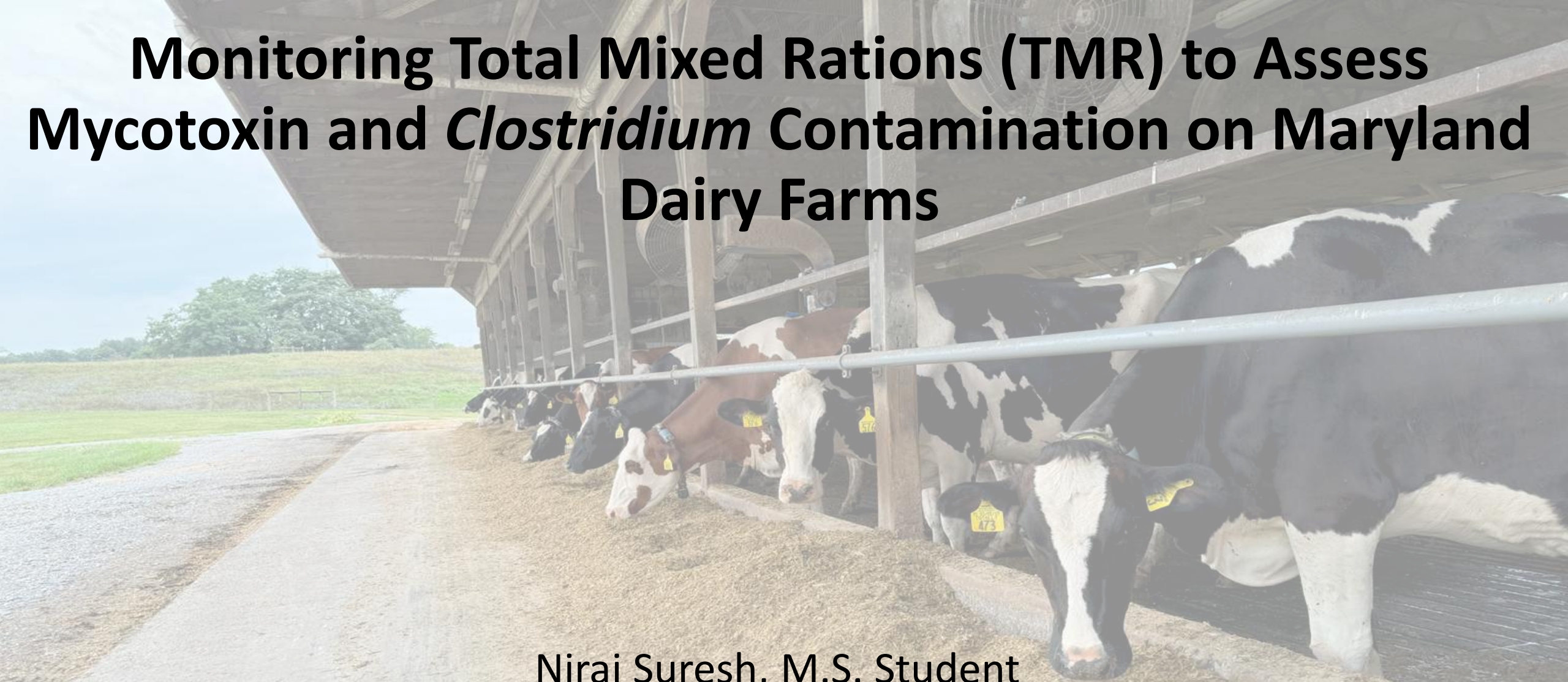
# Monitoring Total Mixed Rations (TMR) to Assess Mycotoxin and *Clostridium* Contamination on Maryland Dairy Farms



Niraj Suresh, M.S. Student

PI: Dr. Fabiana Cardoso

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# Outline

- Introduction and Objective
- Materials and Methods
- Results
- Conclusions and Future Directions

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# The Importance of Feed Efficiency

