Georgia Dairy Conference

2026

Proceedings

RUMINANTIA®
Libero confronto d'idee



GEORGIA DAIRY CONFERENCE

January 19, 2026

MAKING EVERY DROP COUNT

your DAIRY CHECKOFF
Dairy Management Inc.

CONSUMER ATTITUDES ARE POSITIVE
DEMAND FOR DAIRY IS STRONG



MAJOR MEDIA OUTLETS HERALD DAIRY'S RENAISSANCE



GLAMOUR

bon appétit

Our Protein Panic Is Making Whole Milk Cool Again

How milk has gone from inflammatory villain to main character in just a few years.

BY ASHLIENE MCM

May 28, 2025



But in 2024, U.S. consumption of whole milk rose by 3.2 percent — only the second increase since the 1970s — while consumption of plant milk fell 5.9 percent, according to data from Circana, a mark up 1.9 perce

FINANCIAL TIMES

"For dairy milk to be growing at these numbers," said John Craw

Opinion Agriculture

How milk got its mojo back

The dairy industry's efforts to woo customers products are a masterclass in corporate survi

BROOKE MASTERS + Add to myFT

the HUSTLE
HubSpot Media

Why everybody's drinking milk again



FOOD TECHNOLOGY MAGAZINE | MARKET TRENDS

Dairy Stages a Comeback

Americans consumed a record number of dairy products in 2023, signaling that there's room for both traditional products and innovative offerings within the sector.



Nicole Kidman Chugged a Glass of Milk on Stage

BUSINESS INSIDER

DAQ -0.39% S&P 500 -0.44% AAPL -0.63% NVDA -1.23%

FOOD

Dairy is so back. It's now a high-protein, gut-healthy superfood shoppers love.

By Kim Schewitz

THE WEEK

Dairy milk, once maligned, is making a comeback

Sales of dairy milk were up 2% in 2024

Newsletter

Why High-Protein Dairy Is Back On The Wellness Radar

Cording. Contributor. Jess Cording is a dietitian and... Follow Author

2025, 08:15am EDT. Updated May 25, 2025, 09:28am EDT

The New York Times

milk is culturally inescapable







NEARLY ALL DAIRY CATEGORIES GREW AT RETAIL IN 2025



TOTAL U.S. RETAIL VOLUME % CHANGE VS YEAR AGO

2024 and 2025 Volume Growth vs. Previous Year

	COTTAGE CHEESE	PROTEIN	YOGURT		WHIPPING CREAM	BUTTER
% volume chg vs yago '23-'24	12.5%	9.5%	7.6%	6.0%	8.8%	1.8%
% volume chg vs yago '24-'25	14.3%	10.8%	8.8%	7.6%	3.4%	1.8%

	CHEESE & MEAT			SOUR CREAM		ICE CREAM
% volume chg vs yago '23-'24	-7.3%	1.9%	1.2%	1.9%	-0.3%	1.0%
% volume chg vs yago '24-'25	1.3%	1.0%	0.5%	0.0%	-0.5%	-2.4%

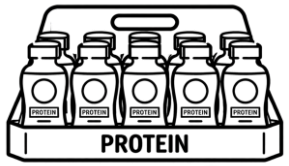
Source: Circana MULO+ with convenience. Note: Butter includes butter blends, Ice Cream includes sherbet, Yogurt is dairy yogurt, Creams include half & half, reg/lt cream & dairy creamers, Cheese excludes imitation/vegan

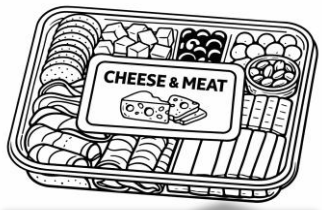
NEARLY ALL DAIRY CATEGORIES GREW AT RETAIL IN 2025



GEORGIA RETAIL VOLUME % CHANGE VS YEAR AGO

2024 and 2025 Volume Growth vs. Previous Year

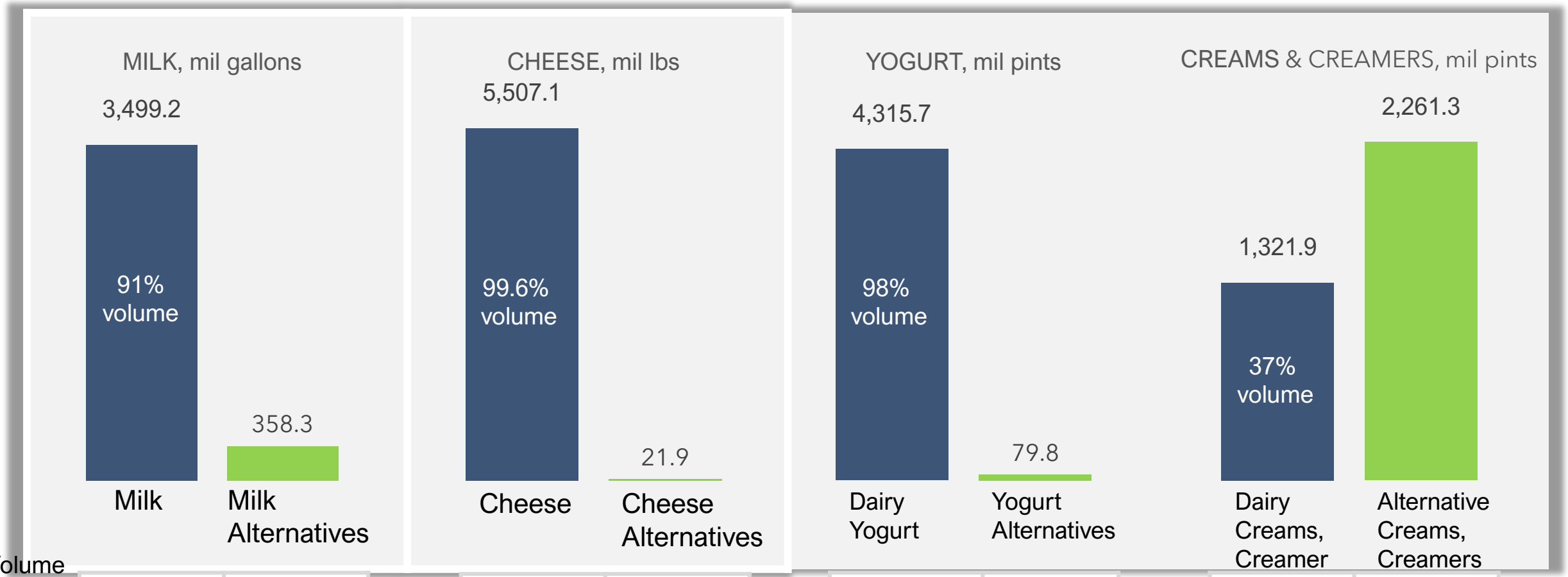
						
% volume chg vs yago	18.3%	7.7%	11.1%	9.6%	9.6%	4.8%
	20.4%	11.1%	10.9%	10.0%	8.5%	1.2%
	’23-’24					
	’24-’25					

						
% volume chg vs yago	2.9%	2.9%	1.4%	0.8%	-5.9%	2.6%
	0.8%	0.3%	0.3%	-0.4%	-1.5%	-1.8%
	’23-’24					
	’24-’25					

Source: Circana MULO+ with convenience. Note: Butter includes butter blends, Ice Cream includes sherbet, Yogurt is dairy yogurt, Creams include half & half, reg/lt cream & dairy creamers, Cheese excludes imitation/vegan

CHEESE, YOGURT AND CREAM/CREAMERS ARE DELIVERING MORE ABSOLUTE GROWTH THAN NON-DAIRY ALTERNATIVE

2025 Retail Volume Sales and Growth vs. 2024



	Milk	Milk Alternatives	Cheese	Cheese Alternatives	Dairy Yogurt	Yogurt Alternatives	Dairy Creams, Creamer	Alternative Creams, Creamers
% Volume Chg	▼ -0.5%	▼ -6.0%	▲ 1.0%	▼ -9.6%	▲ 8.8%	▲ 25.2%	▲ 7.6%	▼ -1.9%
Volume Growth	-19.2M gal	-22.8M lbs	55.5M lbs	-2.3M lbs	348.5M pts	16.1M pts	92.9M pts	-43.6 pts

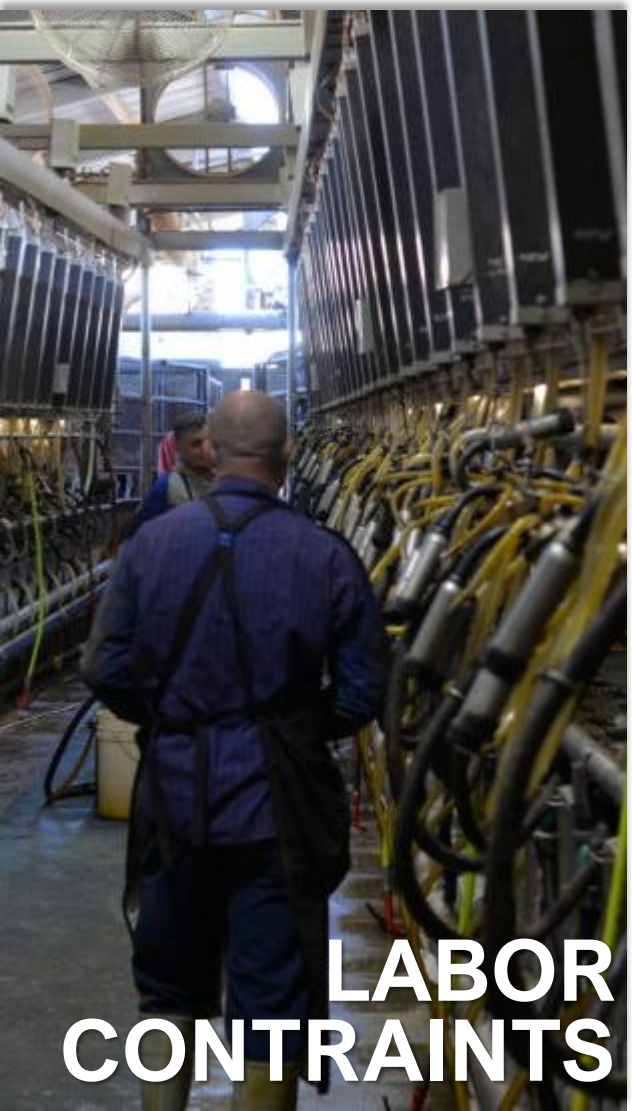
Source: Circana MULO+ with convenience, Total U.S.

THE 2025-2030 DIETARY GUIDELINES FOR AMERICANS

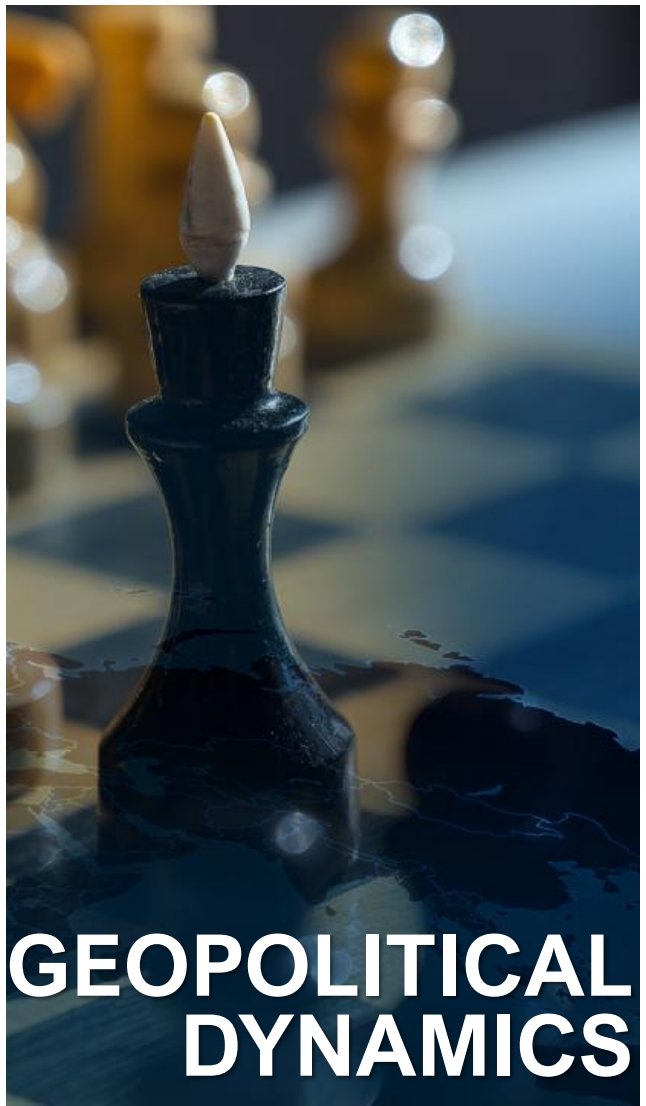




KEEPING FOOD SYSTEM MOVING AMID CHALLENGES













2023-2025 PLAN IMPACT

KEY STRATEGIES TO DELIVER INCREMENTAL VOLUME GROWTH



Drive scale through partners & Industry



Inspire investment in innovation



Stimulate incremental usage and purchase

STRONG GAINS IN DAIRY UTILIZATION WITH PARTNERS



+9%



+8%



+10%



+3%

Significant innovation and marketing programs drive results

STRONG GROWTH IN YOGURT















Sharing science and insights that have led to real innovation

EXPANDING PORTFOLIO WITH HEALTH CLAIMS

DANONE









NATIONAL DAIRY COUNCIL RESEARCH ENGINE REMAINS A COMPETITIVE ADVANTAGE

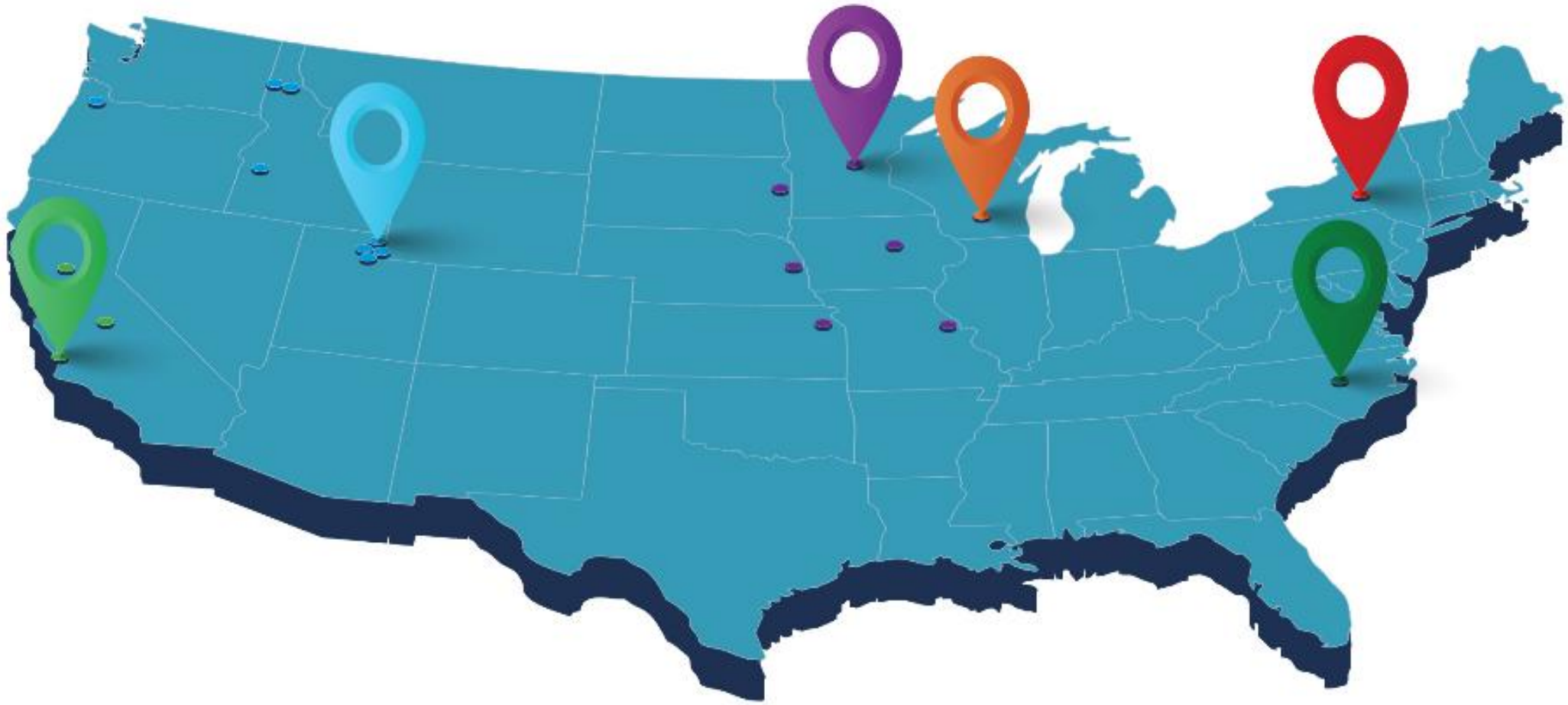
80 active R&D projects

40 nutrition studies

25 scientific papers in credible professional journals



ATTRACTING FUTURE TALENT TO THE CATEGORY



CALIFORNIA DAIRY INNOVATION CENTER

WESTERN DAIRY CENTER

MIDWEST DAIRY CENTER

CENTER FOR DAIRY RESEARCH

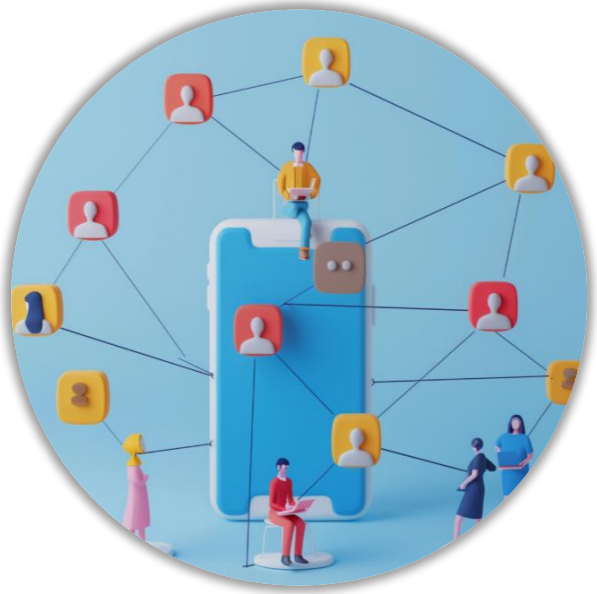
NORTHEAST DAIRY FOODS RESEARCH CENTER

SOUTHEAST DAIRY FOODS RESEARCH CENTER

KEY STRATEGIC PLAYS FOR REPUTATION



Improve Perceptions



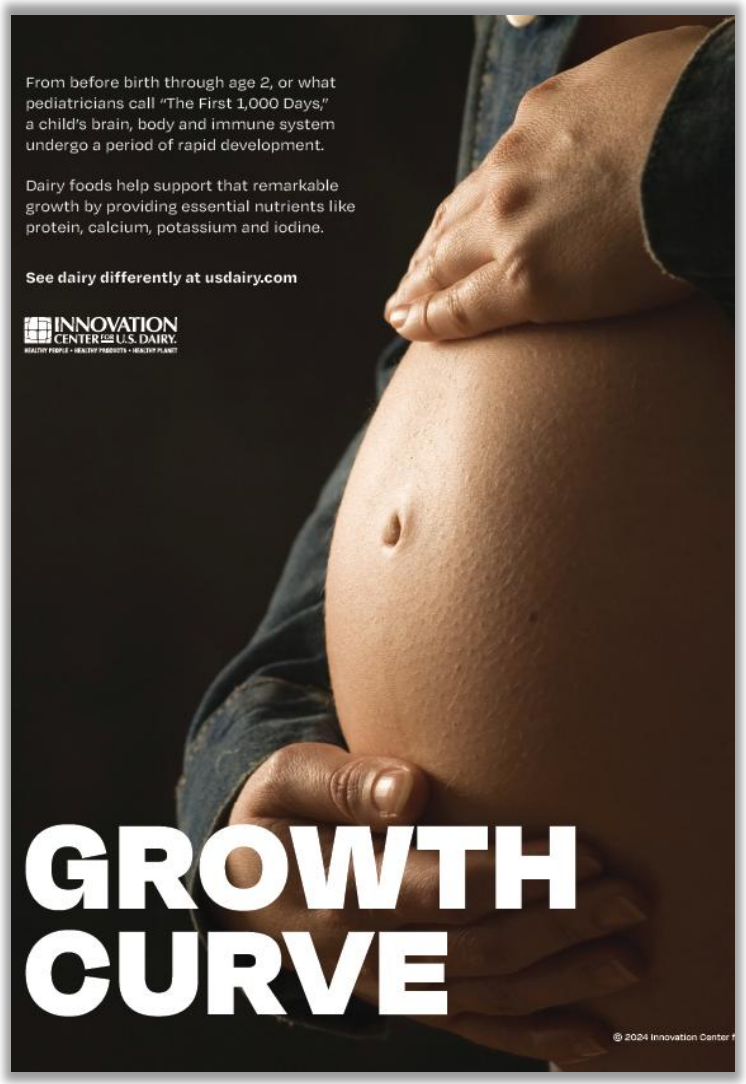
Increase Relevance



Focus on Health & Wellness Benefits

CHAMPION FARMERS & DAIRY IN FIRST 1,000 DAYS





MAYO CLINIC


2025
2026

ACCELERATED LAUNCH BY 18 MONTHS








UNIFIED PLAN 2026–2028

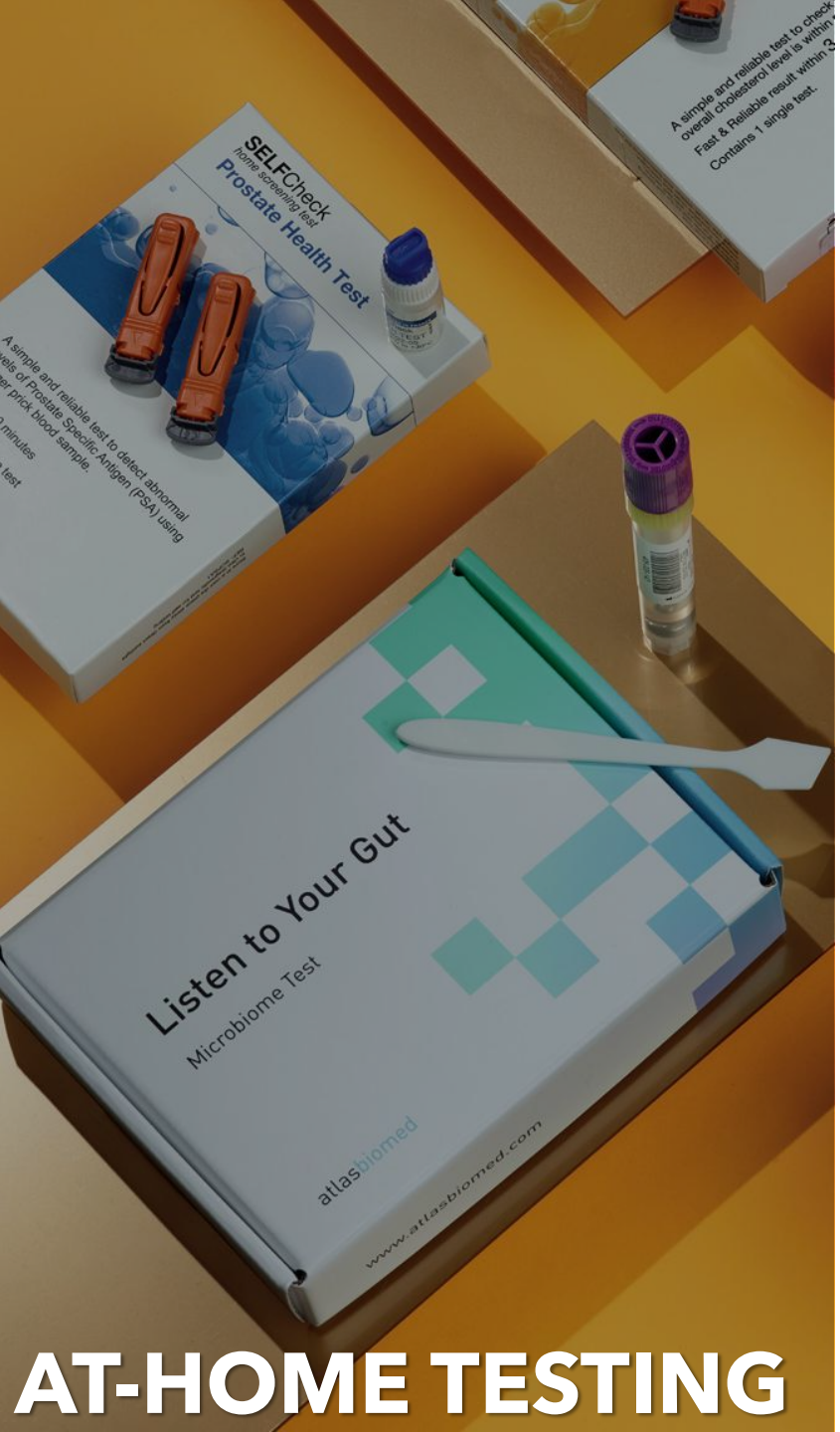



CAPITALIZE ON HISTORIC INVESTMENTS IN RESEARCH, DISCOVERY R&D, CONSUMER FORESIGHT



TEN YEAR PIPELINE FOR GROWTH

- Heart Health
- Weight Management
- Gut Health
- Mental Health & Cognition
- Women's Health



AT-HOME TESTING



AI-MEDICAL ASSISTANTS



MEDICAL SENSORS


MAYO
CLINIC


UCDAVIS
UNIVERSITY OF CALIFORNIA


InsideTracker


SCIENCE, TECHNOLOGY
AND INNOVATION
MAKING
EVERY
DROP
COUNT
your
DAIRY
CHECKOFF
Dairy Management Inc.

DRIVING GROWTH NOW & IN THE FUTURE

Three Core Focus Areas Will Deliver Impact

MAKING EVERY DROP COUNT | your DAIRY CHECKOFF Dairy Management Inc.

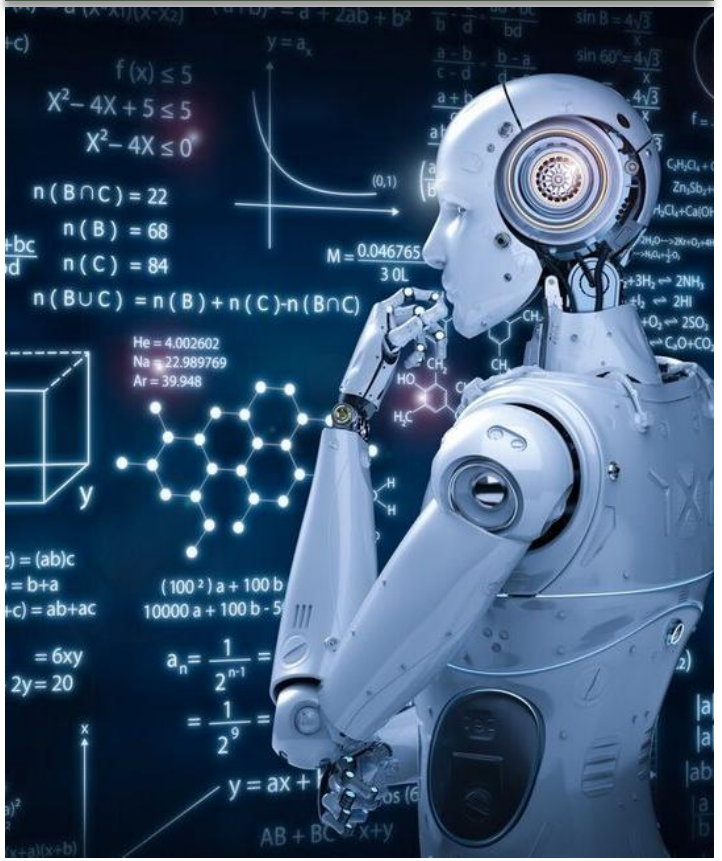
Unlock New Growth Platforms



Validate Disruptive Nutrition Science



Prove New Product Technology



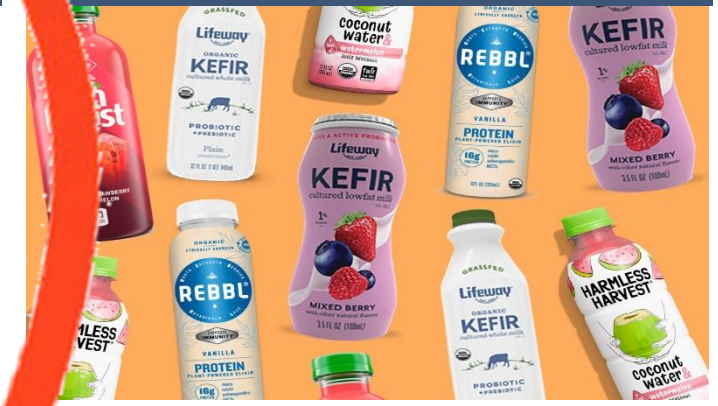
UNLOCKING GROWTH PLATFORMS

Health & Wellness



$350B

Beverages



$100B

Food Service



$240B

IDENTIFYING TOP HEALTH & WELLNESS GROWTH

Growth Potential Totaling $350B

ENERGY



2028 Market Size **$11B**

PHYSICAL PERFORMANCE



$45B

SKIN HEALTH



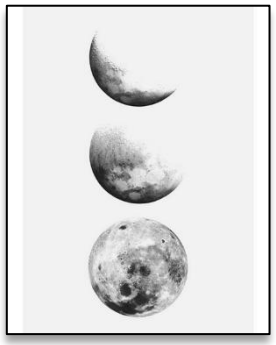
$44B

MENTAL/ EMOTIONAL H&W



$9B

SLEEP



$5B

WEIGHT MANAGEMENT



$44B

BONE HEALTH



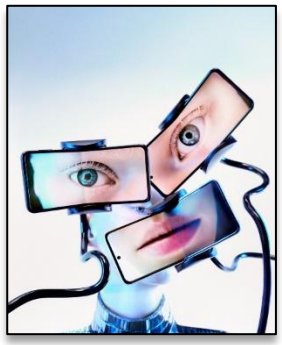
$46B

ORAL HEALTH



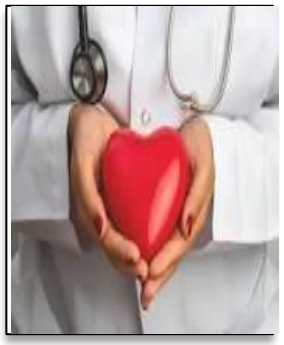
$12B

VISION



$2B

HEART HEALTH



$23B

HAIR & NAIL HEALTH



$15B

DIGESTIVE HEALTH



$30B

HYDRATION



$49B

IMMUNITY



$6B

H&W Condition Size Including F&B and Non-F&B Projected for CY 2028 ($B)

DAIRY'S OPPORTUNITY IN HEALTH & WELLNESS



Food | Beverage | OTC Supplements

DISRUPTIVE NUTRITION SCIENCE
Broadening Dairy's Benefits



DAIRY SCIENCE EFFORTS

Unlocking New Benefits to Power Consumer Wellness

Now



FIRST 1000 DAYS



BONE HEALTH



PERFORMANCE



GUT HEALTH

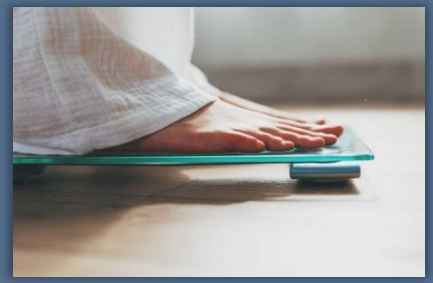
Future



BIOACTIVES



BETTER SLEEP



WEIGHT MANAGEMENT



COGNITION & STRESS

DRIVING SCIENCE NOW

New Study Shows Butter Benefits vs Margarine/Oils

BUTTER

> 1 tsp. per day



- **Less** insulin resistance
- **Higher levels** of “good” cholesterol (**HDL**)
- **Lower** triglycerides
- **Lower** risk of developing T2D

MARGARINE

> 1.5 tsp. per day



- **29% higher risk** of heart disease
- **41% higher risk** of T2D diabetes

NON-HYDROGENATED OILS



- **Higher** body weight
- **Higher levels** of “bad” cholesterol (**LDL**) by about 8 point

DRIVING SCIENCE NOW

Arming the Industry with Science-Backed Messages

57 Science-Based Messages



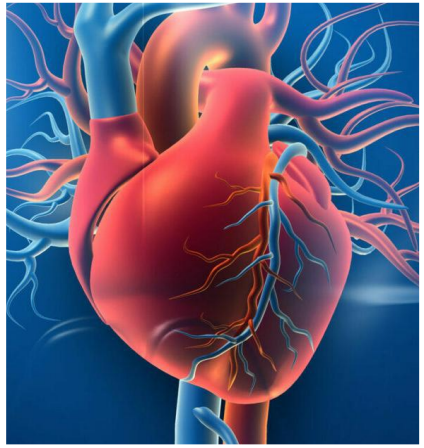
First 1000 Days:

Your baby's **brain doubles** in size in the first year! Cheese and yogurt are nutrient powerhouses providing **essential vitamins and minerals** for early **brain development**.



Grow and Perform:

Milk, cheese or yogurt's **high-quality protein** contains the essential **amino acids** needed for boosting **recovery** and **muscle growth** post-workout.



Health Heart and Weight:

Reducing your risk of heart disease is key to **long-term health**. Delicious milk, cheese and yogurt as part of a balanced diet, are **linked to a lower risk** of hypertension and cardiovascular disease.



Systems Super Charge:

The **best defense is a good offense**. The **nutrients** in milk, cheese and yogurt help **support your immune system** and are **powerhouse** fuel for your overall wellness.

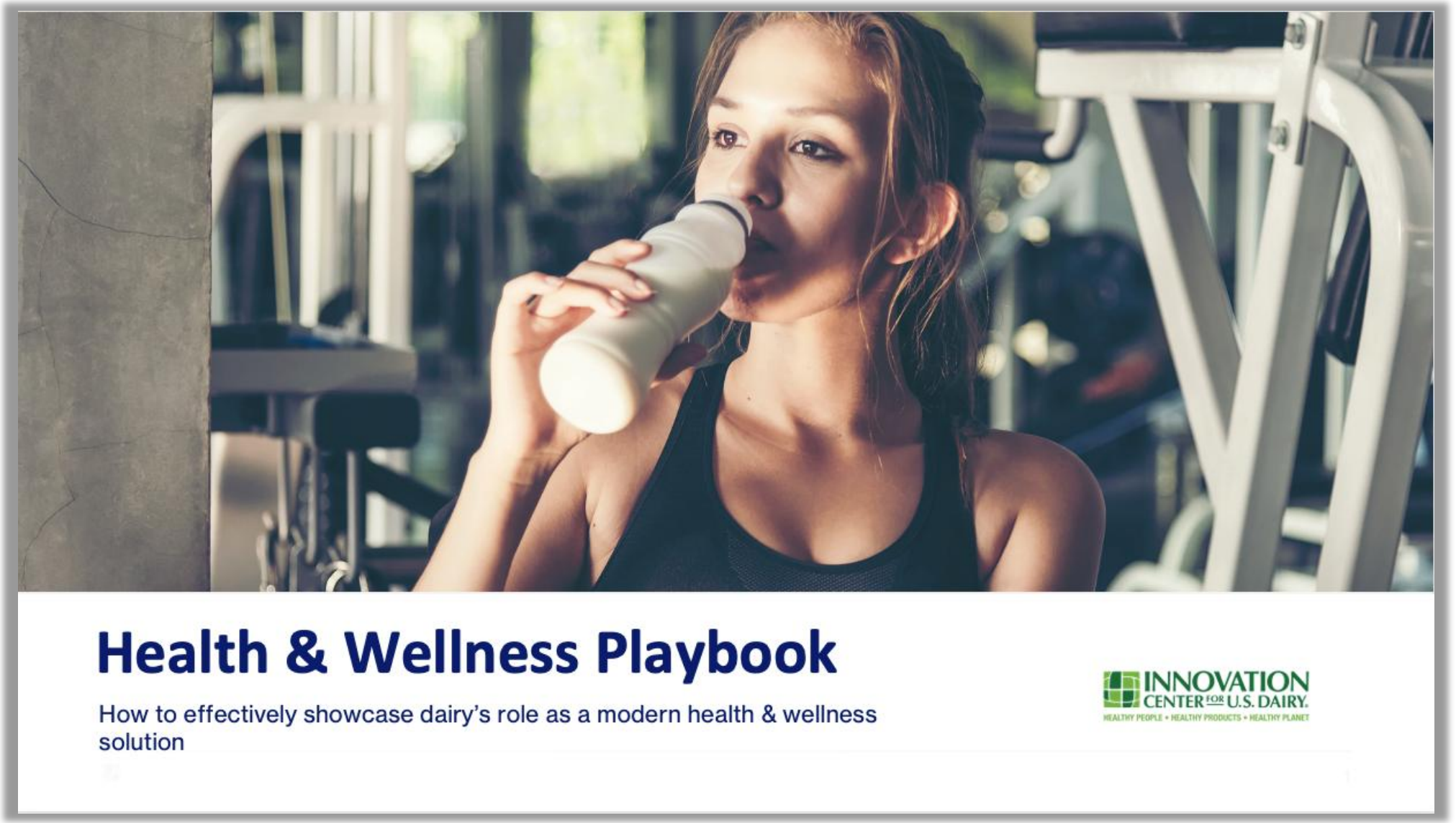
COMMERCIALIZING THE SCIENCE WITH CONSUMERS

milk pep





ARMING THE INDUSTRY
Health & Wellness Playbook



High Growth Platforms via Partners & Industry



PRIORITIZED GROWTH PLATFORMS

1

Foodservice Beverages



2

Foodservice Cheese & Ingredients



3

Retail Cultured



4

Retail Beverages



DRIVING THE FUTURE NOW
Foodservice Beverage



Dirty Sodas



Specialty Coffee



Refreshers



Functional Beverages

DRIVING THE FUTURE NOW
Foodservice Cheese



Sandwiches

Butter BBQ Chicken Stack



Breakfast

Stuffed Hashbrown



Appetizers & Sides

Crispy Cheese-Stuffed Chicken Bites

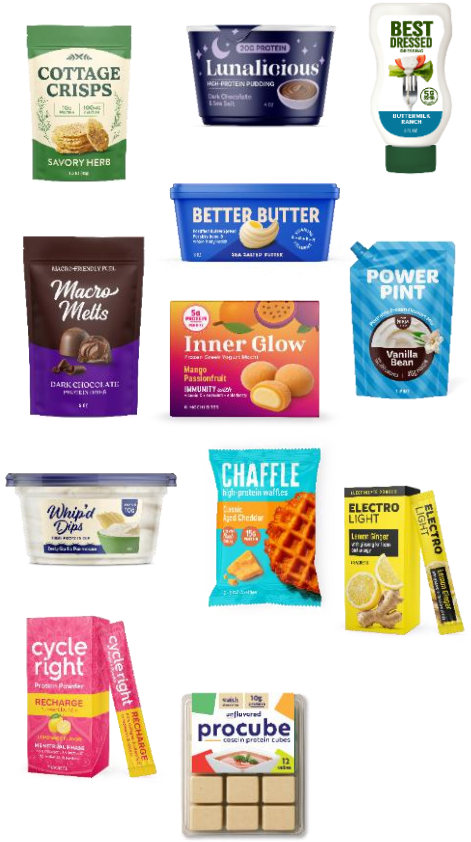


Chicken & Cheese

Four Cheese Melt

INSPIRING THE FUTURE OF DAIRY AT RETAIL

Via Disruptive Formats

Milk & Cream	Yogurt & Yogurt Drinks	Cheese	RTD	Cottage Cheese	Other Formats
					

Get Inspired With Our Dairy Innovator Site

Check Out DMI's Dairy Innovation Portal Today

THE DAIRY ALLIANCE

DMI DAIRY MANAGEMENT INC.

Product Science & Technology



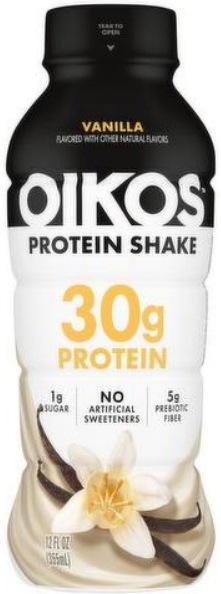
MAGIC OF MILK'S MOLECULES ARE FUELING A POWERFUL "FAMILY TREE"

FAMILY TREE OF BIOACTIVES AND BENEFITS





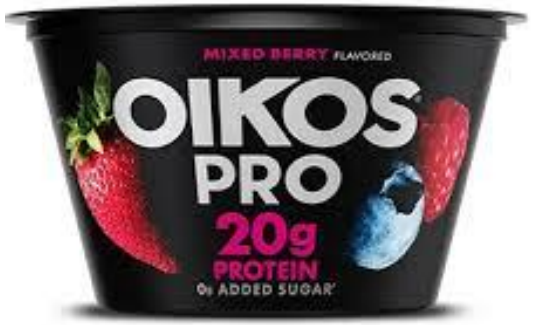
PROTEIN R&D LEADERSHIP IMPACTS















AI PLATFORM
Driving Growth in Food as Medicine

CONFIDENTIAL

New Products



Fluid milk for memory with added lactoferrin + collagen for muscle and joint health

New Categories



Travel powder packs for skin health enhanced with lactoferrin and lactobacillus strains

New Claims

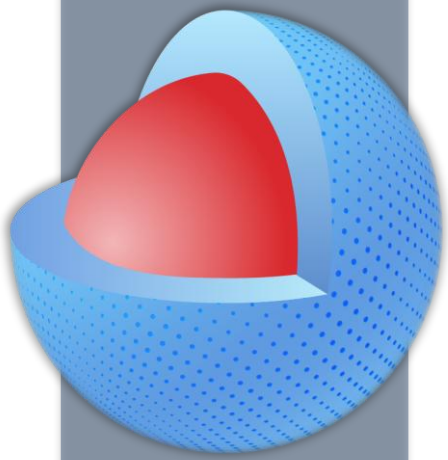


Yogurt for kids with added sphingomyelin for brain development

R&D LEADING TECHNOLOGY

To Deliver Future Growth Using Magic of Milk Molecules

Lactoferrin Encapsulation



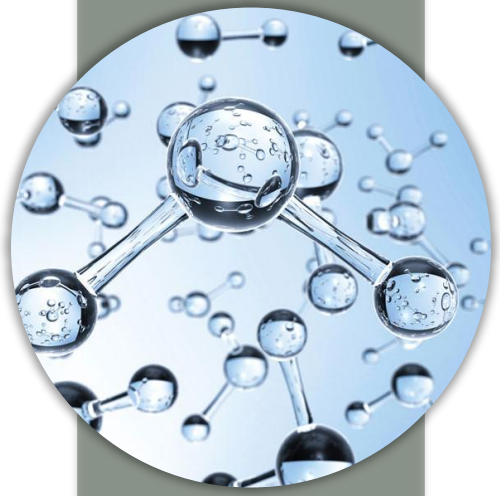
Immunity $6B

Filtration & Drying Milk Fat Globule Membrane



Cognition $9B

Fermentation Bioactive Peptides



Healthy Heart $23B

LACTOFERRIN/IMMUNITY

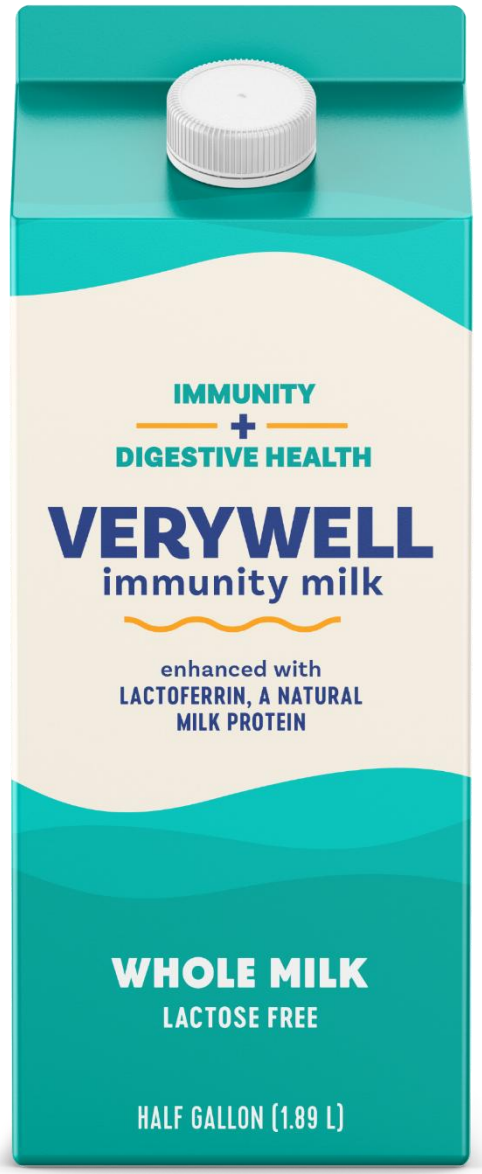
* Consumer Exploratory Packaging Concepts Only

CONFIDENTIAL









*These statements have not been approved by USDA

TRYPTOPHAN/CALM

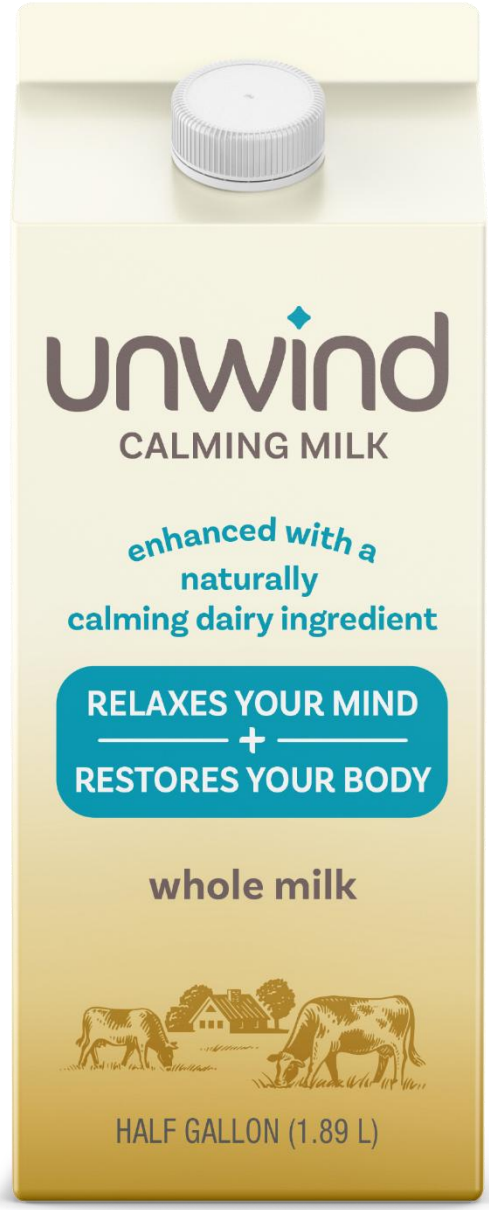
* Consumer Exploratory Packaging Concepts Only

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*These statements have not been approved by USDA

TRYPTOPHAN/SLEEP

* Consumer Exploratory Packaging Concepts Only

CONFIDENTIAL









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KEY TAKEAWAYS



Category Leadership: DMI and TDA working together to lead category growth through deep industry and customer engagement and inspiration

Technology: Creating value-added products for domestic and export markets in retail and foodservice channels

Science: Discovering new health benefits to unleash new product claims and marketing messaging

Innovation: Inspiring new growth platforms and new product development

CoBANK

Navigating Dairy Trends in 2026 & Beyond

Corey Geiger
Lead Dairy Economist

Georgia Dairy Conference
January 19, 2026



Dairy is dynamic and growing

$80.3 billion

Retail dairy sales in 2025



Largest category in retail grocery

(alcohol is no. 2)

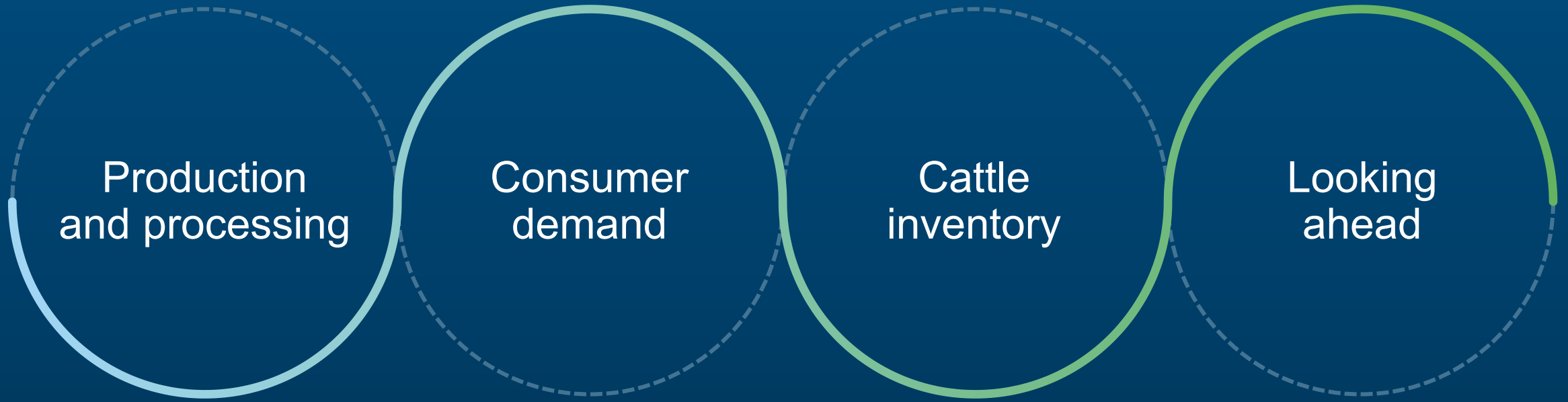


Up 3.2% from 2024



Dairy is the world's largest refrigerated supply chain

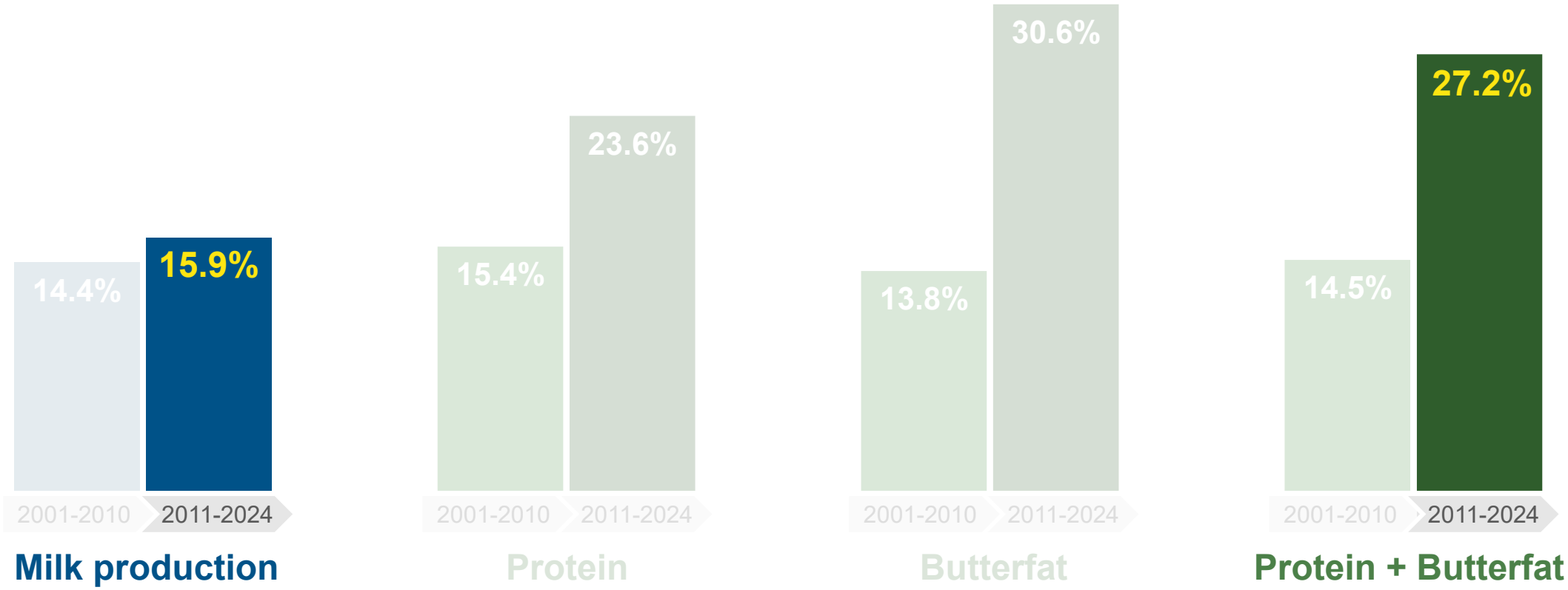
Source: DMI and Circana sales data. Presentation by Corey Geiger and Abbi Prins, CoBank.


