Resource Leveraging in Agricultural Enterprises (EIS)

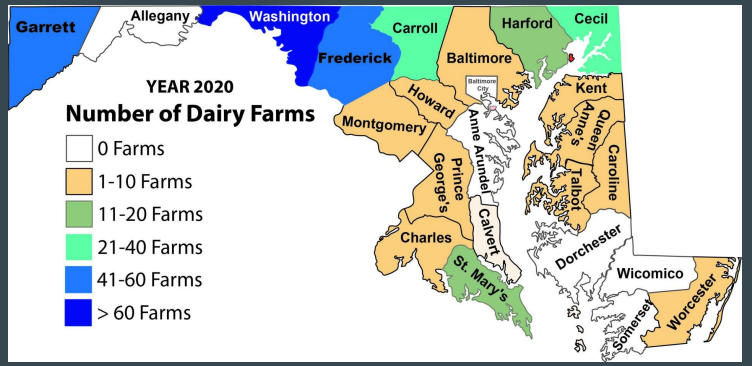
Will Heffernan, Alexia Early, Derek Miller, Michel Ashton

Introduction

- Client: Mel Litter, Elemental Impact Solutions (EIS)
- Focused on automated milking systems (AMS) on dairy farms
- **Roles**
  - Will: Project Manager/Liaison
  - Derek: Researcher & Analyst
  - Alexia: Lead Researcher
  - Michel: Lead Editor

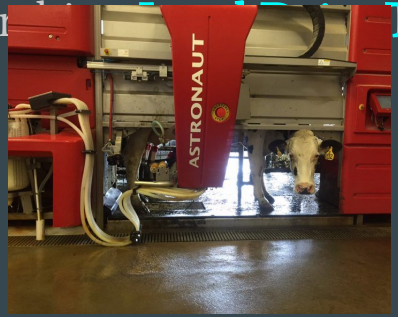
Context

- Many farms in Maryland are family-owned and operated for generations
  - Range from small farms with traditional practices, to large farms with modernized facilities
- In Maryland, **automatic milking systems** are a relatively new development with farmers
- Robotics are being used to solve problems caused by...
  - Low/Fluctuating milk prices
  - Shortage of Labor Available
  - Rising operational costs
  - Competition from Larger Dairy operations
  - Changes in Consumer Preferences

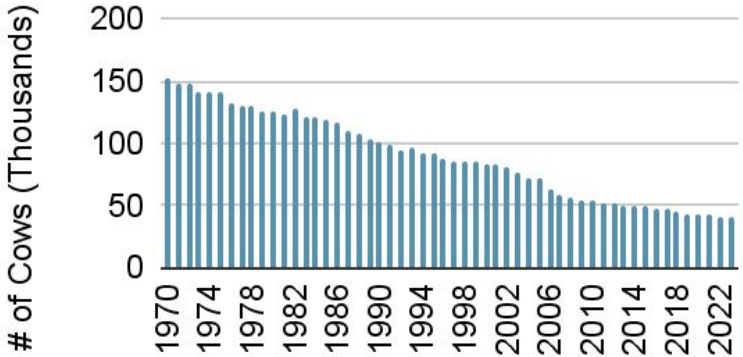


Project Requirements

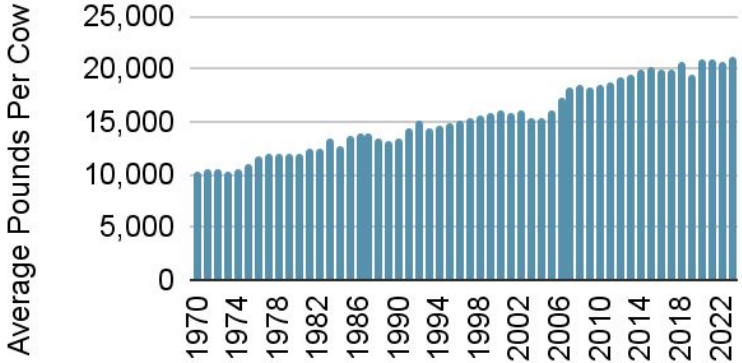
- One Main original Requirement → Stick to Farming in Maryland, Frederick County specifically if possible
  - Besides that, No original deliverables and focus area left to our discretion
- Began with broad scope of studying agricultural technologies
- Narrowed down scope to **Robotics and Automation of Dairy Farming processes**
- Reached out to client and UMD extension agricultural department for guidance
- Visit to dairy farm in Frederick, MD helped to further narrow scope to AMS
- Decided on resea **Trends** **Effects on Dairy Economics**