Feed efficiency is vital for sustainability

Feed is the largest cost on livestock operations

Minimizing feed waste and contamination is crucial to ensure feed efficiency

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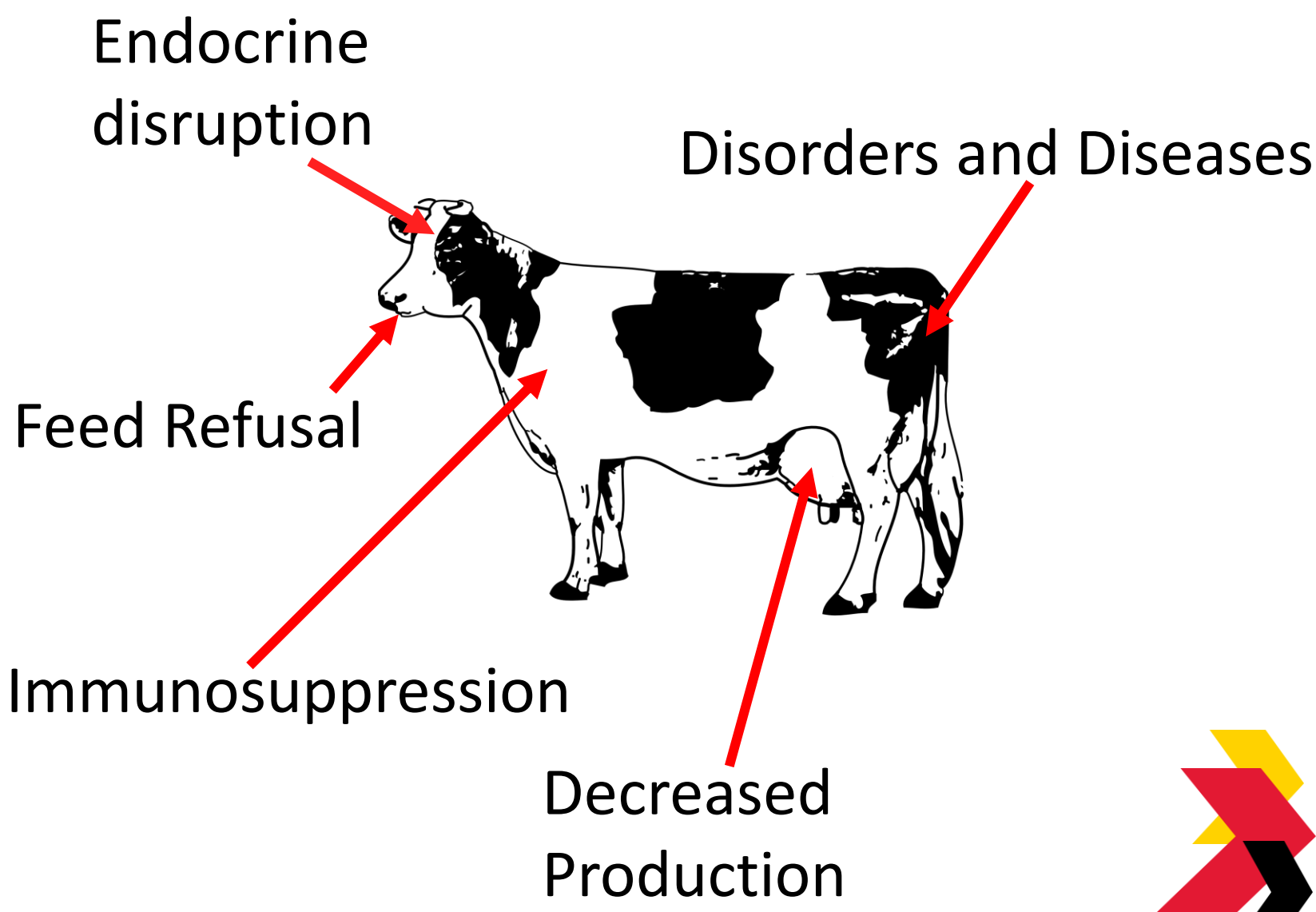
# Mycotoxins

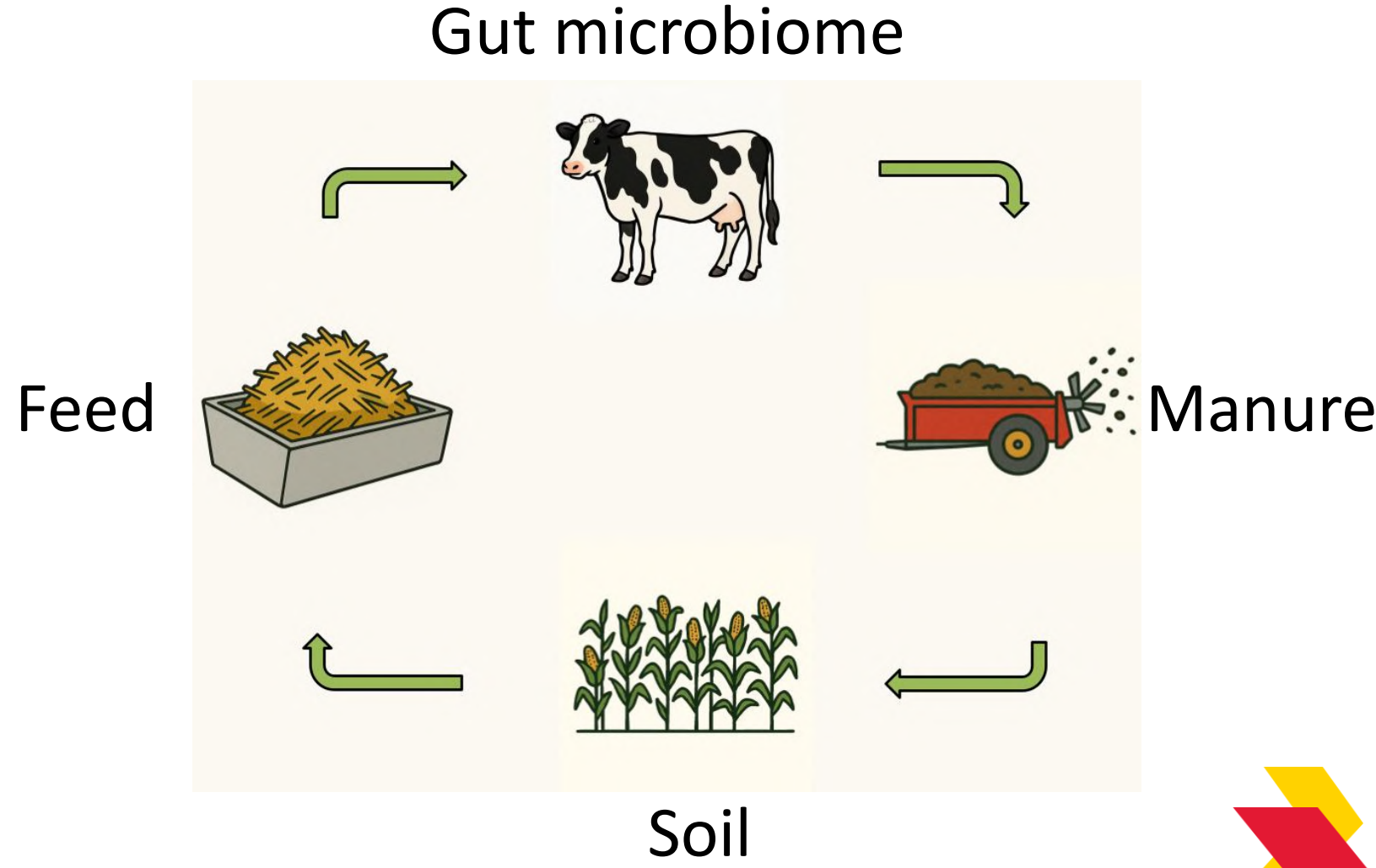
- Naturally occurring toxins produced by certain molds
- Key mycotoxins affecting dairy cattle (Whitlow, 2005)
  - Fumonisin
  - Zearalenone
  - Aflatoxin
  - Deoxynivalenol
  - T-2 toxin
  - Ochratoxin