Production and processing
Consumer demand
Cattle inventory
Looking ahead

Production and processing

Milk components matter more than milk production

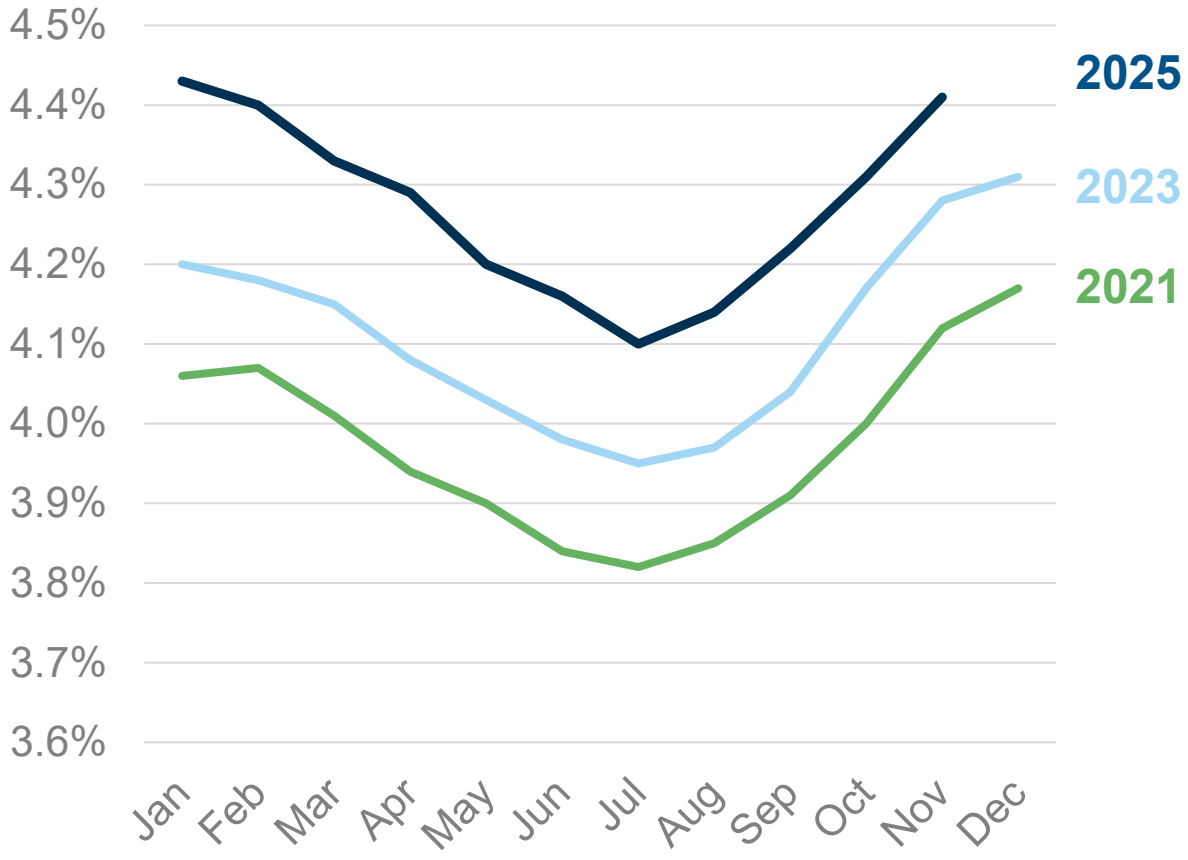
Percent change



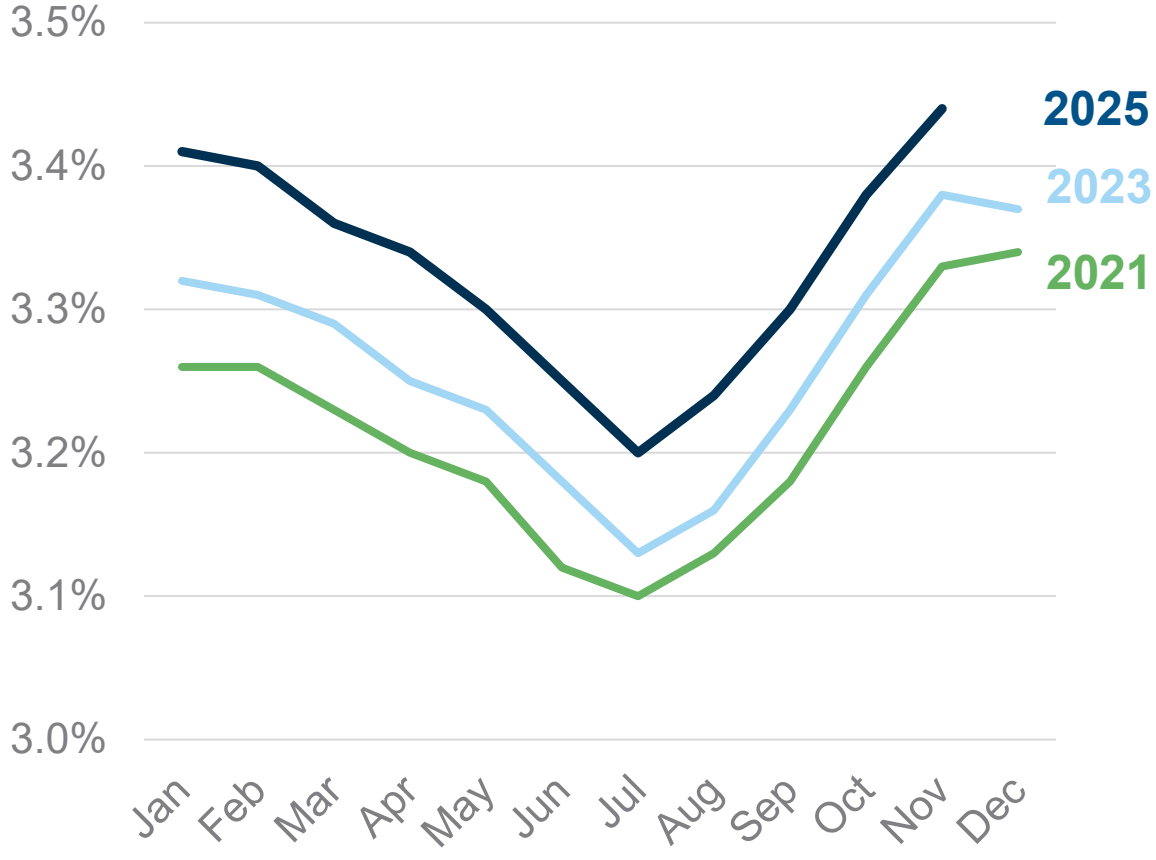
Source: USDA and FMMO data, calculation. Presentation by Corey Geiger, CoBank.

Big shifts in butterfat and protein levels

FMMO butterfat 2021 to 2025



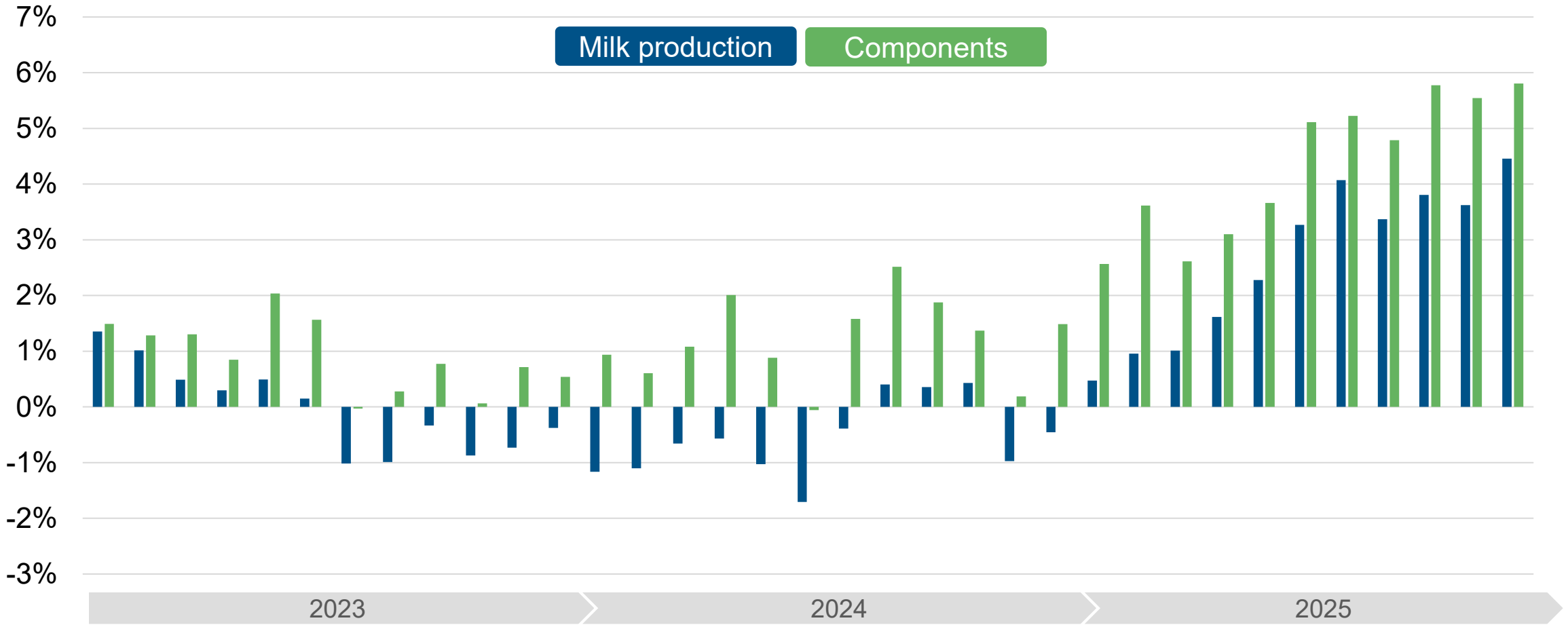
FMMO protein 2021 to 2025



Source: USDA and Federal Milk Marketing Order data. Presentation by Corey Geiger and Abbi Prins, CoBank.

Milk production is picking up steam, but components keep growing at a faster rate

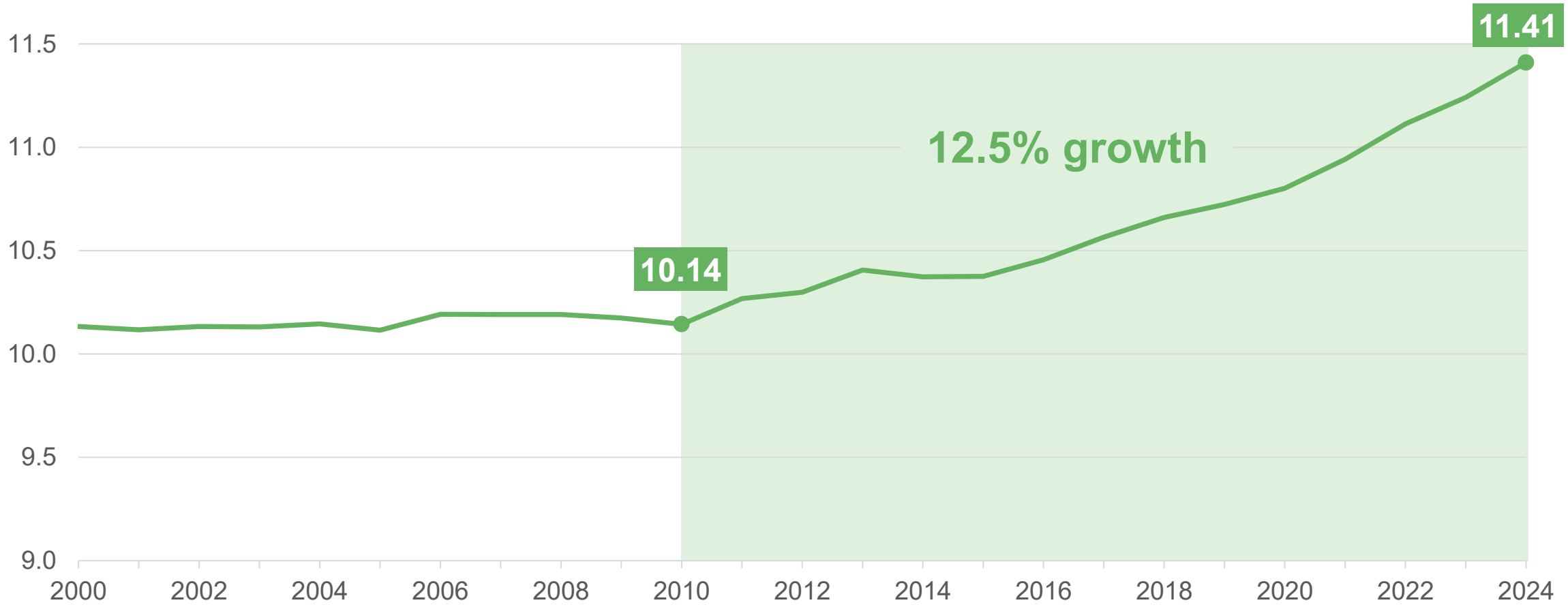
Year-over-year percent change



Source: USDA-NASS and FMMO data. Presentation by Corey Geiger and Abbi Prins, CoBank.

Farmgate milk yields more dairy products

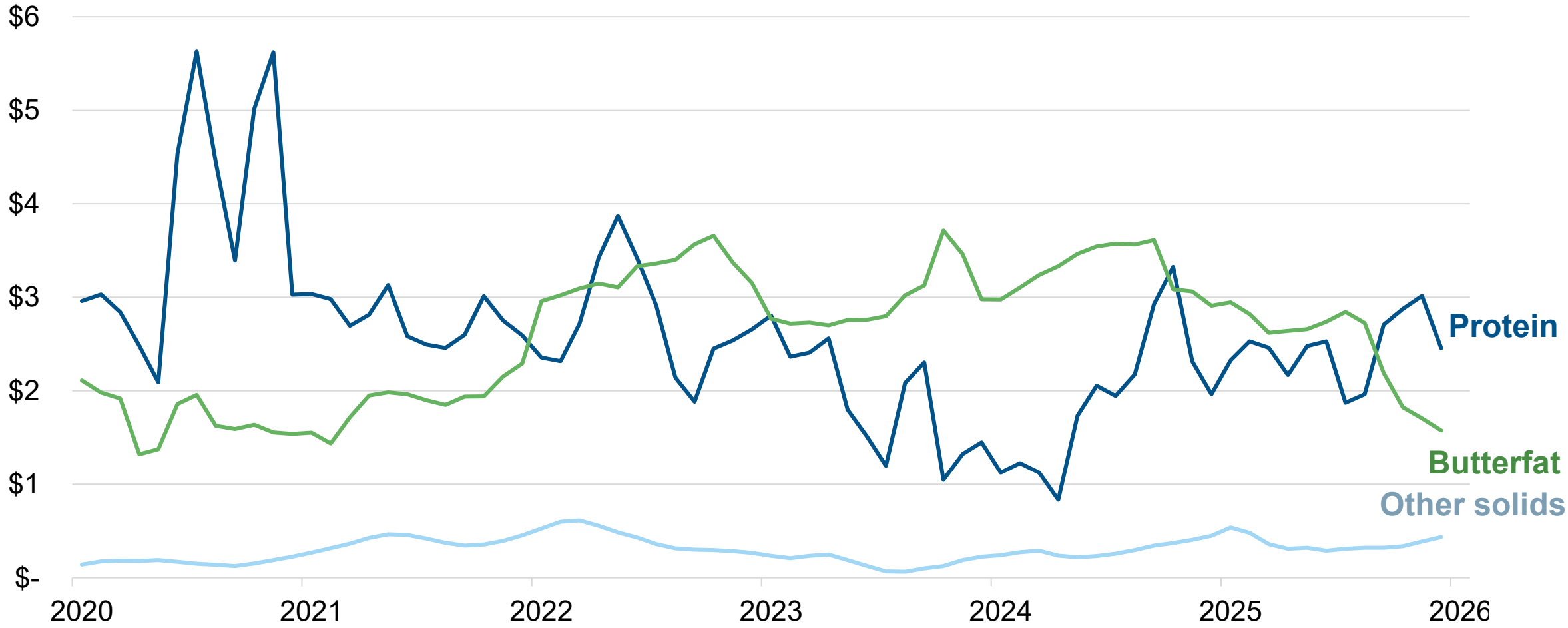
Pounds of **cheese** yield per hundredweight of milk



Source: USDA and FMMO Data. Calculations and presentation by Corey Geiger and Abbi Prins, CoBank.

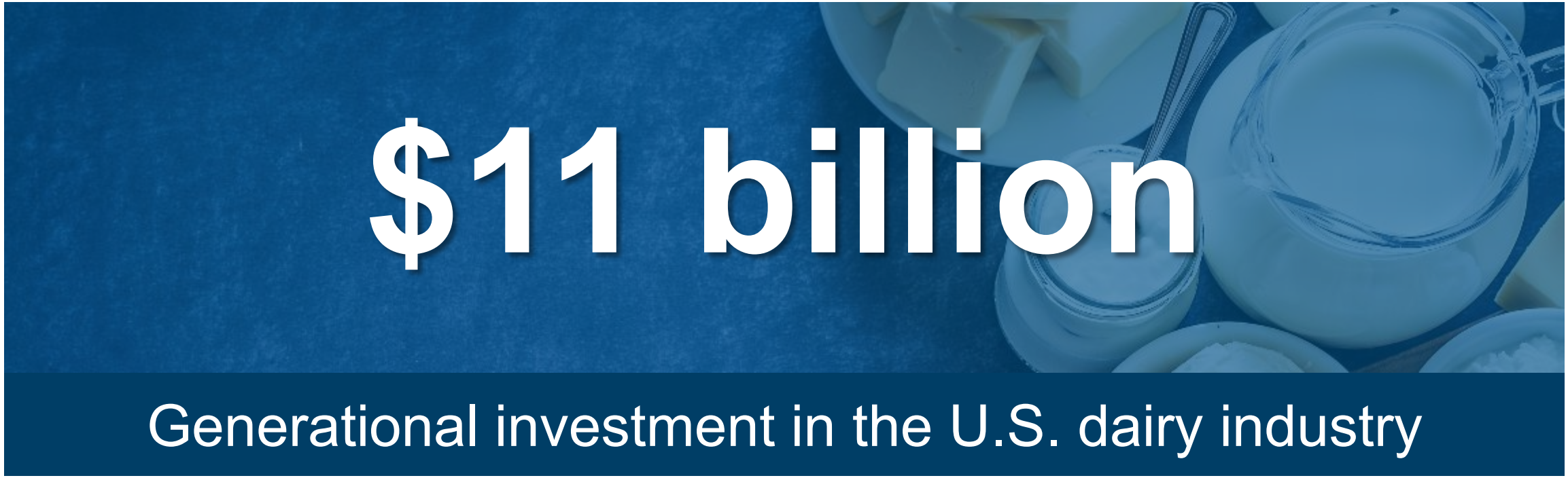
Over 90% of milk priced on Multiple Component Pricing

Monthly federal order butterfat, protein, and other solids prices (dollars per pound)



Sources: USDA and Federal Milk Marketing Order. Presentation by Corey Geiger and Abbi Prins, CoBank.

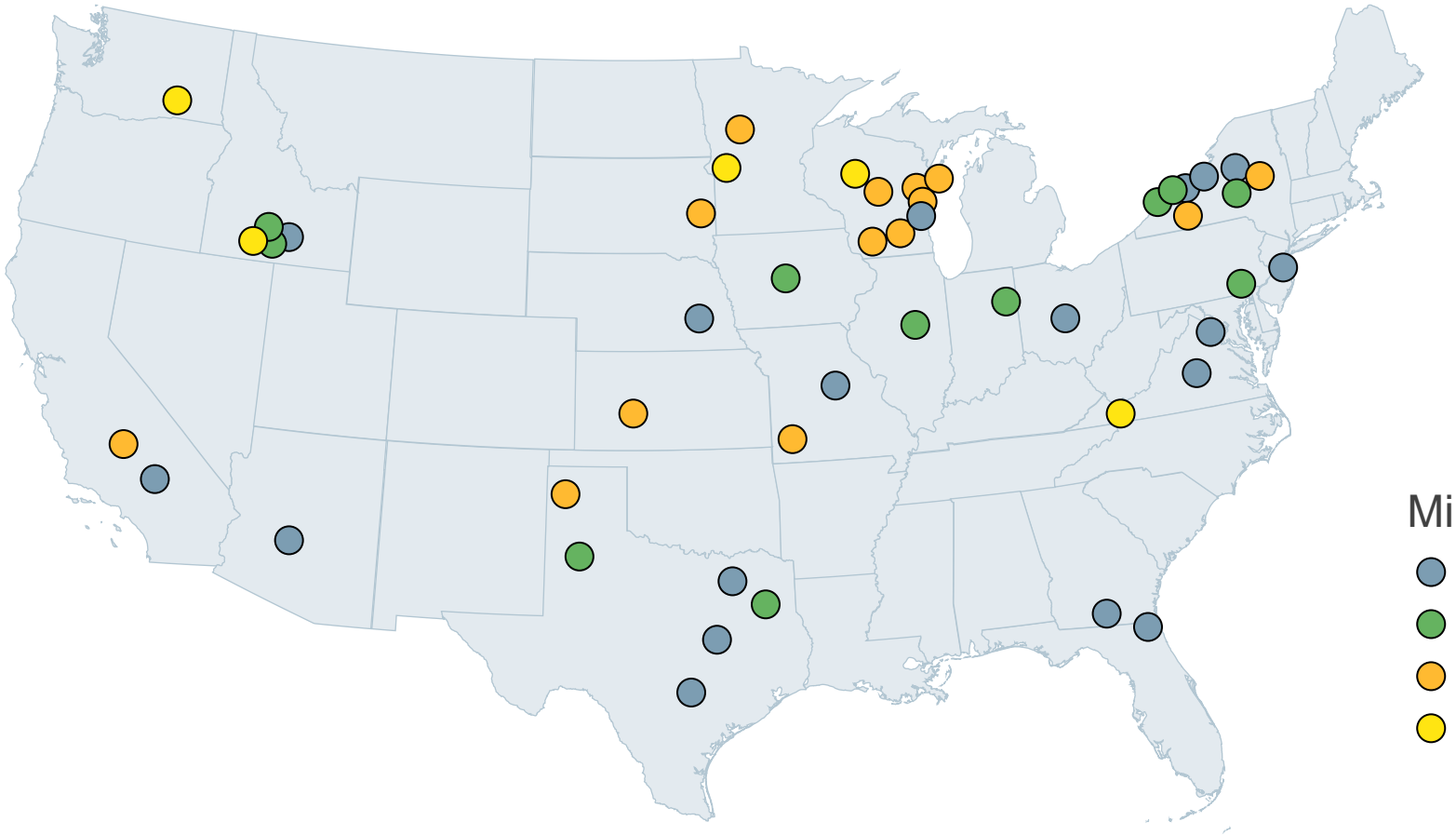
Dairy processing expansion is moving quickly



Source: U.S. Dairy Export Council, National Milk Producers Federation, and CoBank. Presentation by Corey Geiger and Abbi Prins, CoBank.

What's the future for U.S. dairy consumption?

New or recently completed plants through 2028 – $11 billion

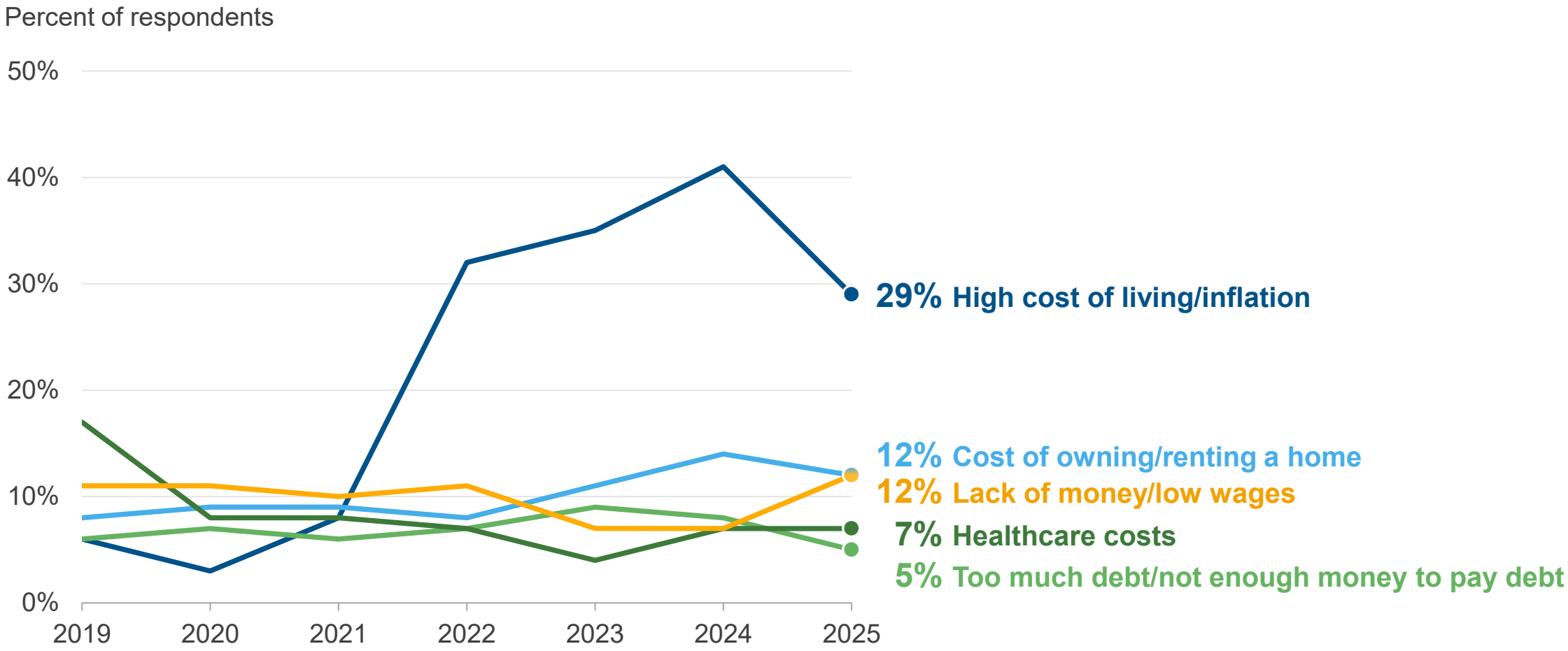


Source: U.S. Dairy Export Council, National Milk Producers Federation, and CoBank. Presentation by Corey Geiger and Abbi Prins, CoBank.


Consumer
demand

Consumers say high cost of living is number one problem

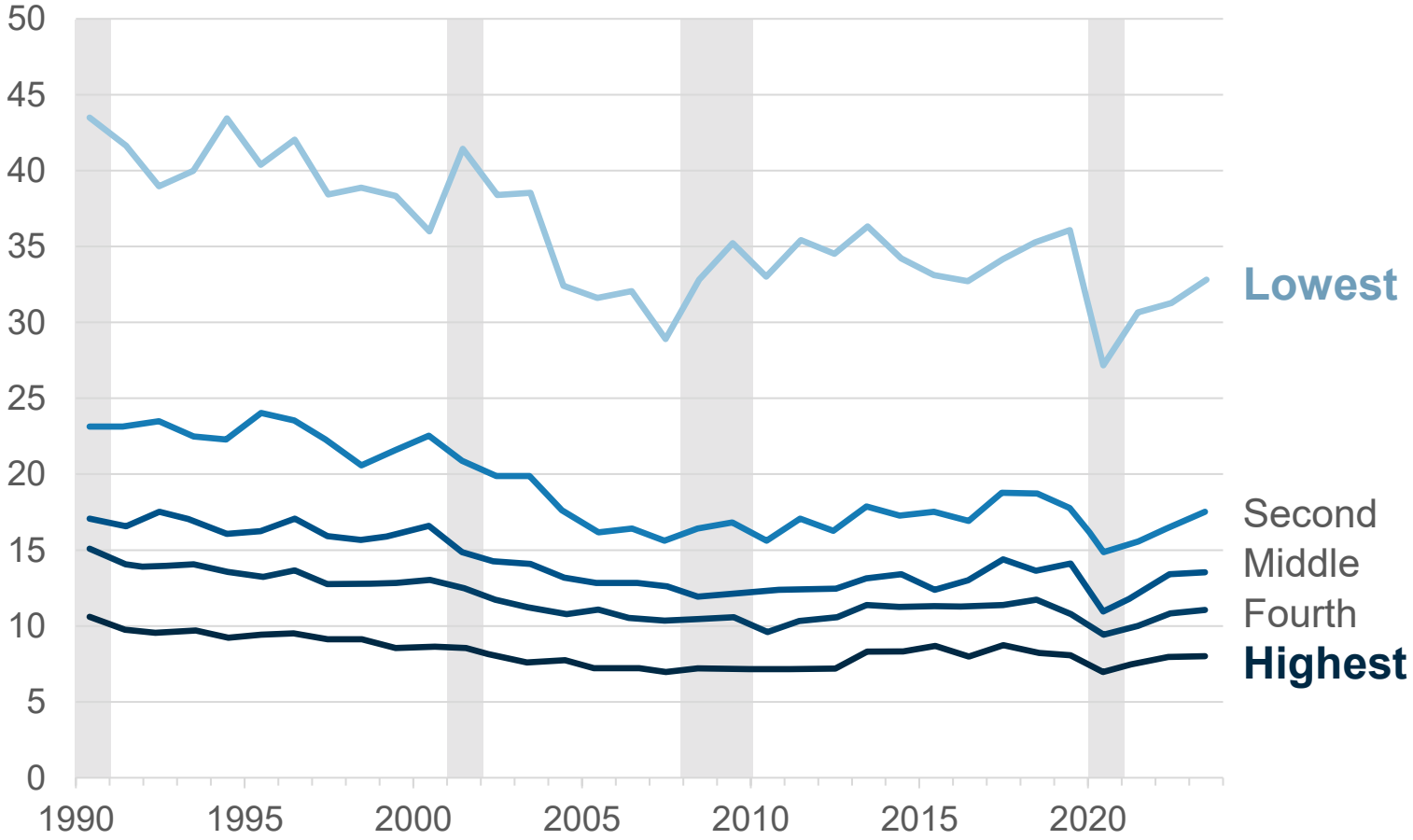
What is the most important financial problem facing your family today?



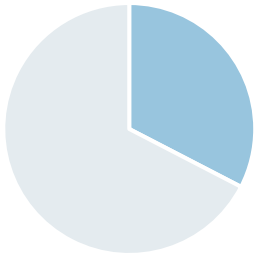
Source: Gallup. Presentation by Corey Geiger and Abbi Prins, CoBank.

Food prices have impacts across the economy

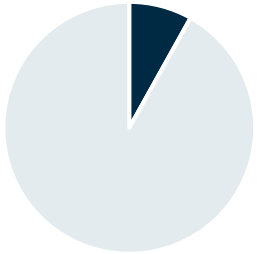
Percent of after-tax income spent on food by income quintile



Lowest income quintile spent **$5,300** in 2023 (32.6% of income)



Highest income quintile spent **$17,000** in 2023 (8.1% of income)

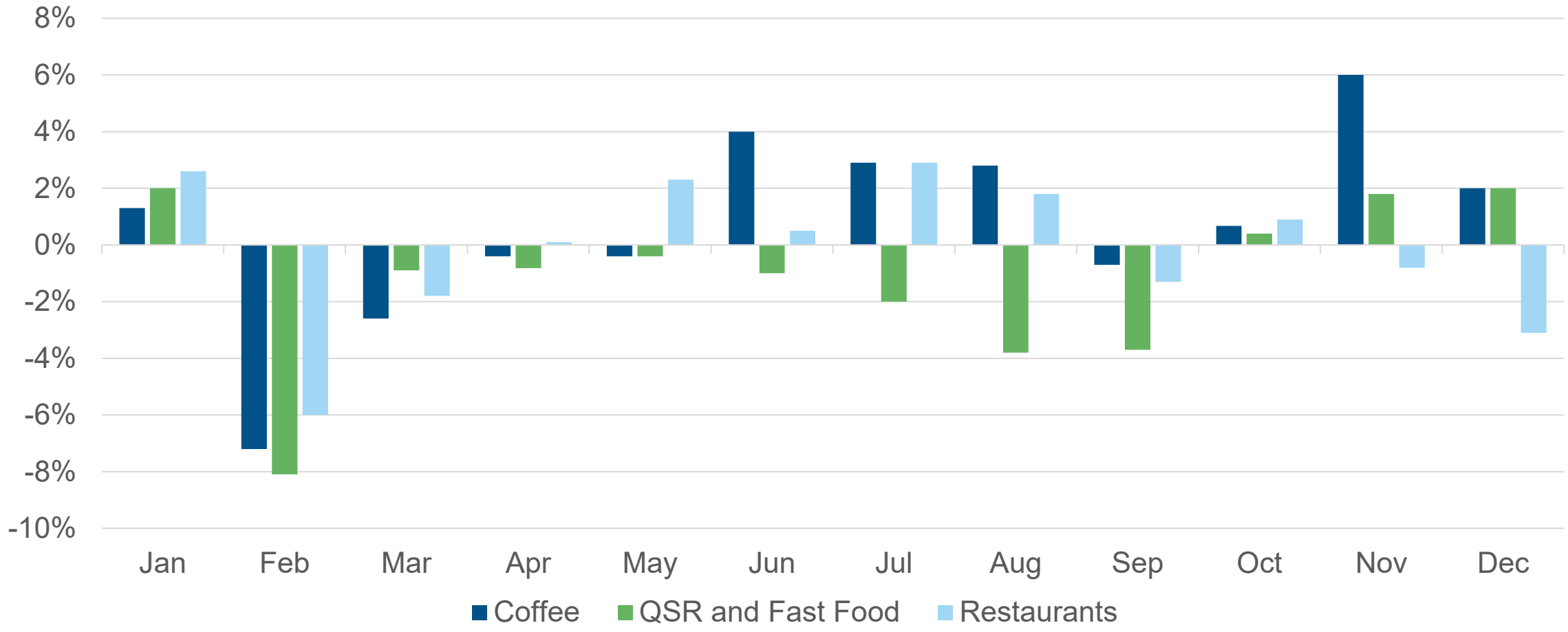


Shading indicates a recession

Source: Megan Sweitzer, USDA ERS, using BLS Consumer Expenditure Survey. Presentation by Corey Geiger and Abbi Prins, CoBank.

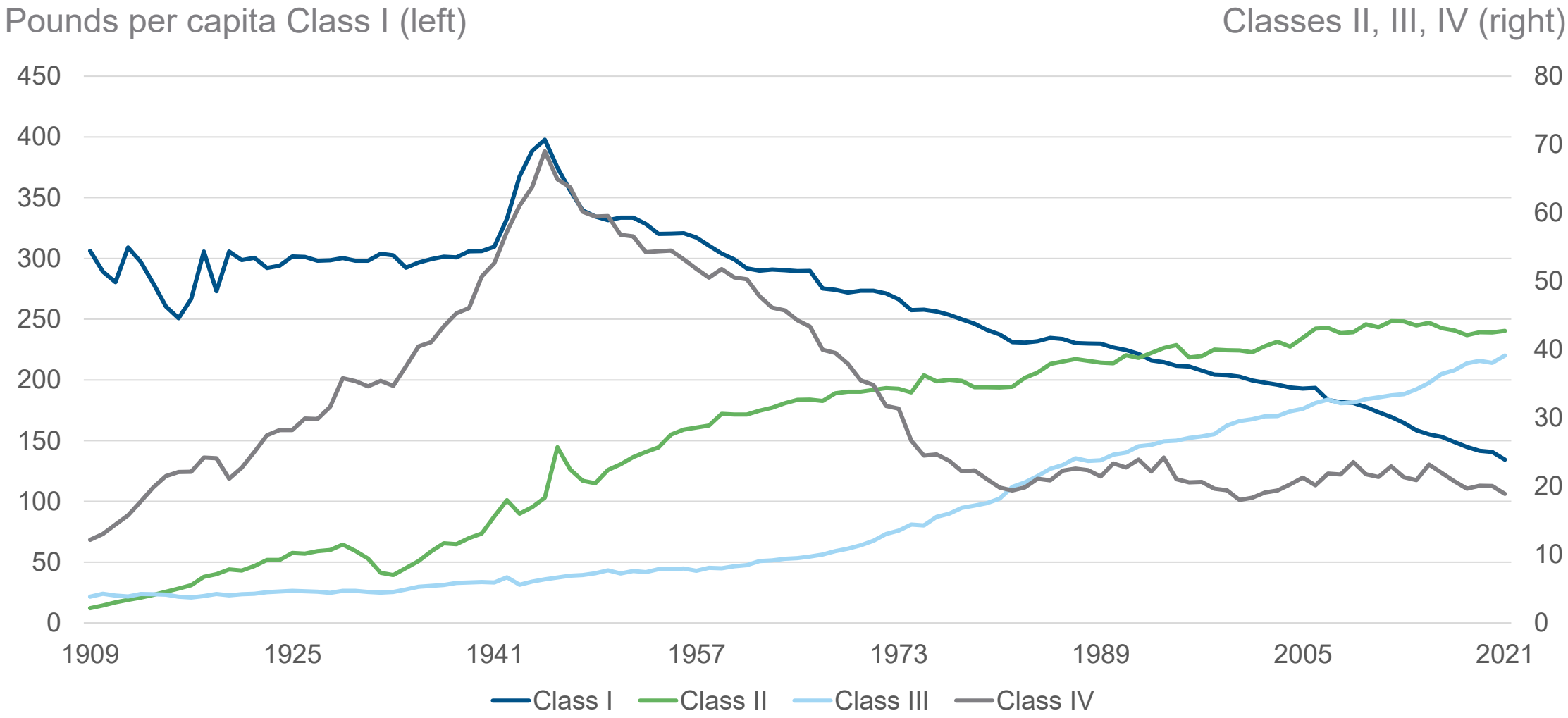
Restaurant visits show a shift in consumer behavior in 2025

Restaurant visits per location by restaurant type (% change YoY)



Source: Placer.ai. Presentation by Corey Geiger and Abbi Prins, CoBank.

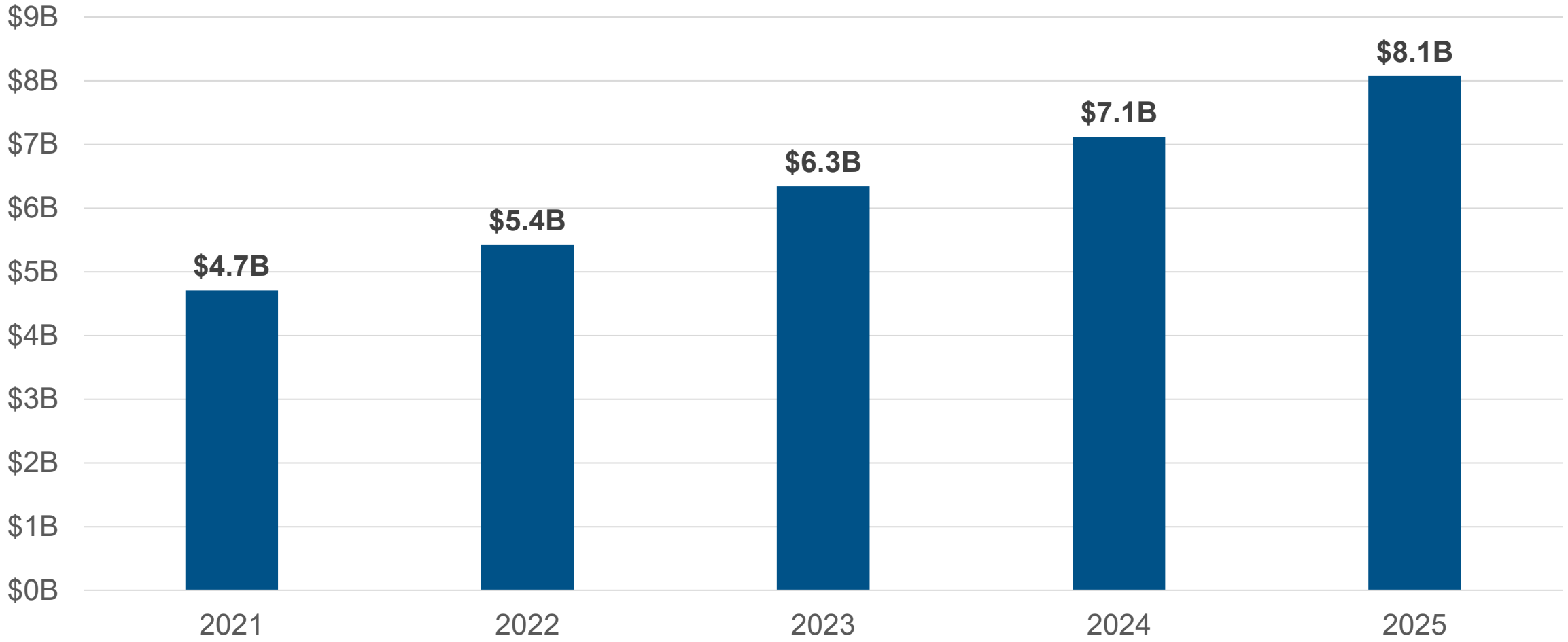
Consumers are eating dairy more than they are drinking



Source: USDA-Economic Research Service. Presentation by Corey Geiger and Abbi Prins, CoBank.

Ready-to-drink protein dairy shakes and nutritionals sales up 71% in four years

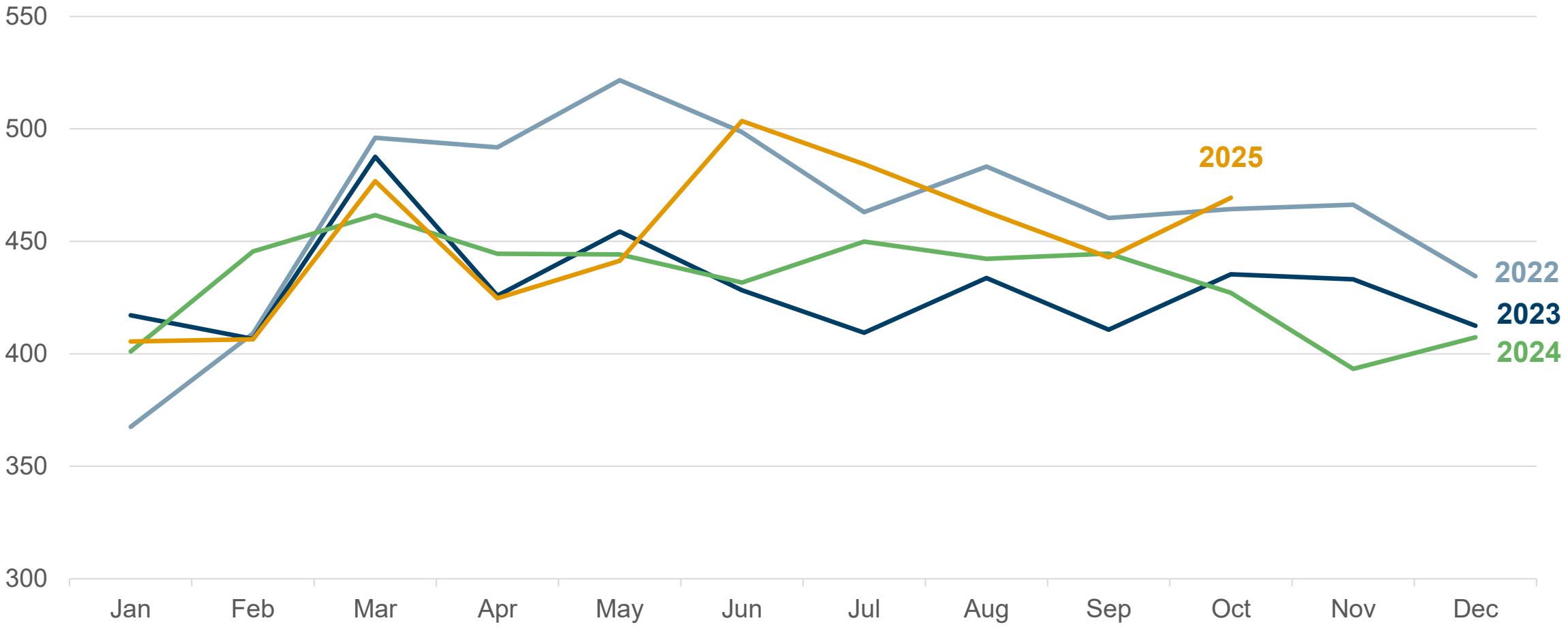
Dollar sales



Source: Circana MULO+ with RTD Nutritionals as based on UPCs. Presentation by Corey Geiger and Abbi Prins, CoBank.

