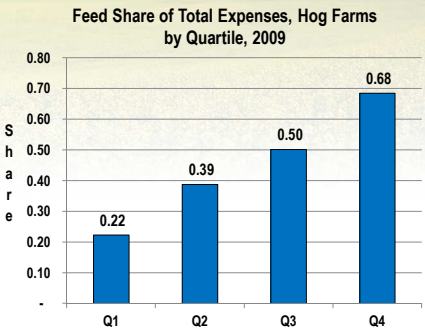


Source: AAFC-CADMS



Differences in farm structure influence the relative impact of rising feed costs.

- Use farm-level data to identify differences in farm structure.
- We found that the importance of purchased feed varied due to:
  - Hog operation type
  - Land availability

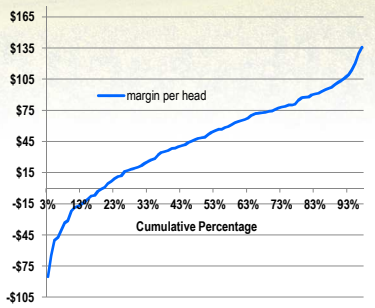


Source: AAFC-CADMS

Better performing farms had lower shares of total expenses from feed.

- Use farm-level data to identify differences in farm characteristics based on a range of outcomes.
- Farms with higher margins tended to have lower shares of feed from total expenses.
  - Reflect differences in efficiency and operation type but also hedging strategies.

Cumulative Distribution, Margin per Head, Hog Farms 2012*



*Likely scenario
Margin = Market Receipts less Livestock Variable Costs

Source: AAFC-CADMS

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Development is Underway to Further Enhance CADMS

1. Allow farm representation to be more accurate and descriptive at the farm-level
   - Incorporate crop yields, birth/death rates of livestock, crop rotations, geographic differences and degree of specialization
2. Improve the ability to map out distributions through the CADMS model in areas where capabilities are limited
   - Off-farm income
3. Development of the medium-term module of CADMS to facilitate medium-term simulations
   - Incorporate expectations and structural change (change production structure over time, model entry and exit)
   - Integrate CADMS with AAFC's Medium Term Outlook to produce medium term farm level forecasts

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NEXT STEPS

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