**Several Adverse Effects**



# *Clostridium* perfringens

- Gram positive spore forming bacterium
- Linked to many adverse health conditions such as the highly fatal Hemorrhagic Bowel Syndrome (HBS)

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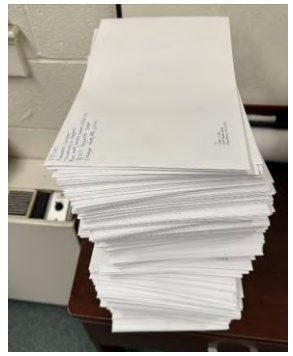
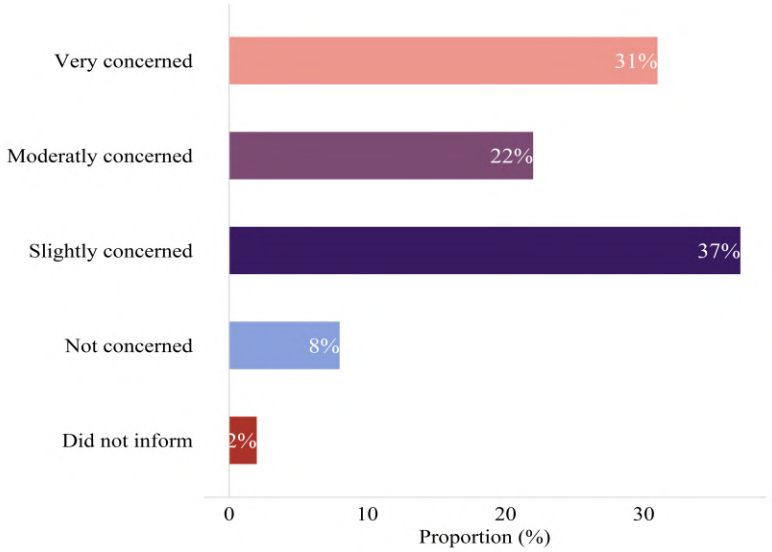
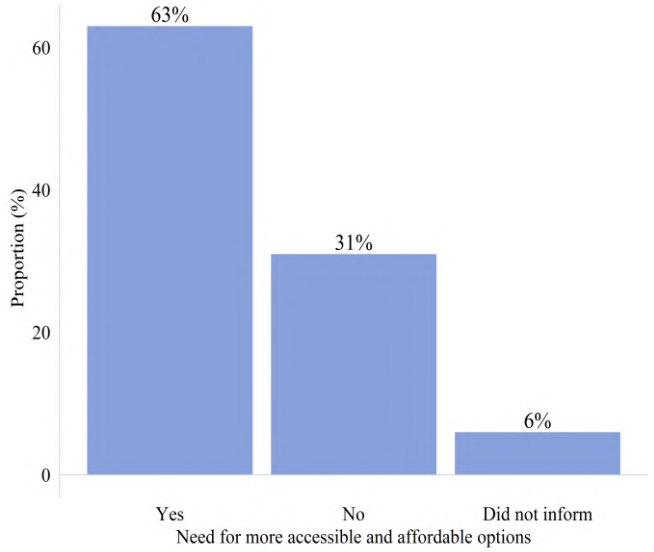
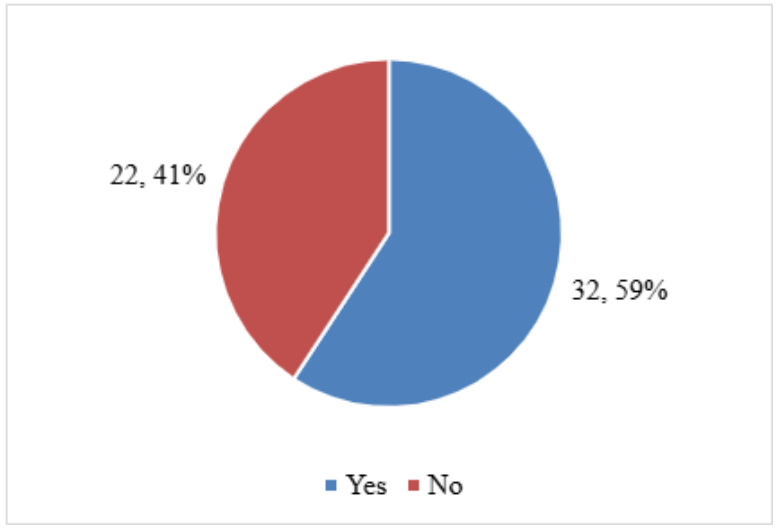
# Materials and Methods