Roughly 17% of U.S. milk production is exported

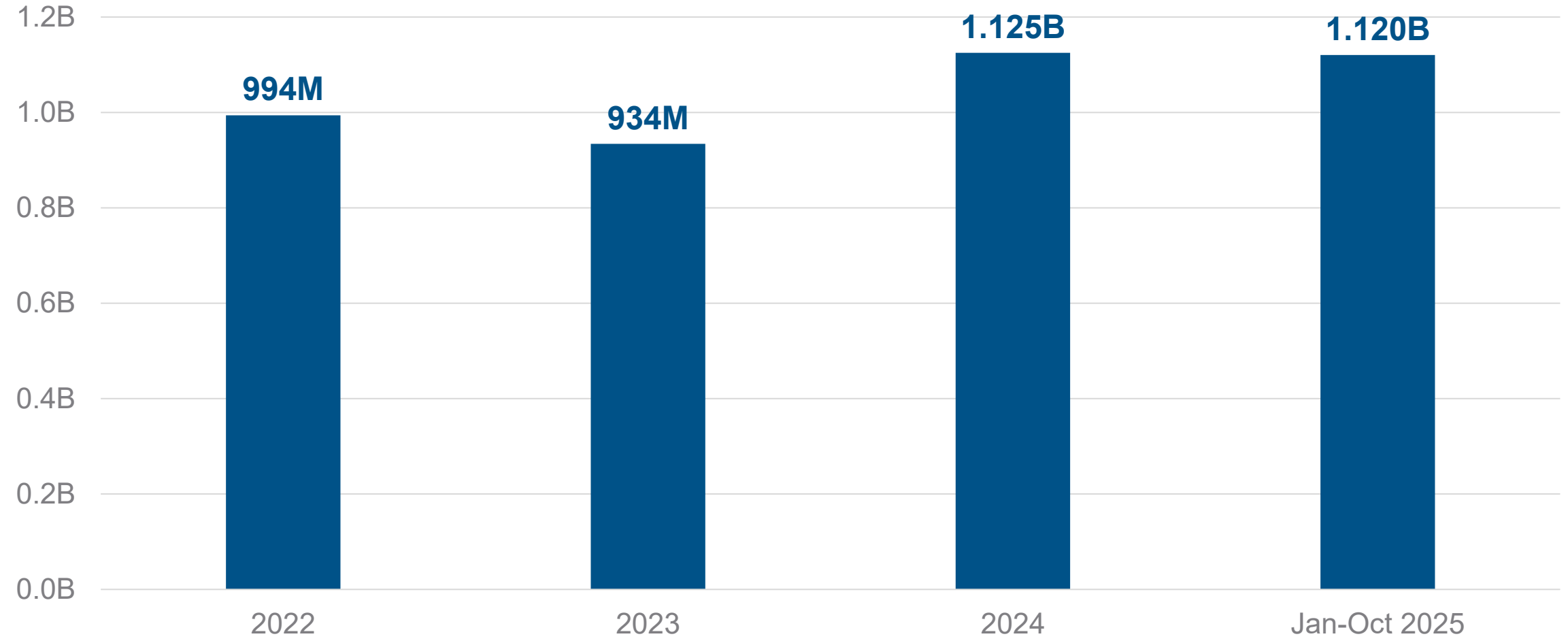
U.S. dairy exports by month (million pounds)



Source: U.S. Dairy Export Council. Presentation by Corey Geiger, CoBank.

New records for cheese exports in the making

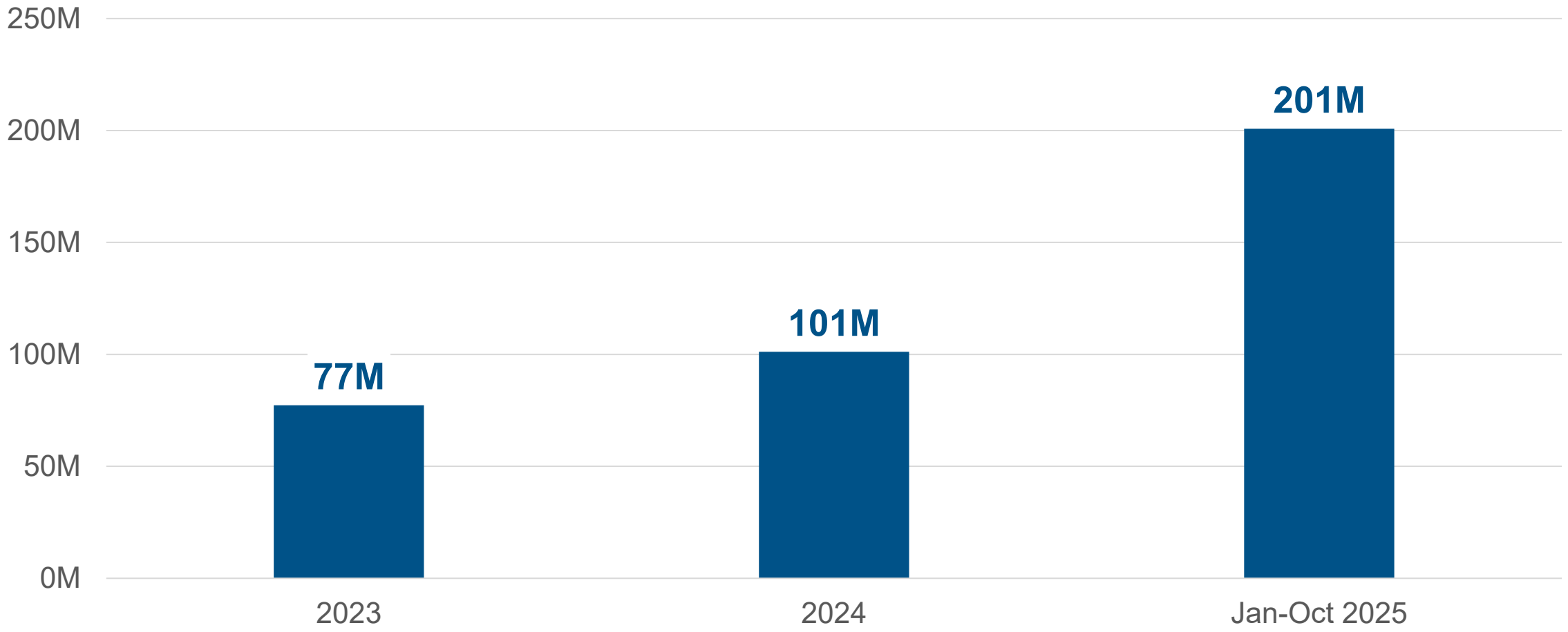
U.S. cheese exports (pounds)



Source: USDA and U.S. Dairy Export Council. Presentation by Corey Geiger and Abbi Prins, CoBank.

2025 butterfat exports will be over double of 2024

Butterfat exports (pounds)



Source: USDA-FAS. Presentation by Corey Geiger and Abbi Prins, CoBank.

Cattle inventory

Dairy herd is growing based due to fewer cull cows

529,300

Pullback on dairy cow culling since Labor Day 2023



So far, 90,700 fewer cows in 2025 than last year



Fewer heifer replacements leading to fewer cows culled



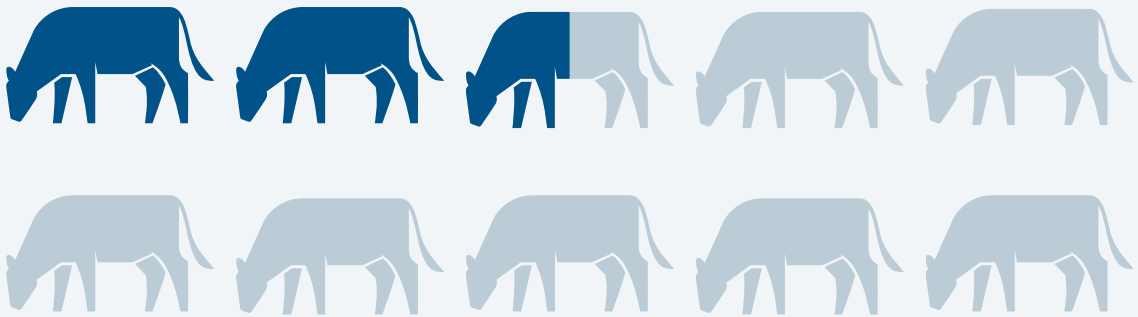
Culling has picked up since August

Source: USDA. Presentation by Corey Geiger and Abbi Prins, CoBank.

The dairy triple play

Sexed semen | **Genomics** | Beef-on-dairy

20%-25% of U.S. dairy heifers have genomic tests



Revealing **70%** of genetic ability while still a calf

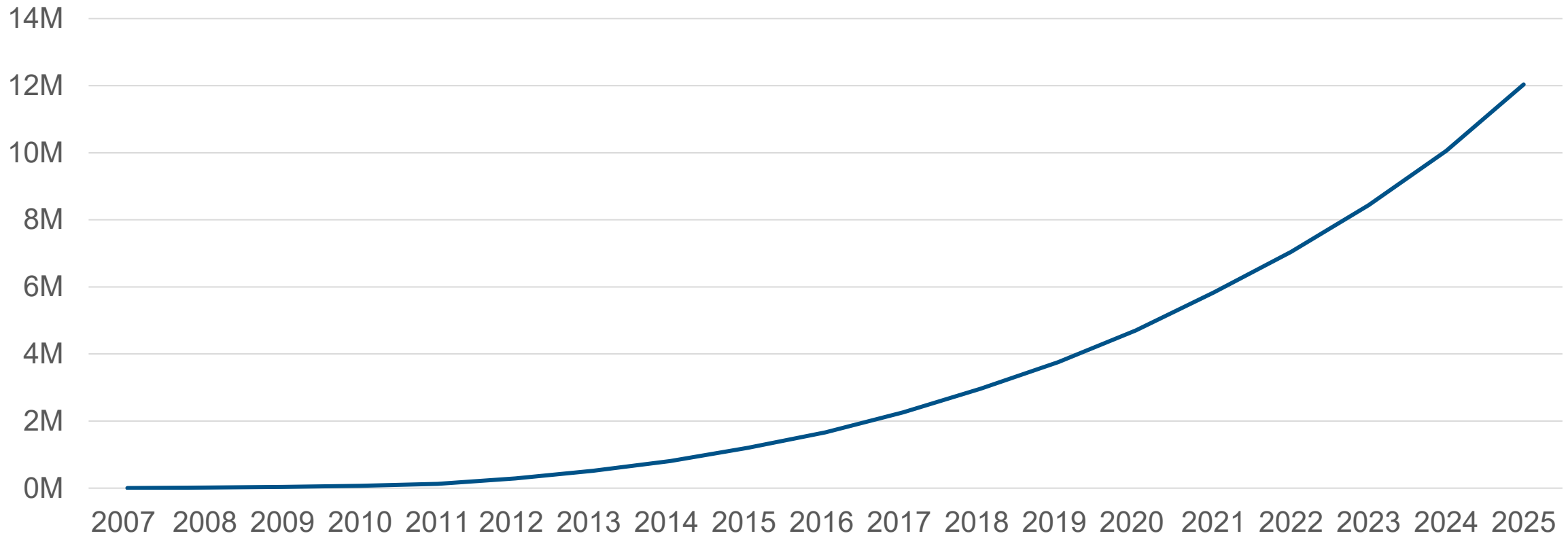


Source: CDCB and NAAB. Presentation by Corey Geiger and Abbi Prins, CoBank.

The dairy triple play

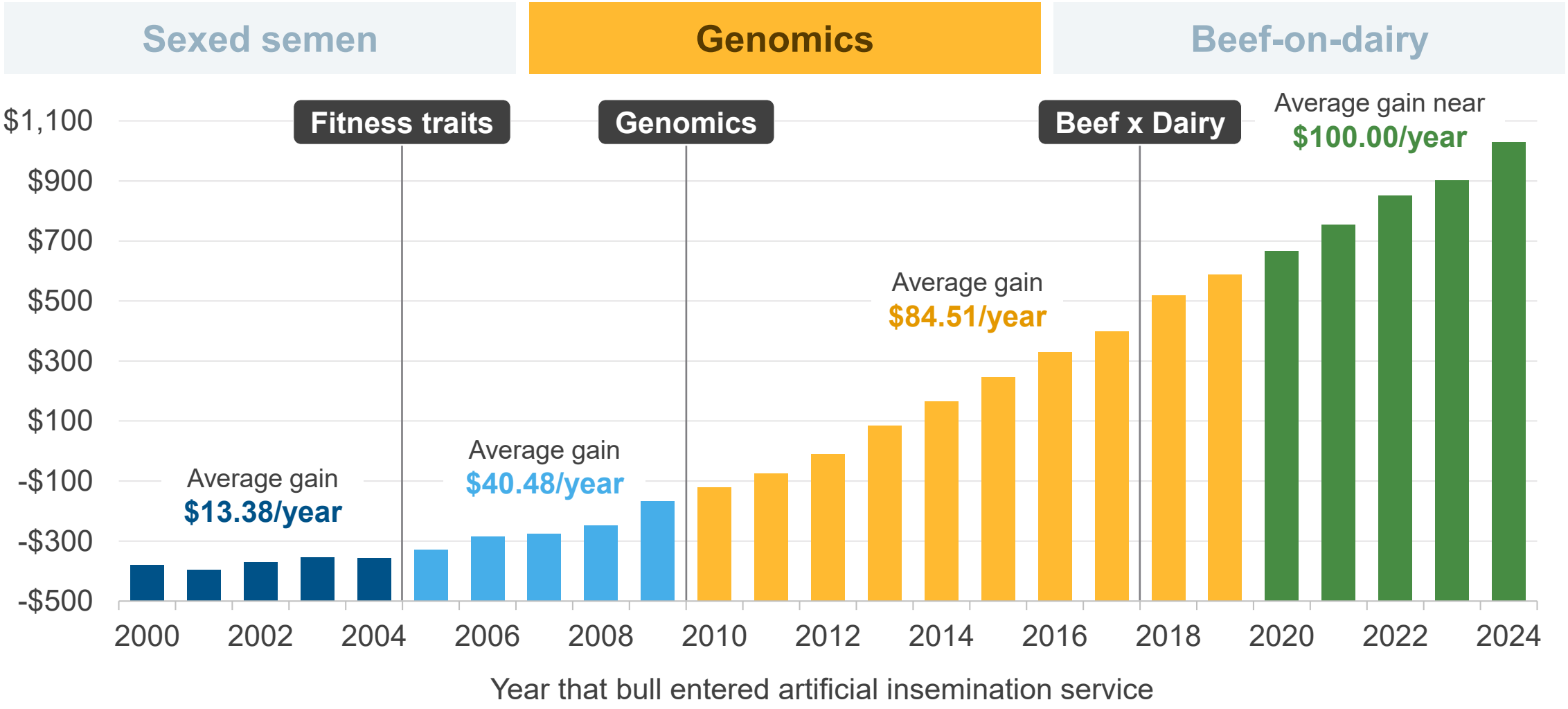
Sexed semen | **Genomics** | Beef-on-dairy

Animals genotyped in National Cooperator Database



Source: CDCB. Presentation by Corey Geiger and Abbi Prins, CoBank.

Genetic merit of marketed Holstein bulls



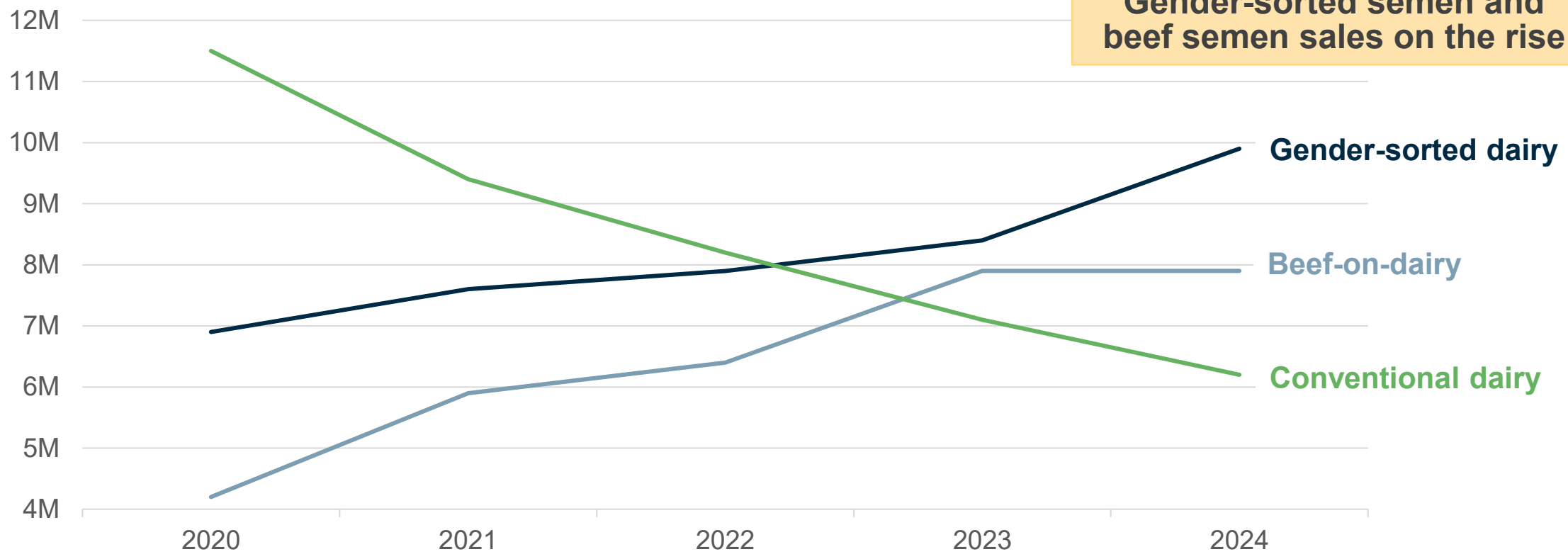
Source: Council on Dairy Cattle Breeding. Presentation by Corey Geiger and Abbi Prins, CoBank.

Replacements will limit ability to raise U.S. milk production

Sexed semen | Genomics | Beef-on-dairy

Units of semen sold

Gender-sorted semen and beef semen sales on the rise

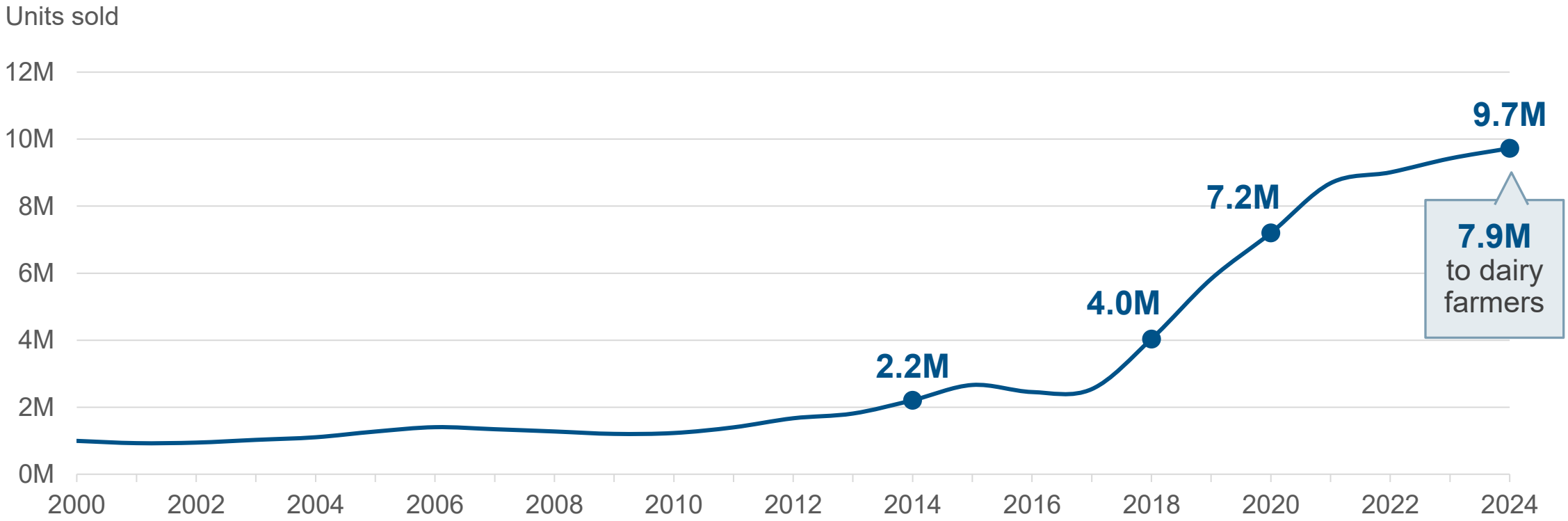


Source: National Association of Animal Breeders. Presentation by Corey Geiger and Abbi Prins, CoBank.

Beef-on-dairy continues to transform category

Sexed semen | Genomics | **Beef-on-dairy**

Domestic beef semen sales climbed substantially

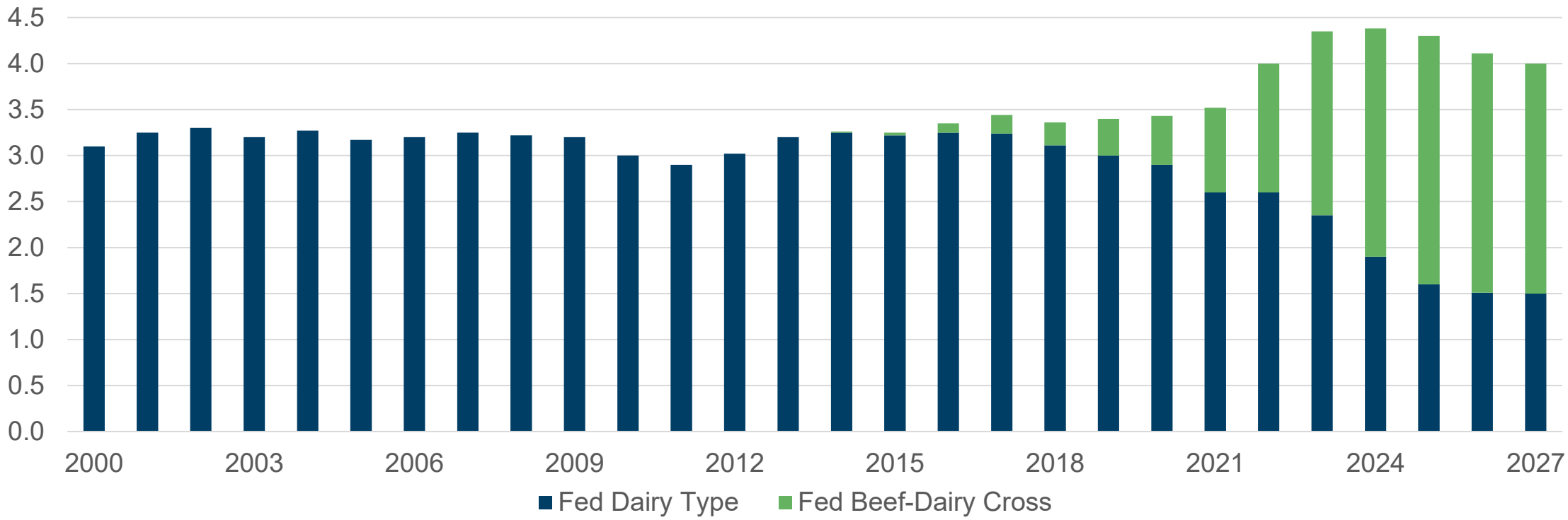


Source: Council on Dairy Cattle Breeding. Presentation by Corey Geiger and Abbi Prins, CoBank.

Beef on dairy cattle add more head to the feeder supply

Sexed semen | Genomics | **Beef-on-dairy**

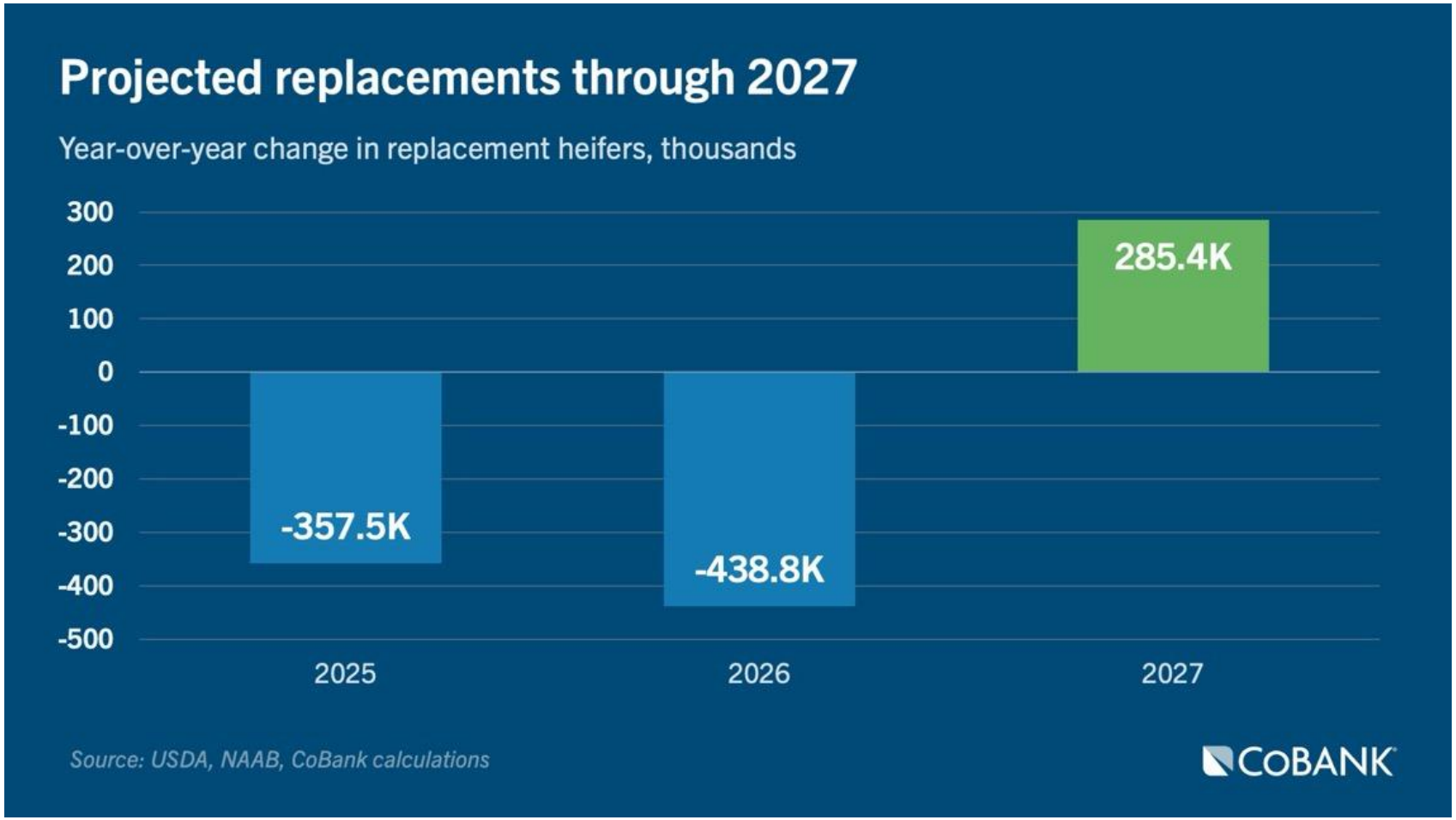
In millions of head



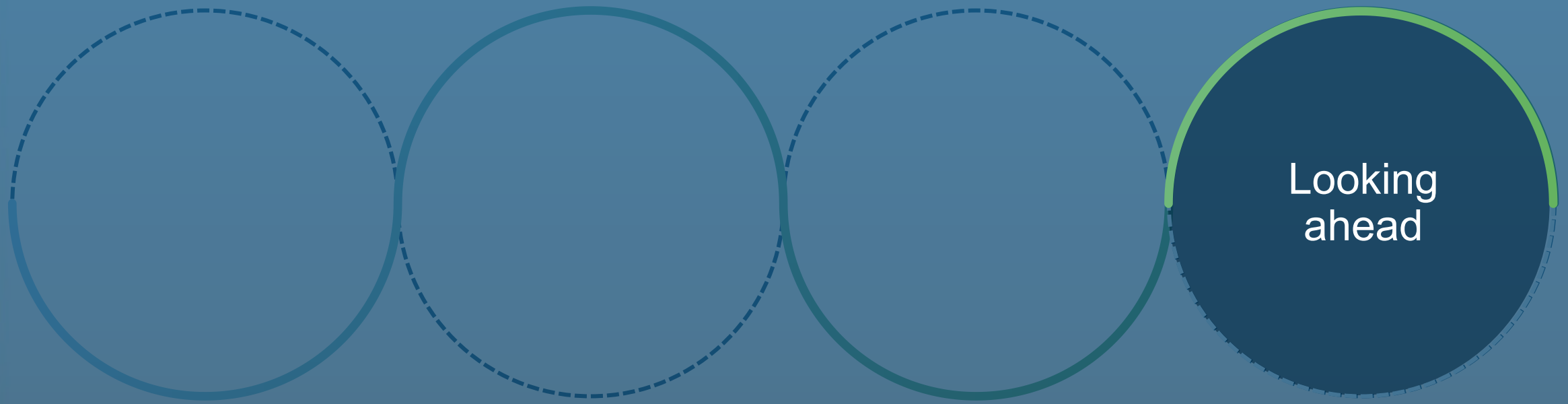
Source: CattleFax, USDA. Presentation by Corey Geiger and Abbi Prins, CoBank.

Dairy replacements will shrink further until 2027

Dairy replacements available to enter the milking string on U.S. dairy farm (year over year)



Source: Model and calculations by Corey Geiger. Presentation by Corey Geiger and Abbi Prins, CoBank


Looking
ahead

Largest dairy cow herd in 30 years

Monthly dairy cow inventory



Source: USDA. Presentation by Corey Geiger and Abbi Prins, CoBank.

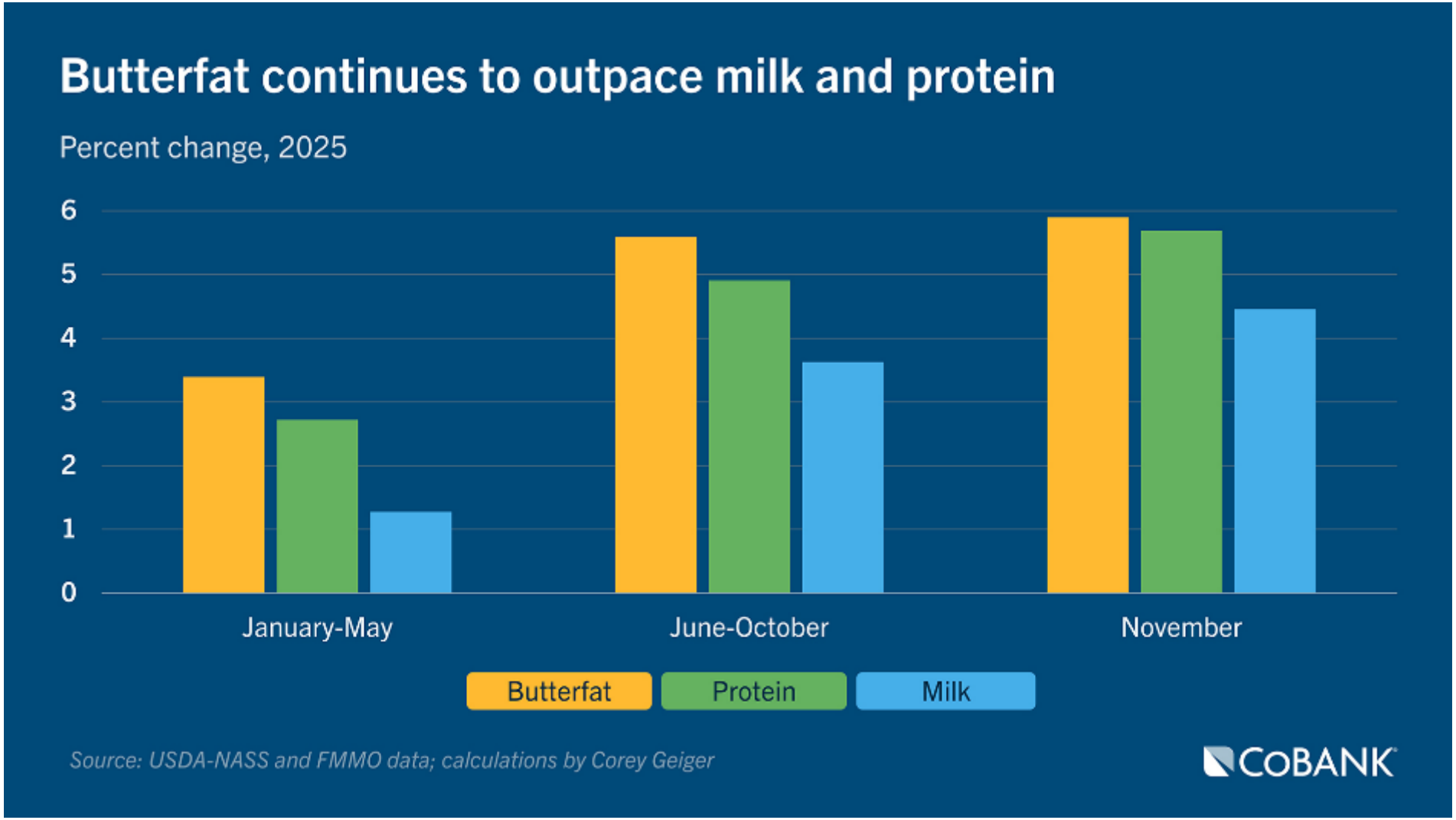
Why cow numbers and milk may not contract quickly

Pennsylvania beef-on-dairy calf pricing (price per calf)



Source: USDA, LMIC. Presentation by Corey Geiger, CoBank.

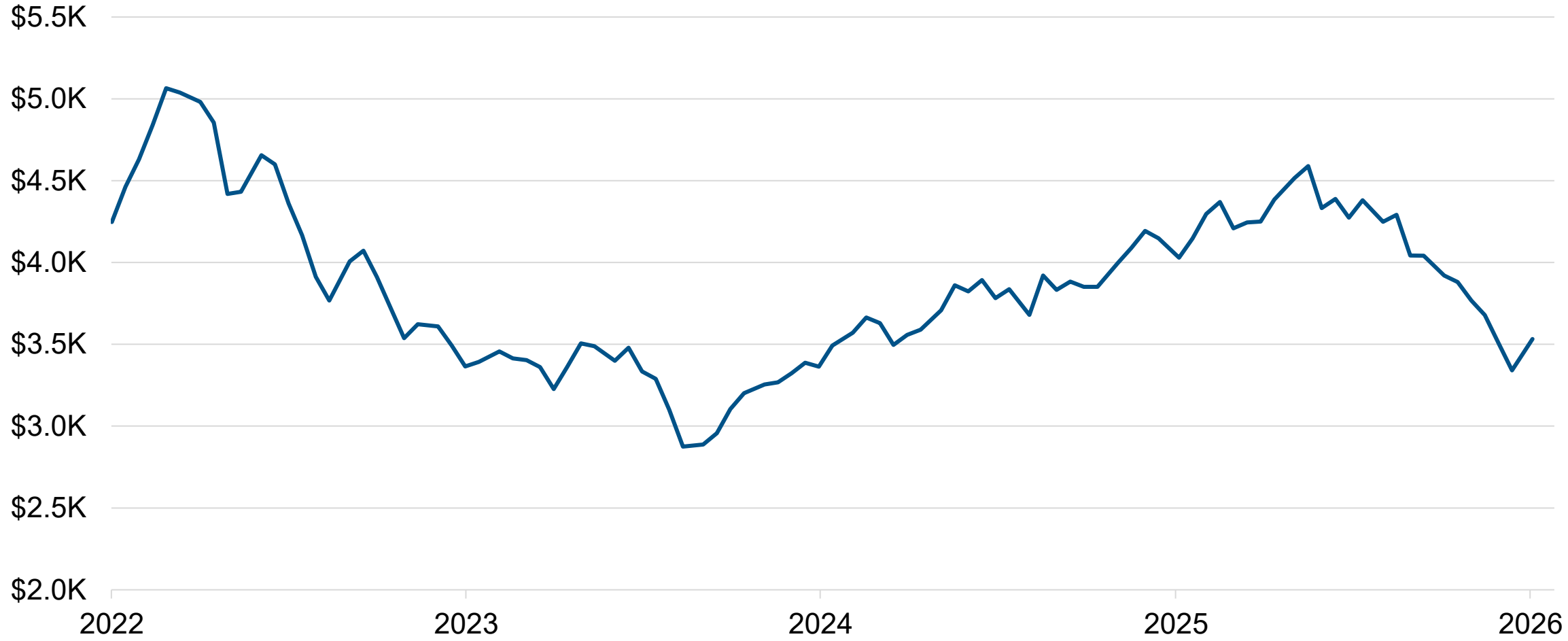
Butterfat production continues to surge year over year



Source: USDA-NASS and FMMO data. Presentation by Corey Geiger and Abbi Prins, CoBank.

Global Dairy Trade (GDT) pricing fell for 5 months before rebound

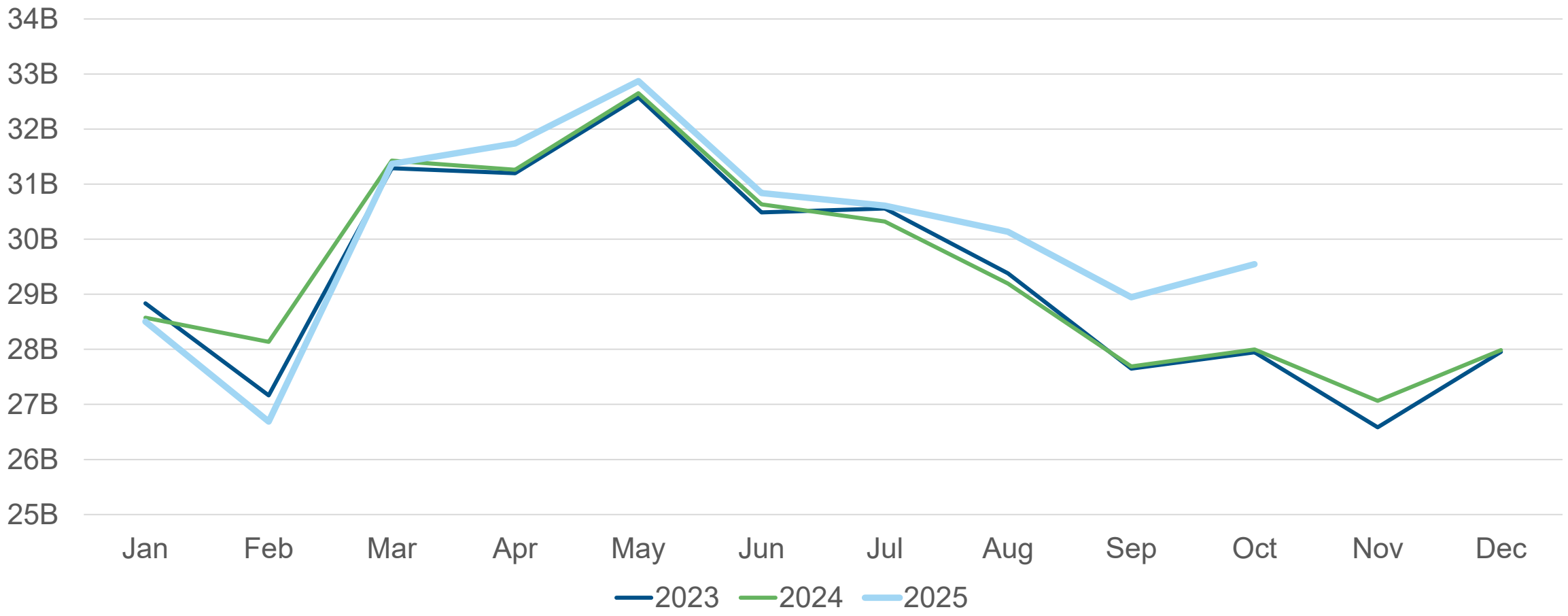
Average weighted price (in USD per MT)



Source: Global Dairy Trade, UDM. Presentation by Corey Geiger and Abbi Prins, CoBank.

EU milk production has been moving higher

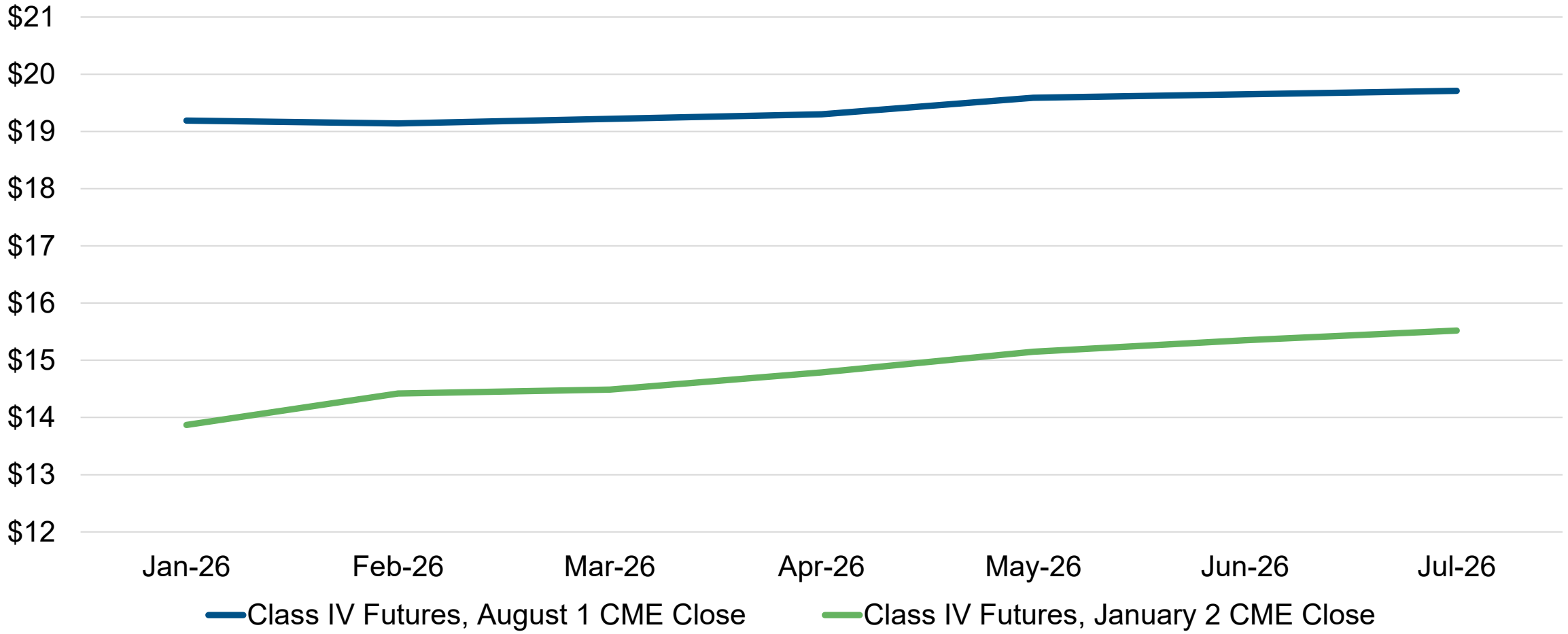
EU milk production (pounds)



Source: European Commission. Presentation by Corey Geiger and Abbi Prins, CoBank.

CME Class IV futures quickly turned bearish

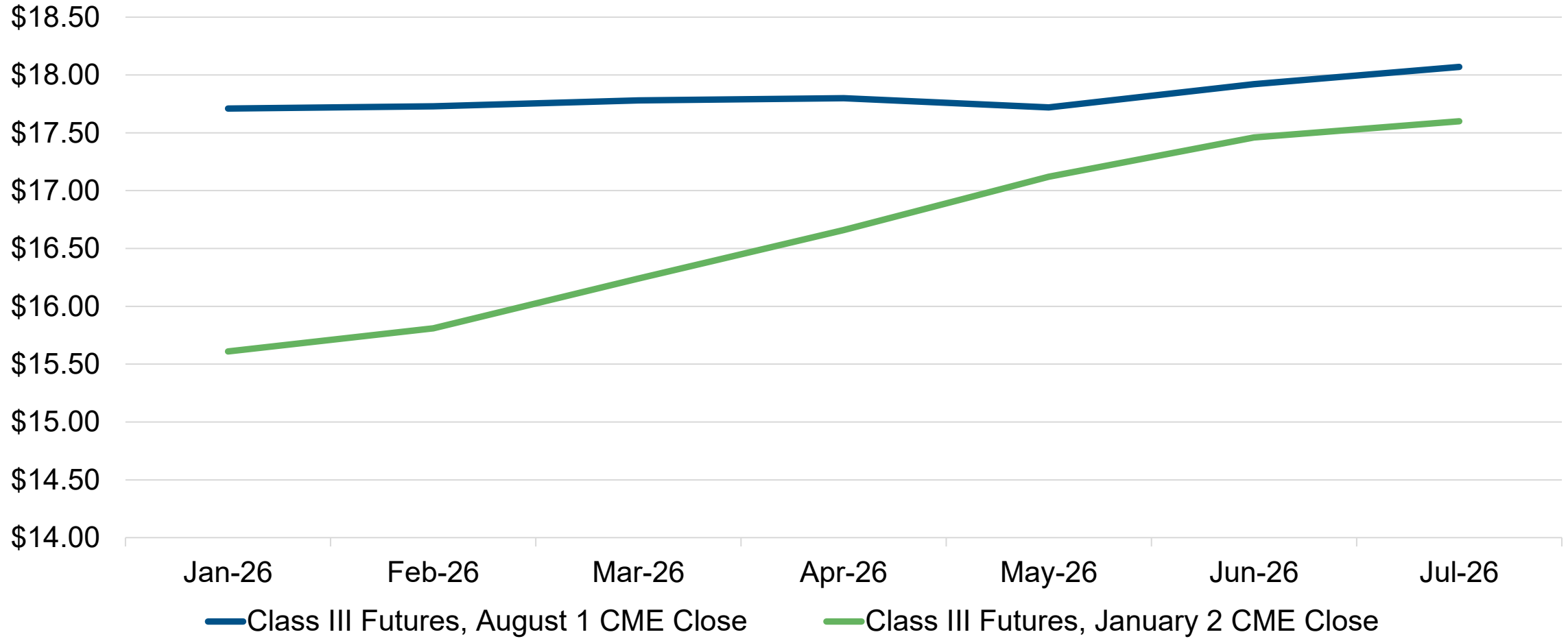
Class IV Milk (in $ per hundredweight)



Source: CME. Presentation by Corey Geiger and Abbi Prins, CoBank.

Class III Milk Futures Have Turned Lower

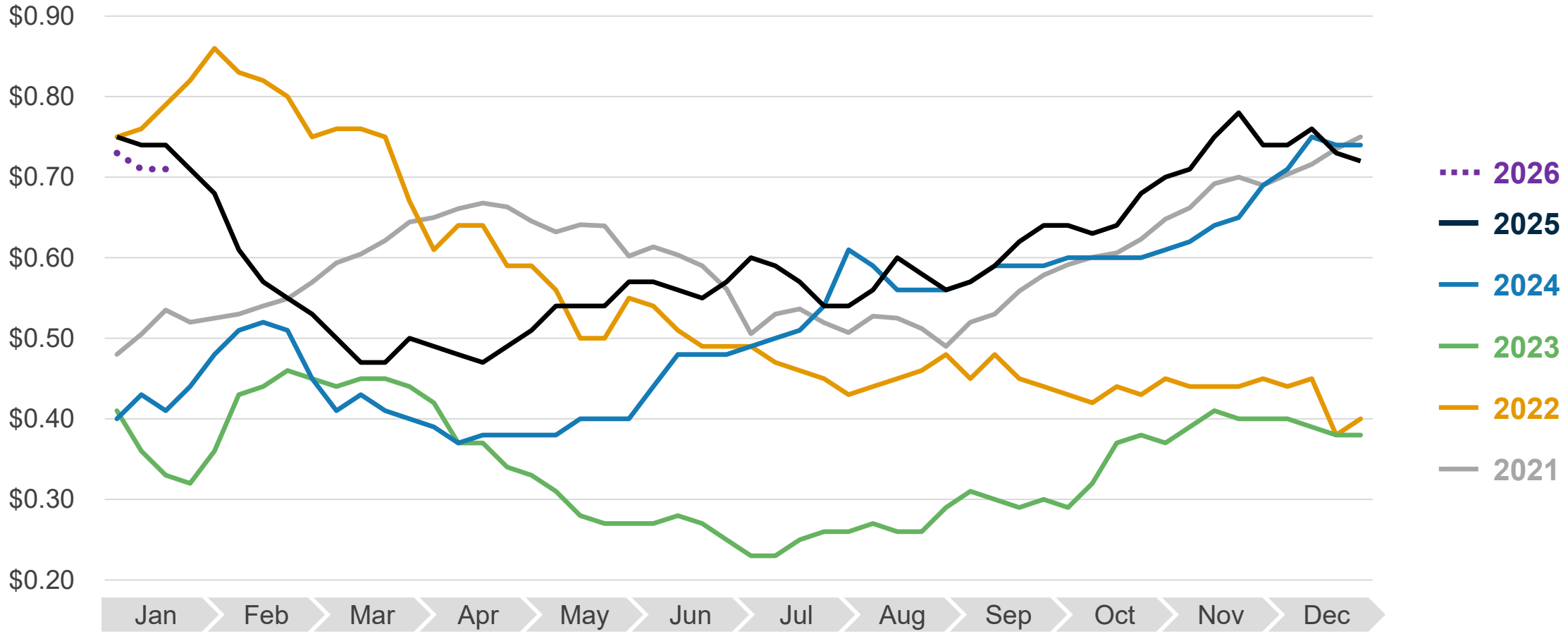
Class III Milk (in $ per hundredweight)



Source: CME. Presentation by Corey Geiger and Abbi Prins, CoBank.