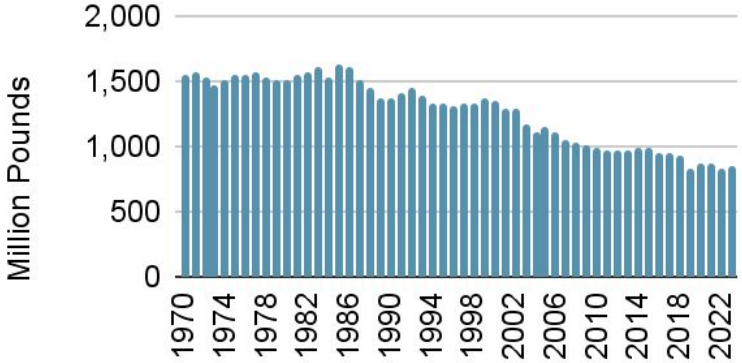
Milk Cows in Maryland



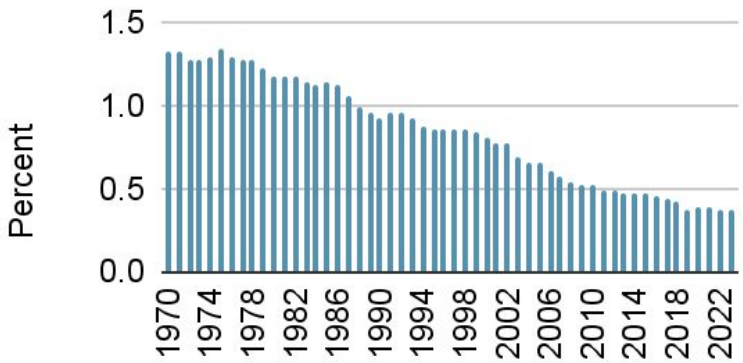
Milk Production Per Cow



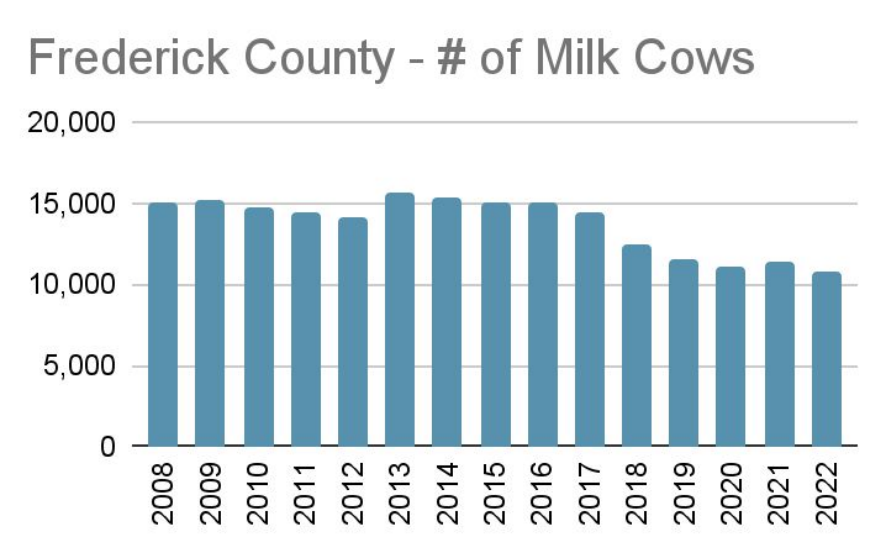
Total Milk Production

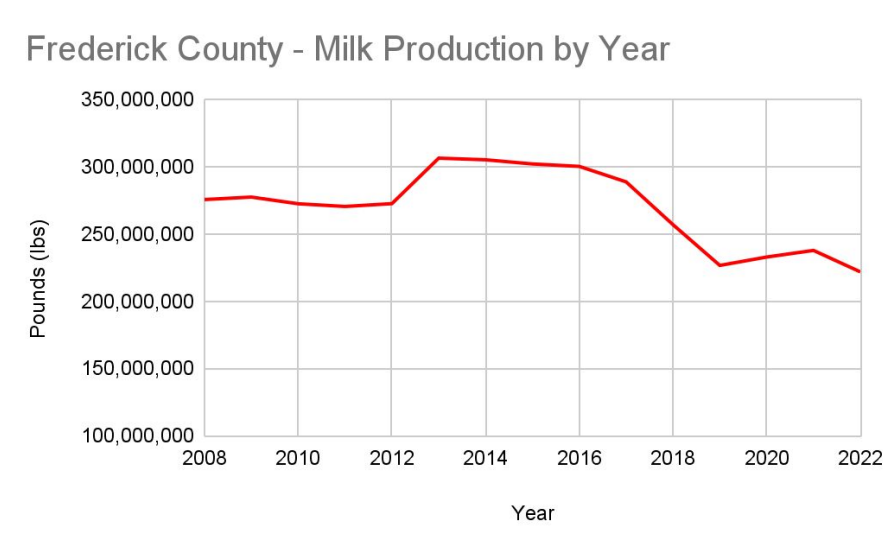


% of U.S. Milk Production



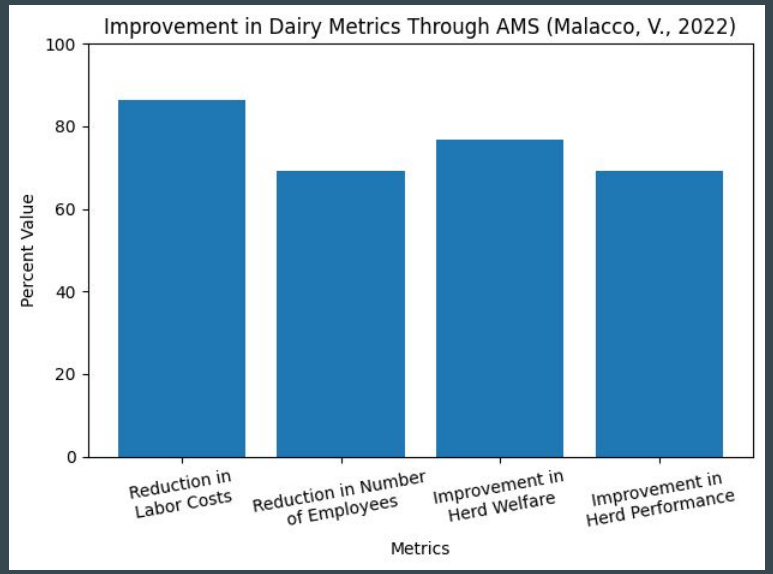
Solution - Frederick County Milk Cows & Production

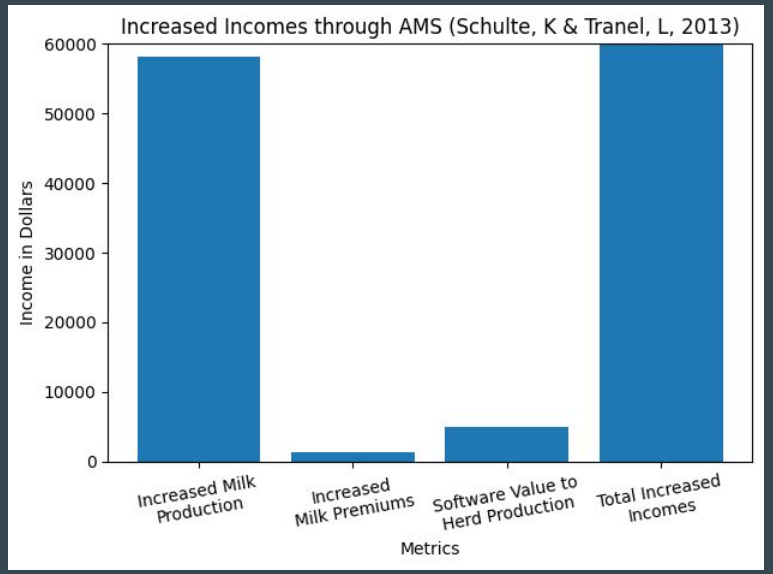




Solution

- Research report on AMS
- Includes background on AMS, analysis, and recommendations for dairy farming involving or considering the implementation of AMS
    - Snapshot of metrics down below





Challenges & Opportunities

- Challenges
  - Lack of data
  - Proprietary nature of existing data
  - Unfamiliarity with agricultural research and technologies
- Opportunities
  - Researching and providing recommendations for an industry that continues to grow and adapt to the changing world
  - Ground-level experience through dairy farm visit
  - Contributing to the further development of an essential industry and workforce

Deliverables

- Research paper consisting of:
  - Current & Historical Dairy trends in Maryland & Frederick County
  - Analysis of the role of AMS within farms
  - Effects of AMS on livestock as well as workers
  - Economics/Cost Benefit Analysis of integrating AMS
  - Recommendations for businesses and farmers
  - Feasibility and possible requirements for an AMS apprenticeship
  - Future of AMS

Conclusions

We compiled a list of recommendations for:

- Businesses
  - Invest in the growing technology; it has lots of room to grow and expand economically
  - Lots of room in the industry for smaller businesses to have their own product on the market with room for creativity and uniqueness
- Farmers
  - If farmers plan on expanding or already own a large farm then invest in the agtech
  - If not, there are other semi-automatic options available for a cheaper price

Future Plans

- Our project is the start to many different avenues of research:
  - More In-depth research on different AMS brands used in Frederick County
    - Possible survey-based project that requires reaching out to many different dairy farms in the county
  - Explore other robotics of a dairy (Feeder, pusher, etc.)
  - Explore other agtech options
  - Agtech robotics in space
  - Manufacturing affordable agtech