Mailed Surveys to every registered dairy farmer in Maryland (n=293)






Concern for mycotoxins and *Clostridium*

Need for more Accessible and Affordable Testing Options

Willingness for feed sampling to test for mycotoxins and *Clostridium*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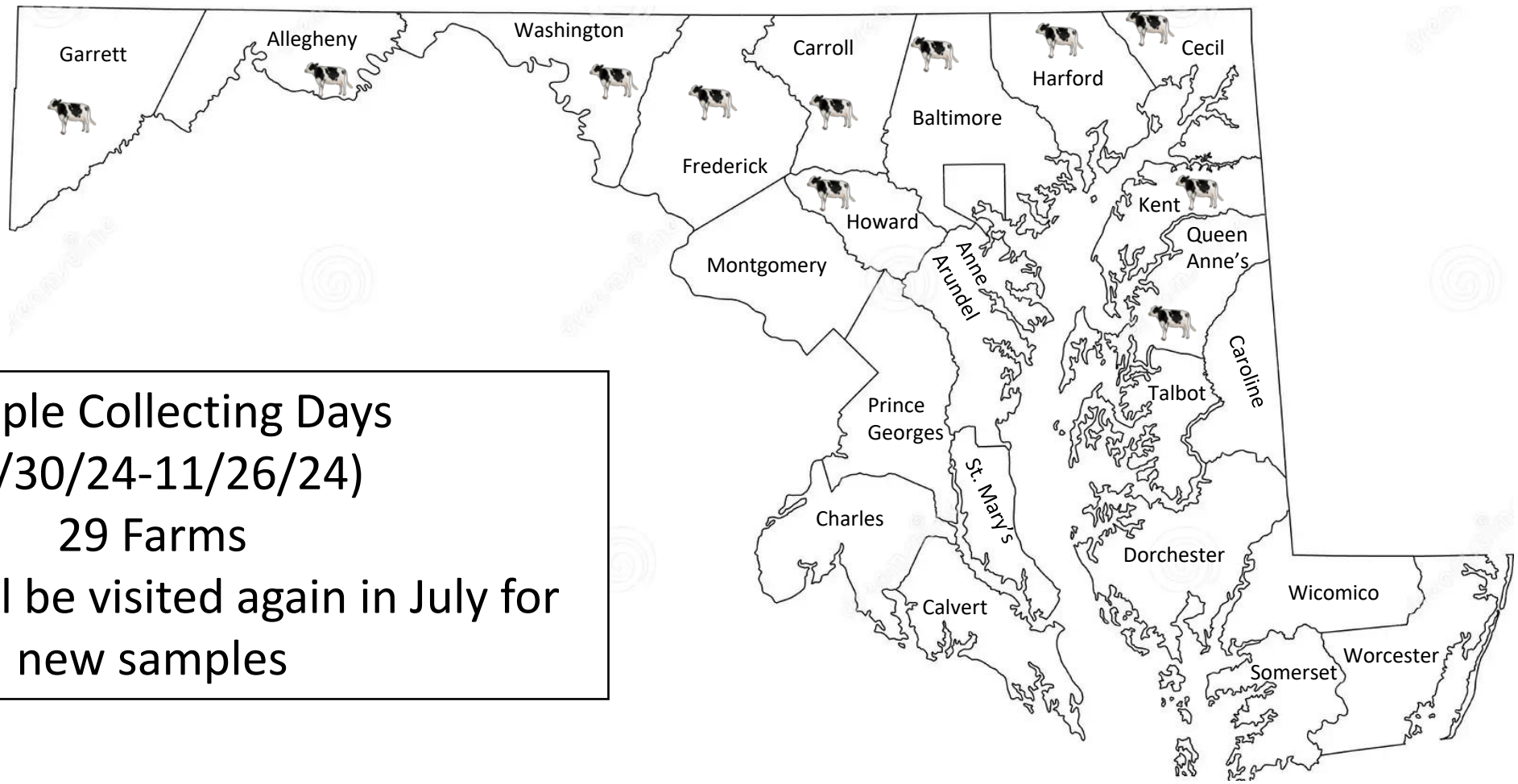
# Materials and Methods




Sample Collecting Days
(9/30/24-11/26/24)
29 Farms
All farms will be visited again in July for new samples

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Garrett
Allegheny
Washington
Frederick
Carroll
Baltimore
Harford
Cecil
Howard
Kent
Queen Anne's
Montgomery
Anne Arundel
Caroline
Talbot
Prince Georges
St. Mary's
Charles
Dorchester
Wicomico
Calvert
Worcester
Somerset

# Materials and Methods

1. Arrive at farm, introductory interview with farmer

2. Take samples of TMR and corn silage
   - TMR tested for mycotoxins and *Clostridium* perfringens
   - Corn silage tested for chemical composition

3. Overnight ship samples to a commercial lab

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# Statistical Analysis

- Descriptive analyses were generated using SAS to assess distribution and variability
- Frequency analysis determined the prevalence of *Clostridium* Perfringens
- Correlation analysis evaluated potential relationships between mycotoxin levels and bacterial presence