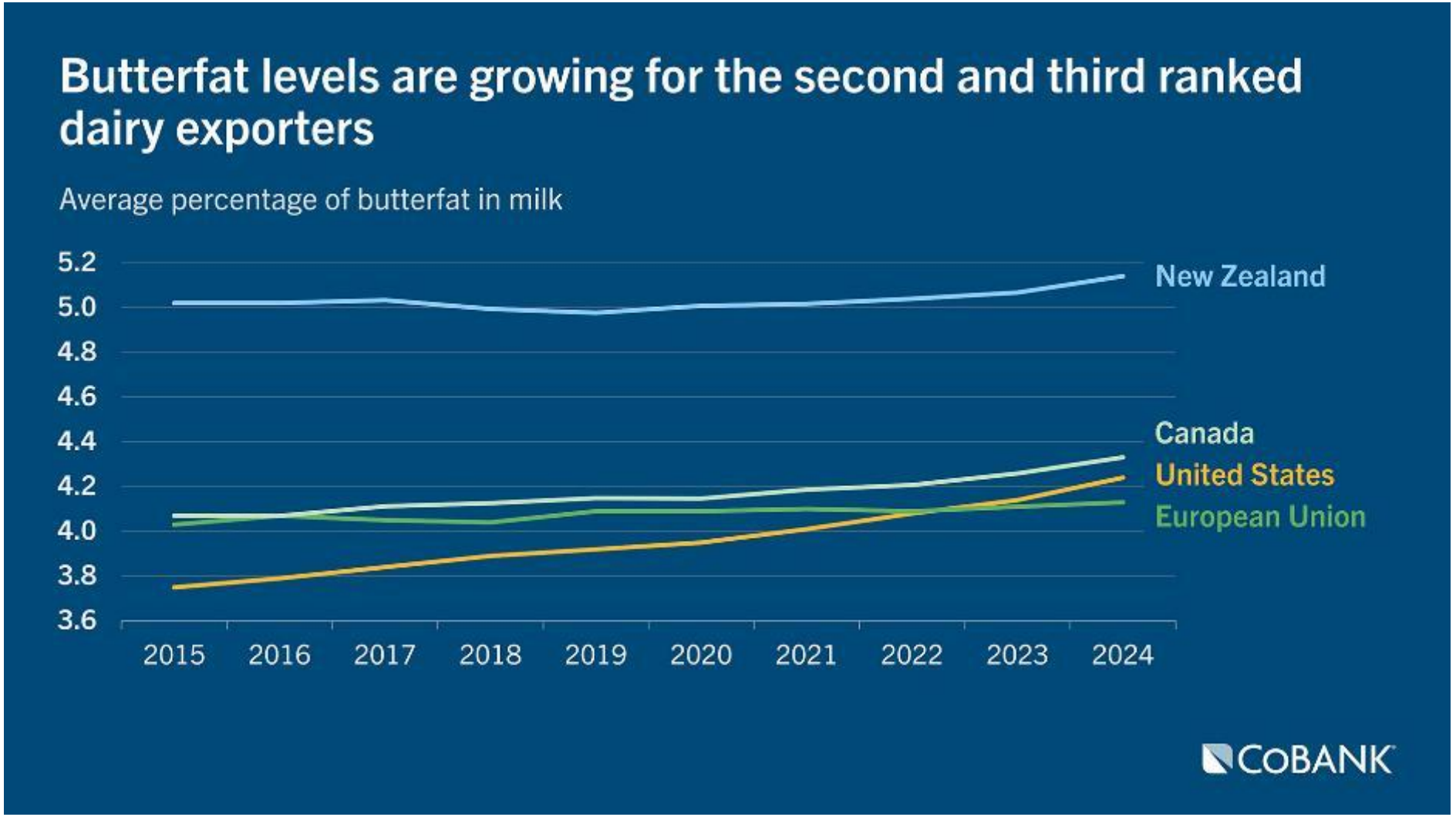
Whey values keep growing driven by consumer demand

CME weekly average cash dry whey prices (dollars per pound)



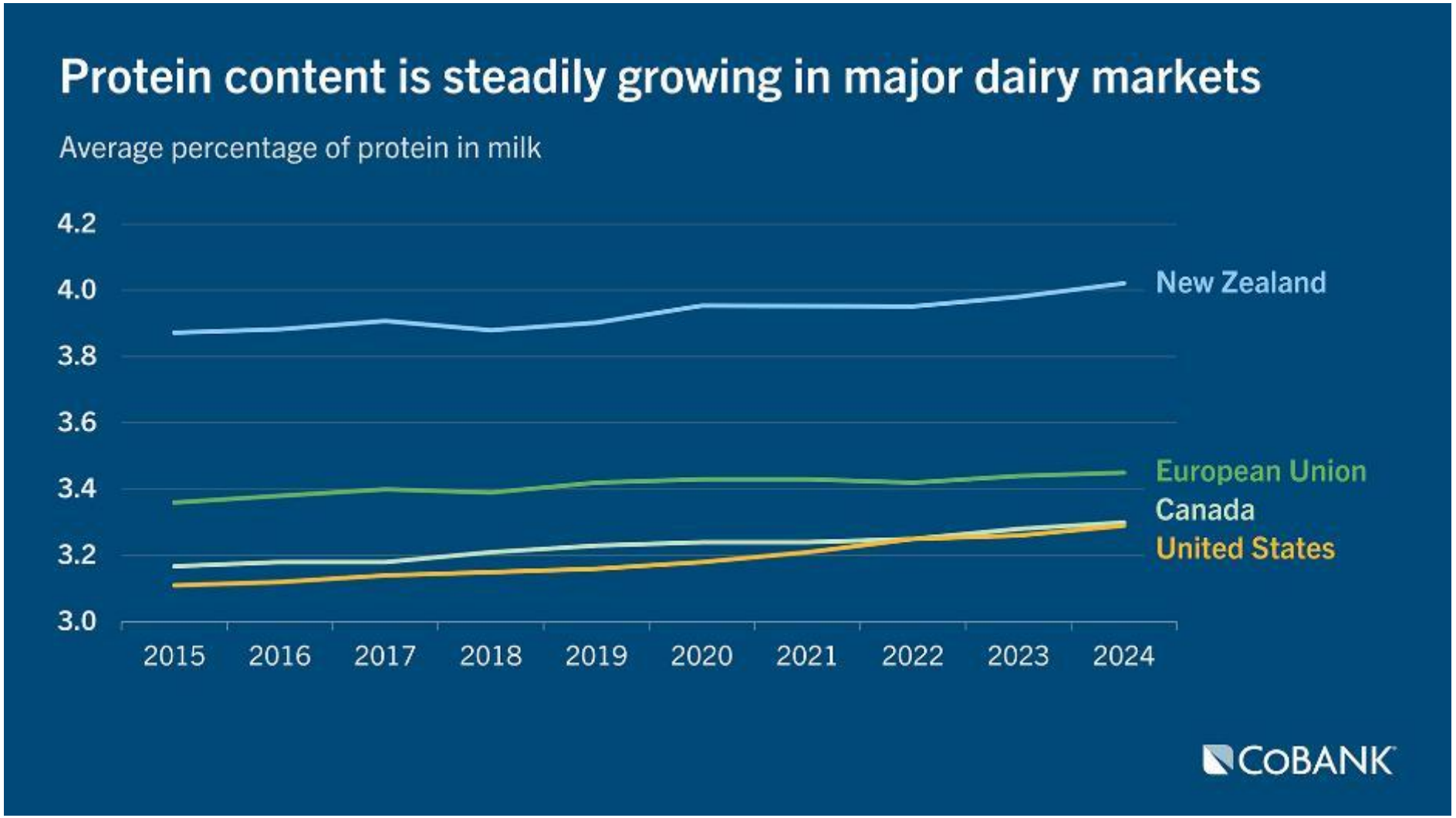
Source: USDA and CME. Presentation by Corey Geiger CoBank.

U.S. butterfat percentages have grown over 13% in past decade



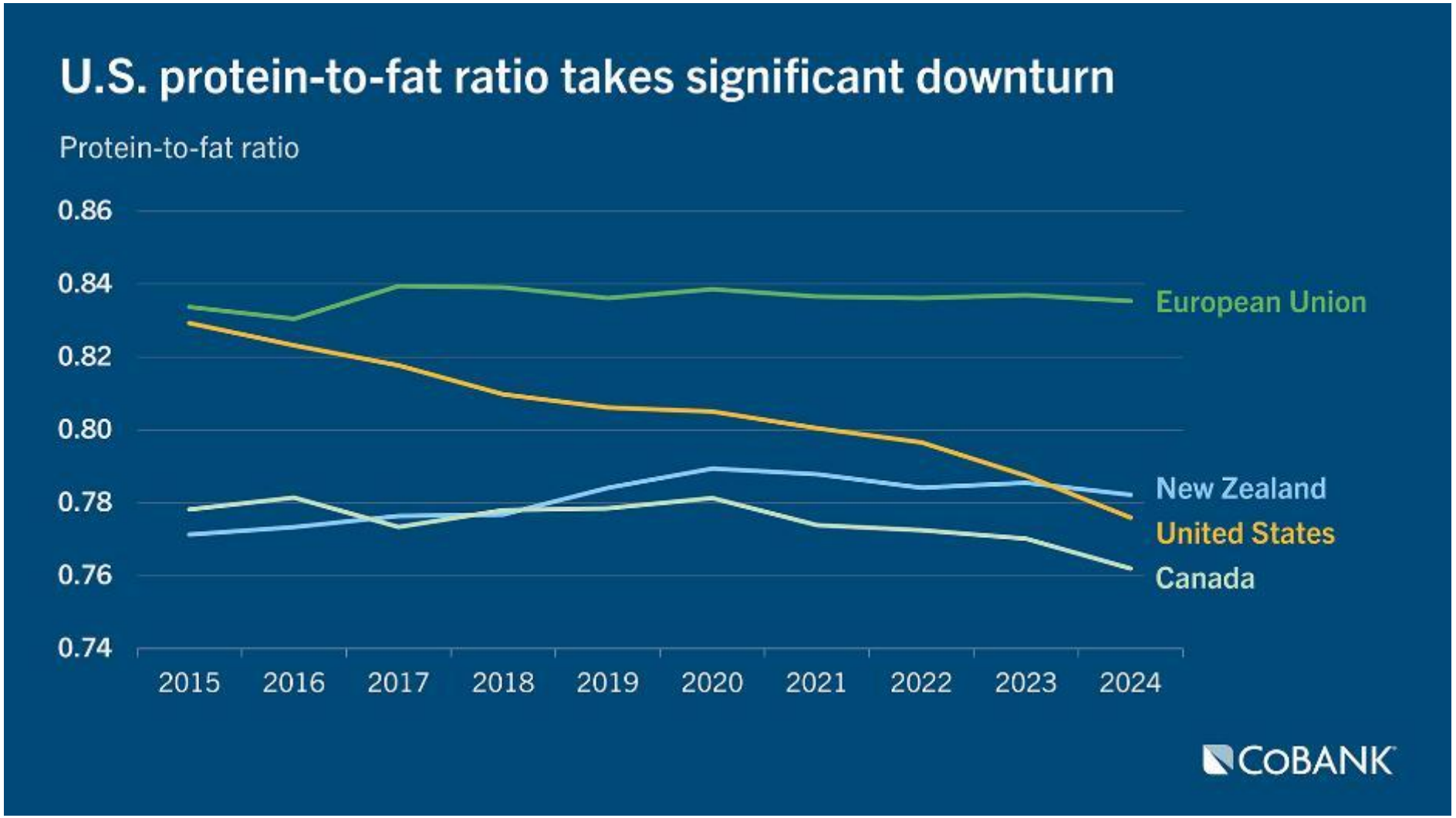
Source: Dairy NZ, and LIC; CLAL and Eurostat; and USDA and FMMO data. Presentation by Corey Geiger and Abbi Prins, CoBank.

U.S. protein percentages have grown 6% in past decade



Source: Dairy NZ, and LIC; CLAL and Eurostat; and USDA and FMMO data. Presentation by Corey Geiger and Abbi Prins, CoBank.

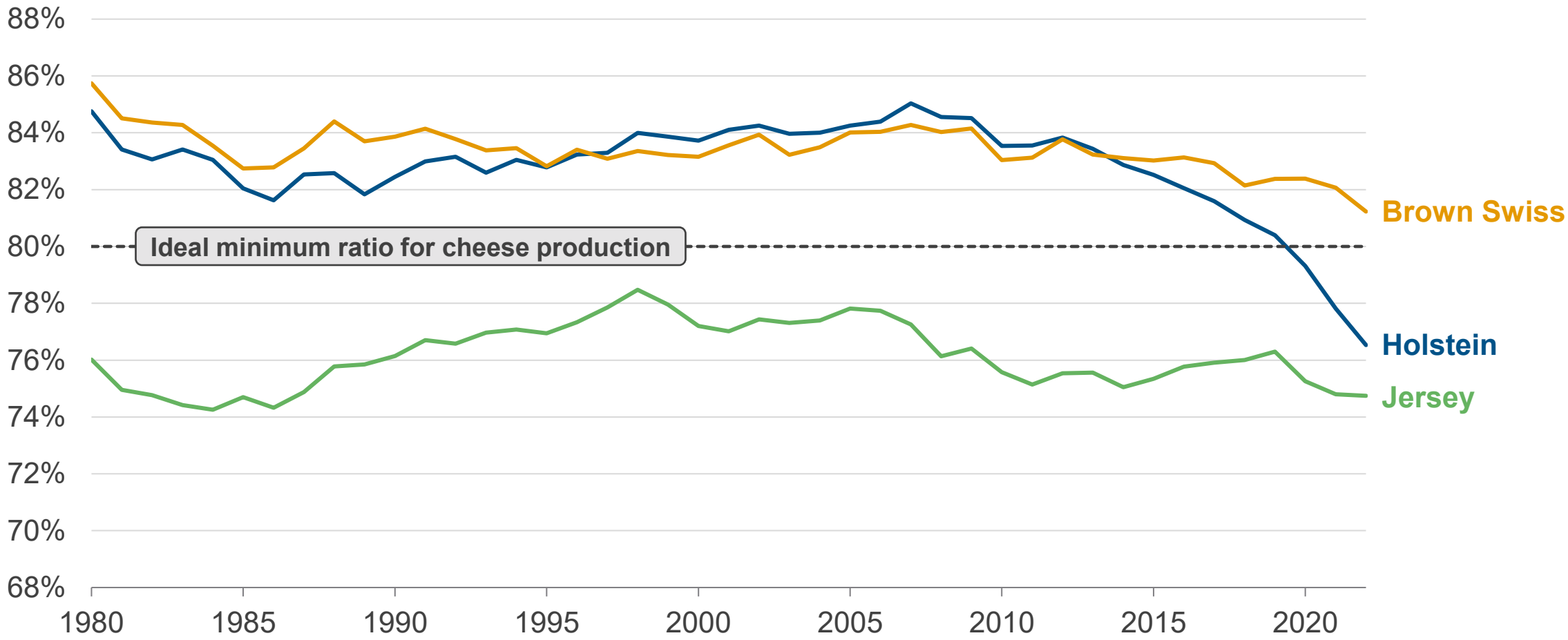
U.S. protein-to-fat ratio brings issues to cheesemakers



Source: CoBank protein-to-fat ratio calculations based on country data. Presentation by Corey Geiger and Abbi Prins, CoBank.

Protein to fat ratios have been steadily declining

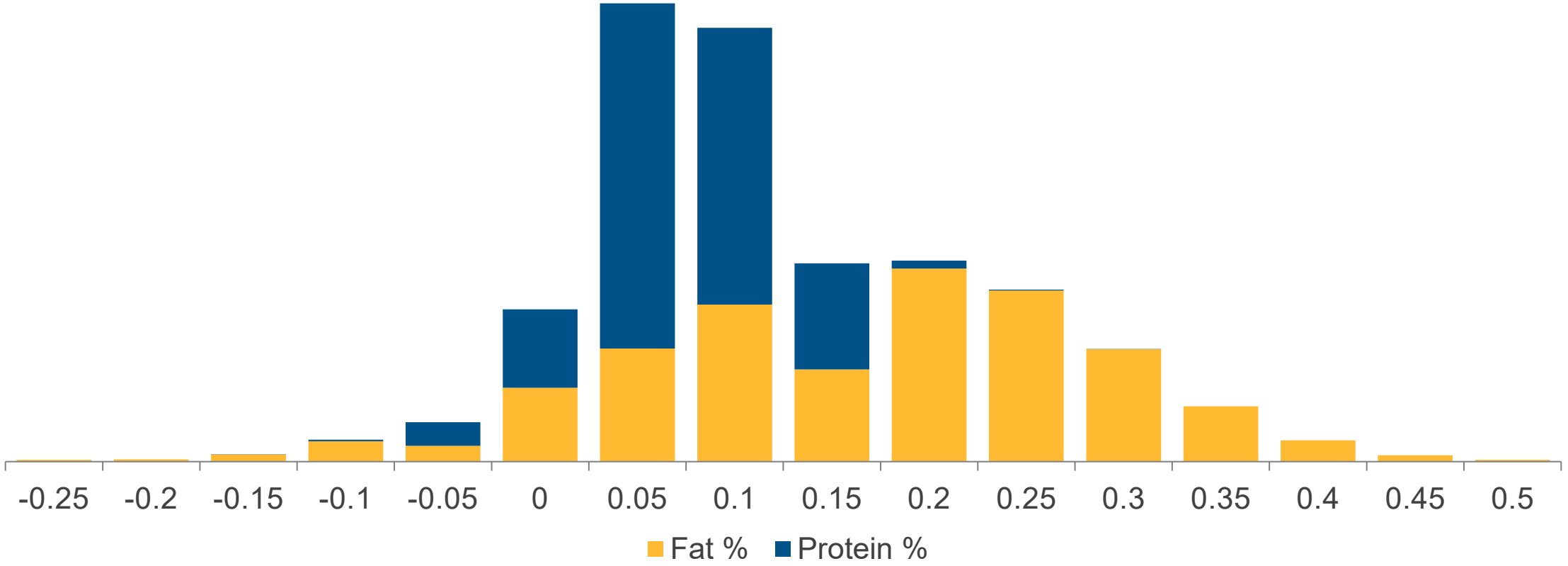
Percentage of milk protein relative to milk fat



Source: Chad Dechow and Hoard's Dairyman, January 10, 2026, edition, page 11 of Volume 171, No. 1

More genetic variation for fat than protein

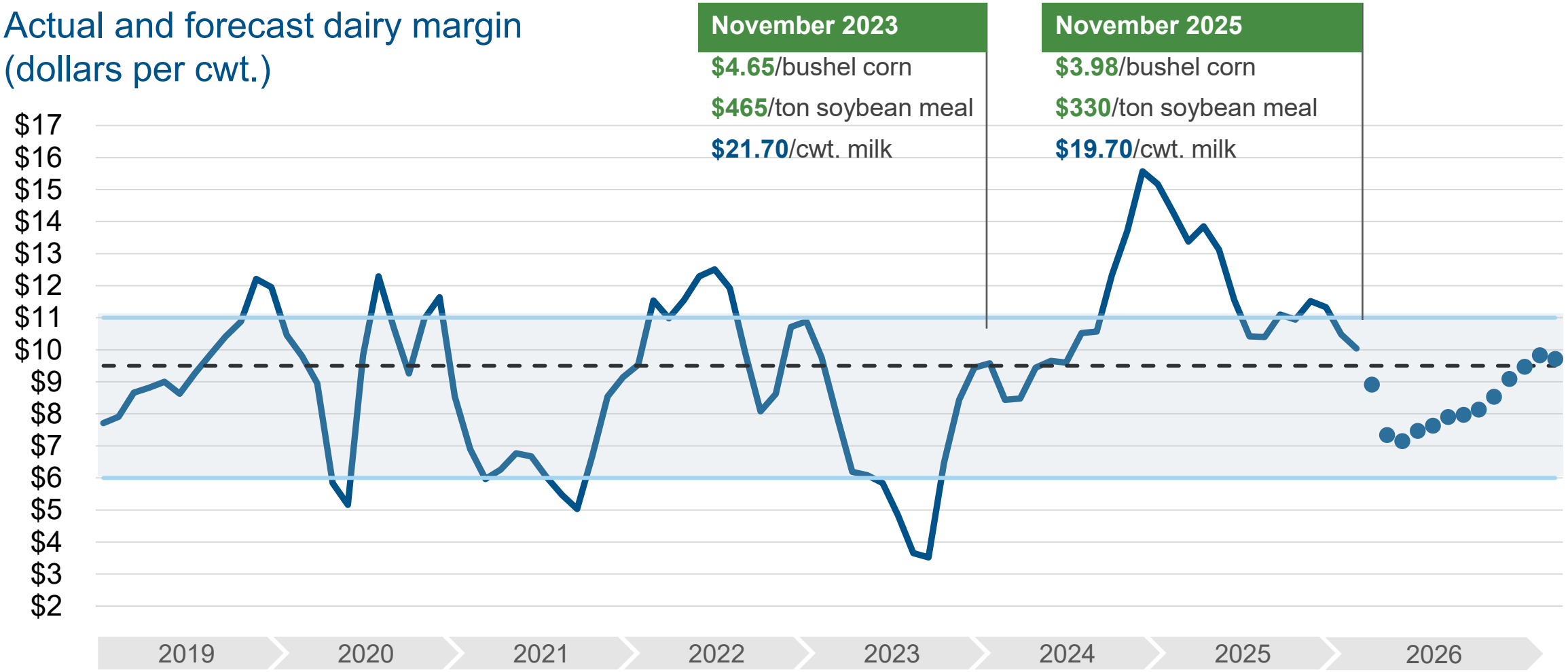
Predicted transmitting ability (PTA) for fat and protein percentages of Holstein A.I. bulls born since 2020 (frequency of bulls)



Source: Chad Dechow and Hoard's Dairyman, January 10, 2026, edition, page 11 of Volume 171, No. 1

Dairy margins to be hindered until milk price rebound

Actual and forecast dairy margin (dollars per cwt.)



Source: USDA Farm Service Agency Dairy Margin Coverage (DMC) calculations, Dairy Markets & Policy. Presentation by Corey Geiger and Abbi Prins, CoBank.

Key themes

- Dairy is a growing food category
- Historic growth in milk components
- Beef brings more to dairy

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CoBANK

Navigating Dairy Trends in 2026 & Beyond

Corey Geiger
Lead Dairy Economist

Georgia Dairy Conference
January 19, 2026





Beef Market Trends & Dairy Sector Thoughts to Ponder

Glynn Tonsor
Professor, Kansas State University gtonsor@ksu.edu

https://agmanager.info/contributors/tonsor

Quarterly Beef-Cattle Forecasts (LMIC: 1/5/26)

Year Quarter	Comm'l Slaughter	% Chg. from Year Ago	Average Dressed Weight	% Chg. from Year Ago	Comm'l Beef Production	% Chg. from Year Ago
2025						
I	7,524	-4.2	869.6	4.1	6,543	-0.2
II	7,447	-7.0	866.4	2.7	6,453	-4.6
III	7,334	-8.3	867.0	2.3	6,359	-6.2
IV	7,487	-6.0	885.1	2.5	6,627	-3.7
Year	29,793	-6.4	872.1	2.9	25,981	-3.7
2026						
I	7,117	-5.4	885.4	1.8	6,302	-3.7
II	7,060	-5.2	881.2	1.7	6,222	-3.6
III	6,992	-4.7	880.5	1.6	6,157	-3.2
IV	7,124	-4.8	900.7	1.8	6,417	-3.2
Year	28,294	-5.0	887.0	1.7	25,097	-3.4
2027						
I	6,793	-4.6	899.0	1.5	6,107	-3.1
II	6,749	-4.4	892.4	1.3	6,023	-3.2
III	6,739	-3.6	893.1	1.4	6,018	-2.2
IV	6,867	-3.6	911.9	1.2	6,262	-2.4
Year	27,148	-4.1	899.2	1.4	24,411	-2.7

Data Source: Livestock Marketing Information Center

Quarterly Beef-Cattle Forecasts (LMIC: 1/5/26)

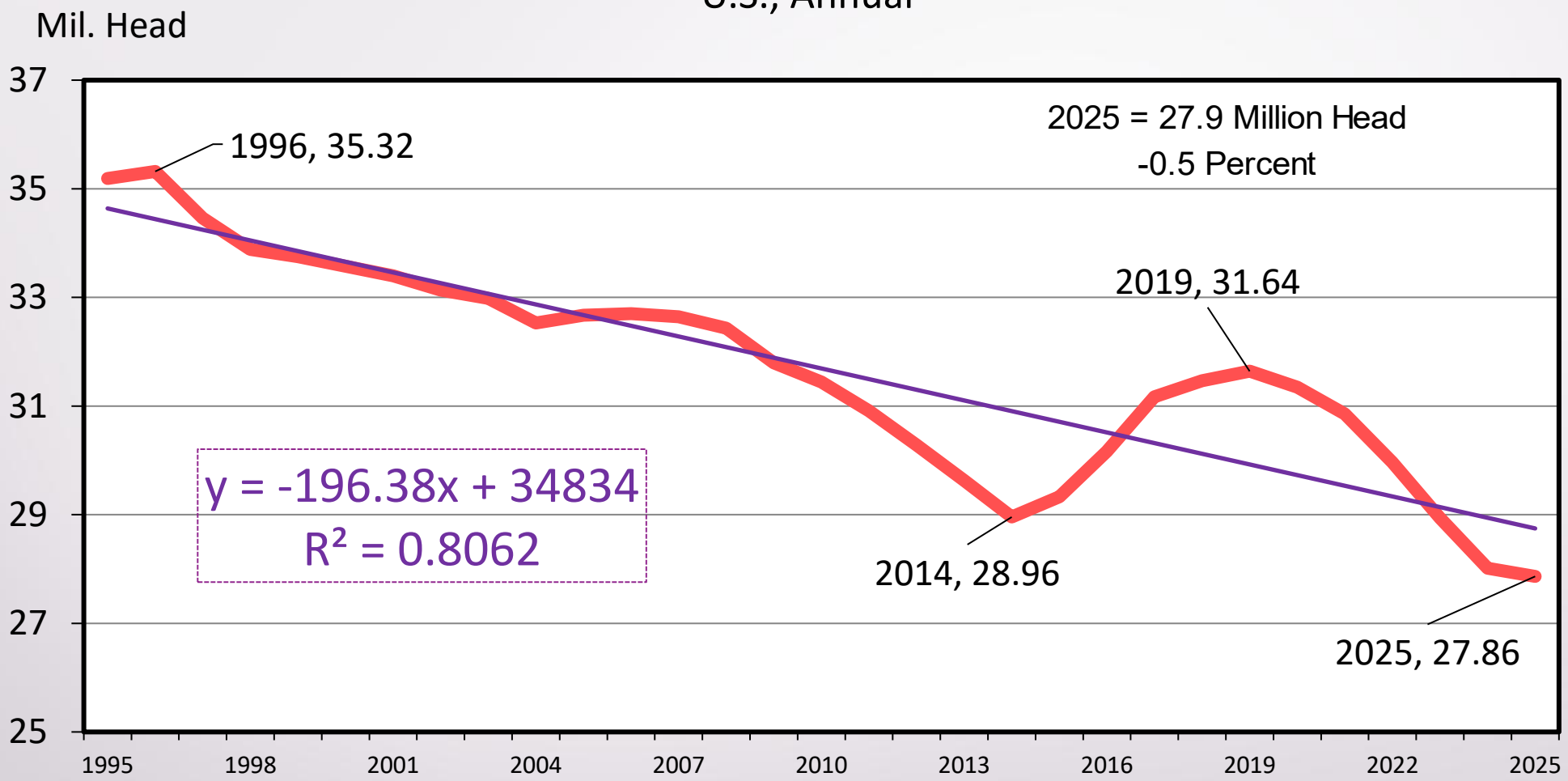
Year Quarter	Live Sltr. Steer Price 5-Mkt Avg	% Chg. from Year Ago	Feeder Steer Price Southern Plains 7-800#	5-600#
2025				
I	205.02	13.2	285.27	354.86
II	225.22	19.5	311.14	386.73
III	239.62	26.6	365.05	430.56
IV	228.29	20.3	357.58	436.52
Year	224.54	20.1	329.76	402.17
2026				
I	235-239	15.6	358-362	438-442
II	239-244	7.2	359-364	439-444
III	241-247	1.8	361-367	437-443
IV	239-246	6.2	358-365	434-441
Year	236-246	7.3	357-367	435-445
2027				
I	241-250	3.6	362-371	448-457
II	245-255	3.5	363-373	451-461
III	247-258	3.5	368-379	452-463
IV	244-256	3.1	365-377	448-460
Year	242-257	3.5	362-377	447-462

Data Source: Livestock Marketing Information Center



JANUARY 1 BEEF COW INVENTORY

U.S., Annual



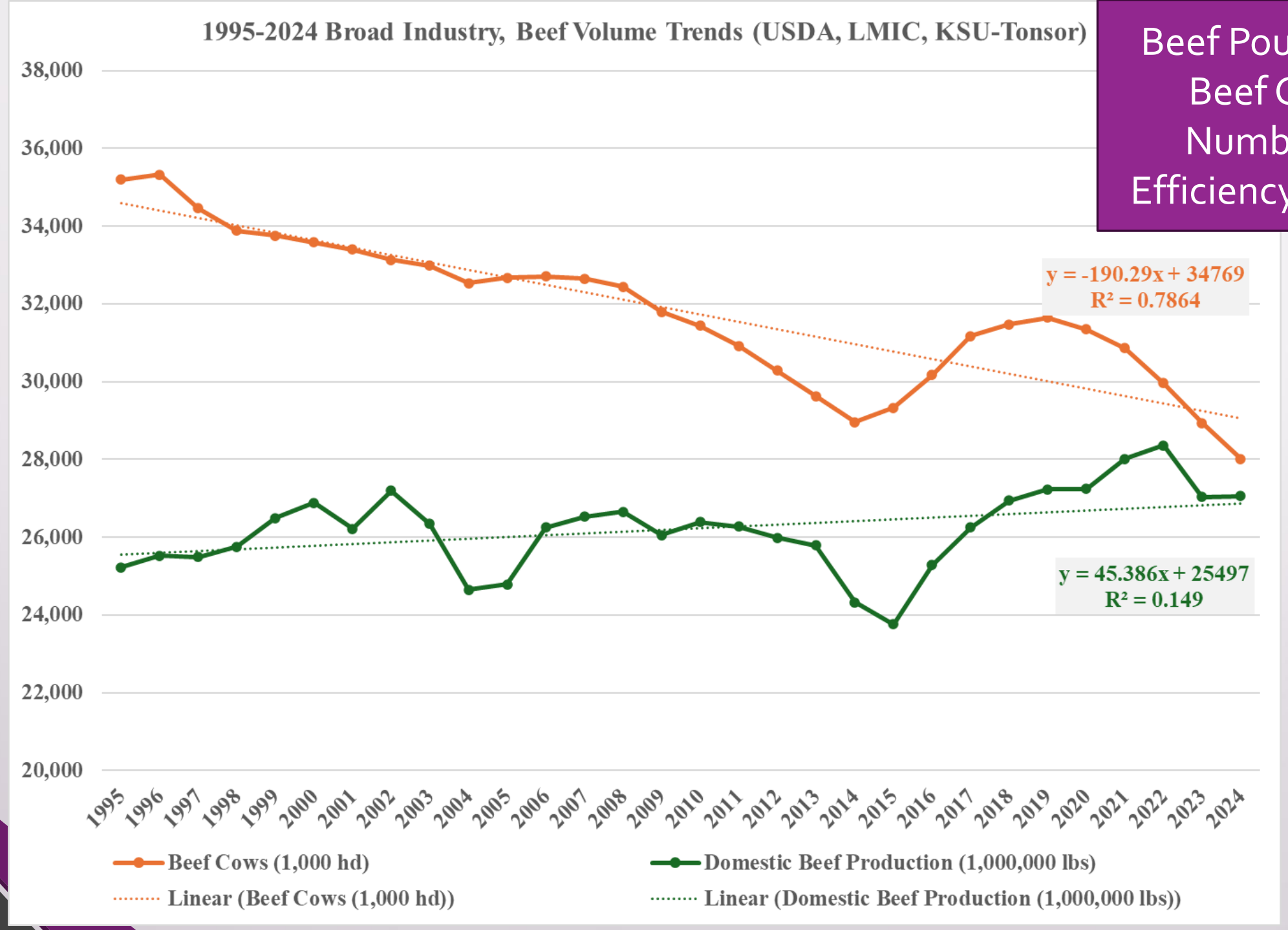
Data Source: USDA-NASS

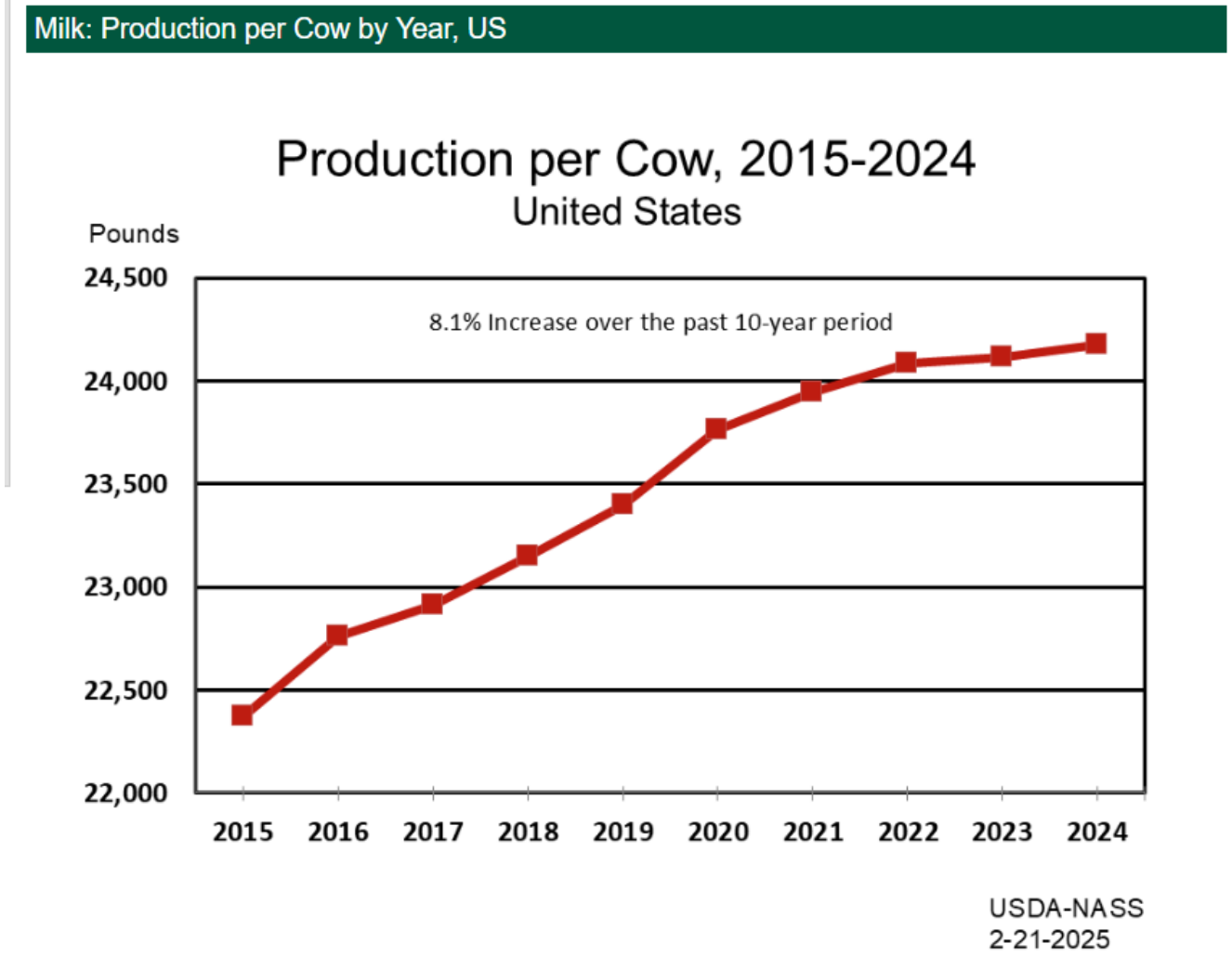
Livestock Marketing Information Center

C-N-02

07/25/25

Beef Pounds vs Beef Cow Numbers: Efficiency Story!





Efficiency Trend NOT Unique to Beef…

https://www.nass.usda.gov/Charts_and_Maps/Milk_Production_and_Milk_Cows/cowrates.php

K-State Dept. of Agricultural Economics Extension Publication 03/21/2022

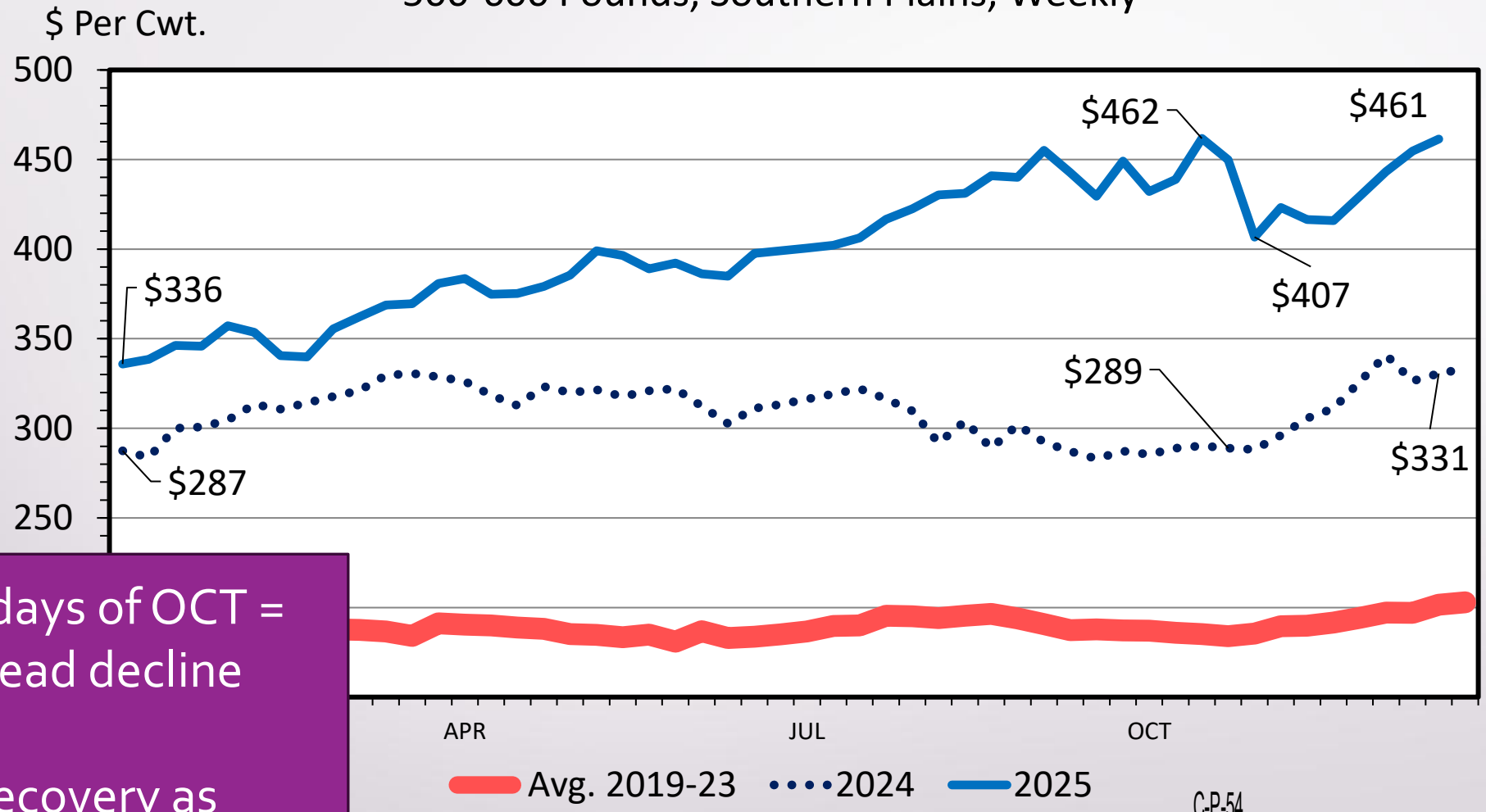
An Updated Evaluation of the U.S. Cattle Cycle

Jaime R. Luke (jrluke@ksu.edu)
Andrew E. Anderson (ander909@ksu.edu)
Glynn T. Tonsor (gtonsor@ksu.edu)
Kansas State University Department of Agricultural Economics
March 2022

https://agmanager.info/livestock-meat/production-economics/updated-evaluation-us-cattle-cycle

MED. & LRG. #1 STEER CALF PRICES

500-600 Pounds, Southern Plains, Weekly



Data Source: USDA-AMS

Livestock Marketing Information Center

C-P-54

01/05/26

Final ~10 days of OCT = >$250/head decline

Then recovery as fundamentals guided 25' concluding…

FOOD

Economist Glynn Tonsor on how Argentine beef imports could affect U.S. producers

OCTOBER 24, 2025 · 3:39 AM ET

HEARD ON MORNING EDITION

Steve Inskeep

5-Minute Listen + PLAYLIST TRANSCRIPT ···

NPR's Steve Inskeep speaks with agricultural economist and Kansas State University professor Glynn Tonsor about what President Trump's plan to import more Argentine beef could mean for U.S. producers and consumers.

Newsweek

Nation World Lifestyle Opinion Rankings

Politics Argentina Beef Cattle Breaking News Donald Trump Grocery Stores

News Article

Donald Trump Rebukes Cattle Ranchers Concerns About Argentina Beef Plan

PUBLISHED OCT 22, 2025 AT 01:13 PM EDT

UPDATED OCT 22, 2025 AT 07:25 PM EDT

Latest Local News Live Shows ··· CBS NEWS

Texas | News Weather Sports Video Texas Monthly ···

Local News

U.S. ranchers oppose Trump's Argentina beef imports, experts doubt it will lower prices

October 21, 2025 / 9:17 PM CDT / AP



AgriTalk AFTER THE BELL

10/31/2025 · 41 MIN

AgriTalk-October 31, 2025 PM

AgriTalk PM

▶ Play

Our second part of this week's College Roadshow coverage on AgriTalk features Professor Glynn Tonsor from the Department of Agricultural Economics at Kansas State University. We talk protein demand, market fundamentals and more with Prof. Tonsor.

See omnystudio.com/listener for privacy information.

In the Cattle Markets: Beef Demand – Key Producer Vitality Driver in 2025

Glynn T. Tonsor, Ph.D., from Kansas State University breaks down the markets

PUBLISHED ON **AUGUST 12, 2025**

Want Feeder Cattle Price, Basis, & VOG Projections?

Use BeefBasis.com

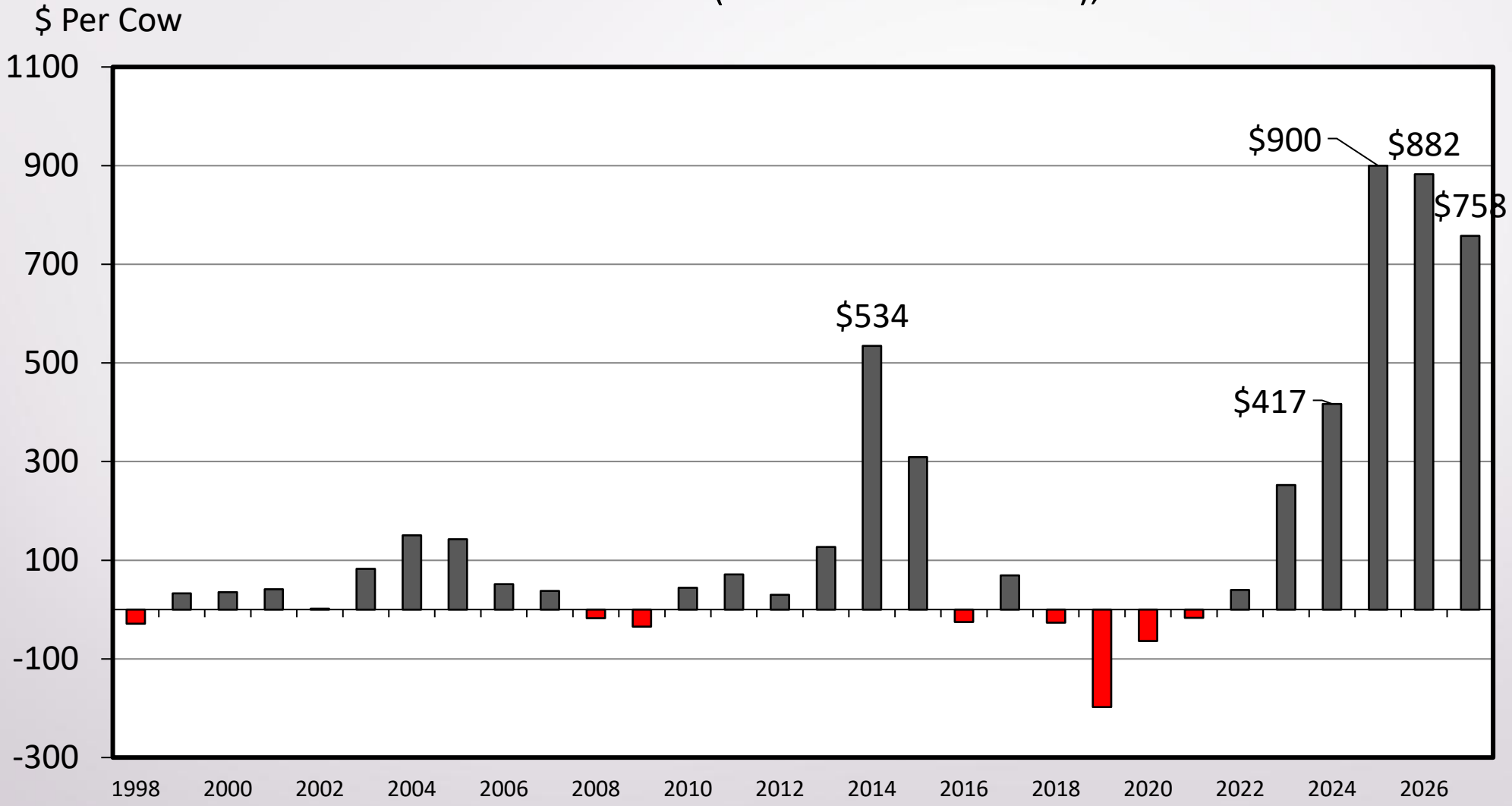
Salina FALL CALF Market, as of 1/16/26

10/14/2026 Sell @ Weaning @ 600 lbs.

- ***Expected Cash Price: $400/cwt***

ESTIMATED AVERAGE COW CALF RETURNS

Returns Over Cash Cost (Includes Pasture Rent), Annual



Data Source: USDA & LMIC, Compiled by LMIC

Livestock Marketing Information Center

C-P-66
11/18/25

USDA Economics, Statistics, and Market Information System
U.S. DEPARTMENT OF AGRICULTURE

Publication Search | Release Calendar | API Documentation

Home > Cattle

Cattle

This biannual report contains the inventory numbers and values of all cattle and calves, number of operations and size group estimates by class and state, as well as for the entire United States. Also included are statistics on cattle on feed and grazing on small grain pasture, as well as calf crop data.

Agency: National Agricultural Statistics Service

Frequency of Release: Not specified

Upcoming releases: Jan 30 2026 3:00 PM , Jul 24 2026 3:00 PM

https://esmis.nal.usda.gov/publication/cattle

KS Feedlot Returns

Barometer of Unhedged Trends

Jan 10, 2026 Update – Reflects notable fed cattle market recovery since late-Oct

Table 1. Projected Values for Finishing Steers in Kansas Feedyards*

Closeout Mo-Yr	Net Return	FCOG**	Fed Price	Fed Futures	Fed Basis	Feeder Price	Breakeven FCOG**	Breakeven Fed Price	Breakeven Feeder Price
Dec-25	$ 443.82	92.94	227.93	227.39	0.54	262.79	163.85	199.32	310.77
Jan-26	$ 546.58	95.21	236.52	235.28	1.25	265.16	182.64	200.63	326.06
Feb-26	$ 580.94	95.69	237.31	236.23	1.09	264.71	186.56	199.48	329.54
Mar-26	$ 580.50	98.14	240.46	236.23	4.24	264.29	192.38	202.49	327.89
Apr-26	$ 516.37	99.17	235.49	231.28	4.22	267.24	180.03	201.19	326.81
May-26	$ 562.94	100.18	240.34	231.28	9.07	269.16	188.46	203.18	333.34
Jun-26	$ 539.16	102.83	234.63	228.48	6.15	265.42	184.08	198.83	329.42
Jul-26	$ (211.75)	103.94	232.50	228.48	4.02	340.32	71.40	246.35	316.19
Aug-26	$ (211.30)	102.74	230.89	227.95	2.94	345.29	71.89	244.58	320.69
Sep-26	$ (231.82)	103.58	230.19	227.95	2.24	340.69	69.30	244.97	314.71

https://agmanager.info/livestock-meat/cattle-finishing-historical-and-projected-returns

Kansas State University Department Of Agricultural Economics Extension Publication 12/16/2025

A Microeconomic Assessment of the US Retail Beef Market: Beef Demand Matters

Brian K. Coffey (bcoffey@ksu.edu) – K-State Department of Agricultural Economics
Glynn T. Tonsor (gtonsor@ksu.edu) – K-State Department of Agricultural Economics
December 2025

- ***"…Our demonstrative analysis attributes 14% of the 2024 to 2025 price increase to a supply decrease and 87% to an increase in consumer demand."***

https://agmanager.info/livestock-meat/meat-demand/meat-demand-research-studies/microeconomic-assessment-us-retail-beef

Meat Demand Big-Picture Overview

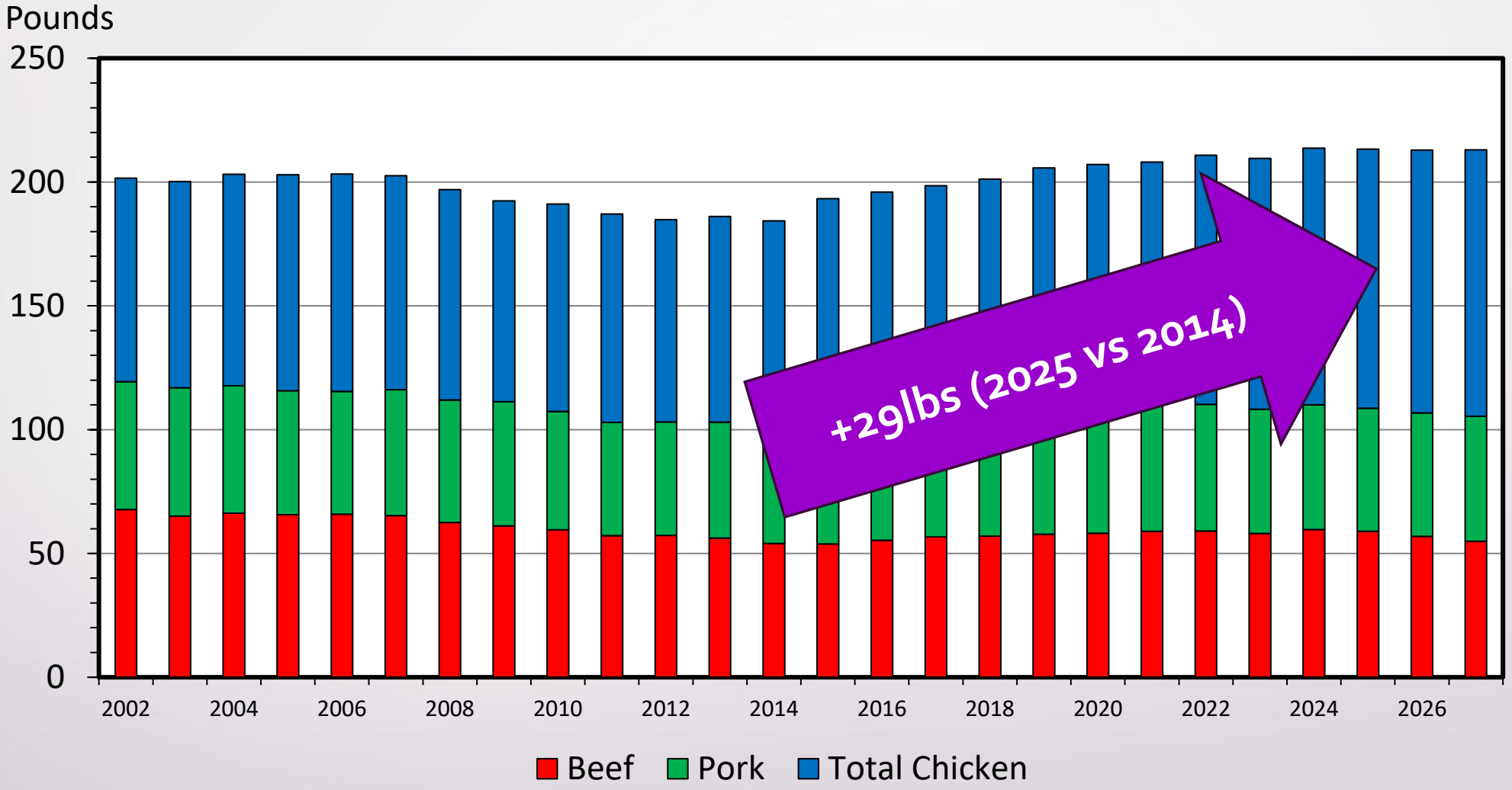
2014:
184 lbs

2025:
213 lbs
(+16% vs 2014)

2026f &
2027f:
213 lbs

US RED MEAT & POULTRY CONSUMPTION

Per Capita, Retail Weight, Annual



Data Source: USDA-NASS and USDA-ERS, Compiled & Analysis by LMIC

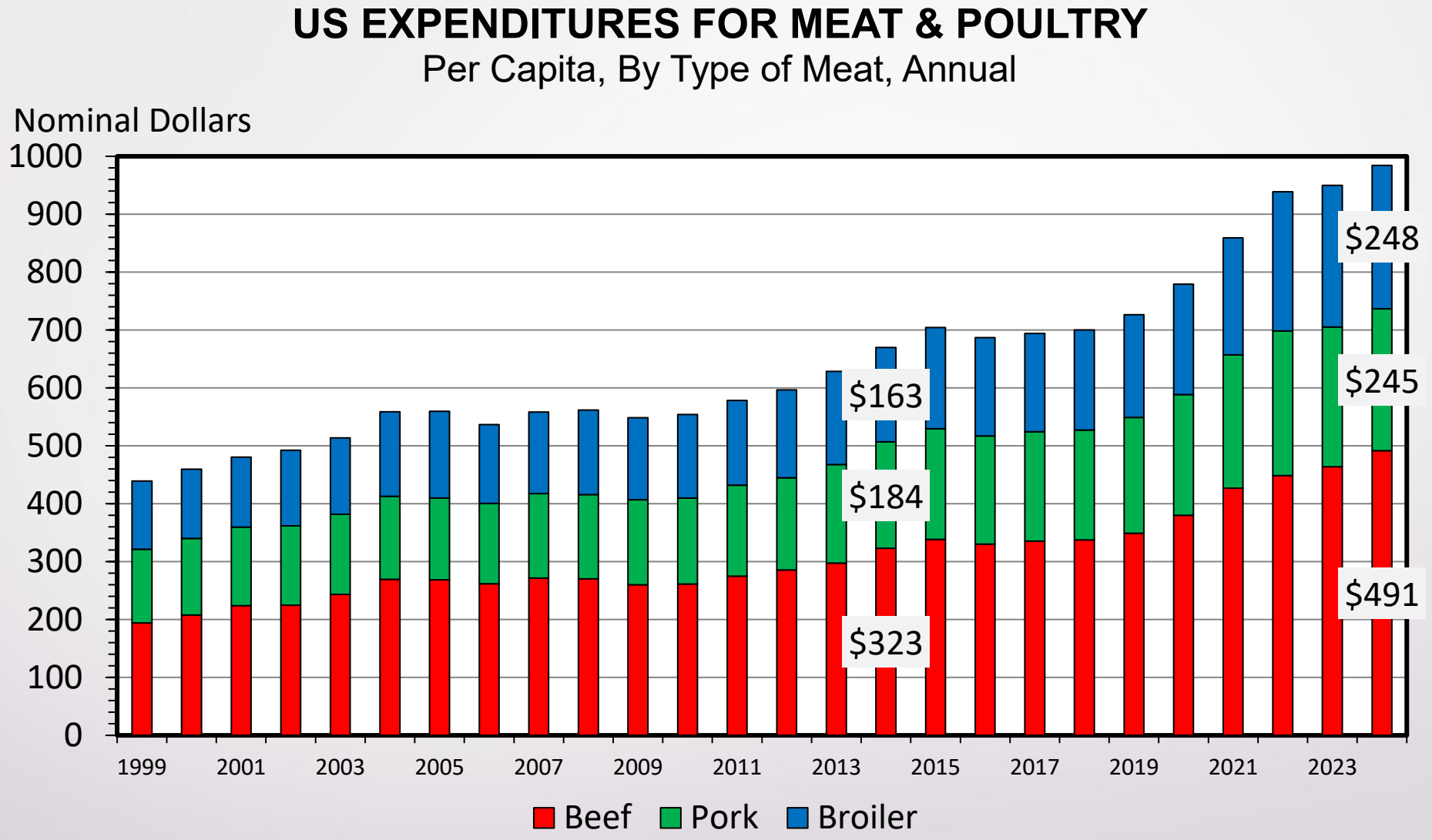
Livestock Marketing Information Center

M-C-01
12/08/25

2014:
$670

2024:
$984
(+47% vs 2014)

CPI: +33%



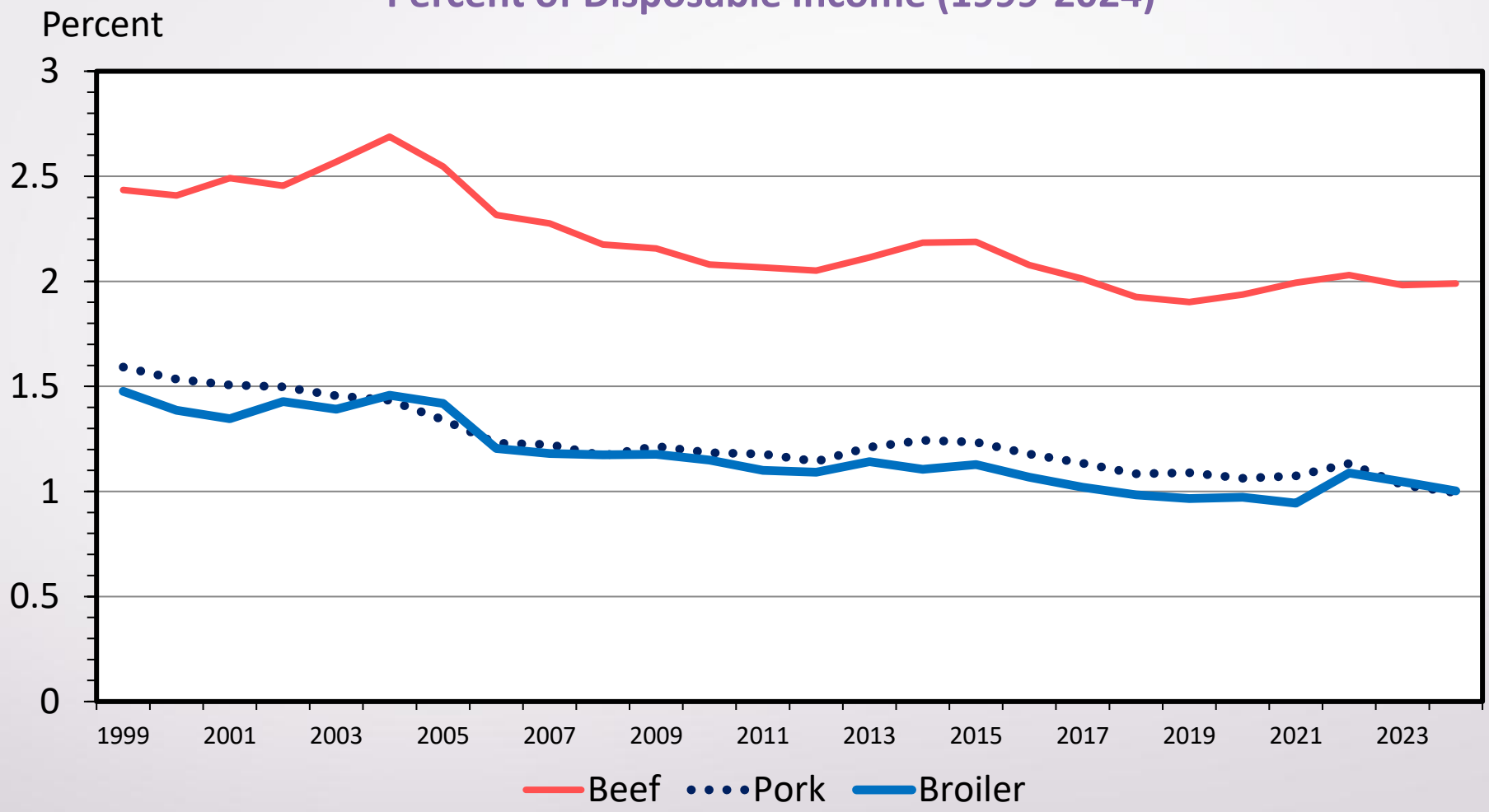
Data Source: Bureau of Economic Analysis & USDA-ERS, Compiled by LMIC

Livestock Marketing Information Center

M-C-16A
12/08/25

US EXPENDITURES FOR MEAT & POULTRY

Percent of Disposable Income (1999-2024)



Data Source: Bureau of Economic Analysis & USDA-ERS, Compiled by LMIC

Livestock Marketing Information Center

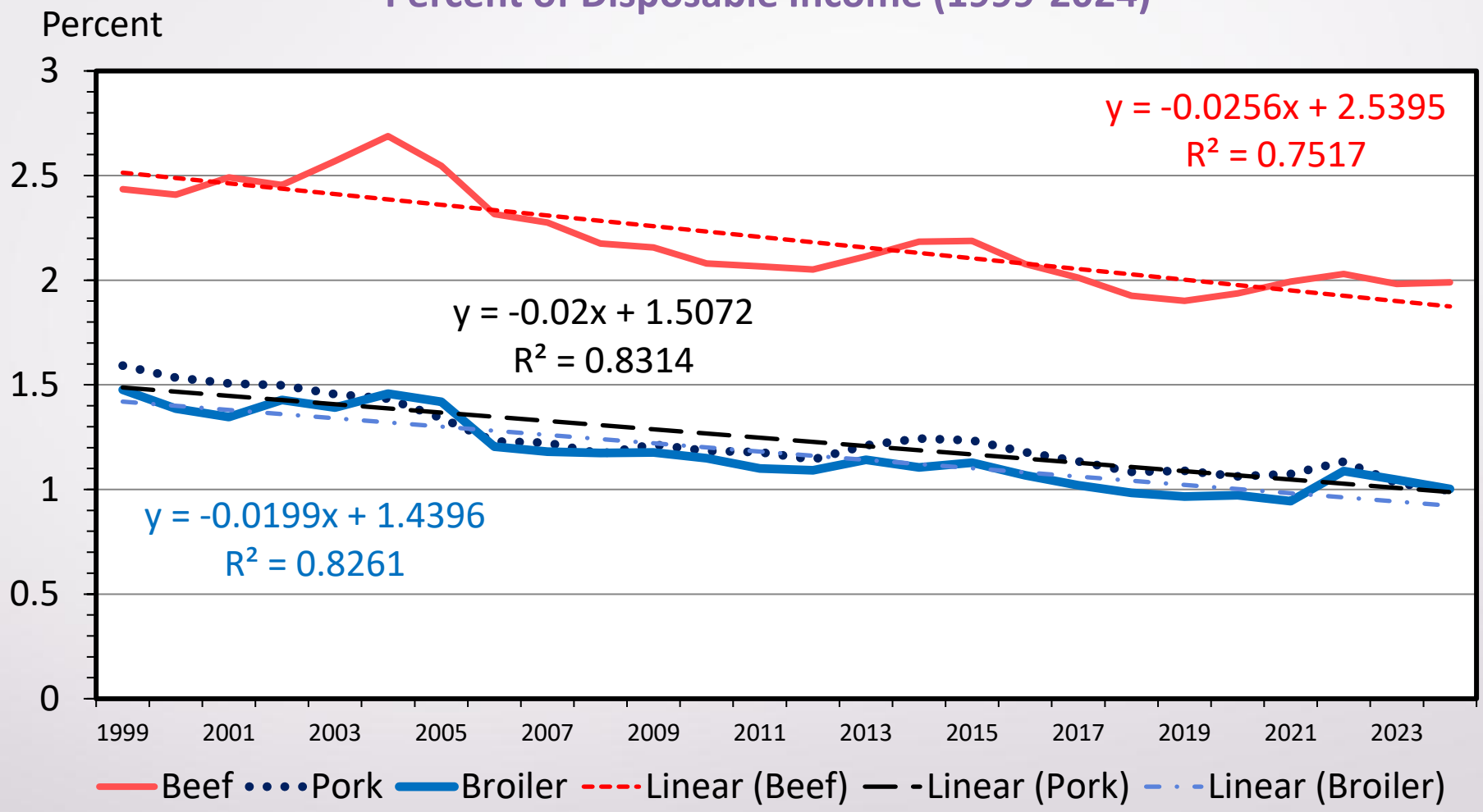
M-C-16
12/08/25

"Affordability Trends"…

"It's All Relative"

US EXPENDITURES FOR MEAT & POULTRY

Percent of Disposable Income (1999-2024)



Data Source: Bureau of Economic Analysis & USDA-ERS, Compiled by LMIC

Livestock Marketing Information Center

M-C-16
12/08/25

Meat Demand Outdoes Meat Avoidance

Meat Science 190 (2022) 108843

Contents lists available at ScienceDirect

Meat Science

journal homepage: www.elsevier.com/locate/meatsci



Check for updates

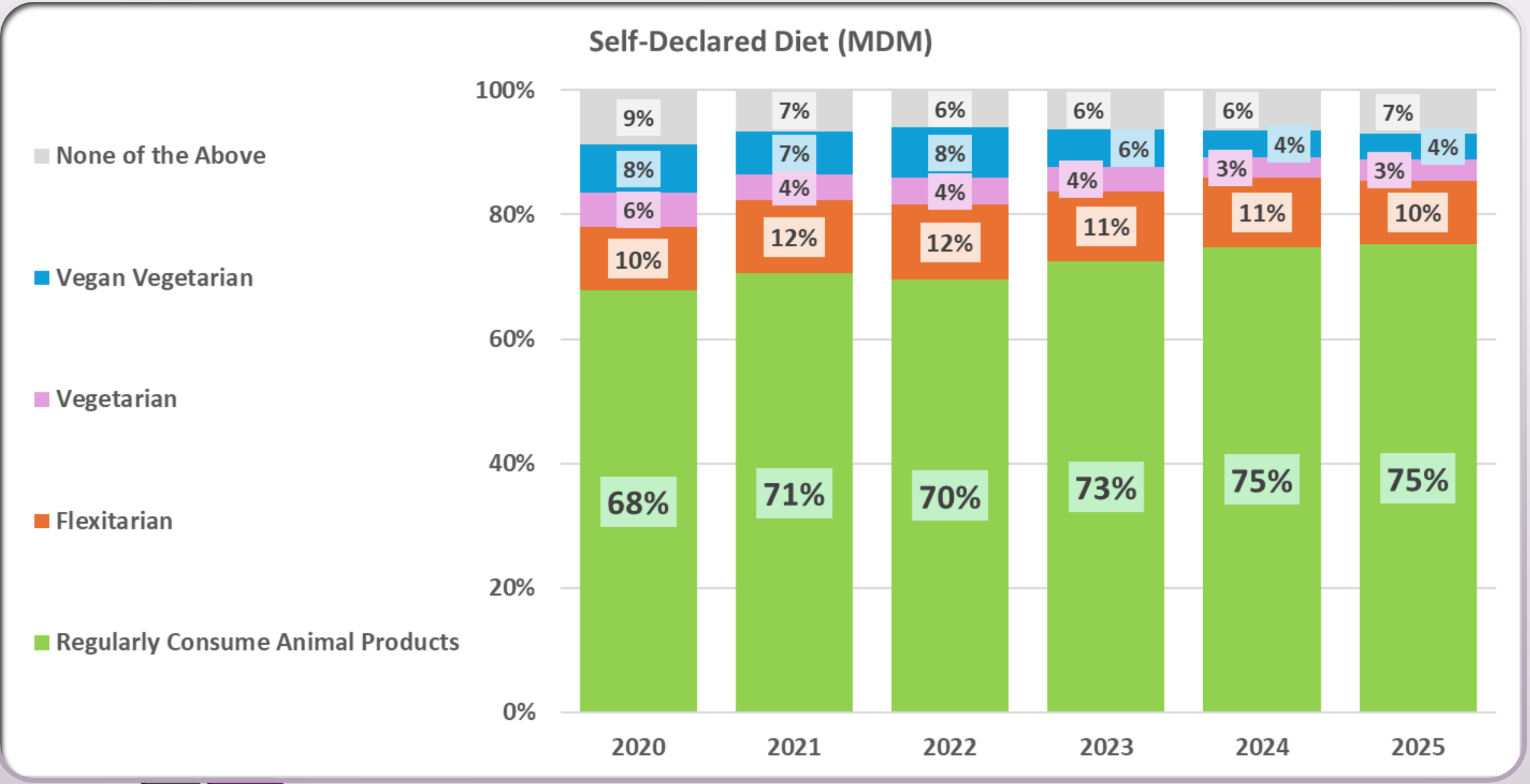
U.S. perspective: Meat demand outdoes meat avoidance

Glynn T. Tonsor [a], Jayson L. Lusk [b,*]

[a] Department of Agricultural Economics, Kansas State University, United States of America
[b] Department of Agricultural Economics, Purdue University, United States of America

https://www.sciencedirect.com/science/article/pii/S0309174022001115

Meat Demand Monitor (MDM)



https://agmanager.info/livestock-meat/meat-demand/monthly-meat-demand-monitor-survey-data



What's The Similarity Between Blue Jeans and Beef Demand?

*Demand is **NOT** Per Capita Consumption*

BEEF

THE CHECKOFF ⌄ THE CATTLEMEN'S BEEF BOARD ⌄ HOW TO PAY YOUR CHECKOFF

Home > The Drive > What's Demand Got to D...

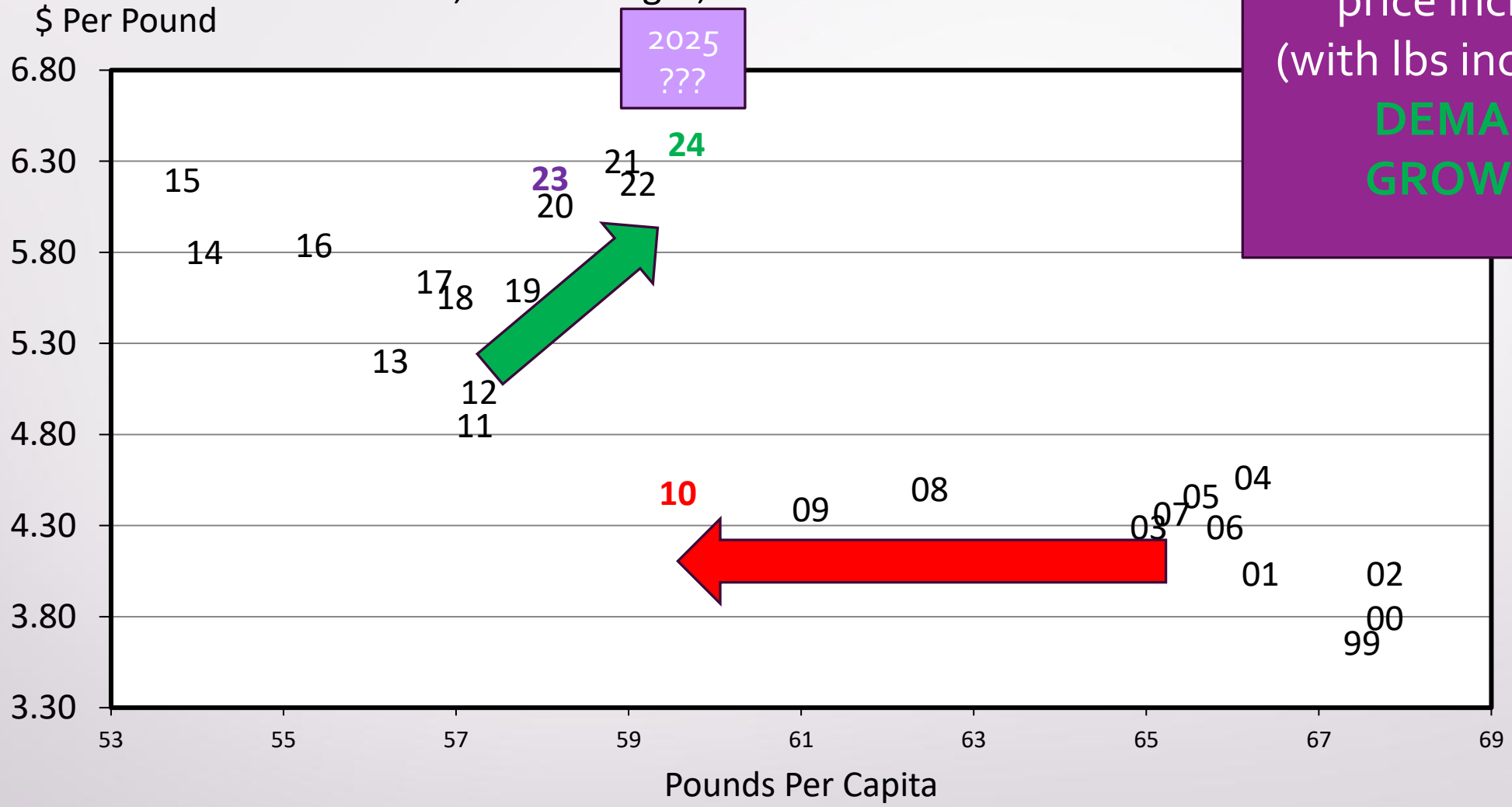
What's Demand Got to Do with It?

https://www.beefmagazine.com/market-news/what-s-the-similarity-between-blue-jeans-and-beef-demand-

https://www.beefboard.org/2025/07/21/whats-demand-got-to-do-with-it/

BEEF PRICE-QUANTITY RELATIONSHIP

Annual, Retail Weight, Deflated All Fresh Retail Price

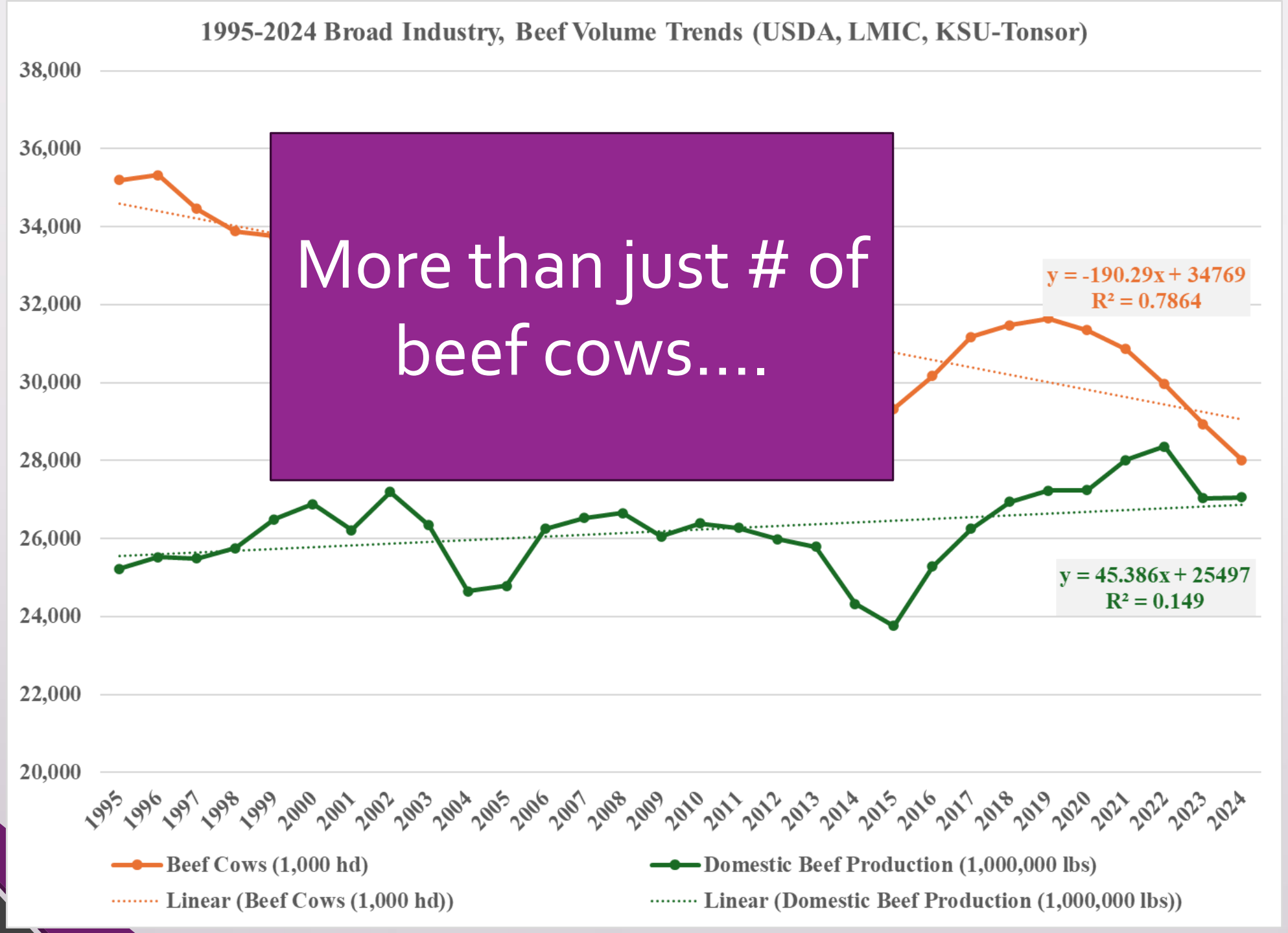


Observing 2024 real price increase (with lbs increase) = **DEMAND GROWTH!**

Data Source: Bureau of Economic Analysis & USDA-ERS, Compiled by LMIC

Livestock Marketing Information Center

C-P-65A
05/09/25


1995-2024 Broad Industry, Beef Volume Trends (USDA, LMIC, KSU-Tonsor)
More than just # of beef cows….
y = -190.29x + 34769
R² = 0.7864
y = 45.386x + 25497
R² = 0.149
38,000
36,000
34,000
32,000
30,000
28,000
26,000
24,000
22,000
20,000
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024
Beef Cows (1,000 hd)
Domestic Beef Production (1,000,000 lbs)
Linear (Beef Cows (1,000 hd))
Linear (Domestic Beef Production (1,000,000 lbs))

PORK BUSINESS/ NEWS/ INDUSTRY

3 Factors Fueling Americans' Obsession with Protein

Whether it's pork, beef or chicken, consumers can't seem to eat enough protein. That's fueling robust demand and prices for livestock producers.



By **Tyne Morgan** · June 06, 2025 10:48 AM



DROVERS/ NEWS/ INDUSTRY/ TOP STORY

Consumers Confirm Protein is In: Meat Continues to Have Its Moment on the Plate

K-State's Glynn Tonsor says the July Meat Demand Monitor revealed positive trends in meat consumption and consumer attitudes toward protein purchases.



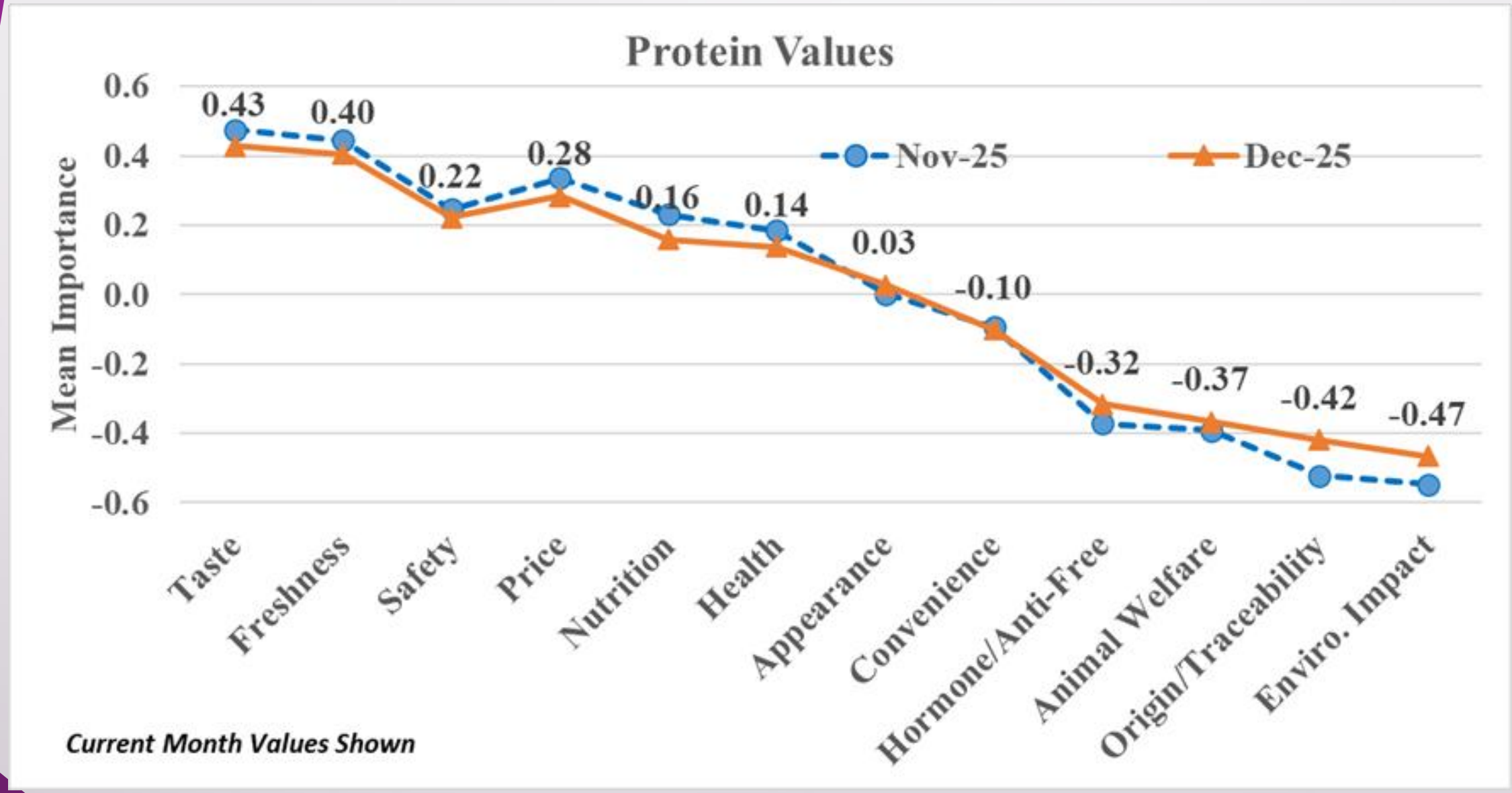
By **Angie Stump Denton** · August 12, 2025 02:21 PM

In the Cattle Markets: Meat Is Having a Moment

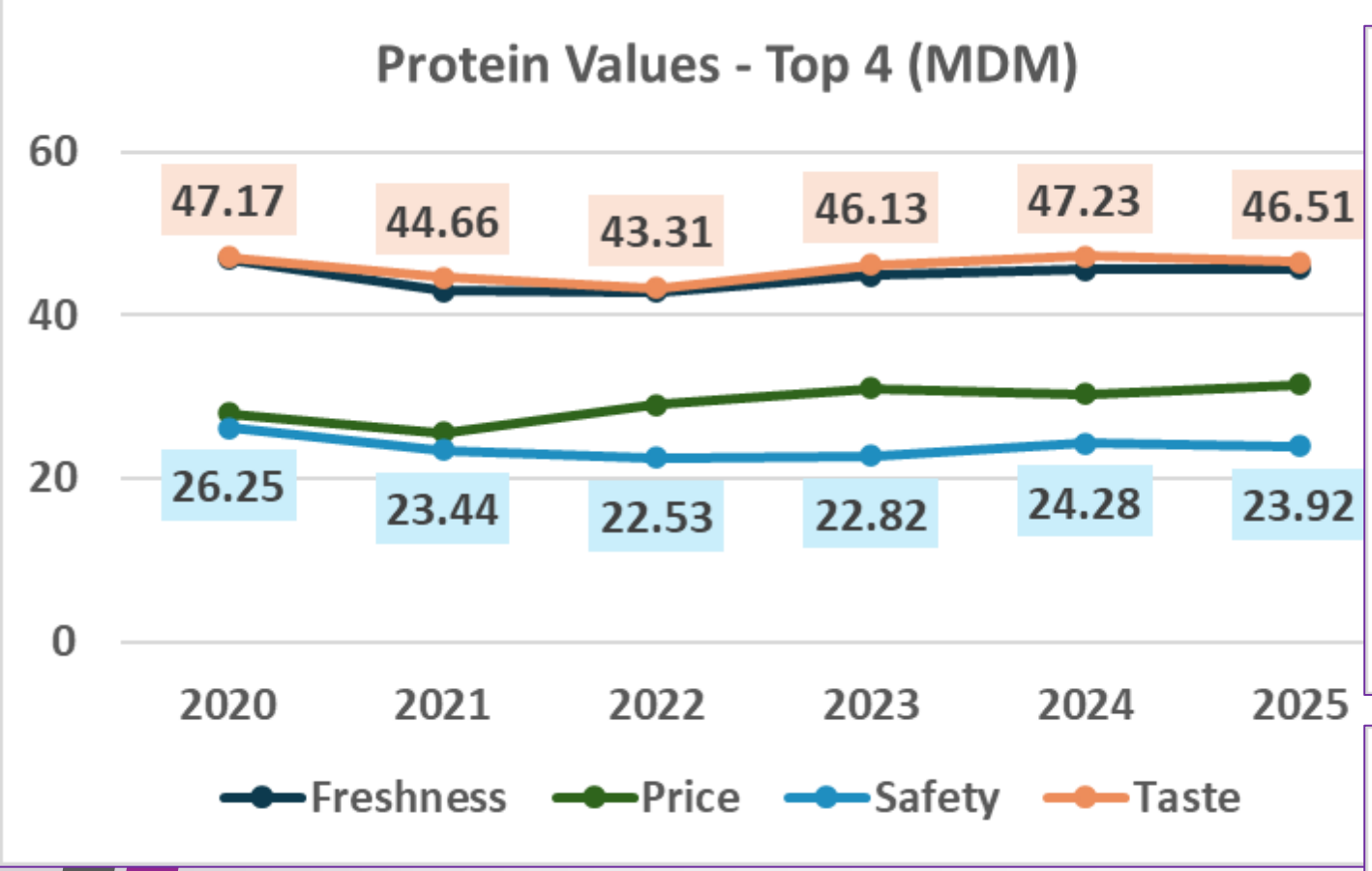
Glynn T. Tonsor, Ph.D., from Kansas State University breaks down the markets

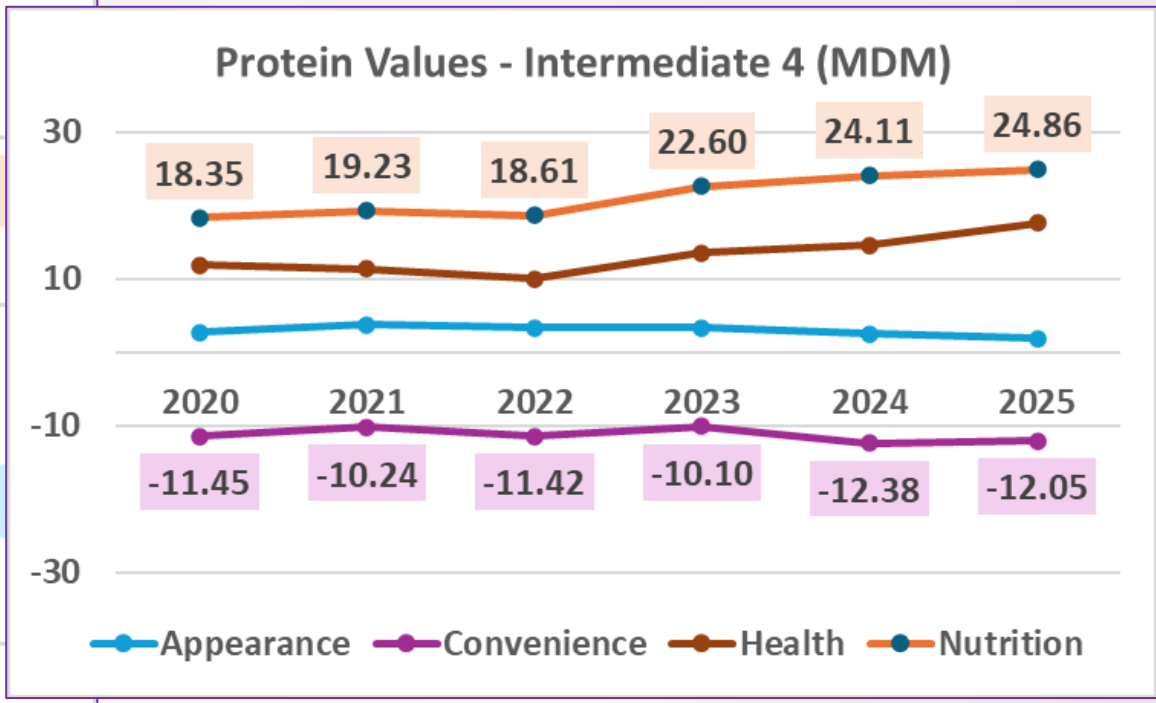
PUBLISHED ON **JUNE 17, 2025**

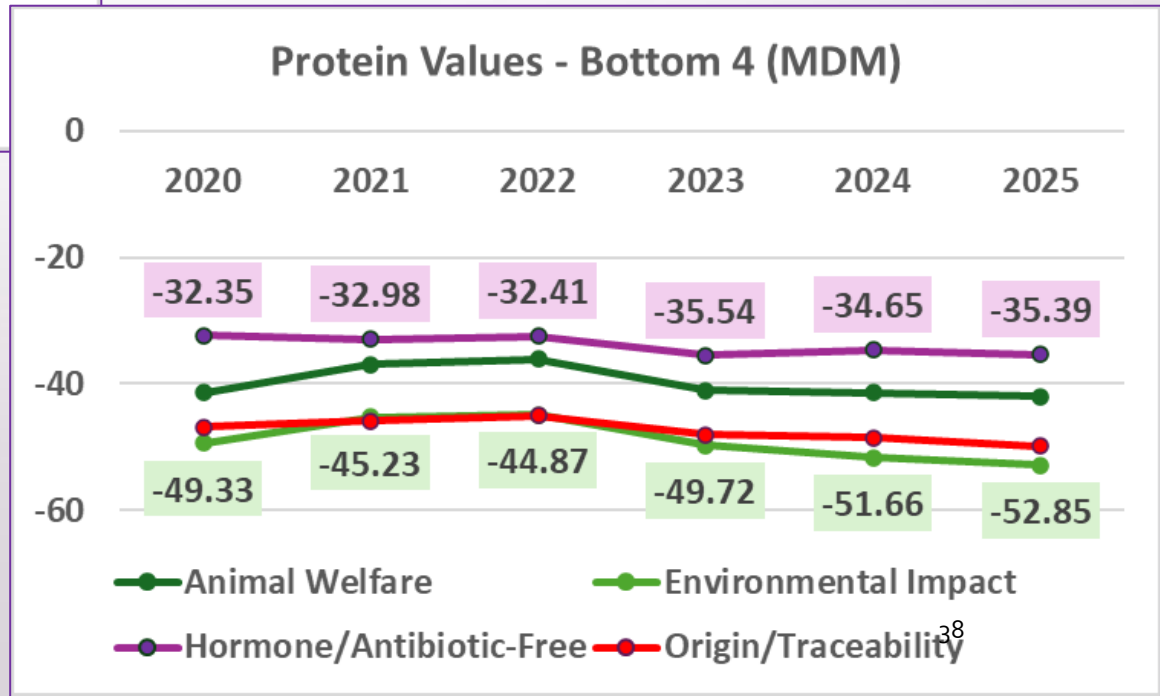
Meat is having a moment, and the craze for more protein is benefiting



https://agmanager.info/livestock-meat/meat-demand/monthly-meat-demand-monitor-survey-data

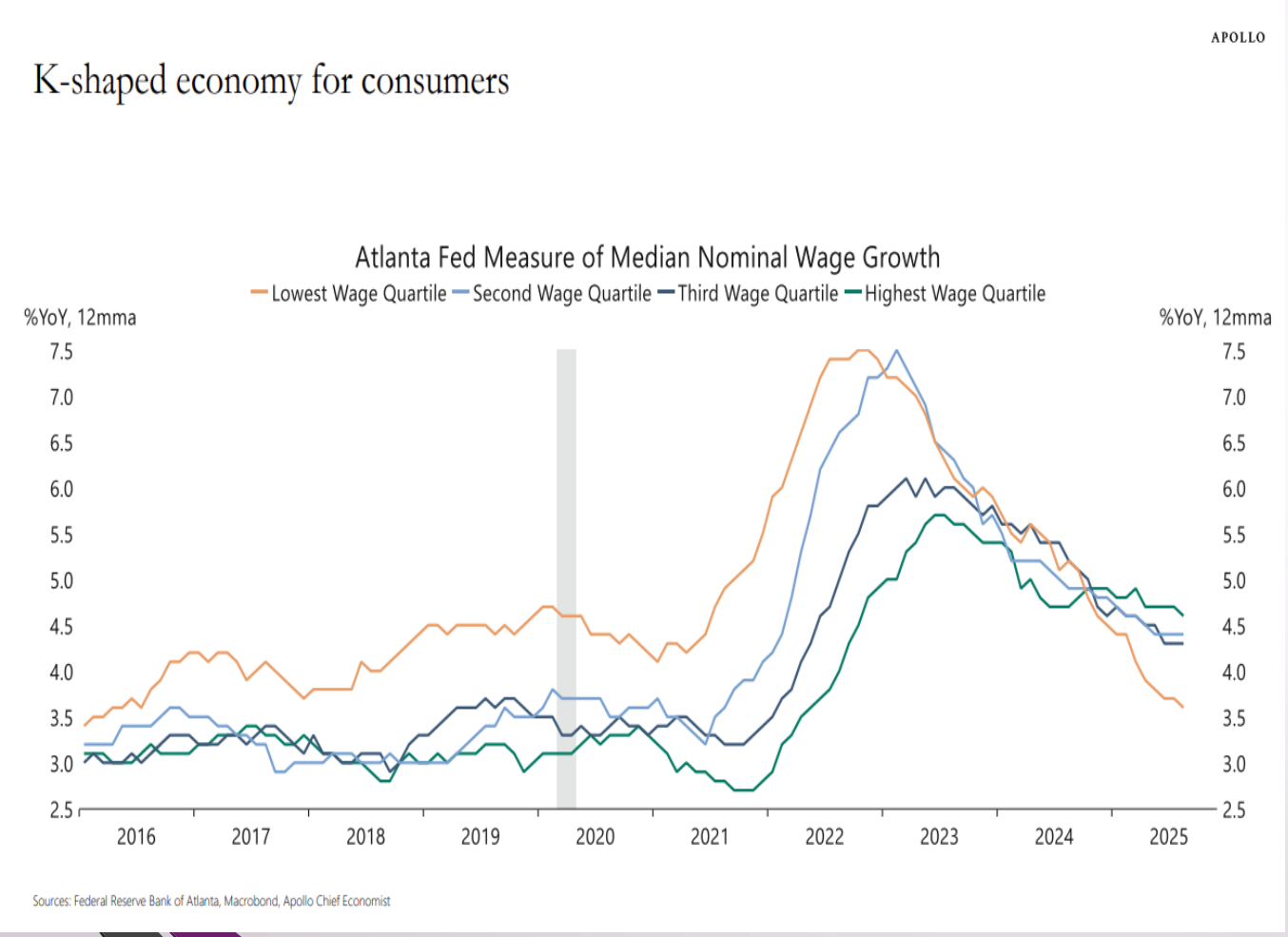


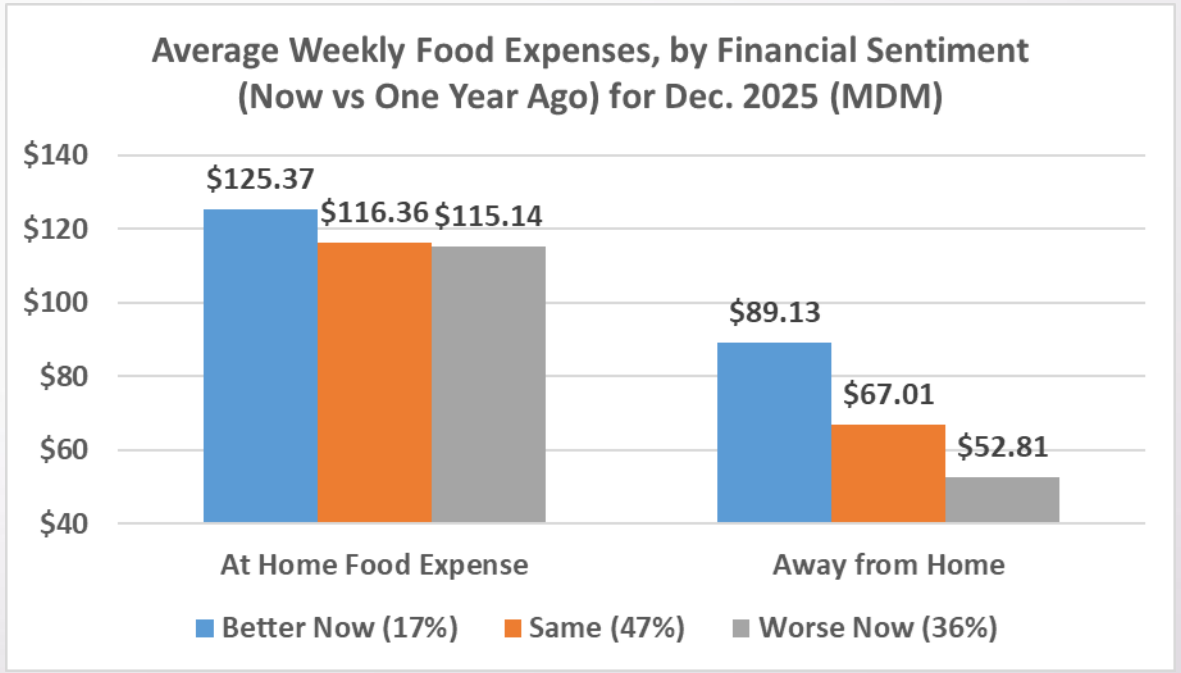




https://agmanager.info/livestock-meat/meat-demand/monthly-meat-demand-monitor-survey-data

Meat Demand Monitor (MDM)





https://www.apolloacademy.com/the-k-shaped-economy/

https://www.agmanager.info/livestock-meat/meat-demand/monthly-meat-demand-monitor-survey-data

Market Movers • November 2025

Protein Demand Rises, but Will Milk Checks Follow?