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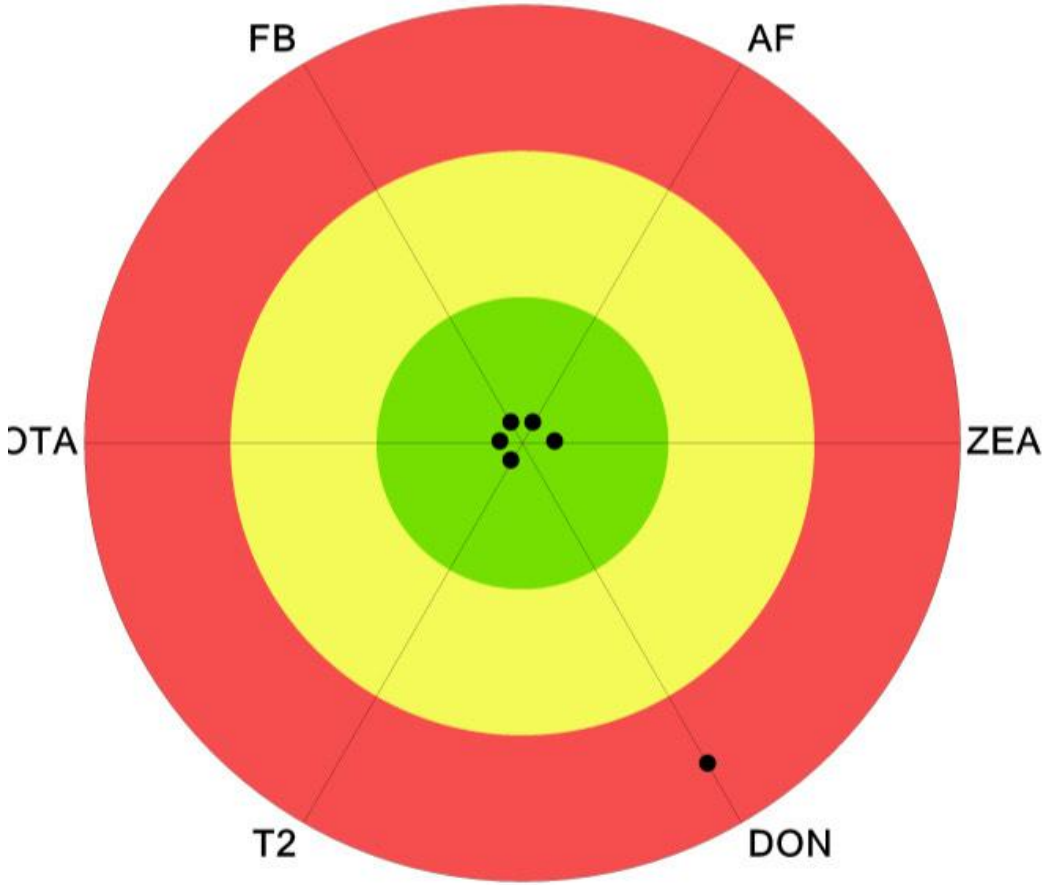


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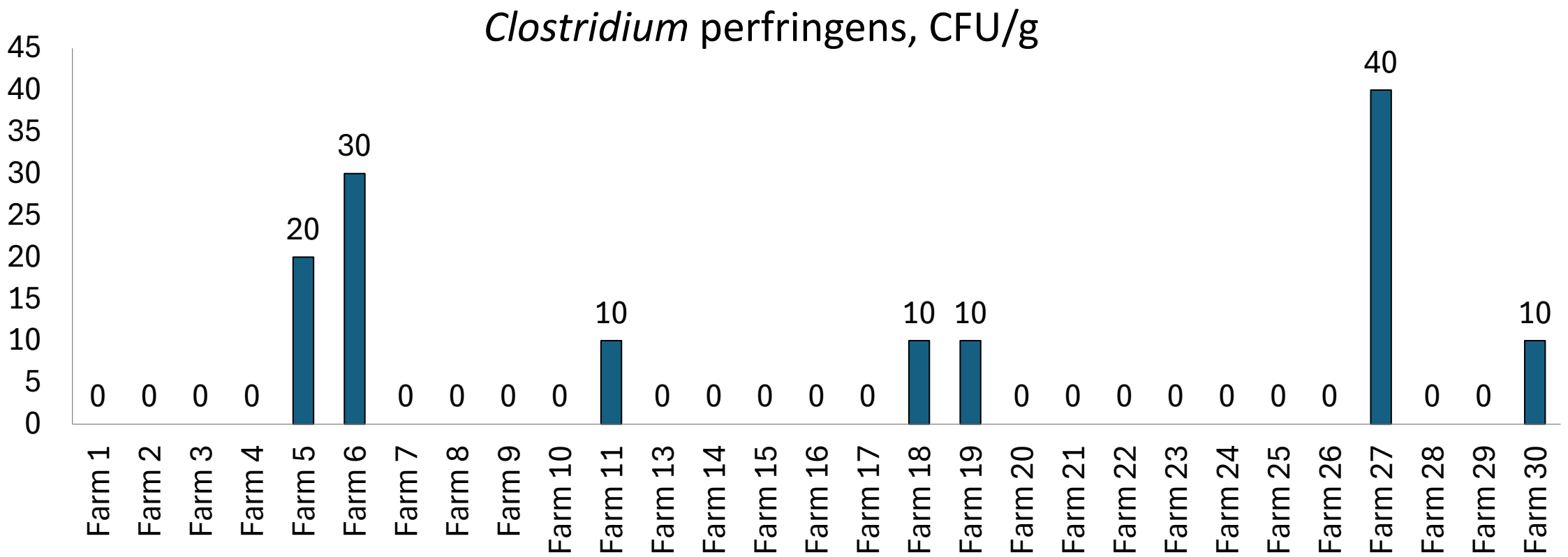
# Results

- *Clostridium* perfringens detected on 7 farms
  - At level of concern (>20 CFU/g) on  2 farms





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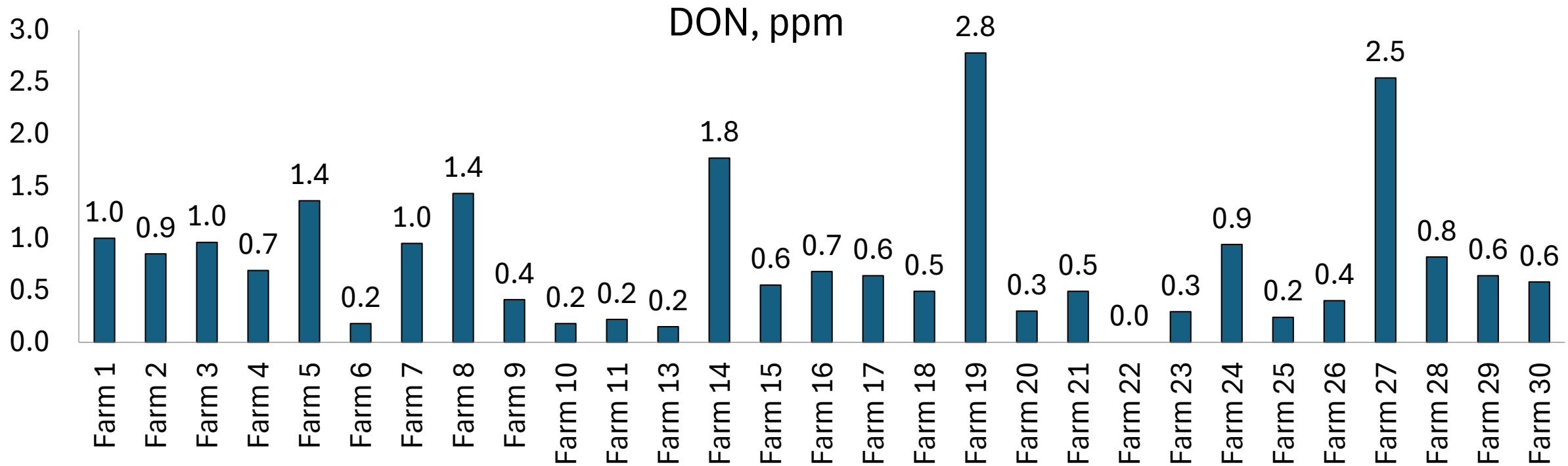
# Results

- Deoxynivalenol (DON) detected on 28 farms
  - At level of concern (≥ 1 ppm) on 8 farms