Article Originally Published in the November 10, 2025, Issue of Hoard's Dairyman Intel

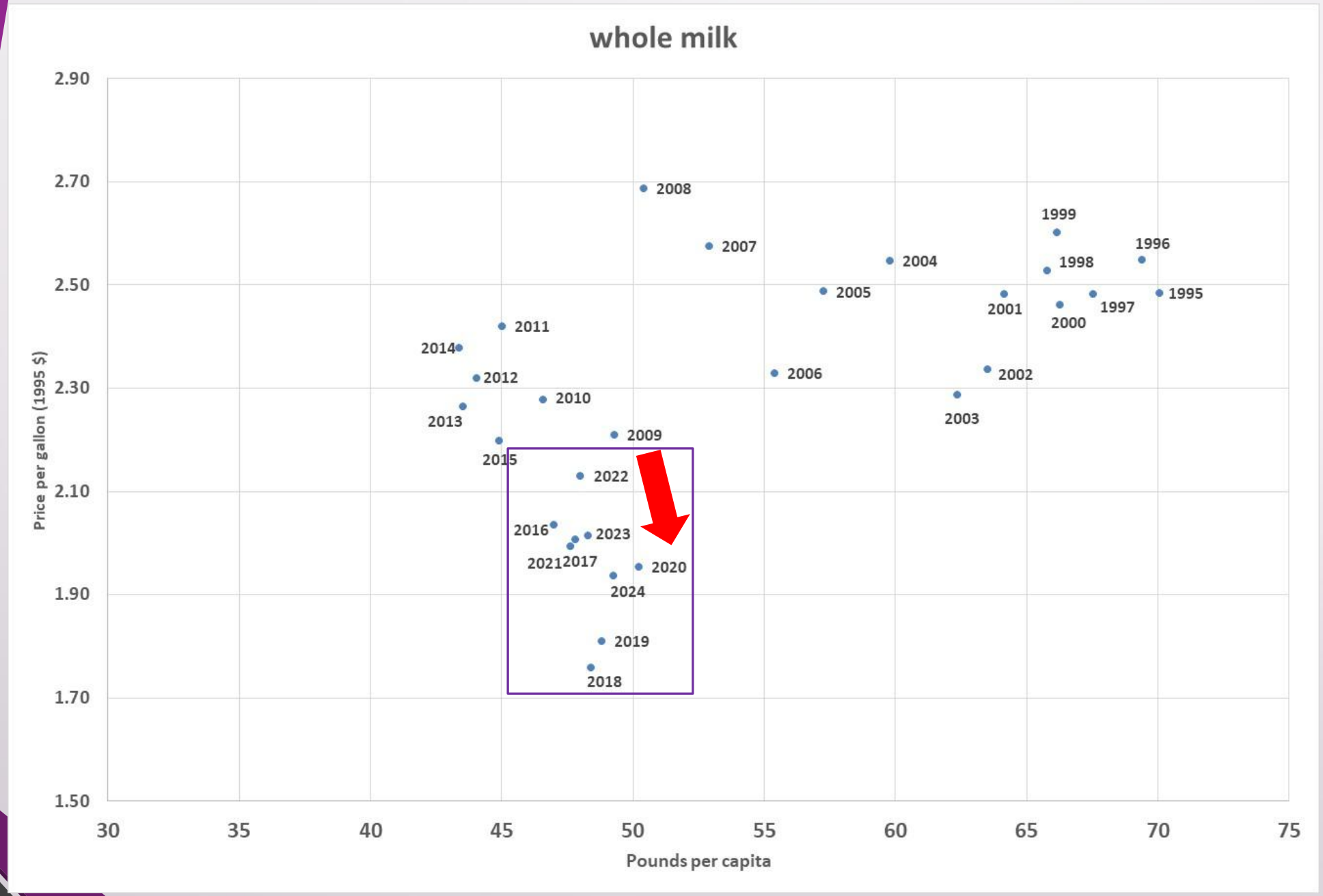


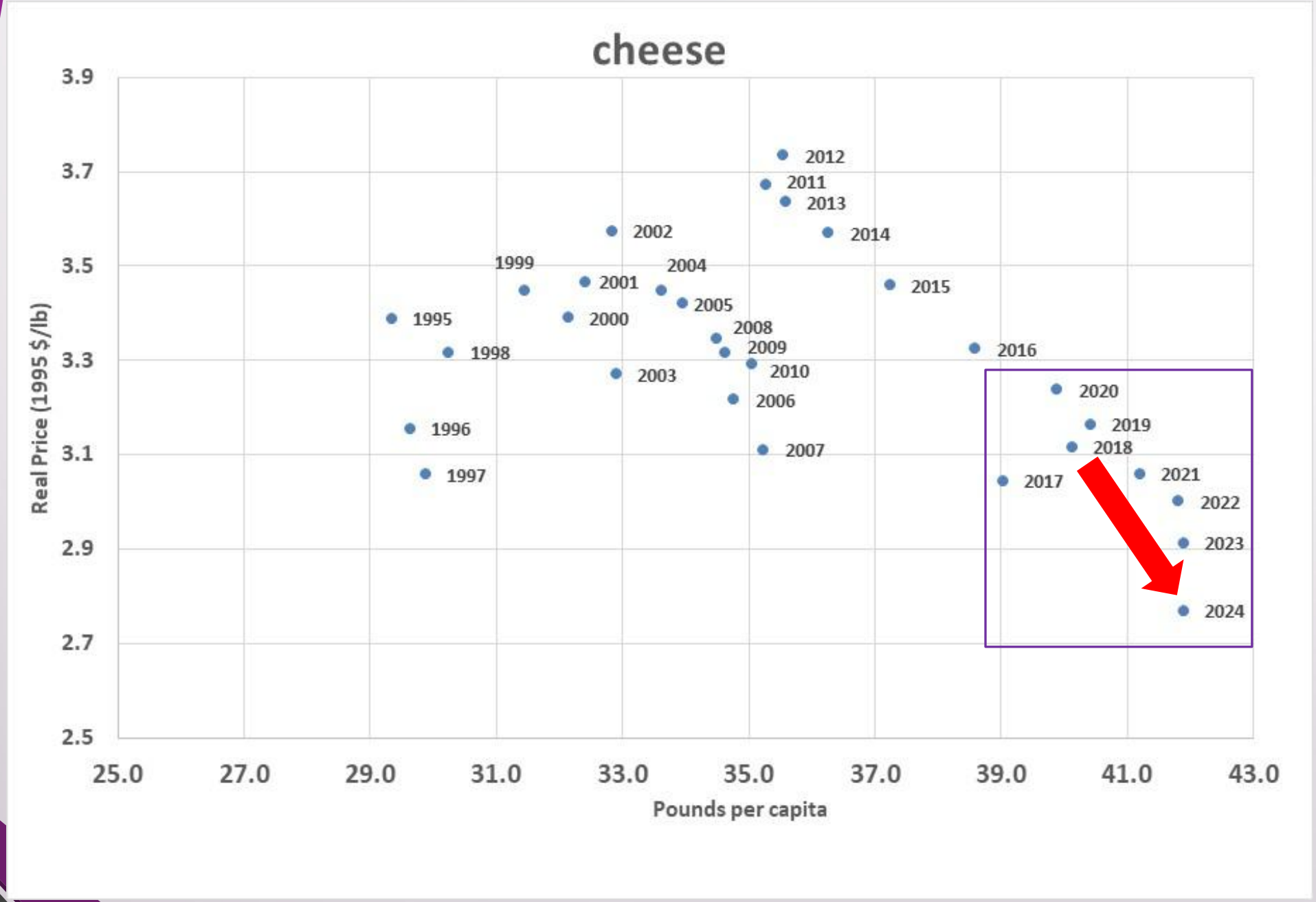
https://www.terrainag.com/insights/protein-demand-rises-but-will-milk-checks-follow/

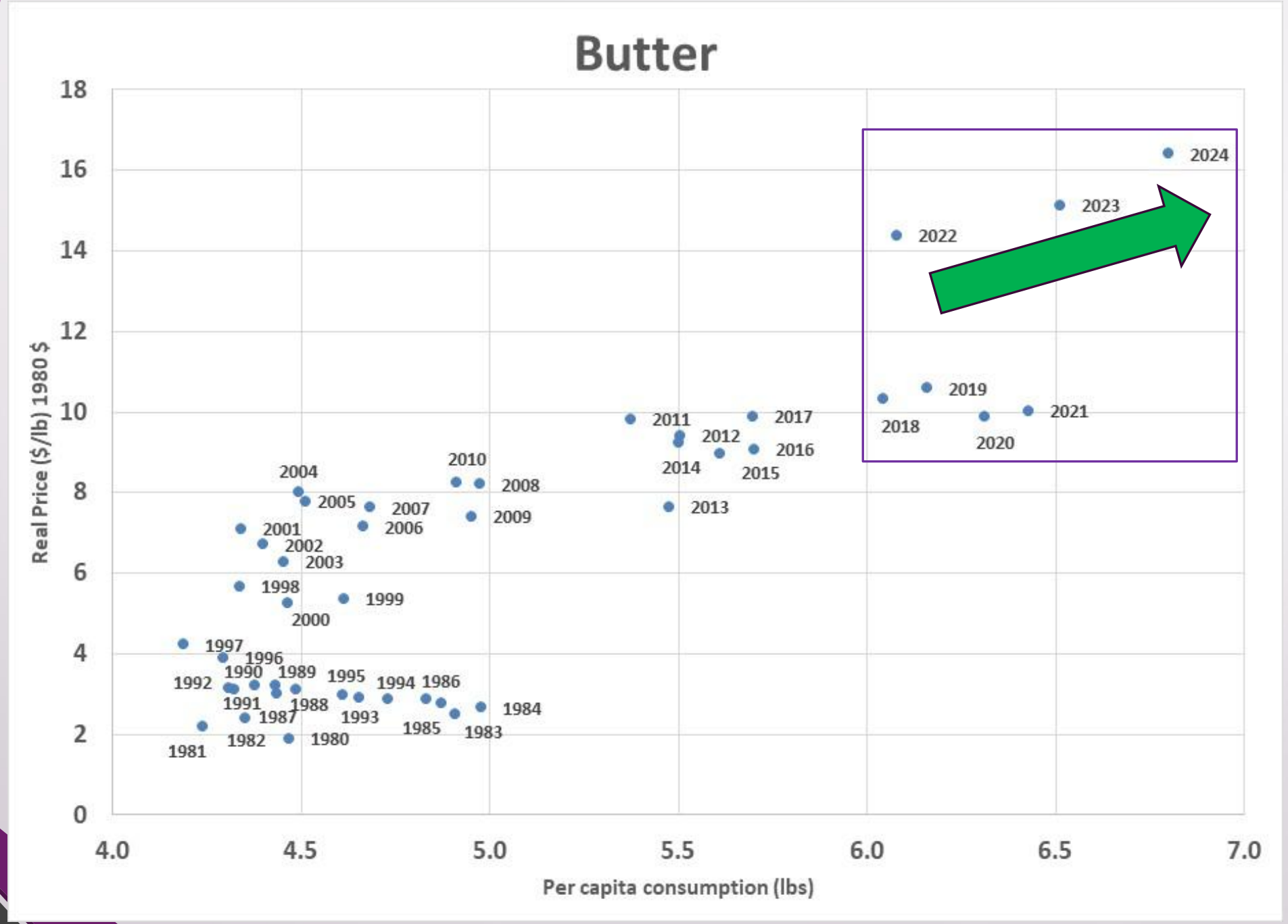


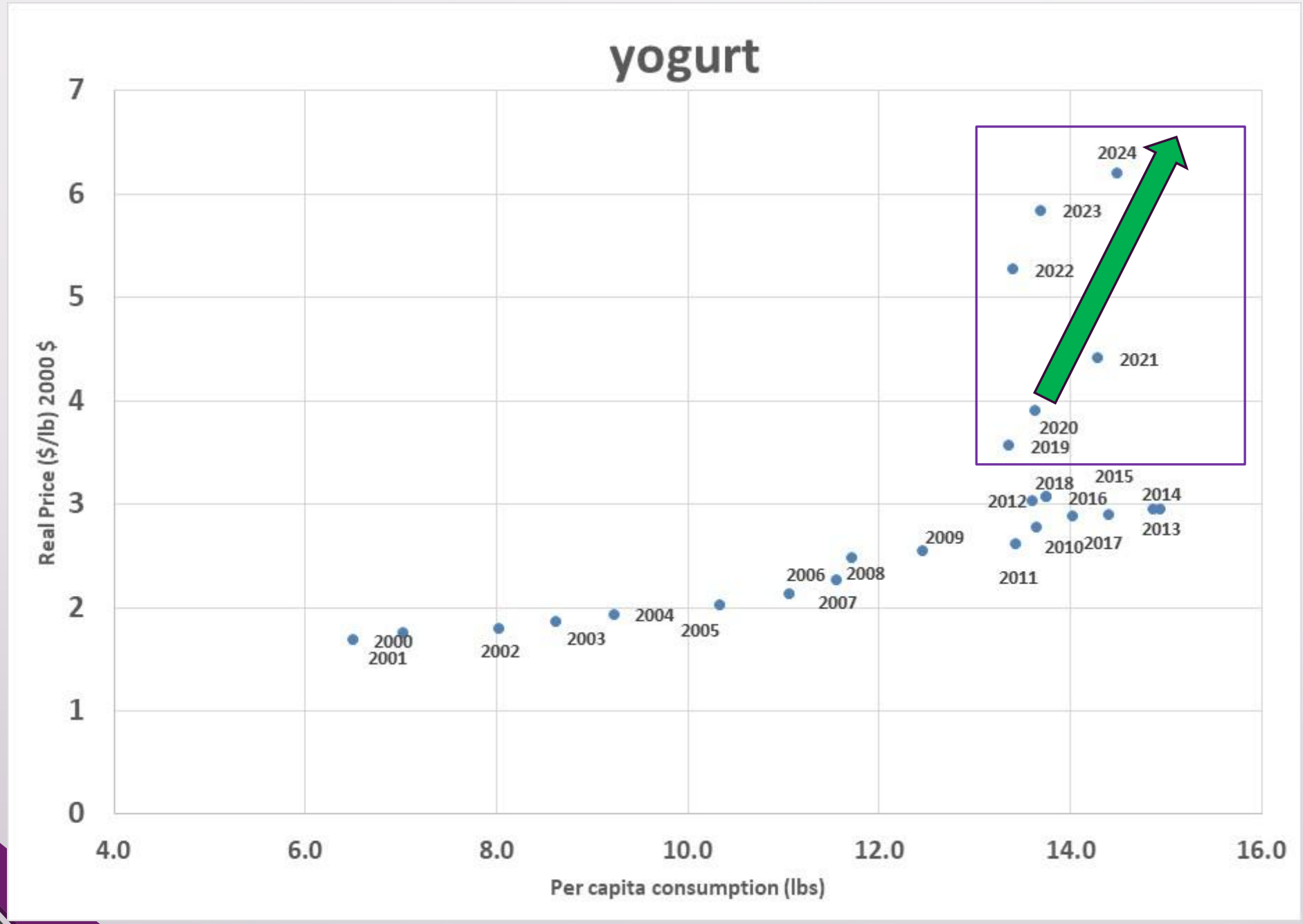
Dyson
Cornell
SC Johnson College of Business

Dairy Consumption & Demand Insights
thx to Dr. Chris Wolf (Cornell)


whole milk
Price per gallon (1995 $)
Pounds per capita
2.90
2.70
2.50
2.30
2.10
1.90
1.70
1.50
30
35
40
45
50
55
60
65
70
75
2008
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2017
2021
2020
2024
2019
2018


cheese
Real Price (1995 $/lb)
Pounds per capita
3.9
3.7
3.5
3.3
3.1
2.9
2.7
2.5
25.0
27.0
29.0
31.0
33.0
35.0
37.0
39.0
41.0
43.0
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2024


Butter
Real Price ($/lb) 1980 $
Per capita consumption (lbs)
18
16
14
12
10
8
6
4
2
0
4.0
4.5
5.0
5.5
6.0
6.5
7.0
2024
2023
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1981


yogurt
Real Price ($/lb) 2000 $
Per capita consumption (lbs)
0
1
2
3
4
5
6
7
4.0
6.0
8.0
10.0
12.0
14.0
16.0
2000
2001
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2023
2024

Circana-Based 2025 Retail Summary

Product	$ vs. YA	$ vs. 2YA	$ vs. 3YA	Lbs vs. YA	Lbs vs 2YA	Lbs vs. 3YA
BUTTER/MARGARINE/SPREADS	-0.6%	4.6%	10.8%	-1.3%	-0.8%	-0.6%
COTTAGE CHEESE	19.7%	40.3%	63.6%	14.3%	28.6%	39.7%
CREAM CHEESE	-2.0%	0.8%	8.1%	0.0%	0.7%	1.8%
DAIRY NATURAL CHEESE	1.1%	2.7%	6.6%	1.5%	4.7%	6.9%
DAIRY PROCESSED CHEESE	-5.6%	-7.0%	-6.0%	-4.3%	-5.1%	-8.0%
MILK	3.2%	5.5%	3.8%	-0.2%	-0.4%	-2.4%
YOGURT	13.7%	23.5%	35.2%	9.0%	17.1%	21.1%

For Public Use | Need more information?
www.circana.com
freshfood@circana.com
210 Analytics
aroerink@210analytics.com

Circana-Based 2025 Retail Summary

Meat Emerged as the Strongest of All Perimeter Departments in 2025

By: Anne-Marie Roerink, President, 210 Analytics LLC

Type	$ vs. YA	Lbs vs. YA
Fresh beef	12.40%	4.30%
Fresh chicken	6.50%	3.20%
Fresh pork	3.30%	1.10%
Fresh turkey	3.90%	0.60%
Fresh lamb	7.40%	-0.60%
Fresh exotic	-1.80%	-1.10%
Veal	-3.00%	-3.30%

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www.circana.com
freshfood@circana.com
210 Analytics
aroerink@210analytics.com
210analytics
Circana.

2016 Beef Improvement Federation
Research Symposium & Convention
June 14-17, 2016 • Manhattan, Kan.

https://www.bifconference.com/bif2016/summaries/BIF2016-Tonsor-Schroeder.htm

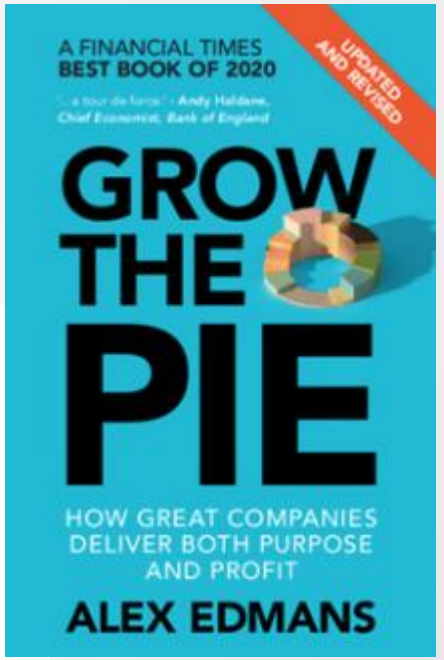


"The prosperity of our entire industry rests with our consumers," said Ted Schroeder. "It's where the revenue that this industry enjoys is."

DROVERS/ MARKETS

In The Cattle Markets: Future of North America's Beef Industry

The key comparative advantages currently enjoyed by North America's integrated industry include a strong trust and premium being placed on their grain-finished beef.



can help (or inhibit) realization of this success. It is much more enjoyable, and arguably economically rewarding over the longer-term, to work together and "build a larger pie to share" than to focus on getting the "largest slice of today's pie."

https://www.drovers.com/markets/cattle-markets-future-north-americas-beef-industry



More information available at:

AgManager.info

This presentation will be available in PDF format at:

http://www.agmanager.info/about/contributors/individual/tonsor.asp

Host of additional industry resources are cross-linked as well

Milking Equipment: Upgrades, Expansions, & What's New

1/22/2035

David A Reid DVM

Rocky Ridge Dairy Consuslting LLC

dreiddvm@gmail.com

612-963-1457

Whenever You Lose Interest in being Better at Something, Chances are You've Already Stopped Being Good At It!


MELBY AIED



Today's Presentation

- Short history of machine milking
- What are the impacts of machine milking and mastitis
- Milking system maintenance
- Parlor expansion concerns
- What's new in the milking machine world, Reid's top 3
- Summary Thoughts

Life Rule # 1:



When you are in deep shit, look straight ahead, keep your mouth shut and say nothing!

Goals

1. Healthy Cows Are Profitable
2. Control Inputs
3. No Management Belief Is Beyond Questioning
4. Make No Changes Without First Establishing How Their Effect will Be Measured.

Dr. John Ferry 1993

Paradigm Lockdown

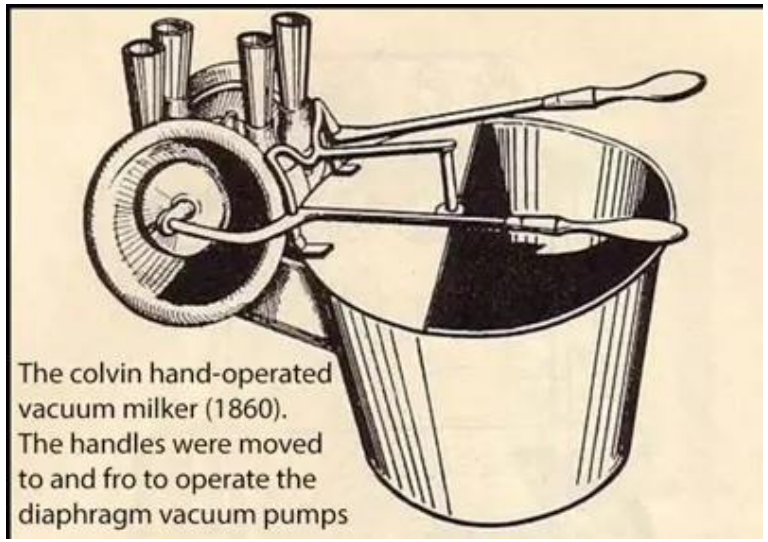
"That's when you have a good way of doing something so you lock down on it as being the best way, rather than considering it a good way and that there might be a better way that you need to find."

Burke Teichert 2011

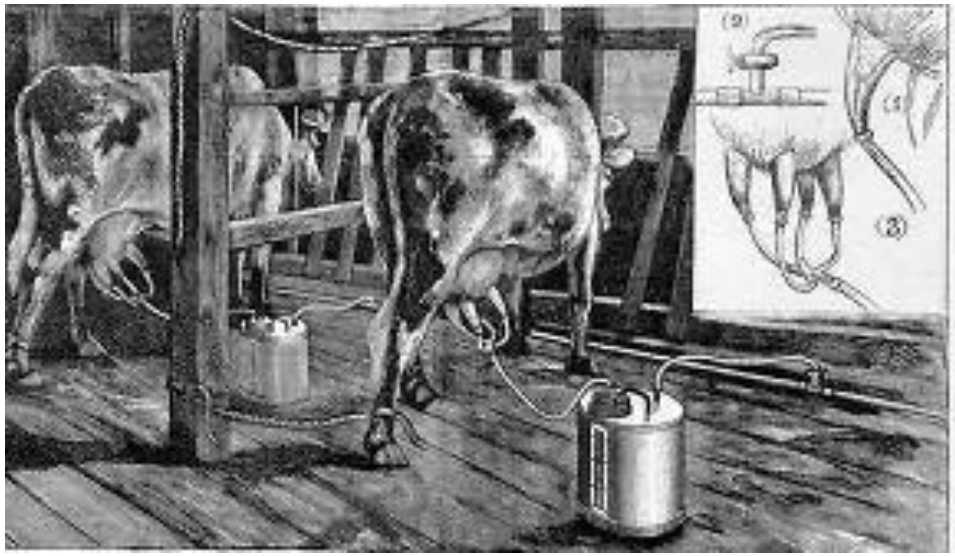
Put another way, thinking whatever you are doing is the **best way**, prevents you from looking for a **better** way to perform a given task.

Machine Milking History

- 1891 1st patent for vacuum based milk removal was with no pulsation



The colvin hand-operated vacuum milker (1860). The handles were moved to and fro to operate the diaphragm vacuum pumps



- 1892 Patent for 2 chambered teat cup
- 1895 Pulsation patented
- 1902 Patented improved 2 chambered teat cup

Machine Milking History

For the last 124 years, almost all milking is with the current 2 chambered teat cup assembly

- Real world experience based, trial & error, not data derived until a 1981 in a study by Williams, Mein and Brown
- "Biological response of the bovine teat to milking: information from *measurements* of milk flow rate within a single pulsation cycle"

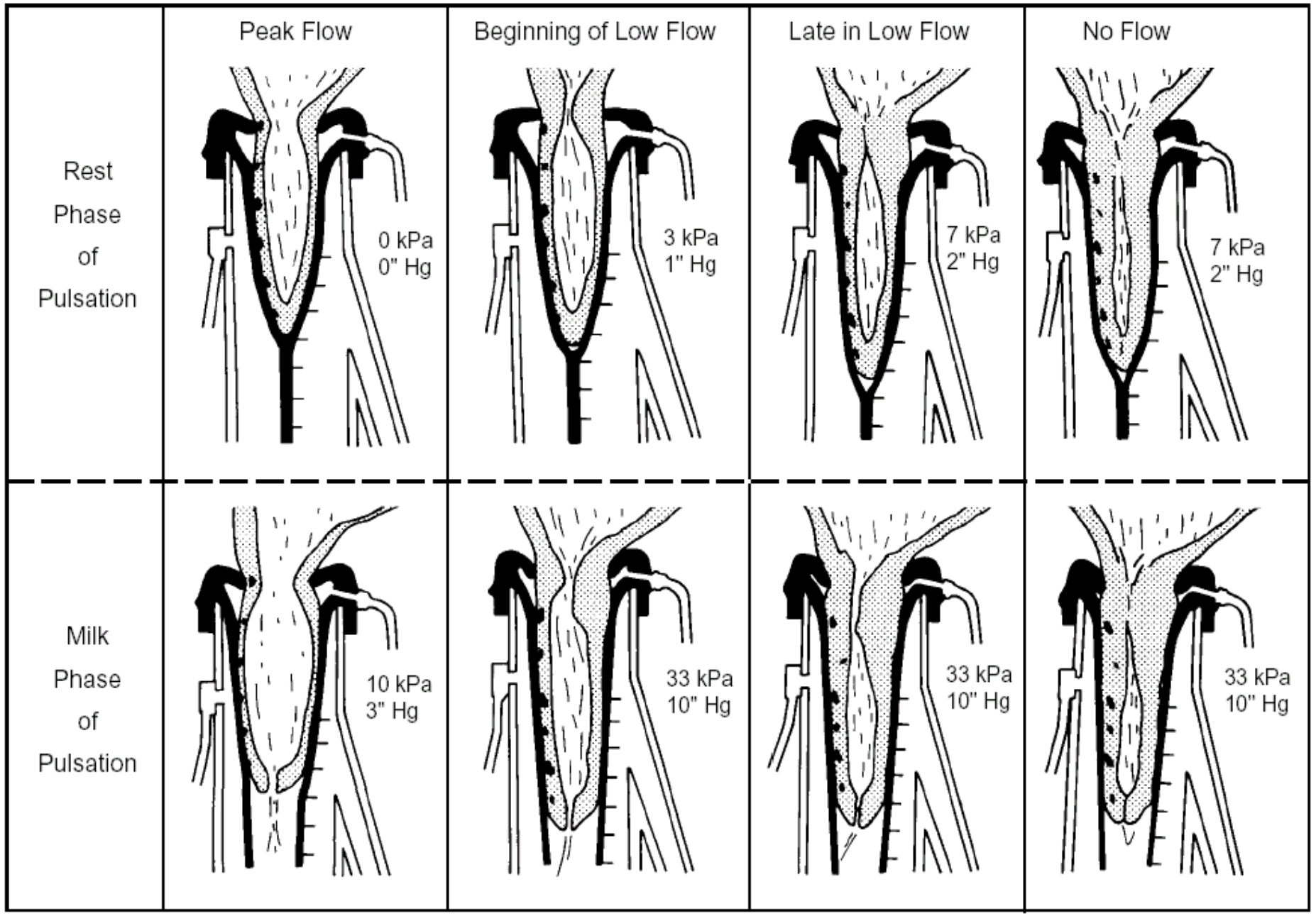
Early observations of milking



Early research using clear liners and shells and early x-ray machine

Liner Open Peak Flow

Action of Opening and Closing Inflations

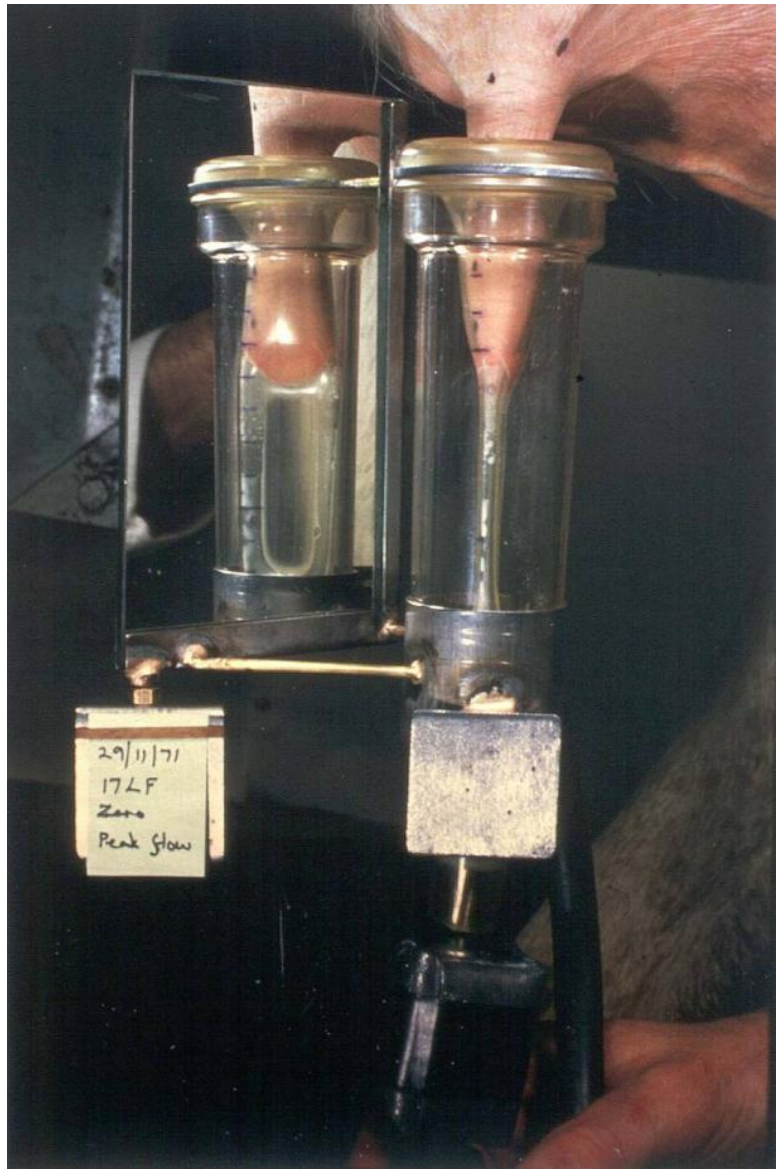


Machine Milking and Lactation. Insight Books Copyright 1992

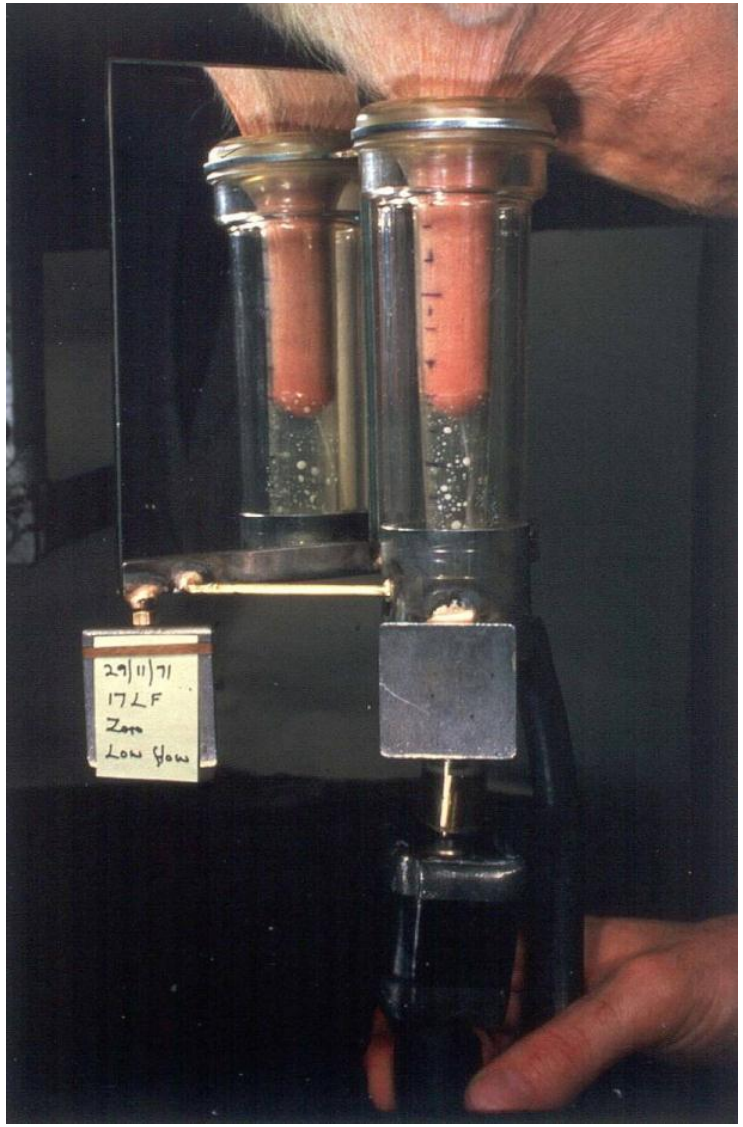
Open peak flow



Closed peak flow



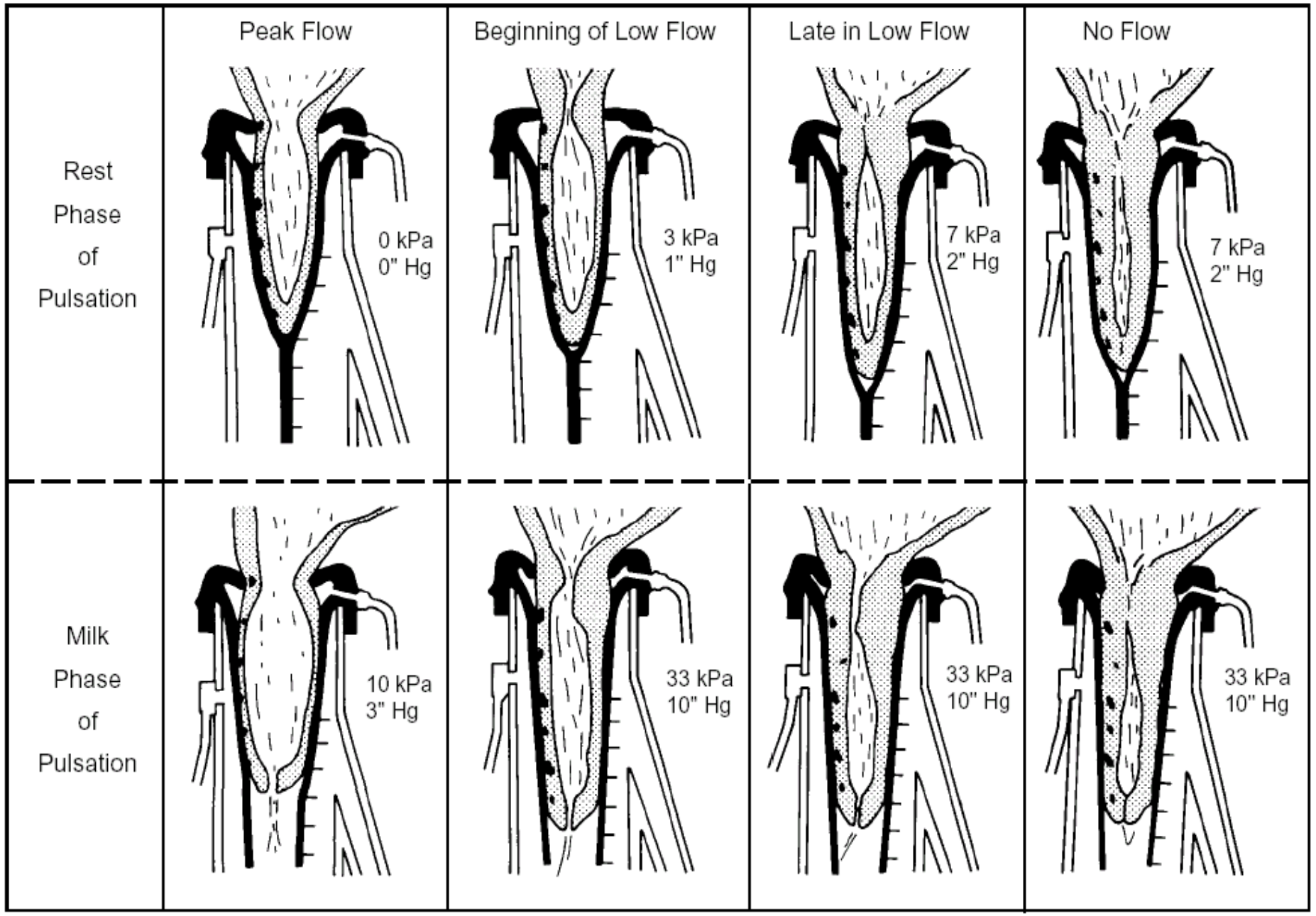
Open low flow



Closed low flow



Action of Opening and Closing Inflations



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J. Dairy Sci. 108:11713–11732
https://doi.org/10.3168/jds.2025-27010
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Invited review: Contribution of milk harvesting research to optimal interaction between biology and milking technology

J. Upton,[1]* R. M. Bruckmaier,[2] G. A. Mein,[3] D. J. Reinemann,[4] M. Wieland,[5] C. O. Paulrud,[6] J. Baines,[7] I. Ohnstad,[8] and M. D. Rasmussen[9]

Graeme Mein

- "Machine milking is a unique example of a mechanical process that requires the willing cooperation of the cow." (many years ago)

- "Milking depends on triggering the milk ejection reflex through tactile stimulation to release oxytocin. This process requires the willing cooperation of each animal to enter her milking position calmly, to stand quietly for milking and to leave calmly without endangering the milking staff." (2025)

Portions of the abstract of this paper

- "Machine milking has evolved from its early mechanical beginnings into a technologically advanced data-driven process that must balance speed, chosen completeness and gentleness on teat tissue to support efficient milk removal and optimal udder health."

- "At the machine level, key variables include milking vacuum, pulsation characteristics, liner properties and teatcup removal strategies."

What about machine function & Mastitis

- Estimates are the milking system effect may be up to 20% of new infections
  - Direct effects: cross contamination, bacteria transport & impacts
  - Indirect: impact on teat end & teat skin condition





Equipment issues that will impact milk quality

1. Acute transient vacuum fluctuations occurring during low milk flow
   a. Liner slips
   b. Vigorous machine stripping
   c. Abrupt cluster removal – can be significant especially in non-automated parlors

2. New infections are higher with pulsation failure & pulsation outside of acceptable limits (short D phase)

What about published articles & field experience?

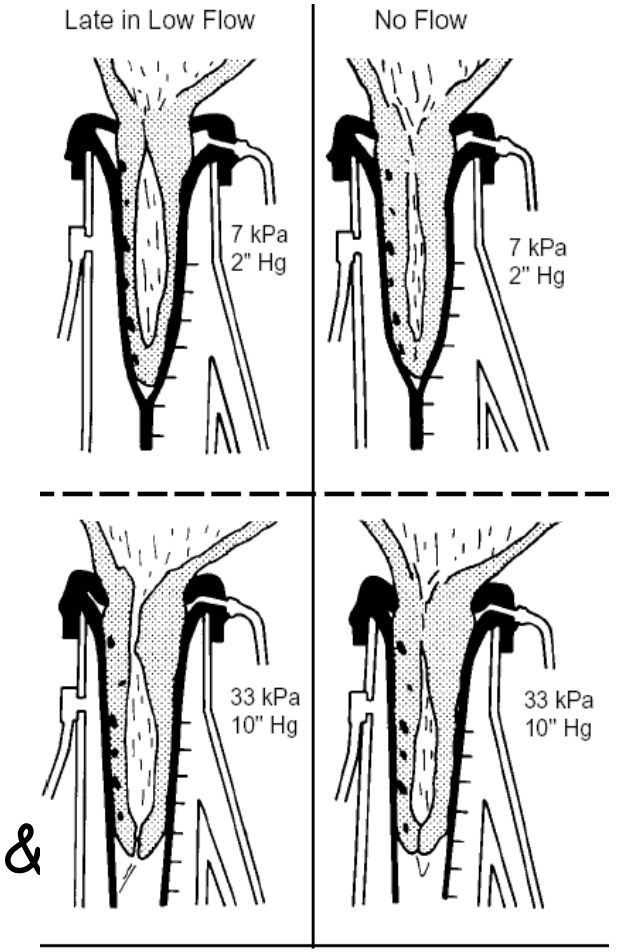
- Be careful, correlation does not imply causation!
- The world is full of testimonials & chance correlations!
- Murray Woolford 1995 quote, "further quantification of the overall contribution of the milking machine (to the new infection rate) is difficult and elusive because of the muti-factorial nature of the disease".

Bimodal Milk Flow

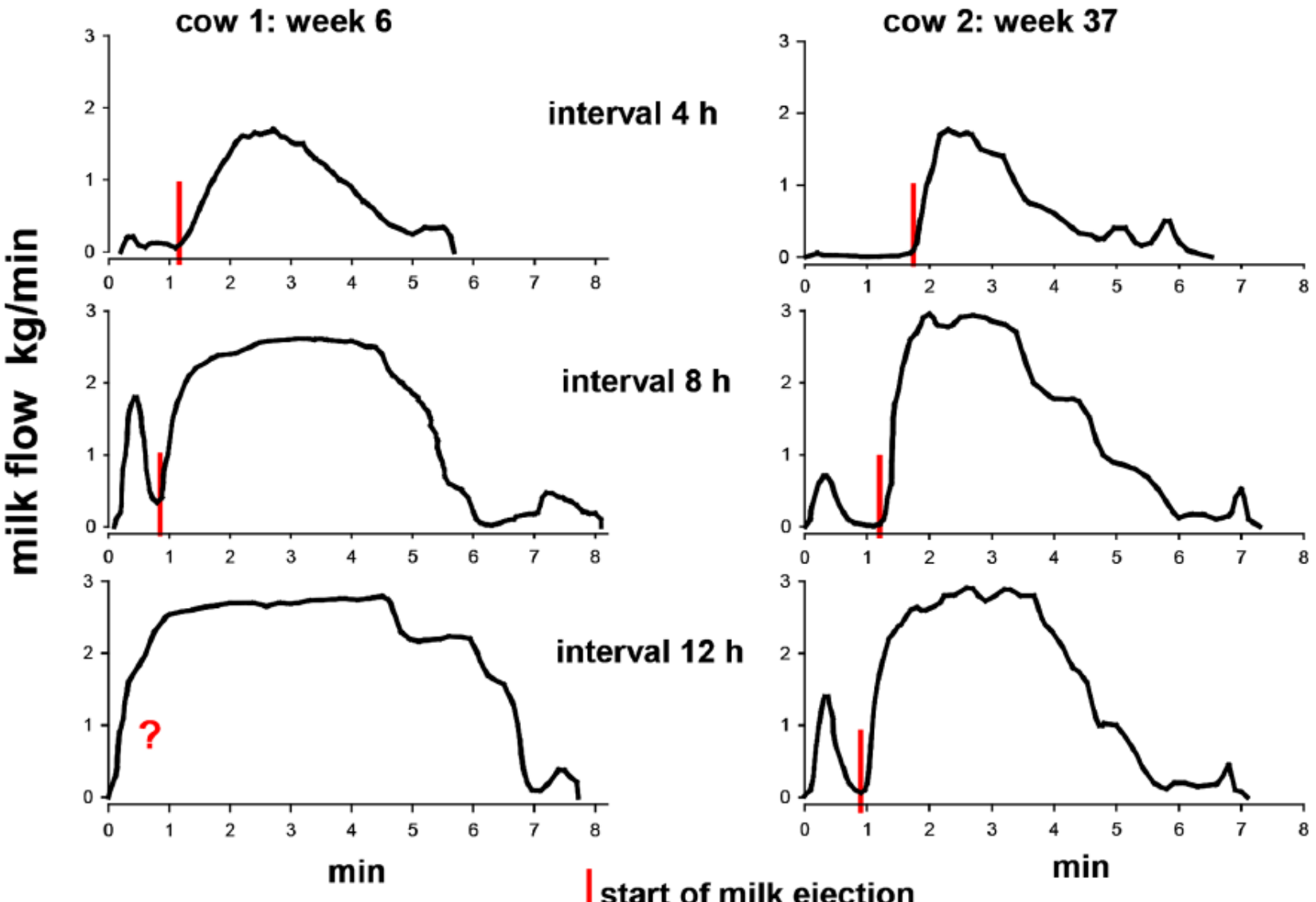
- Risk Factors/Causes
  - Udder stimulation or lack thereof
  - Level of udder fill; 2 or 3 or 4 milkings per day
  - Breed/physical udder size
  - Stage of lactation
  - Teat size/shape
  - Chronic mastitis infections
- Research
  - Bimodal flow will influence average milking duration (1996, 2023)
  - **Speculation**; may affect teat health under certain conditions, recent studies have not confirmed consistent association with teat end condition or mastitis new infection rate

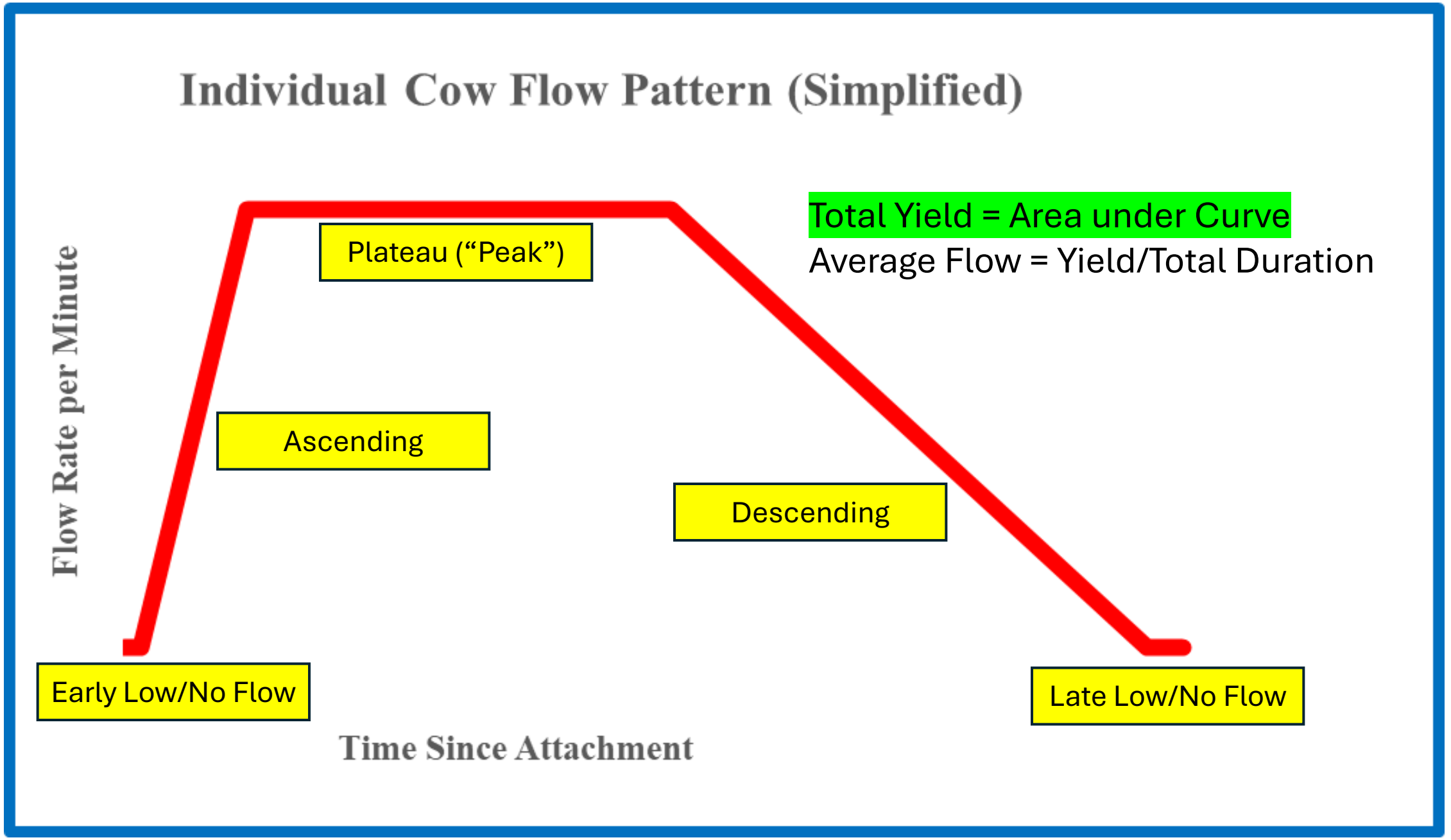
What is the definition of Bimodal?