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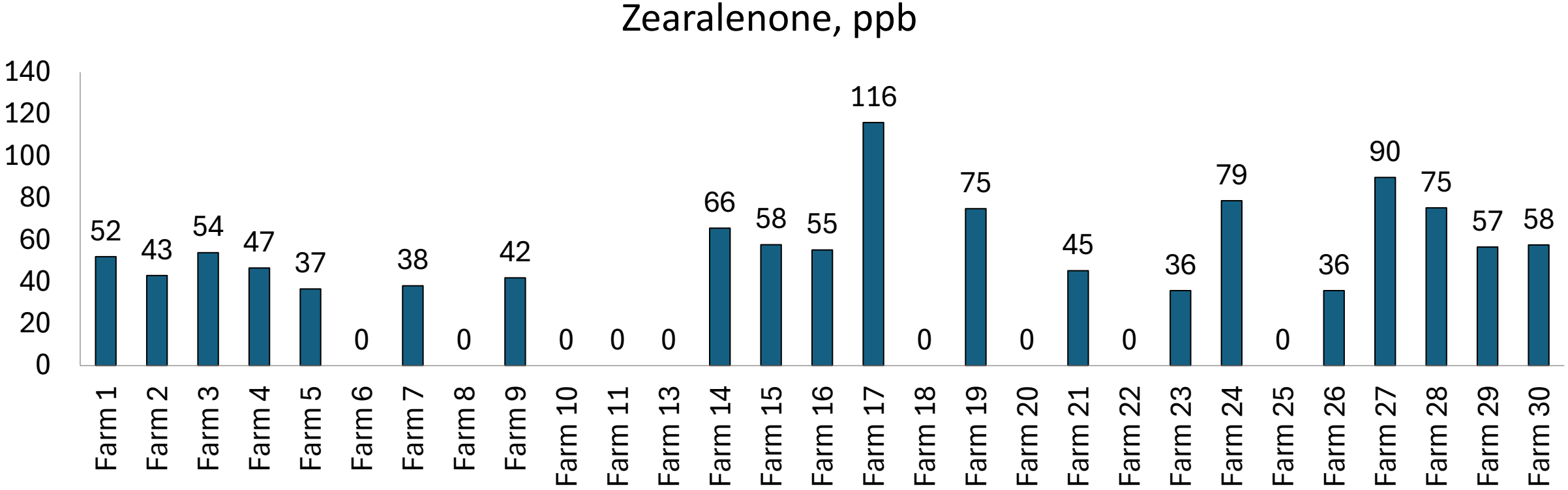
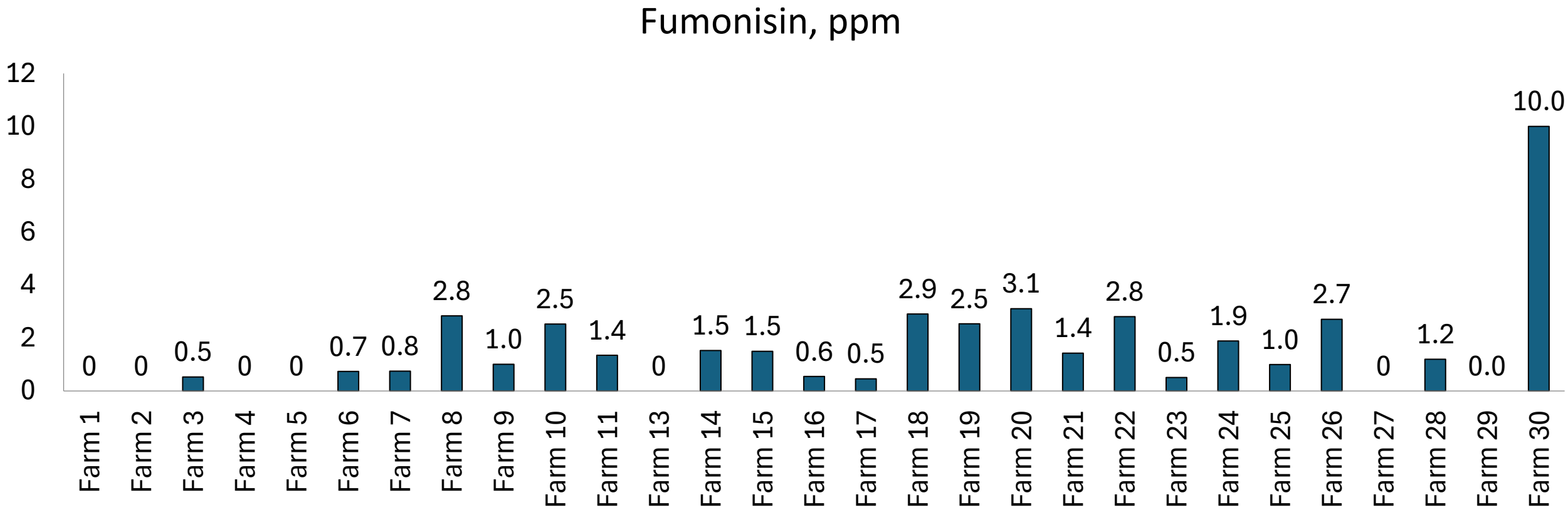
# Results

- Zearalenone (ZEA) was detected on 20 farms
  - No farms were at concerning levels (≥ 400 ppb)



# Results

- Fumonisin (FB) was detected on 23 farms
  - At level of concern (≥ 2 ppm) detected on 8 farms





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# Results

- Aflatoxin, T-2, and Ochratoxin-A were not detected on any farms

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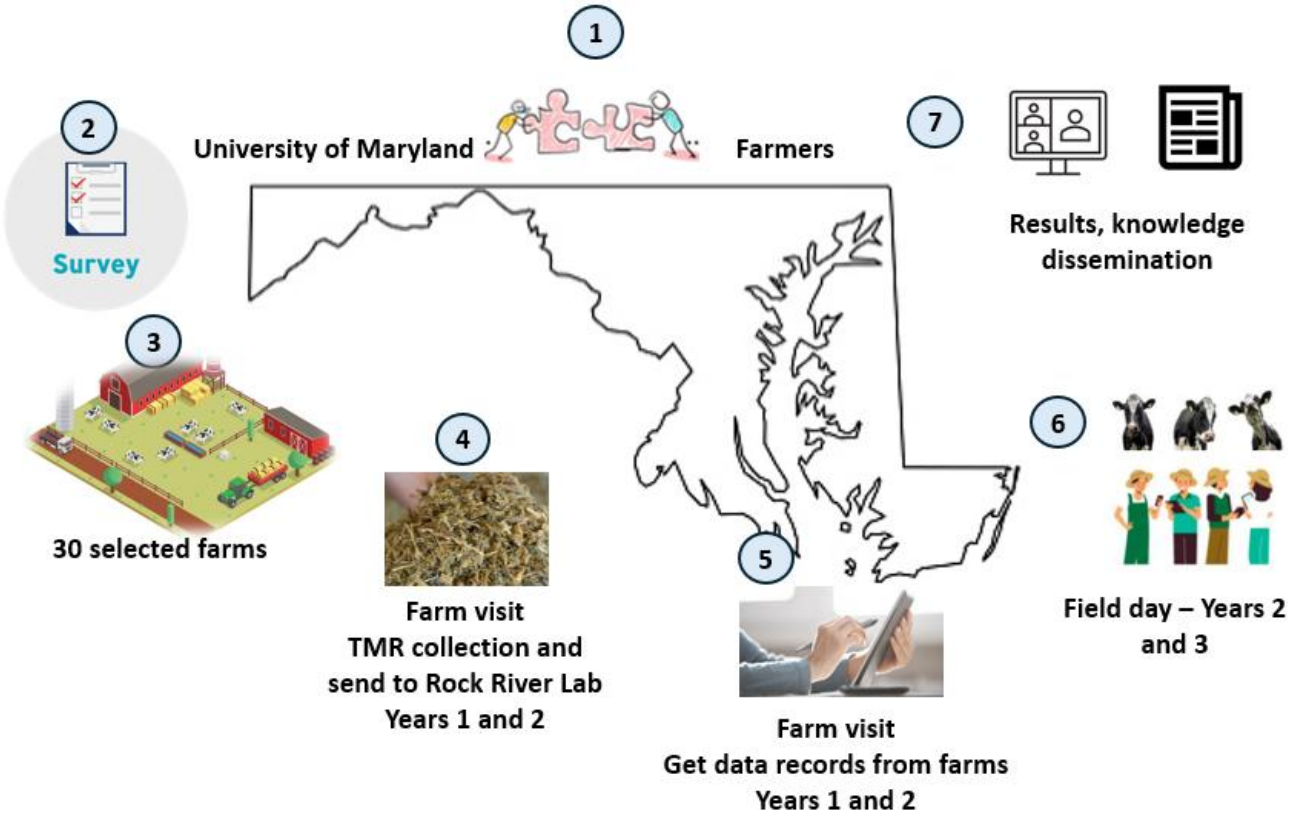
# Conclusions and Future Directions

This study allowed for updated insight into feed contamination on Maryland dairy farms

## Future Directions

- Farms will be visited again for sampling in July
  - Summer
  - New silage
  - Farmer has received our recommendations
- Further Extension and Outreach
  - Field days and workshops
  - Educational materials
  - Online newsletters
  - Feedback surveys



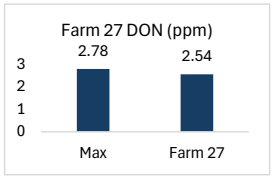
# Farm Reports

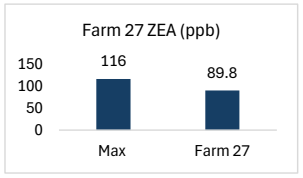
Attached to this email are the results from the TMR and corn silage we sampled. The TMR was tested for mycotoxin and *Clostridium* contamination as well as a full nutritional analysis. The corn silage was tested for a standard nutritional analysis.

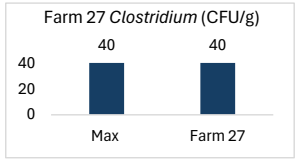
**TMR**

*Clostridium* was detected in your feed. To lower the risk of future contamination in your feed, use feed management practices that allow your feed to be as clean as reasonably possible. This includes things such as not mixing spoiled silage in your TMR, ensuring proper sealing and ensiling of your silage and haylage, cleaning feed bunks and feeding equipment regularly, and ensuring there is always clean, fresh water available.

Fortunately, the levels of mycotoxins in your feed were all below levels of concern.



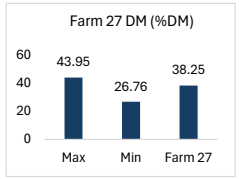



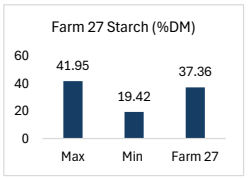



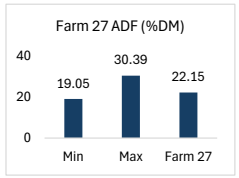

These figures compare the levels of *Clostridium* and detected mycotoxins in your TMR to the maximum that we had found (the minimum was 0). Your feed results are displayed as "Farm 27" in our data for confidentiality.

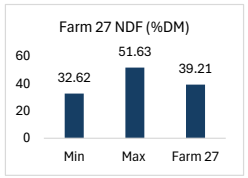
**Corn Silage**

The dry matter in your corn silage is above the optimal range of 30 to 35%. A high dry matter percentage can lead to reduced fermentation and digestibility of your corn silage. Corn must be ensiled at the proper moisture to achieve the necessary fermentation for preservation. A good way to find the proper harvest time for your corn silage is to harvest corn when the milk line is at ¾. We're happy to provide guidance on improving your corn silage quality, including optimal harvest timing (DM analysis before harvesting), particle size, and overall silage management during ensiling and feeding. Let us know how we can assist you! Feel free to text or send an email.




These figures compare the nutritional values in your corn silage to the minimum and maximum we found in our data.

We greatly appreciate you responding to our survey and giving us the opportunity to visit your farm and sample feed! We wish you all the best and will be in touch in the Summer to coordinate our second visit. Please reach out with any questions or assistance you need.

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After the lab results were analyzed, personalized reports were sent to each farmer interpreting the results and offering recommendations

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# Ways to reduce contamination


Wash and steam clean storage areas and equipment used for feeding

Clean feed bunks and waterers regularly

Proper ensiling

Checking herd health regularly

Checking feedstuffs before mixing

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FEARLESSLY FORWARD

# Acknowledgements


- Cardoso lab
- University of Maryland Department of Animal and Avian Sciences
- Northeast Sustainable Agriculture Research and Education Program
- University of Maryland Cooperative Extension Service
- Maryland Dairy Farmers


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Questions?