- Is it just a calculated number based on early calculated flow data?
  - Vacuum sweep impact?
- Based on vacuum levels during dynamic testing?
- Based on observation of "dry milking at the start of milking, no milk flow?
  - Field experience/observations; dry milking shortly after attachment can be a significant issue, increased unit kickoffs/falloffs, slower overall milking & lower milk production



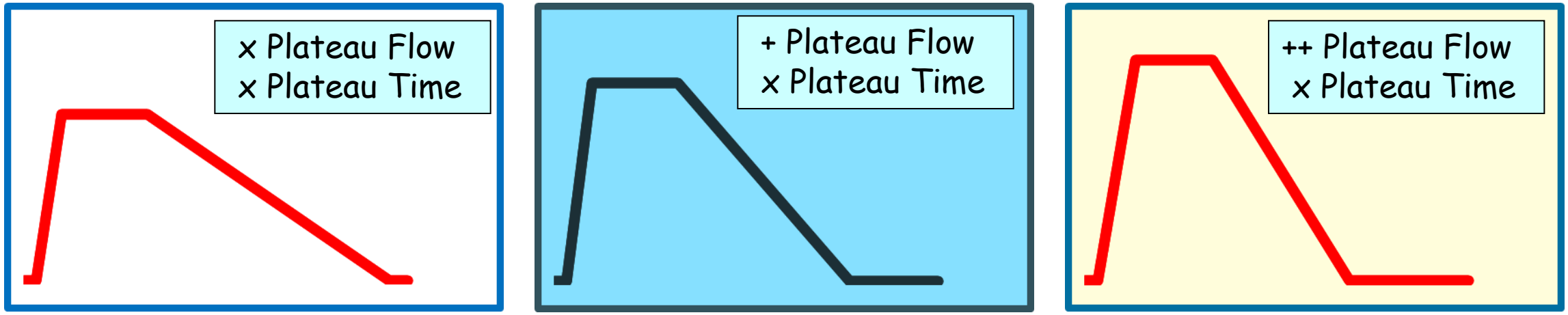
Milking interval & Bimodal flow 2025 JDS




Individual Cow Flow Pattern (Simplified)
Flow Rate per Minute
Plateau (“Peak”)
Ascending
Descending
Early Low/No Flow
Late Low/No Flow
Time Since Attachment
Total Yield = Area under Curve
Average Flow = Yield/Total Duration

Patterns with Equal Milk Yields and Durations

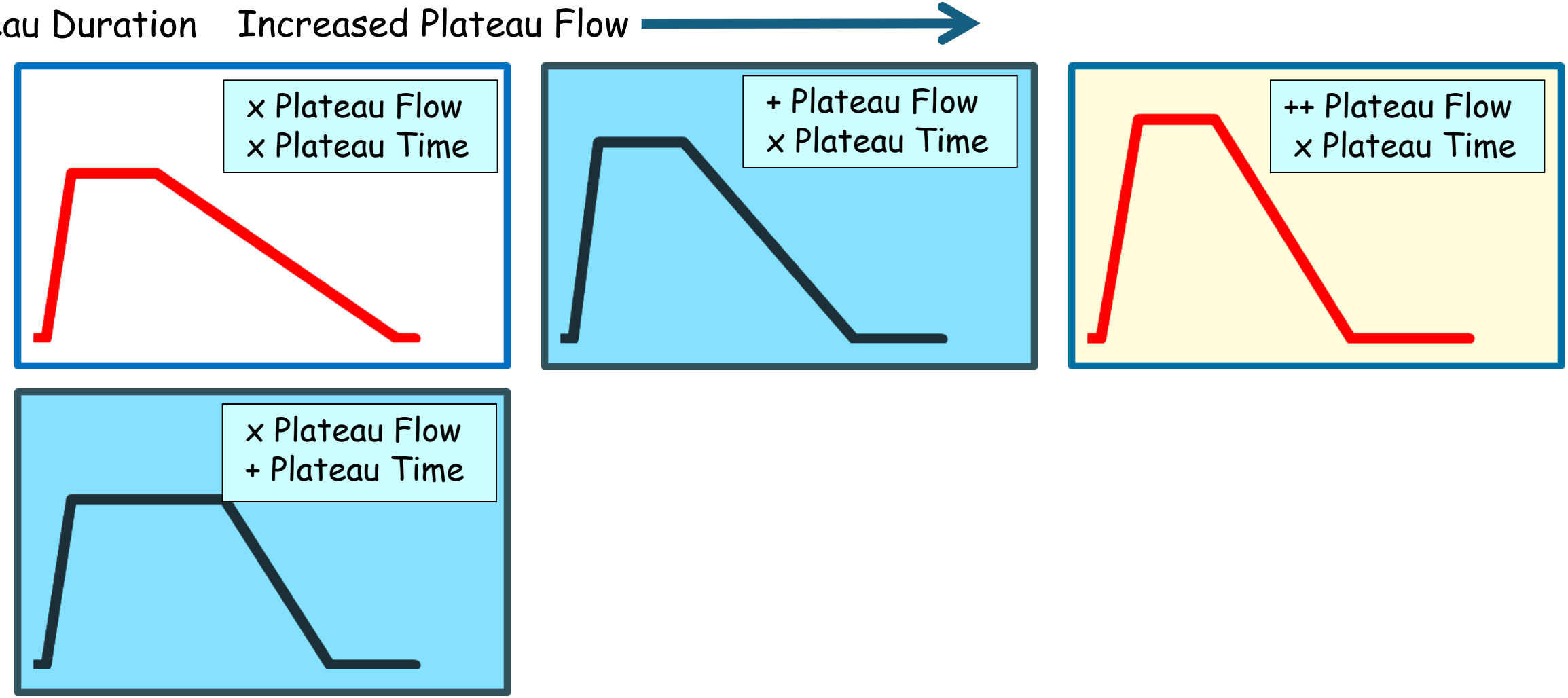
Increased Plateau Flow →



Patterns with Equal Milk Yields and Durations

Increased
Plateau Duration

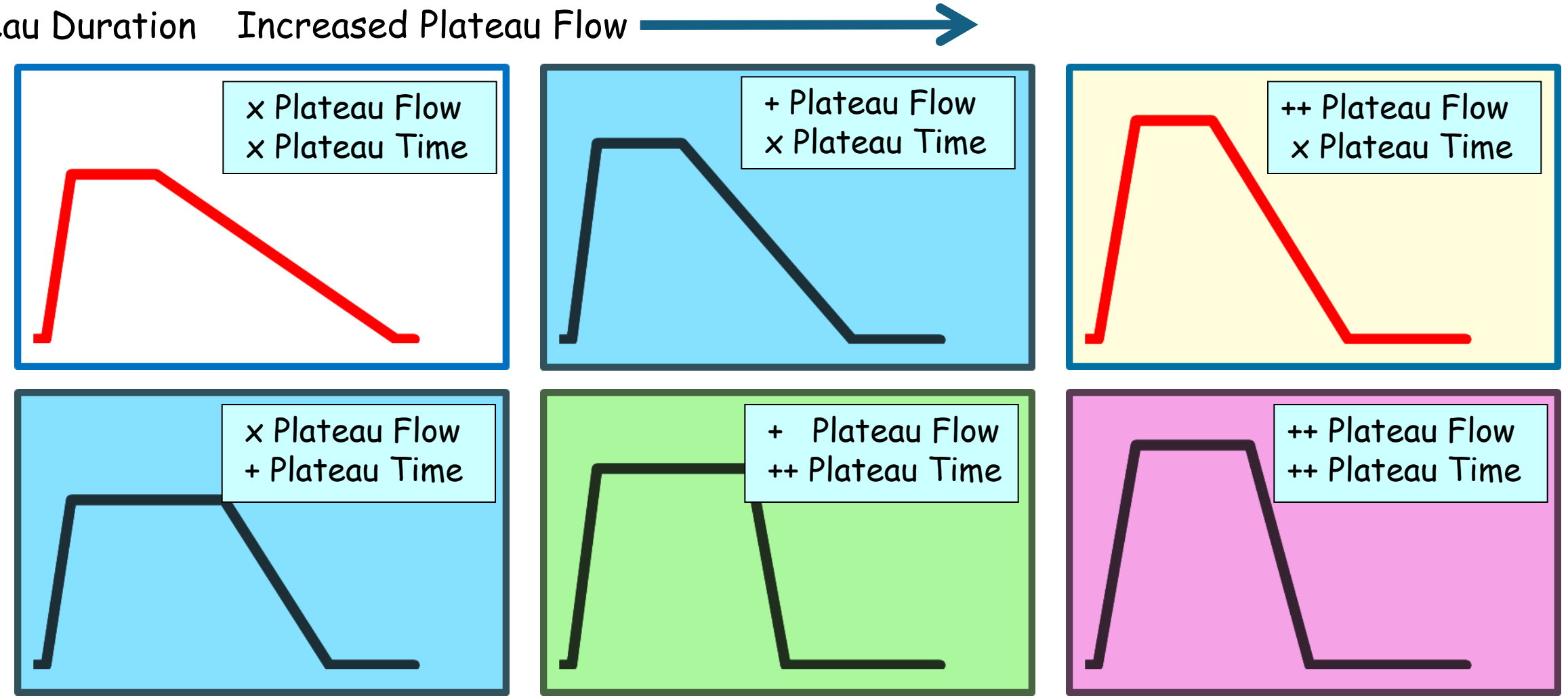
Increased Plateau Flow



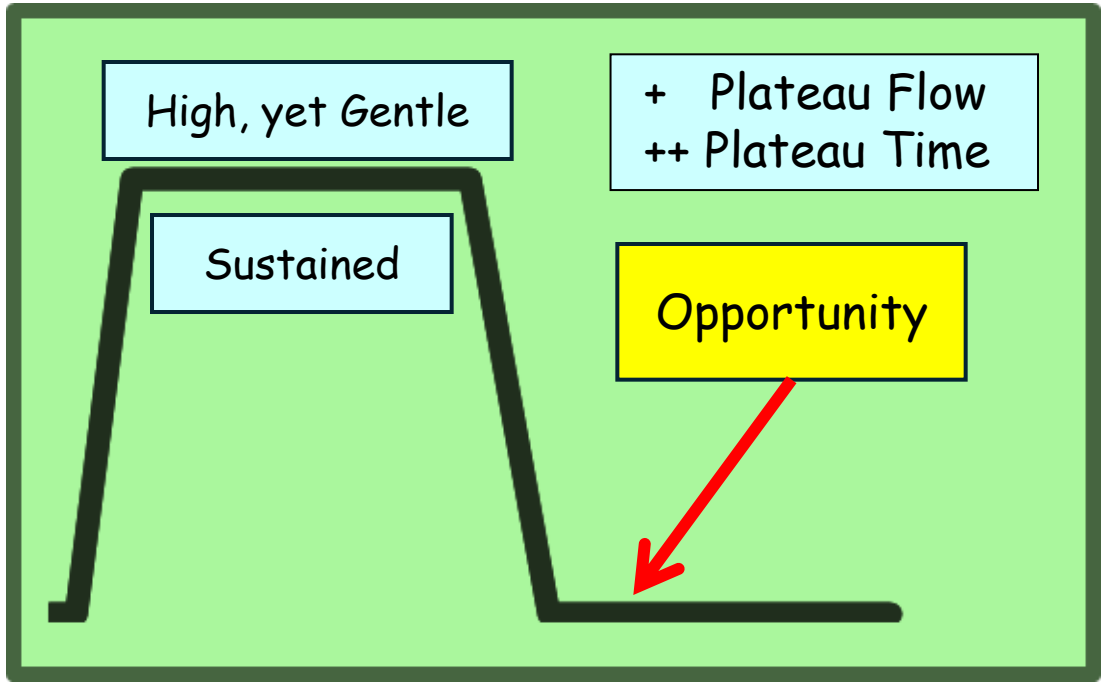
Patterns with Equal Milk Yields and Durations

Increased
Plateau Duration

Increased Plateau Flow



Patterns with Equal Milk Yields and Durations



1. Very short low flow at start
2. Rapid rise to high, yet gentle, plateau flow
3. Sustained high plateau flow
4. Rapid decline near end
5. Opportunity to remove unit and reduce unit on-time

System Maintenance

System maintenance is the biggest mechanical issue I observe on dairies – small, large or mega –doesn't matter, maintenance is the issue

Does your dairy calculate the cost per cow per day for a full maintenance program based on your manufacturer's recommendations?

How many cows are milked in every stall per day?

Most producers know maintenance is important!

- Do you have a written document that outlines your equipment maintenance?
- Who performs each task?
- Who documents that the work was done?
- What is the schedule for dynamic testing?
- Does the dairy have the owner's manual for the following?
  - Pulsation system
  - Vacuum system – including vacuum regulation
  - Automation: meters, shutoffs, retraction cylinders

Example Herd Input Costs

2300 cows milked 3X in a double 30 parlor

70 pounds of milk per day

Full scheduled service program

$44,000 Parts/year

$63,000 Parts & Labor/year

Example Herd Input Costs

Daily Costs

Parts only = $120.59 or 5.24 cents/cow/da

Parts &Labor = $170.68 or 7.4 cents/cow/day

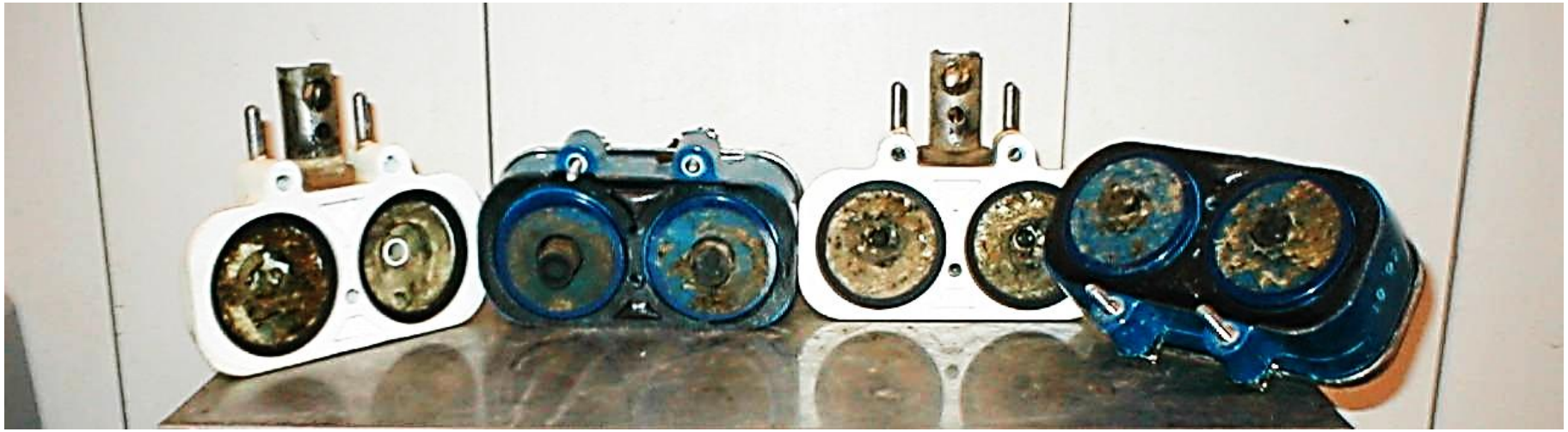
Example Herd Input Costs

If two pulsators are plugged, how many cows are at risk?

2300 cows X 3 milkings = 6,900 cows milked

6900 cows = 115 cows/unit or **230 cows @ RISK Every day!!!**

60 units

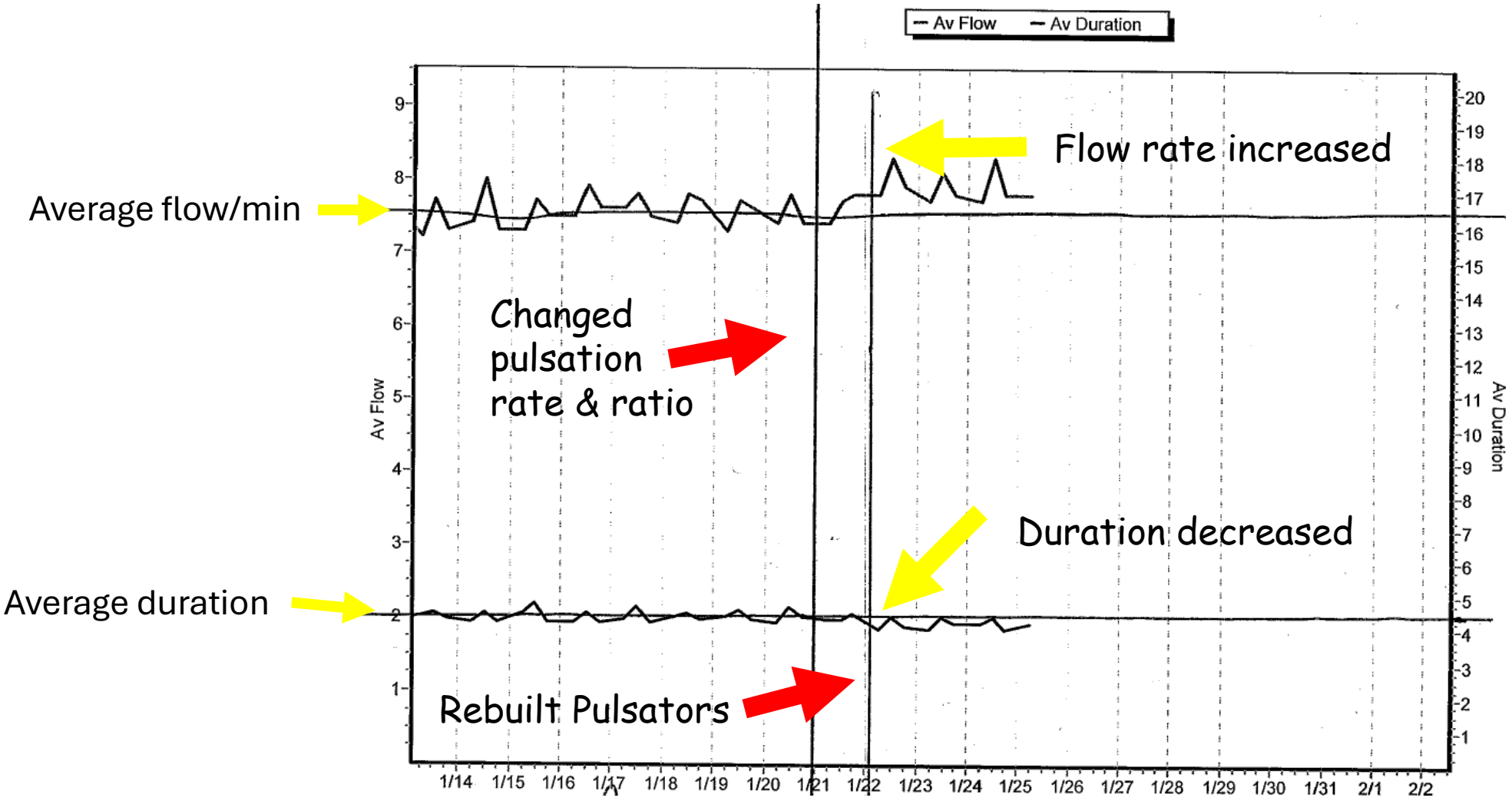


System Maintenance

Maintenance isn't a "someday" project, it should be a calendar item based on parlor size, number of cows and manufacturer recommendations.

Field experience shows that proper maintenance will maximize milking efficiency and production!

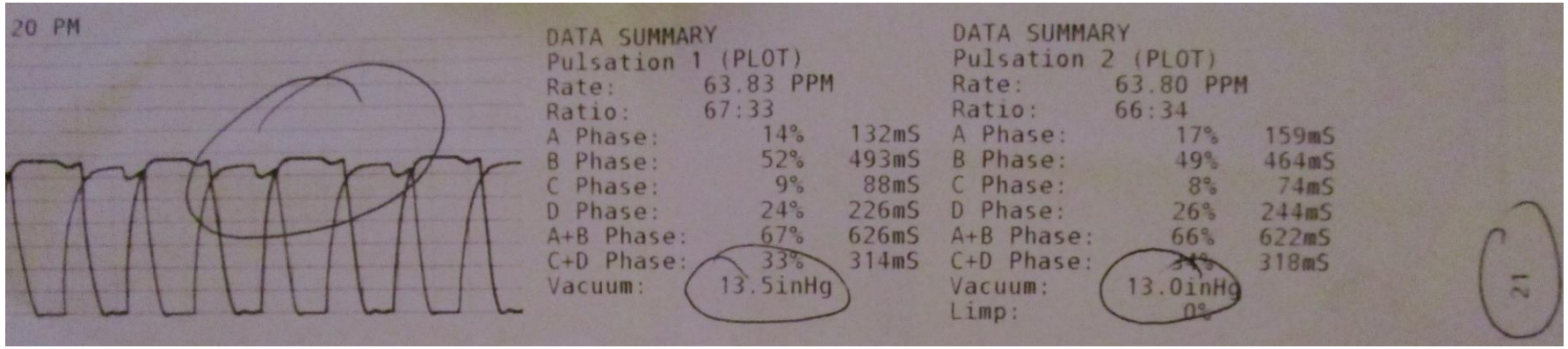
Is pulsator performance important; what changed?



Pulsation system maintenance

- Pulsator rebuilding schedule based on manufacturer's recommendation.
- Short air tubes, 2 months maximum!
- Twin tubing to units from curb manifold, or pulsator depending on location, every 4 months Maximum




20 PM
DATA SUMMARY
Pulsation 1 (PLOT)
Rate: 63.83 PPM
Ratio: 67:33
A Phase: 14% 132mS
B Phase: 52% 493mS
C Phase: 9% 88mS
D Phase: 24% 226mS
A+B Phase: 67% 626mS
C+D Phase: 33% 314mS
Vacuum: 13.5inHg
DATA SUMMARY
Pulsation 2 (PLOT)
Rate: 63.80 PPM
Ratio: 66:34
A Phase: 17% 159mS
B Phase: 49% 464mS
C Phase: 8% 74mS
D Phase: 26% 244mS
A+B Phase: 66% 622mS
C+D Phase: 318mS
Vacuum: 13.0inHg
Limp: 0%
21




DeLaval





System Maintenance

- Milk hoses; curb to claw every 4 months maximum
- All other milk & wash hoses, annually





Maintenance Vacuum System

- Are filters on "add air valves" on the schedule?







- Are vacuum regulators maintained according to the manual?



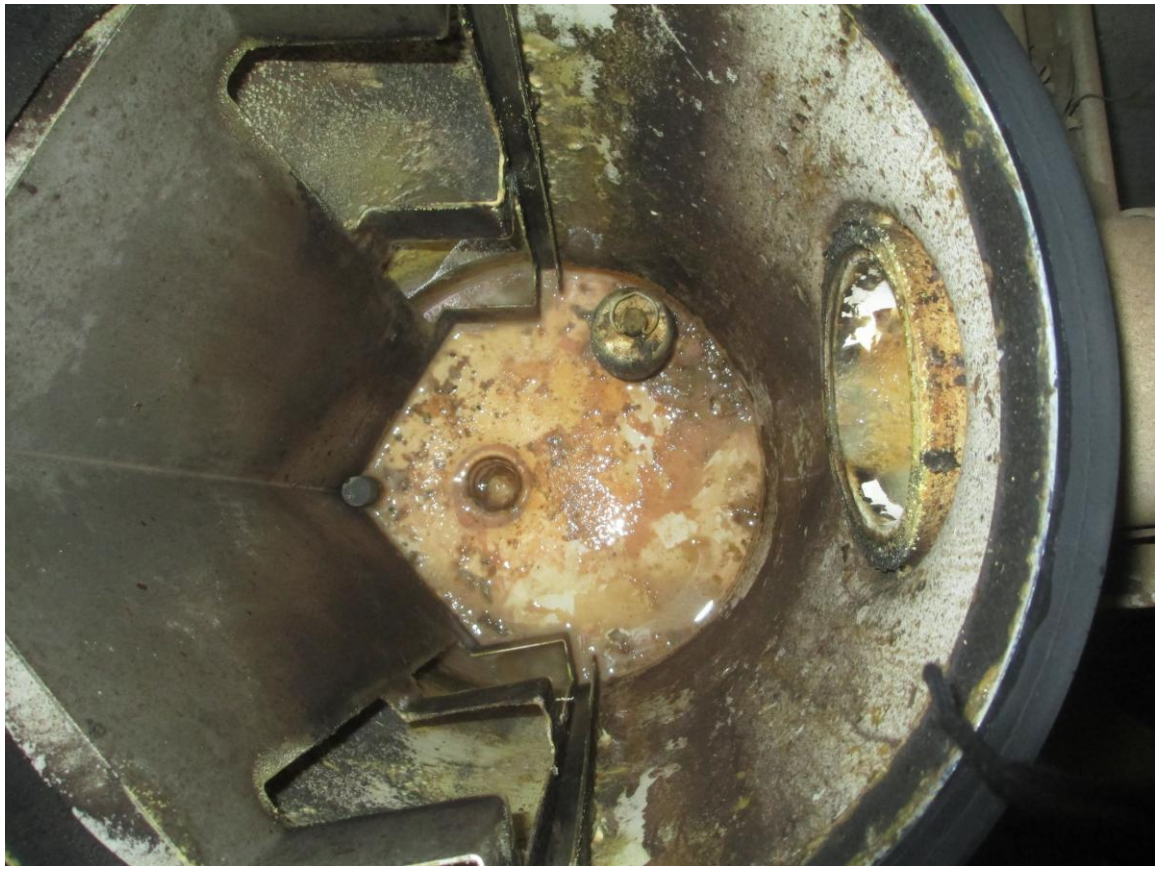








These Filter tanks will not pass the “Vet Test”!

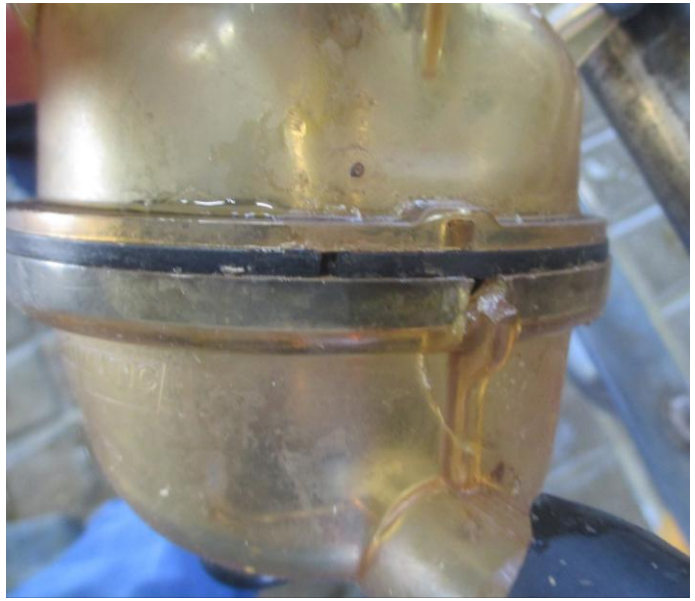


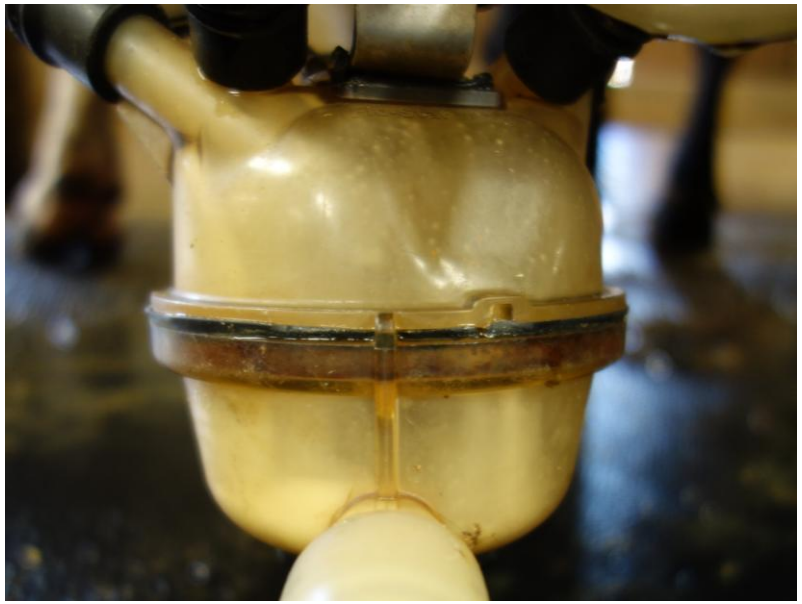


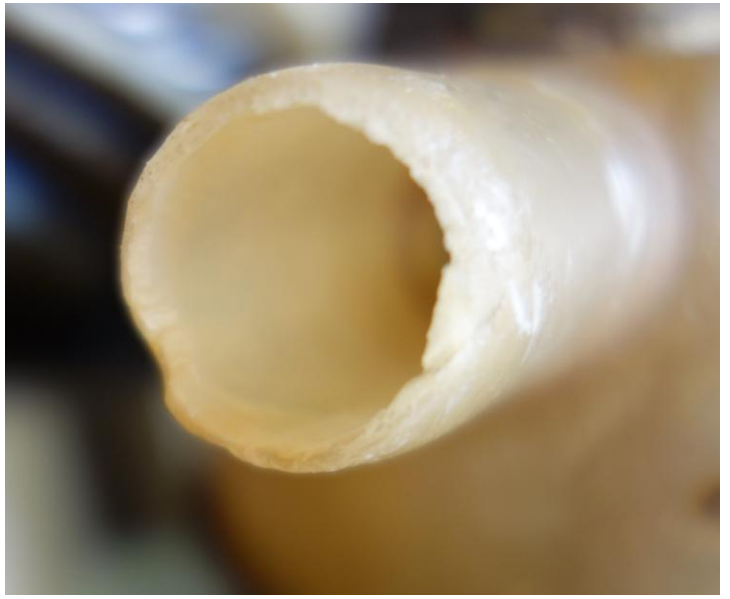
Claw Gaskets

- High use 18+ hrs/day, 6 month maximum
- Inspect at every gasket change









Maintenance Wash System

- Air injector filters & air blow filters





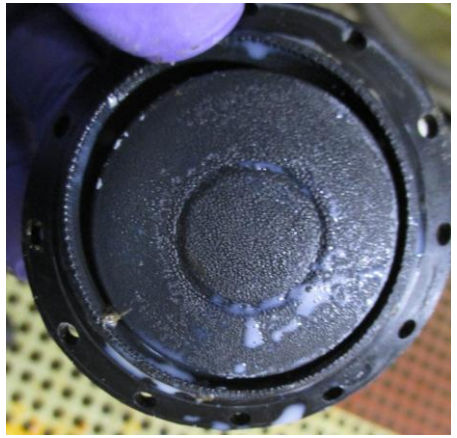


- Scheduled chemical pump capacity evaluation; is the volume correct?

System Maintenance



- Diaphragms in shutoff valves
  - No more than 4 months









- Retraction cylinders & connections to claws
  - How many units hit the deck?
  - How many units hang on the teats after retraction starts?



Parlor Considerations

- All parlors have a limit to the number of cows that can be successfully milked, what is your parlors capacity?
  - Quickly, gently and completely

- What happens when a glitch occurs, how far behind do you get.
  - 4000 cows, 3X = 6.9 turns/hour
  - Stressed milk harvest technicians
  - The milk you miss never comes back!

- Are those extra cows really worth it?

Parlor Upgrade Considerations

- If you build a bigger parlor, does it fit your current pen sizes?
  - Holding pen size
- Many existing parlors do not have basements
  - Shutoffs, sensors, or meters are in a very difficult position to service
  - May require significant labor to achieve proper slope to the milk lines, pits for receivers, relevel milk lines
- Parallel parlors loss efficiency as they get longer
  - Expansion may not bring the anticipated capacity potential
  - Load times are at least 1 second per stall

Parlor Expansions/New parlors

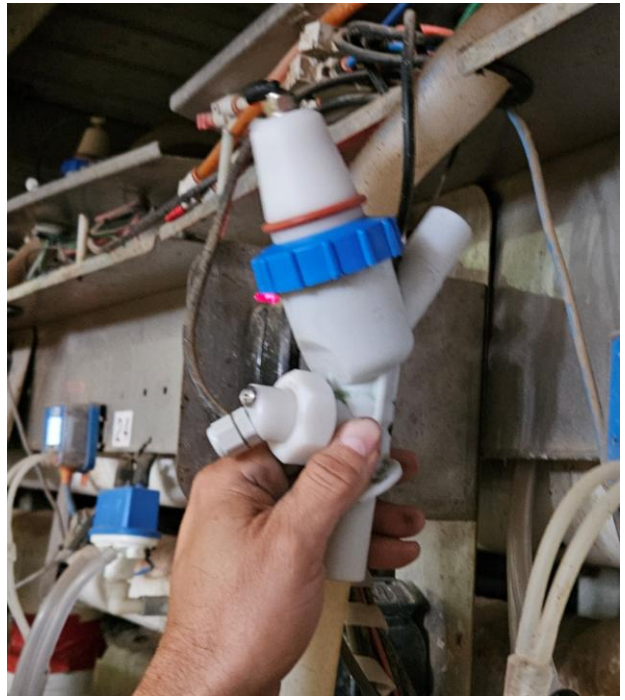
- Closely review installation plans, build it right the first time!
  - Do all areas have correct slope and grade of concrete, hire an engineer!
  - Are there test ports installed at correct locations
  - Consider methods to reduce noise

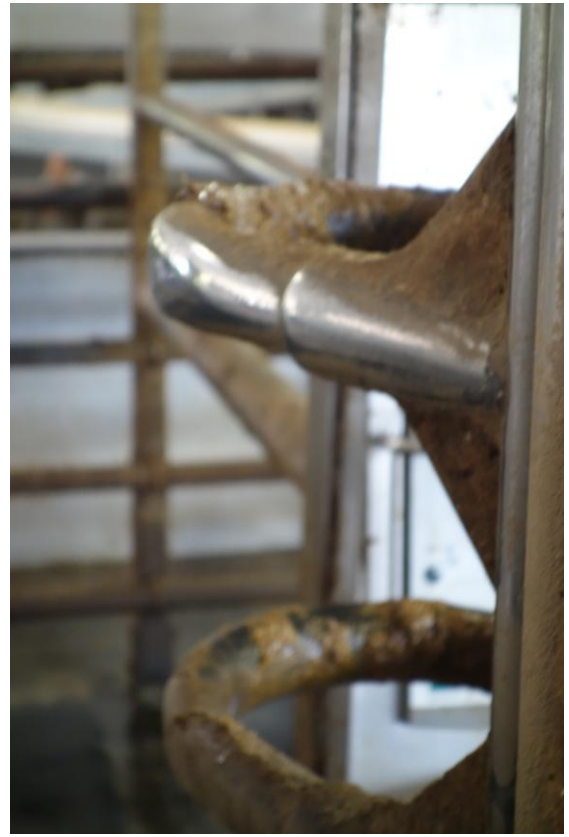




Parlor Expansions/New parlors

- Install it correctly the first time
- Do all low points on vacuum supply lines have drains
- Do all vacuum supply lines have inspection ports/tees
- How easy it to access
  - Pulsators
  - Shut off valves
  - Meters
  - Retraction cylinders
  - Other monitoring devices





Proliferation of large Rotary Parlors

- Easier to train milk harvest technician's; constant position
- Can allow for automation as newer systems come on line which can operate faster, ie pre-post dip robots/arms
- Question:
  - Why do most if not all have wide entry ways?

Natural cow behavior is to follow another cow





Large Rotary parlors

- Normal walking speed for a dairy cow is 2 miles per hour
  5280 ft X 2 = 10,560 ft/hour
  10,560 divided by 60 = 176 ft/min
  176 ft/min divided by 60 = 2.93 ft per second

Do we need entrance alleyways that are 8 or more feet wide?

Rotary Shielding

- Most rotaries do not have shielding high enough
  - Cows should not be able to see over the top, focus cows on the cow in front of them, line them up single file and build the entrance correctly







Reid's top 3 What's New

- DairyProX from GEA.com
- Vortex by Udderways.com
- Shelex 360 auto assist system from Ag Sherpa info@agsherpa.ca

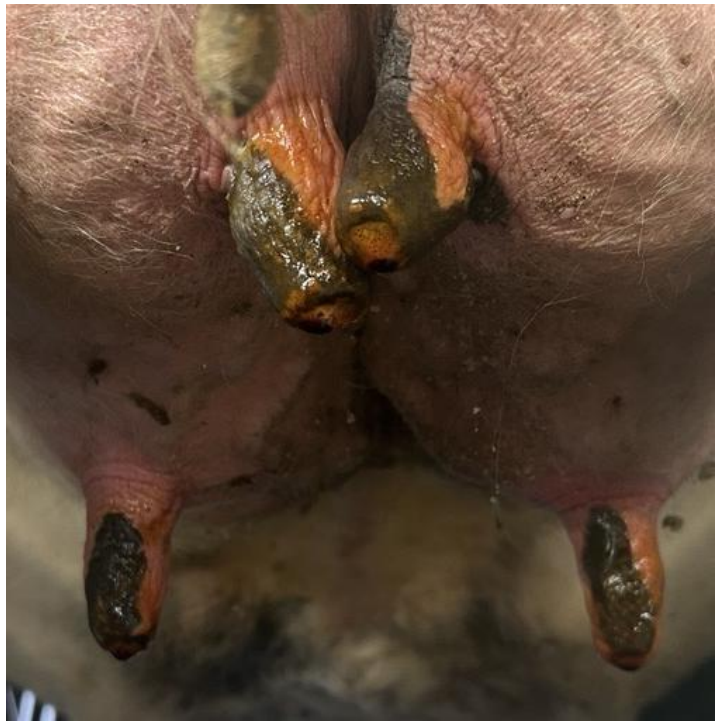
DairyProX

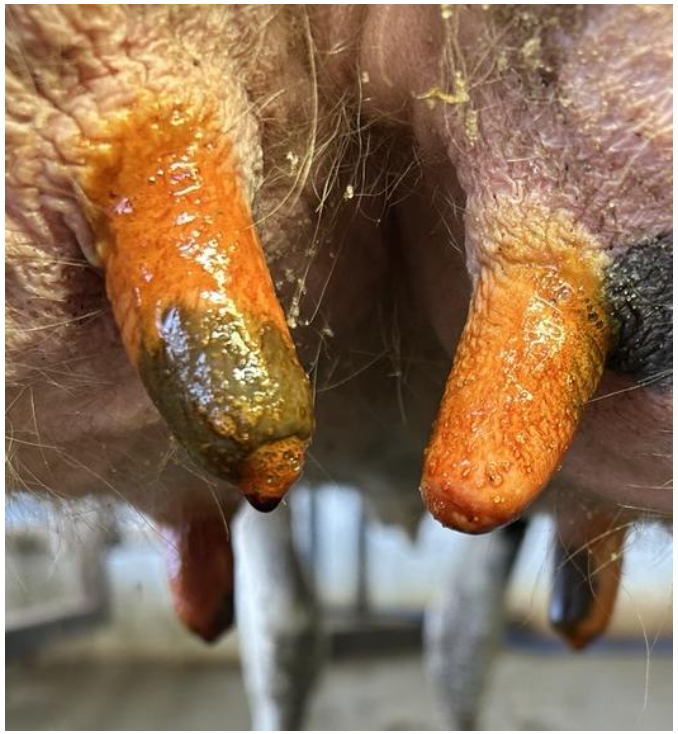
- Removes the arm & camera, technicians only attach units, with the advantage of “absolutely consistent” udder preparation!
- Components are installed in the basement, a much better environment than a box robot!
- Now with several test dairies in NA
- Works with any system with a basement, will need GEA claws and liners only, can keep automation/meters


GEA
DairyProX


GEA
DairyProX

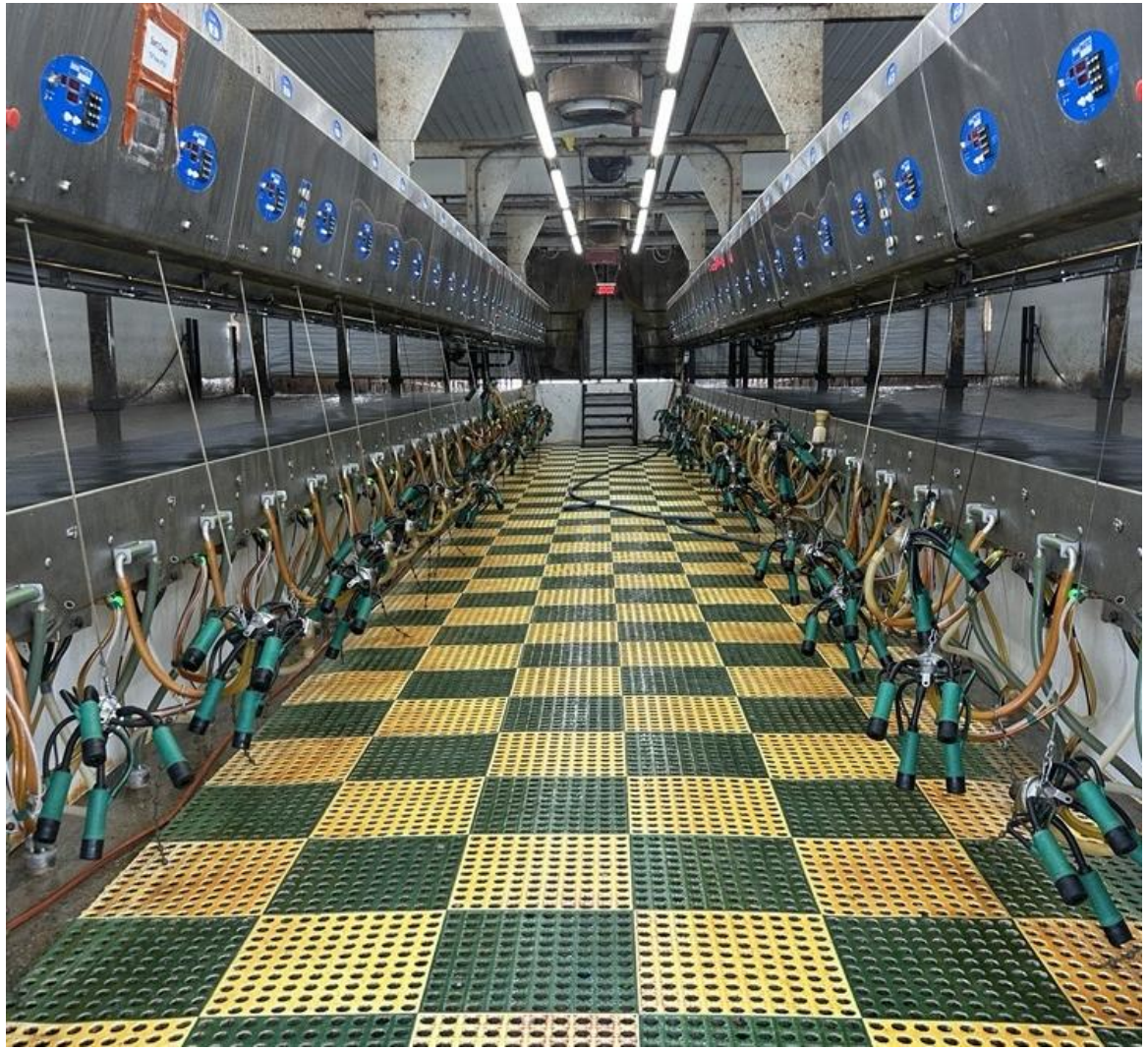

GEA
GEA
GEA
GEA











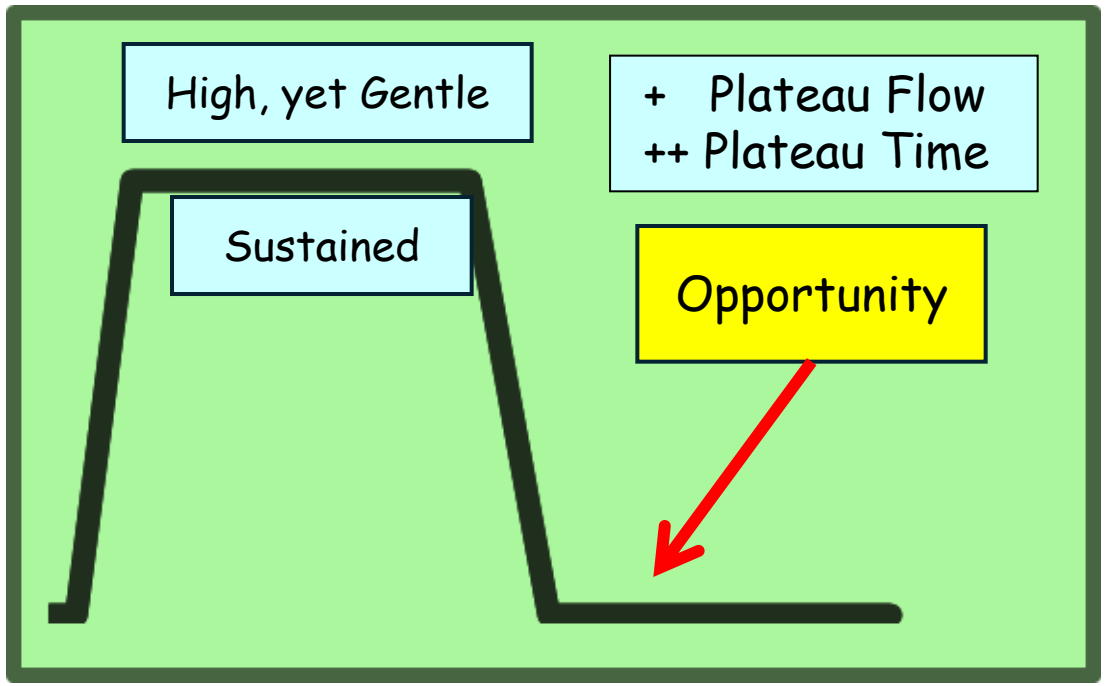







1
2

DairyProX



1. The milk flow graphs approach the model used by Steve Stewart, DVM for milk line capacity calculations in 2025

2. Once the cleaning/stimulation phase ends, rapid increase to plateau milk

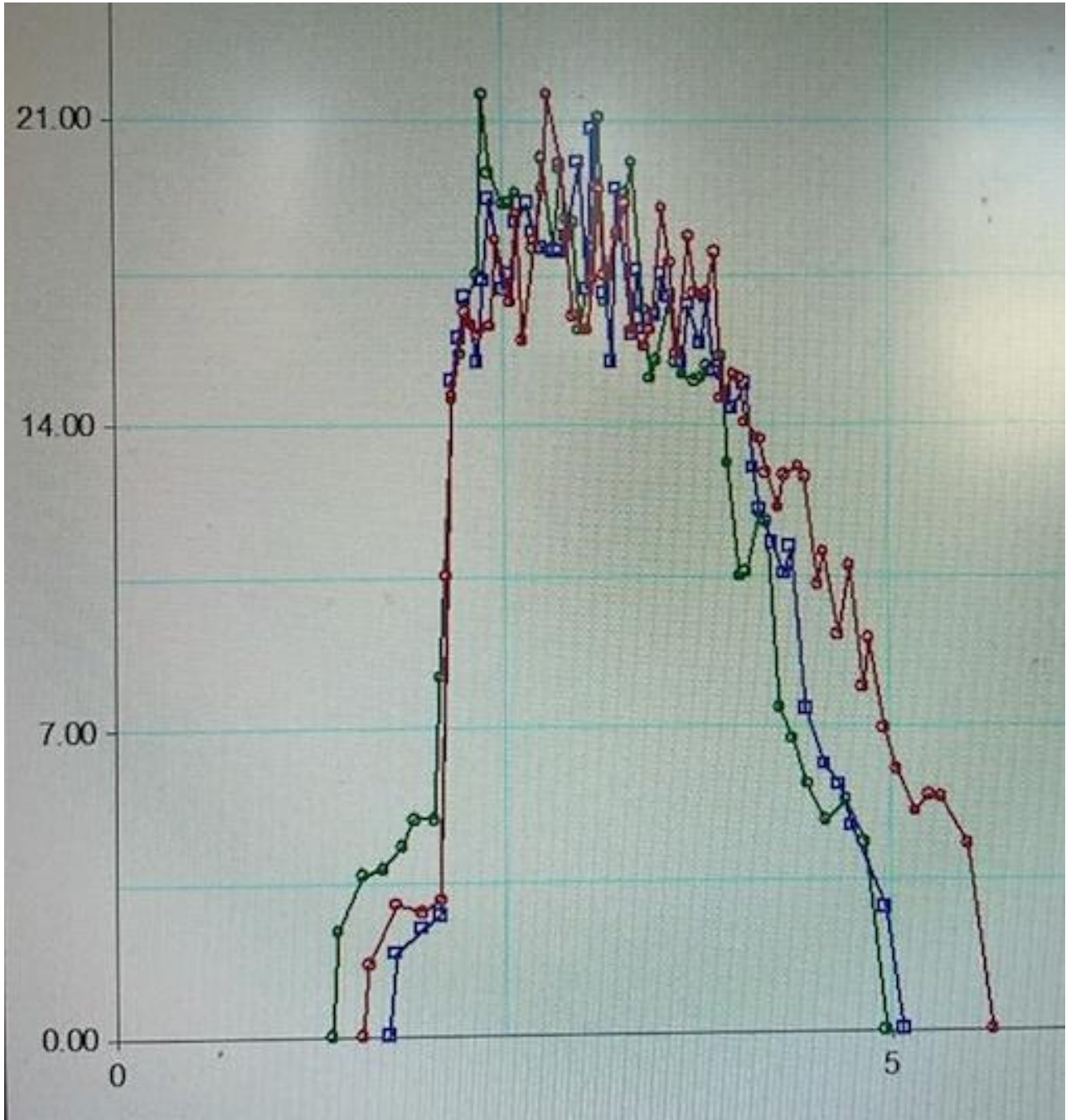
3. Opportunity to remove unit and reduce unit on-time

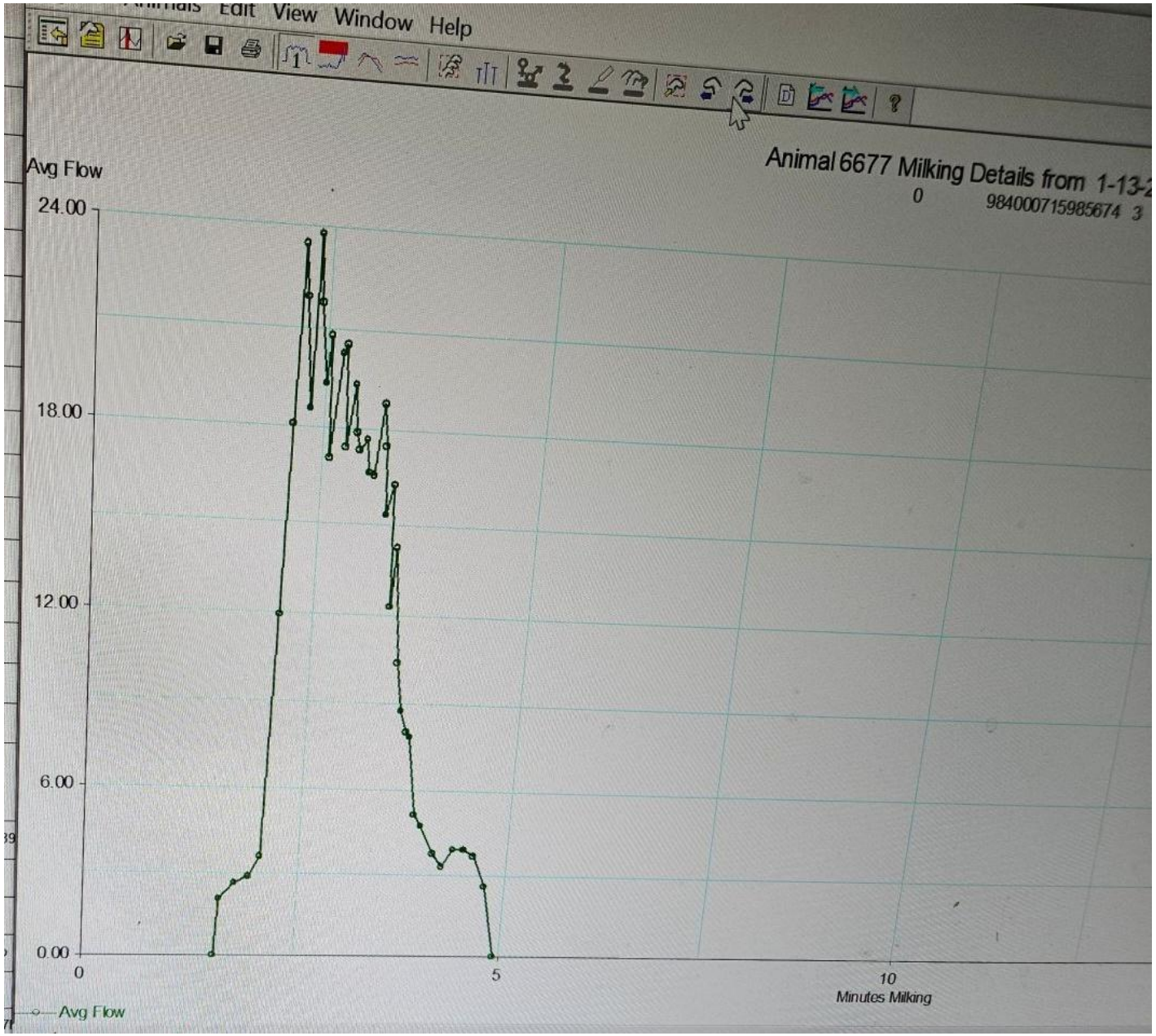
3 Milkings Same Cow with exactly the same udder preparation

red 35#

blue 32#

green 26#




Edit View Window Help
Avg Flow
Animal 6677 Milking Details from 1-13-2
0
984000715985674 3
24.00
18.00
12.00
6.00
0.00
0
5
10
Minutes Milking
Avg Flow

Vortex by Udderways.com

info@udderways.com 585-201-8332

- Uses high pressure water and compressed air to clean & stimulate cows.









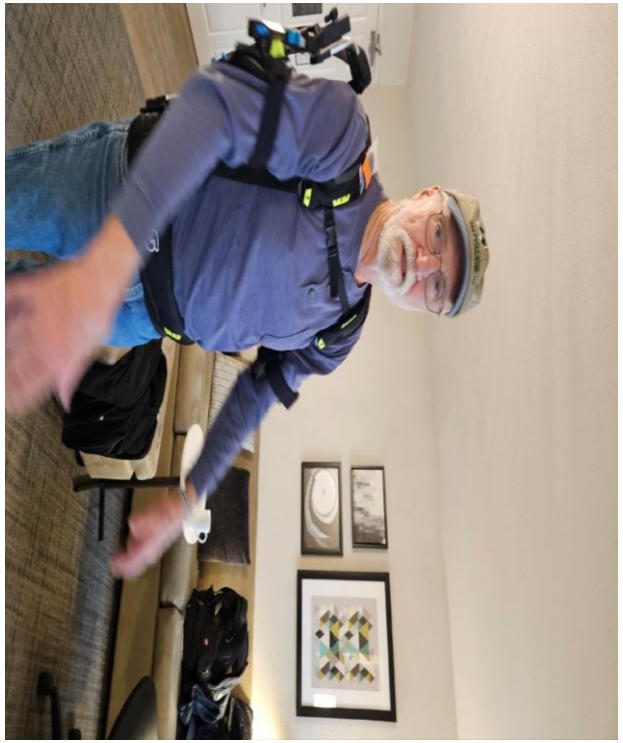
Vortex: Actively looking for trial herds

- Advantages
  - No brushes; limits contamination
  - Testimonials say that the unit actually has some lift due to the spray pattern
    - Low fatigue for milk harvest technicians compared to conventional brush systems
  - When used properly, drying is without towels

- Challenges
  - Water use level
  - Still investigating germicides compatibility and still be economical for the volume of water requires

Skelex 360

Skelex 360 takes a literal weight off your shoulders—lightweight, maintenance-free, and designed to support your arms during milking and overhead tasks





Skelex 360

- Reduces fatigue, especially when brush systems are being used.







Ray Brubacher Story BullVine

Bullvine.com founded by Andrew Hunt

- A legendary Holstein breeder and judge
- This article highlights his character, honesty and relationships over his career. He left several high profile jobs due to changes made to verbal agreements. He based his career on "Trust".
- This story also highlights the changing dairy landscape; we are losing roughly 4+% of the dairy herds in the US every year
- **Will you still be milking cows in 2035 when USDA projects 15,000 herds left in the US?**

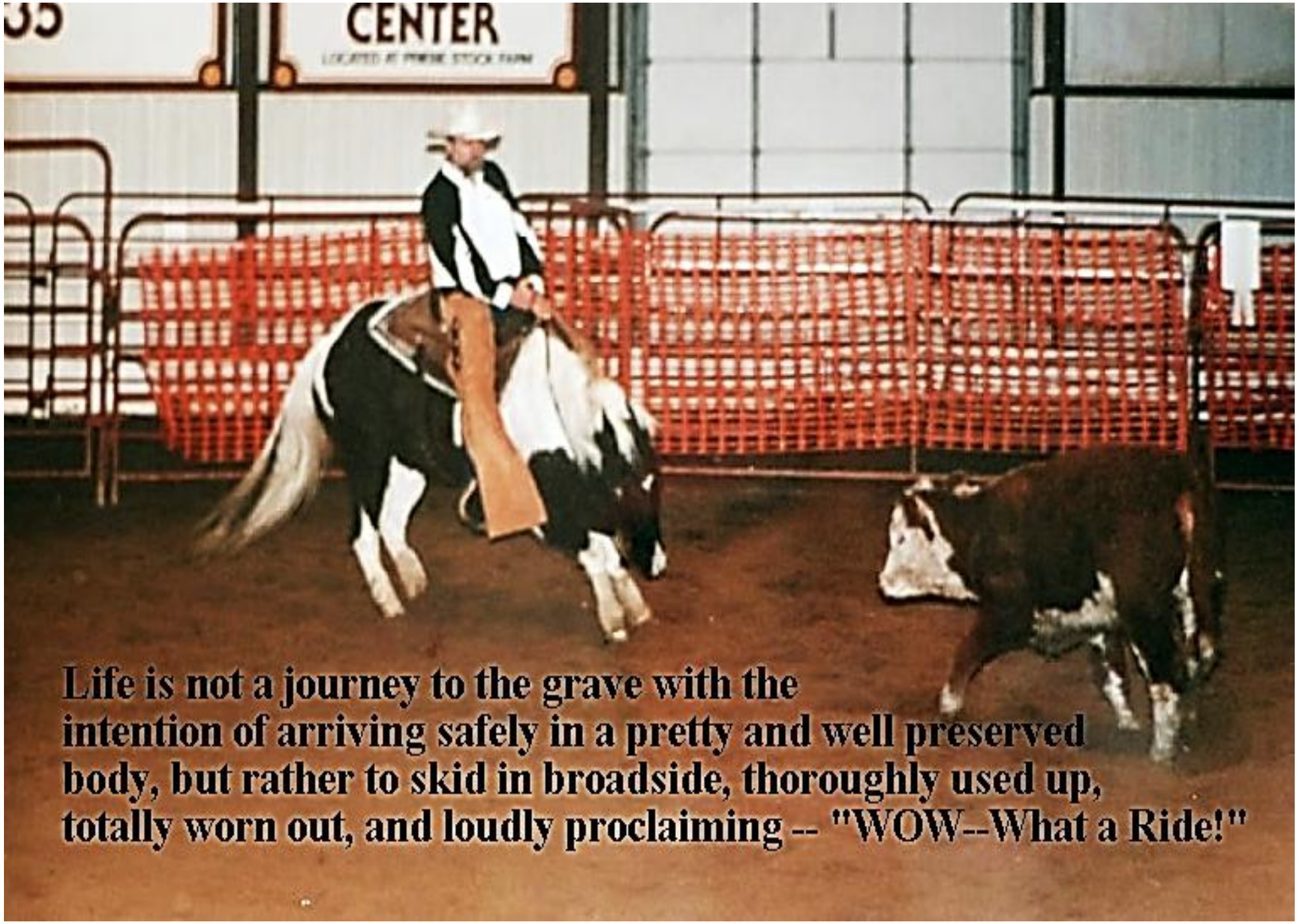
Highlights from this article:

- "Think about your operation right now.
  - Your banker
  - Your feed supplier
  - Your veterinarian.
  - Your milk buyer
  - Your employees
- Do they trust your word?
  - When you say you'll do something, do you do it?
  - Even when it's inconvenient?
  - Even when circumstances change?"

- “Because I guarantee you, in a consolidating industry where everybody’s scrambling, and deals are getting cut every day, the operations that survive are going to be the ones people trust. The ones where a handshake still means something. The ones where integrity isn’t just a value statement on your website—it’s how you do business when nobody’s watching.”

- “Your word is the only thing that appreciates while everything else depreciates.”

- “Reputation is your only appreciating asset. Barns depreciate. Genetics become outdated. Trust compounds.”

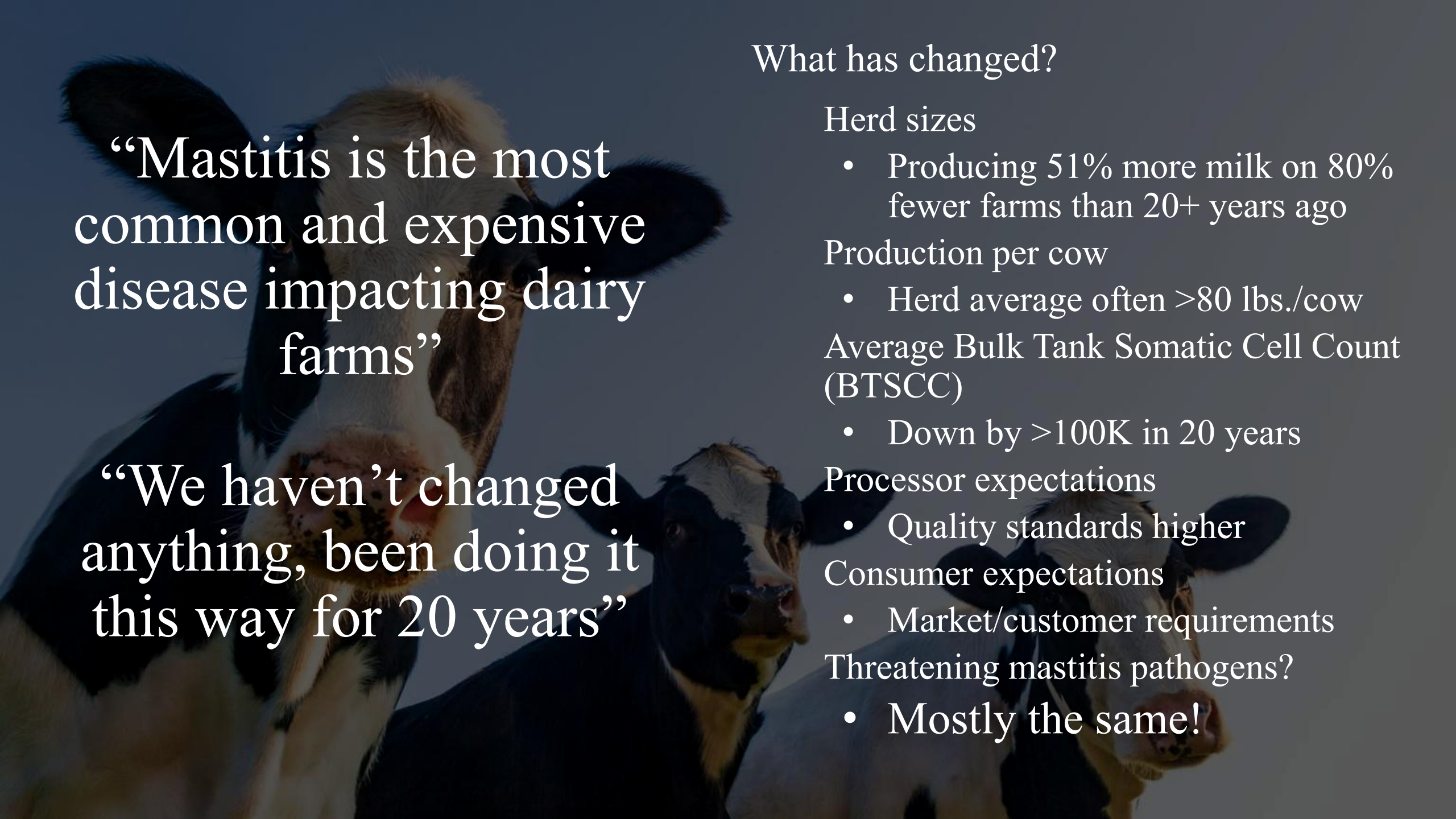

CENTER
Life is not a journey to the grave with the
intention of arriving safely in a pretty and well preserved
body, but rather to skid in broadside, thoroughly used up,
totally worn out, and loudly proclaiming -- "WOW--What a Ride!"

Georgia Dairy CONFERENCE

SAVANNAH GEORGIA

Milk Quality Management: Turning Diagnostics Into Decisions

Dr. Justine Britten
Udder Health Systems
Georgia Dairy Conference, Savannah, GA 2026



"Mastitis is the most common and expensive disease impacting dairy farms"

"We haven't changed anything, been doing it this way for 20 years"

What has changed?

Herd sizes

- Producing 51% more milk on 80% fewer farms than 20+ years ago

Production per cow

- Herd average often >80 lbs./cow

Average Bulk Tank Somatic Cell Count (BTSCC)

- Down by >100K in 20 years

Processor expectations

- Quality standards higher

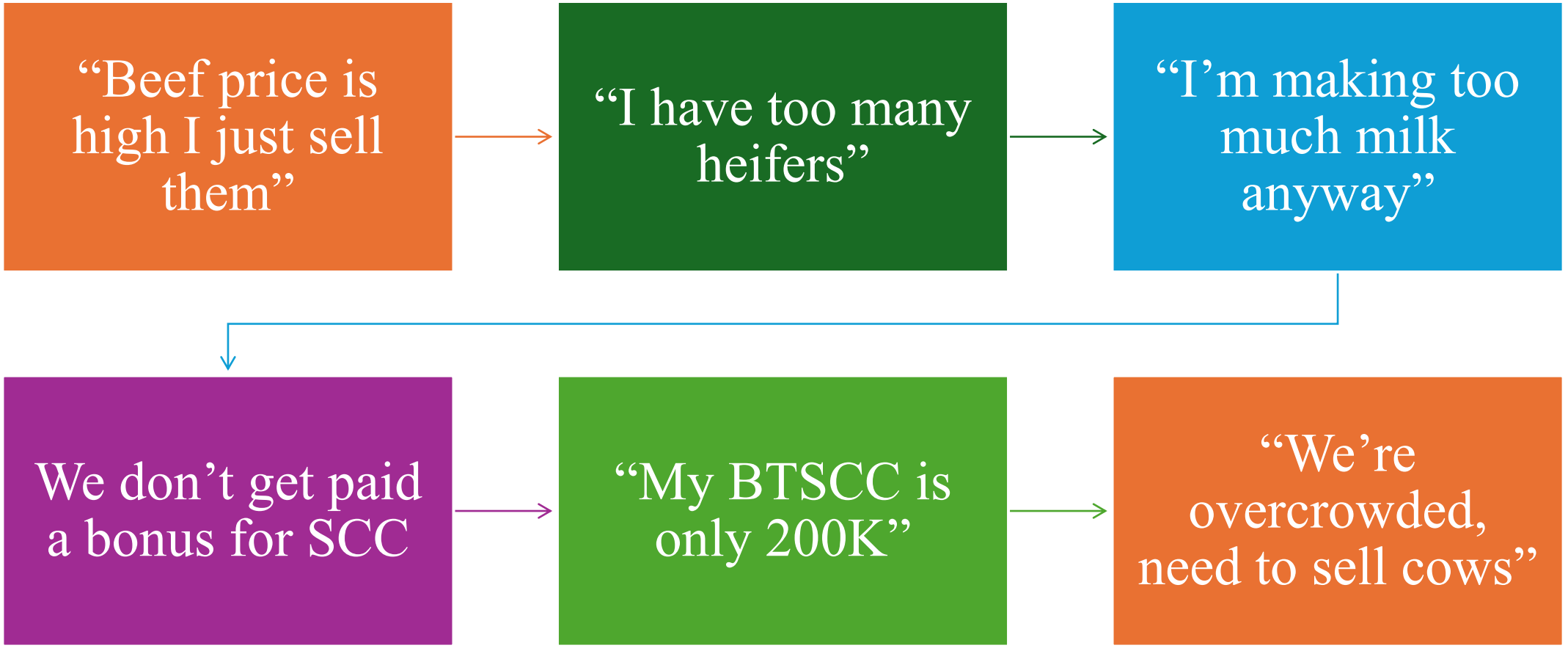
Consumer expectations

- Market/customer requirements

Threatening mastitis pathogens?

- Mostly the same!

So, what's the problem?

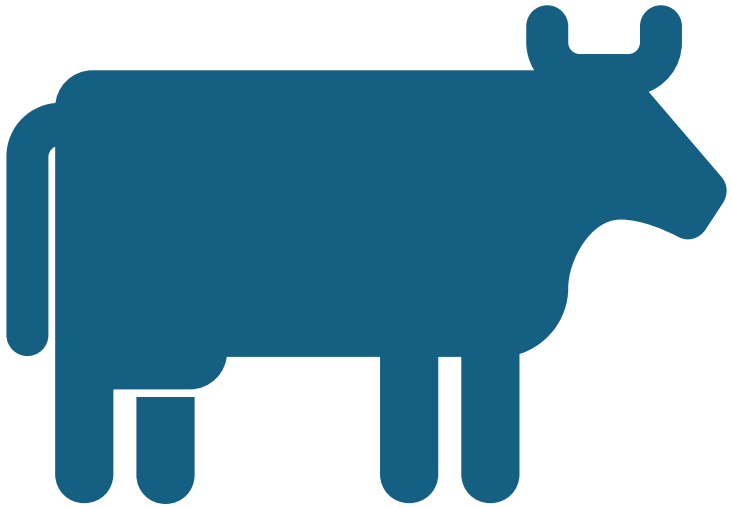


Why Diagnostics Matter

Things I hear the most….

- “I feel like we’re having more mastitis”
- “Seems like there are more Staph cows this month”
- “We’ve never had this many __()___before”
- “But we haven’t changed anything”

Don’t GUESS, use DATA!



Fact: You have an enormous advantage with the dilution effect of a large herd

Fact: This becomes a double-edged sword when disease containment becomes necessary on a large scale

Why do we care?

- Mastitis can and will hide and smolder in your herd
- Contagious mastitis is still a major threat to all herds
- This smolder *will* become a fire *when* enough variables in the equation change
- If you don't have a plan for Contagious Mastitis, it has a plan for you!

Learning Objectives

- Key characteristics of major contagious pathogens
- Real world examples of contagious outbreaks
- Levels of on-farm lab programs
- Advantages and pitfalls of PCR use

Contagious Pathogen Updates

Perspectives and Data from a Milk Quality Lab

Contagious Mastitis Pathogens

Goal: Identify, Control and Prevent

Source: udders, cow to cow transmission

Targets:

- Staph aureus
- Strep ag
- Mycoplasma
- Prototheca





Prototheca

Key Challenges and Solutions

Prototheca

Rising prevalence?

Or are we just getting better at detecting?

Need to make sure we're asking the RIGHT questions!

	Prototheca (+)	# Of Bulk Tanks	% Positive
2008	2	541	0.4
2009	5	488	1
Jan-April 2010	4	404	1
May-Dec. 2010	130	579	22
2011	157	474	33
2012	119	483	25
2019	158	612	26
2020	154	675	23
2021	153	570	27
2022	161	535	30
2023	134	498	27

Eradication Challenges

Low SCC: Very poor indicator of infection

Subclinical

Underestimating cow to cow transmission

Under detection – Culture protocols may miss, **why**?

- Non-selective agar
- Slow growth
- Low shedding
- Pooling

Prototheca in the Environment

Environmental Sources – Relevant but KEY reservoir is the cow

- It WILL be in bedding if in the cows!

Water sources

- Variable but less likely
- Flush water often problematic

	Bedding	Water	Towel
None Detected	374	142	16
Prototheca Spp.	274	19	2
Totals	648	161	18
%	42%	12%	11%

Prototheca in the Cows

Reason Sampled	Total Positives	Blood Agar Positive	Prototheca Agar Positive	Total Samples	% Prevalence
Fresh	644	33	611	13771	5%
Clinical or High SCC	952	339	613	16632	6%
Herd Culture	185	0	185	4843	4%
Hosp. Out/Dry-Off	62	0	62	2013	3%
Retest	45	1	44	506	9%
Unknown Reason	364	100	264	5232	7%

UHS Cow cultures – Blood Agar: 186,438 (2015-2020)

- 251 Prototheca isolates identified – 0.14%

UHS Cow Cultures – Prototheca Agar: 106,219 (2015-2020)

- 2,676 Prototheca isolates – 2.5%

Mastitis Species = *Prototheca bovis*

Prototheca Detection Frequency

	2022	2023	2024	2025	2026
Test Positive	52	55	13	4	0
Tests Total	58	98	71	212	4
Percent Positive	89.7%	56.1%	18.3%	1.9%	0.0%

When do you go further?

Is it in the bulk tank?

- Should trigger investigation

Is the bulk tank SCC elevated?

- Often not a good indicator

Are there clinical cases?

- Cow to cow transmission IS a concern!

Outcome

String Samples – July ‘23

14 Total pens

Cultured all for Staph aureus & Prototheca

10/14 Pos. for one or both

Kept Chasing….

~600+ samples (Herd)

Began Fresh screening

Sampled Ind. Cows

~1200 total samples

69 Staph aureus cows

11 Prototheca cows

Clean Tank – June ‘24

Took 1 year of strings, mass sampling events and fresh screening to finally eradicate

Repeated Strings

2 Pens Pos. – Prototheca

7 Pens Pos. – Staph aureus

Another example….

4000 cow dairy; milking on 80 stall rotary, new startup 2021

Culture program: (University VDL)

- All fresh cows and heifers
- All mastitis cows

40% of fresh cultures positive for Prototheca

- Began late January 2025

December 2024 Bulk Tank SCC = Avg. 150K

March 2025 Bulk Tank SCC = Avg. 300K

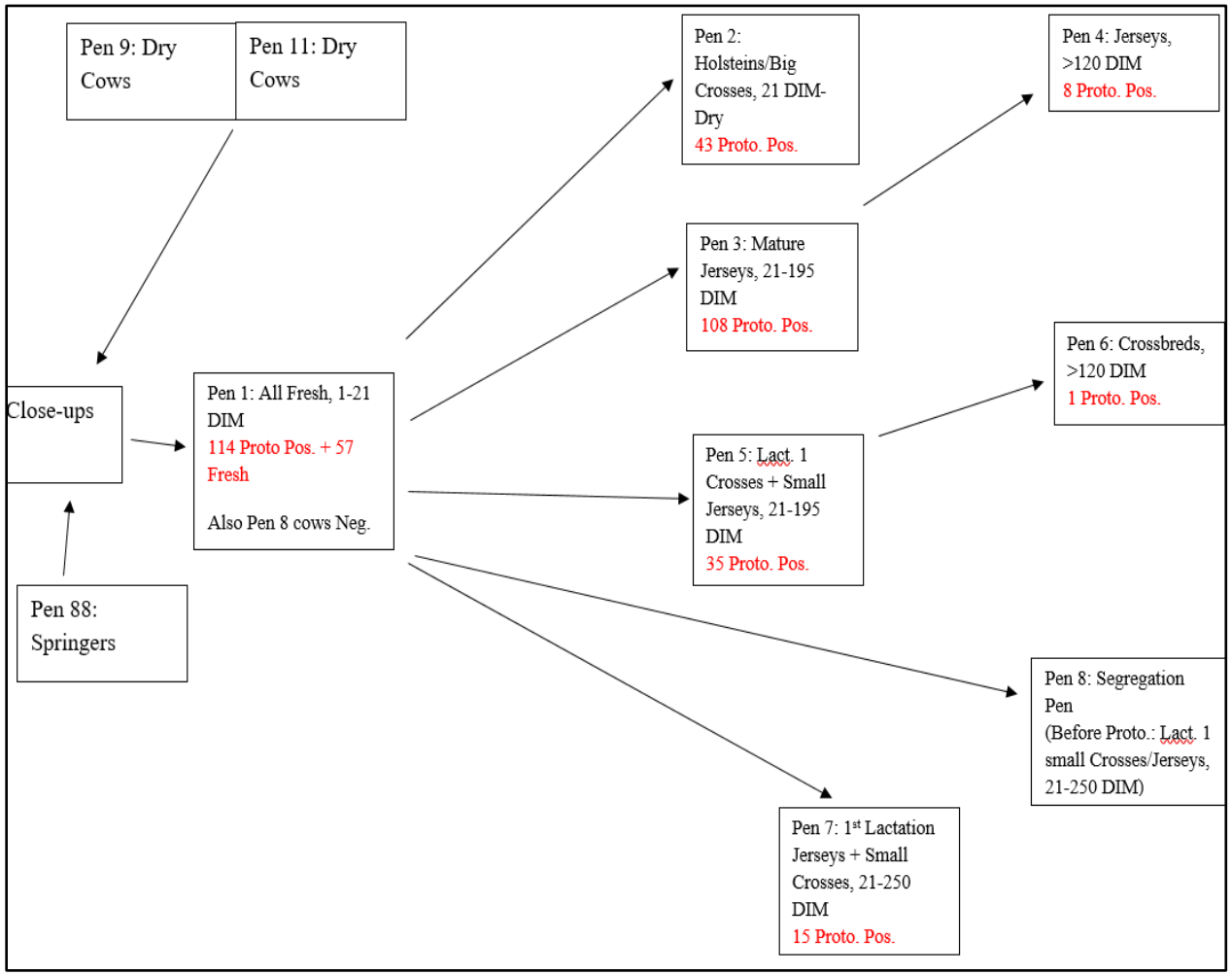
What would YOU do?



Herd Summary Report For 2025

POSITIVES

Month	Streptococcus agalactiae (1)	Staphylococcus aureus (3*)	Prototheca (15)	Mycoplasma (18)	Totals
January	-	-	-	-	0
February	-	-	-	-	0
March	-	125	416	-	541
April	-	17	65	22	104
May	-	21	105	4	130
June	-	7	10	3	20
July	-	23	5	1	29
August	-	17	3	1	21
September	-	24	9	-	33
October	-	3	3	-	6
November	-	5	9	-	14
December	-	10	21	-	31
Total Positives	**0**	**252**	**646**	**31**	**929**
Total Tests	**8736**	**8736**	**10581**	**7967**	



Outcome

Take Home

- Segregate or eradicate; MUST contain the problem!
  - Focus on cow to cow transmission
  - High quality germicides and backflush
- Aggressive approach has been most successful in my experience
  - Ensure “clean” pens are truly clean!
- Every contagious has a tipping point!

Staph aureus & Strep ag

Are they back?



Is Staph aureus still a problem?

<u>The #1 pathogen I am dealing with in large herds</u>

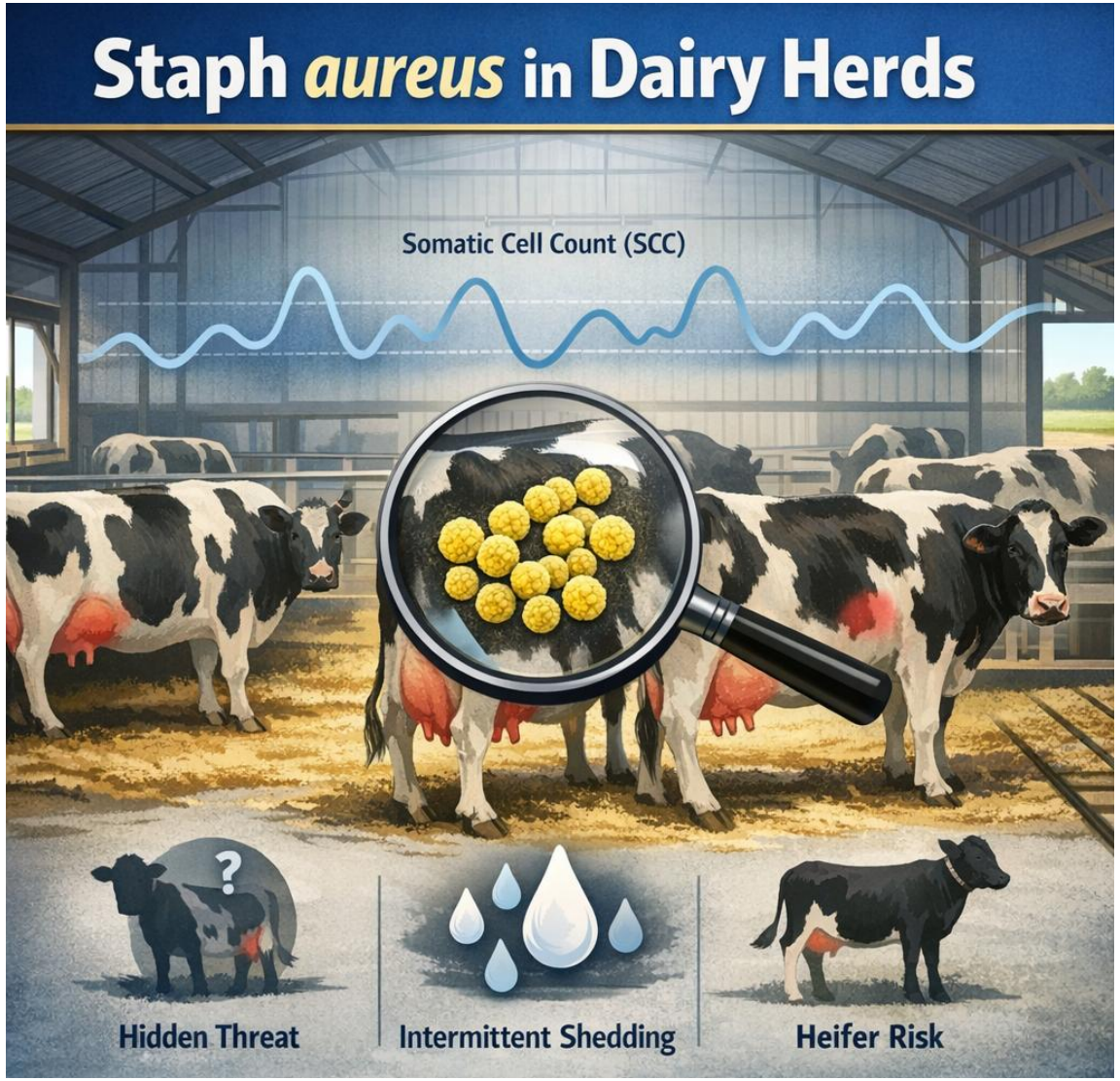
WHY???

Haven’t we learned anything about Staph aureus in the last 50 years???

Historical: High SCC cows/tank, clinical mastitis, exponential increase

Actual:

- Smolders and hides in herd
- SCC is a lagging indicator
- Low clinical mastitis rate
- Production relatively unaffected
- Slow progression
- Intermittent shedding
- Higher heifer prevalence



Cow and Tank SCC Impacts

Not all S. aureus cows will have an elevated SCC!

- SCC will increase over time as udder health declines and infection progresses
- Both number of infected animals **and/or** severity of infections can drive SCC

How many infected animals does it take for a tank to go positive?

- Many factors: size of the herd, size of the tank/silo, number of high shedders vs low shedders, number of animals infected, laboratory method/protocol

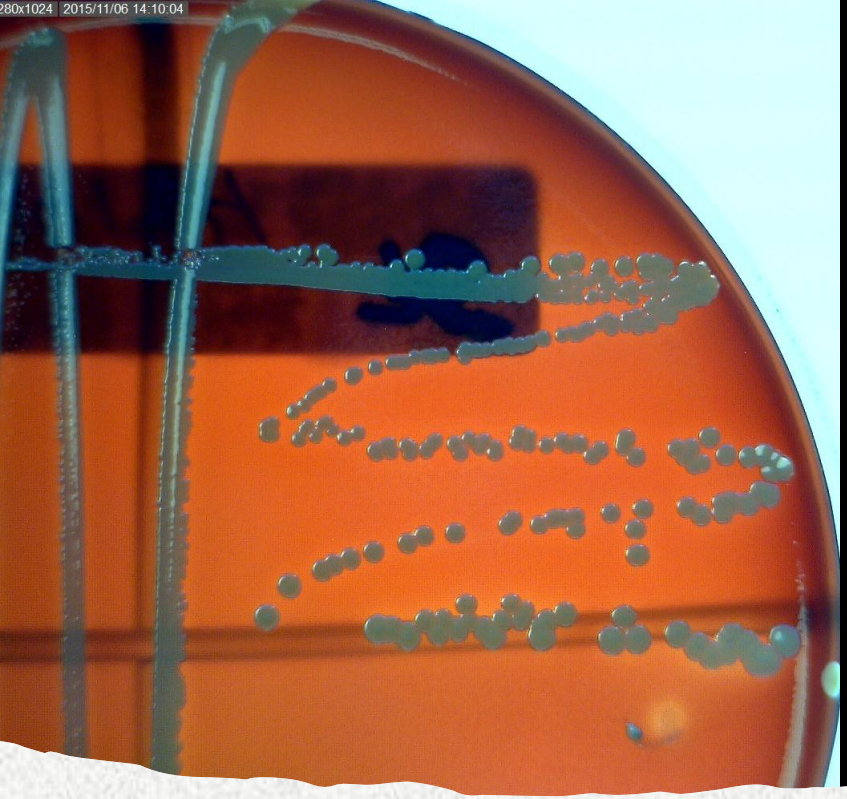
Relationship between culture status of tank and infection status in the herd is moderate at best!

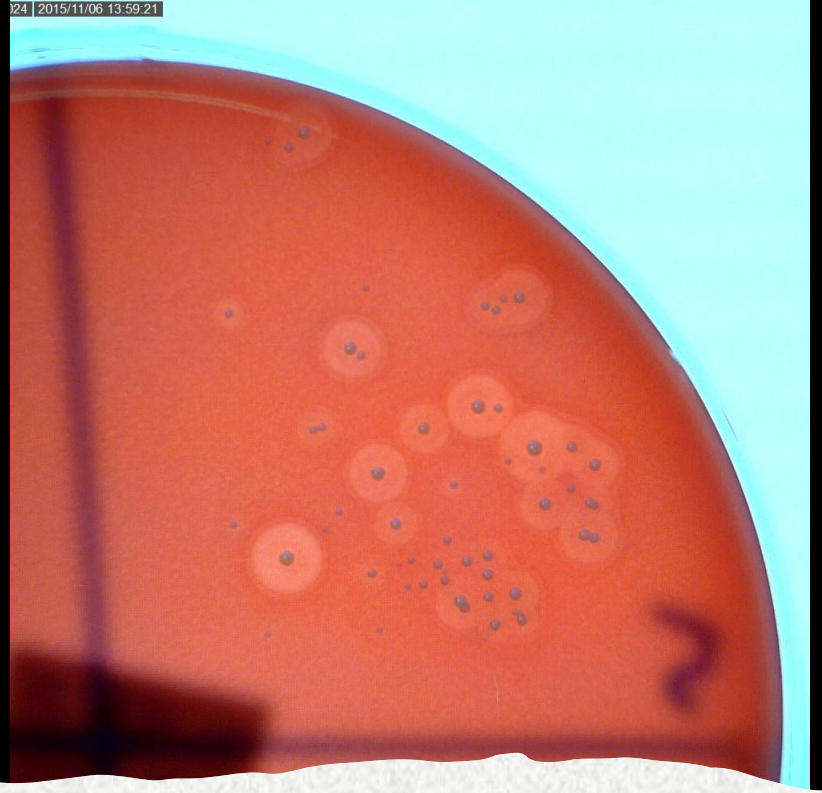
Staph aureus Culture Sensitivity

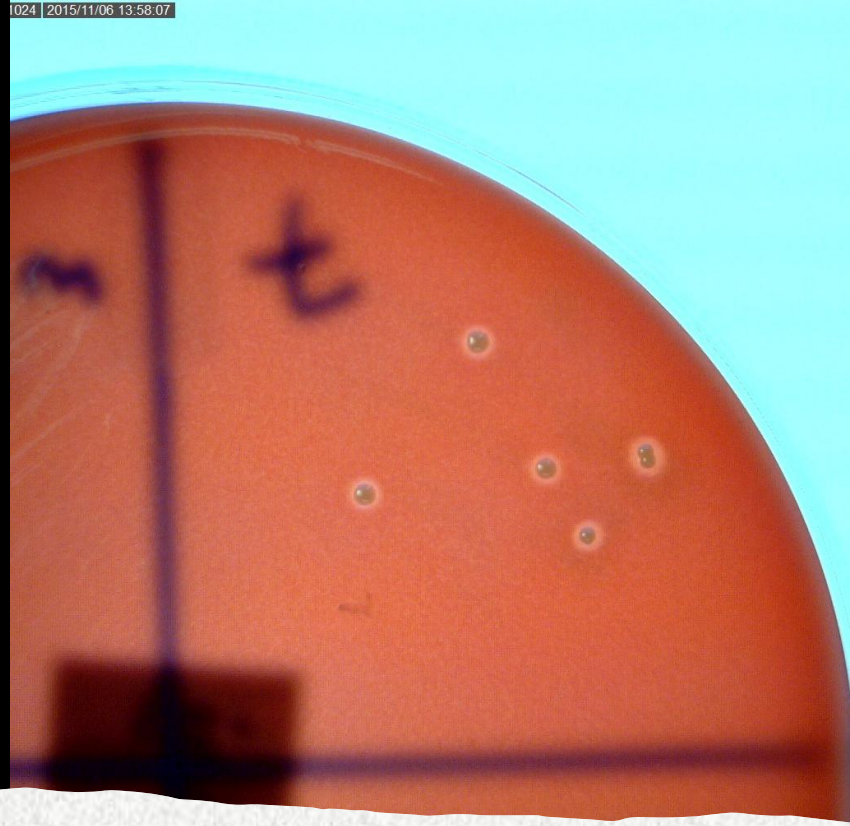
- Detection Range: 30-95%* (!)
- Sampling strategy will significantly impact
  - Composite
  - Quarter
  - Consecutive samples
  - Pooling
  - Volume

Cow ID	Result 1	Result 2	Result 3	Result 4	Result 5
3032	+	+	-	+	-
2575	+	-	+	N/A	N/A
2342	-	-	-	+	+
2259	+	-	+	N/A	N/A
3433	+	+	+	-	-

*Kenneth L. Buelow, William J. Goodger, Michael T. Collins, Murray K. Clayton, Kenneth V. Nordlund, Chester B. Thomas. A model to determine sampling strategies and milk inoculum volume for detection of intramammary Staphylococcus aureus infections in dairy cattle by bacteriological culture, Preventive Veterinary Medicine, Volume 25, Issues 3–4, 1996, Pages 343-355.







Staph aureus Variations

Culture limitations:

- Variable hemolysis → "Classic" Beta not reliable!
- Variable coagulase (rare)

These are all Staph aureus!

How many are we missing?

UHS Staph Study

Staph Aureus Research Project - Data Overview

Total Records

Total Records:	2016	RESEARCH:	1961	400:	55

Staph. aureus Biochemical Groups

Coag+ Beta+	164	66.9%	Coag+ Beta-	72	29.4%
Coag- Beta+	2	0.8%	Coag- Beta-	5	2.0%

Records by Lab (Not Including 400s)

Bellingham (1):	185	9.4%	Meridian (2):	1776	90.6%
Jerome (3):	0	0.0%	Layton (4):	0	0.0%

MALDI Results

Staph aureus (MALDI):	245	12.5%
Staph chromogenes (MALDI):	1213	61.9%
Staph haemolyticus (MALDI):	101	5.2%
Staph simulans (MALDI):	45	2.3%
Staph sciuri (MALDI):	29	1.5%
NRI:	93	4.7%
All Others:	234	11.9%
All Non-Blank Results:	1960	
Non-aureus Staph:	1565	79.8%

PCR Results

Staph aureus (PCR):	245	12.5%
ND (PCR):	1714	87.5%
Total Results:	1959	

Staph aureus in Heifers

Fresh Heifers

- Prevalence at calving may be high
- Some risk of “false” positive exists
- Reference range: 2-15%

When is it considered a problem?

- >10% is high and concerning
- >15-20% is very high
- Goal: <5%
- What can YOU control?
  - Sample collection, fly control, pasteurization

Treatment Outcomes

- Moderate to poor prognosis (~50-60%)
  - How defining cures?
  - Common: single negative culture, 2 weeks post treatment
  - Better: 3 negative cultures, at least 2 weeks apart

Five Pillars of Control

Teat dipping

- Products: 1% Iodine
  - Avoid cheaper germicides
- Coverage: robots, spray, walkovers, foam present some risk!

Backflush

- Iodine or chlorine
- Manual backflush→ Excellent tool if used consistently!

Dry treating

- Blanket antibiotic treatment
- Selective treatment or DCT Alternatives Risky

Identify, segregate or sell

- Quarantine pen
- Permanent ID and visible tag
- Can't manage what you can't see

Zero Tolerance

- Maintain a Negative Bulk Tank
- All Staph cows are sold

Strep ag…Should you worry?

- Very low prevalence but NOT zero
- Will “hide” in large herds – Frequently no consequence
- Organic herds at higher risk
- Herds with Selective DCT or no DCT at higher risk
- May smolder vs explosive outbreak; many variable
- False Positives are a significant Risk!
  - Strep uberis (common)
  - Others exist
- Confirmatory testing must be mandatory for Strep ag!
  - PCR
  - Maldi-ToF

Case Study

- 2000 cow dairy; Holstein, Montbeliarde, VikingRed crosses
- Milking 3x on a 60-stall rotary:
  - Premilking: Future Cow & attach
  - Postmilking: Walkover sprayer
  - No wiping or stripping steps
  - No backflush
- January 2025: Raw count = Avg. >25K, lost bonus
- Bulk Tank SCC: Avg. >200-250K, lost bonus
- February 2025 → Ready to take action

Mistakes were Made….

- Bulk tank positive for 3 years before action taken
- Walkover sprayer broke in April→ limited post dip application for 2 weeks
- Not all positive cows were sorted initially
- Selective dry treatment (maybe stopped altogether?)
- “Minimal” culture program
  - No fresh animals
  - 3-8 clinical samples/week
- No mastitis detection in milking procedure

Outbreak Timeline

Feb. 2025 – Cultured entire herd
- 599 Positive Strep ag
- 258 Staph aureus

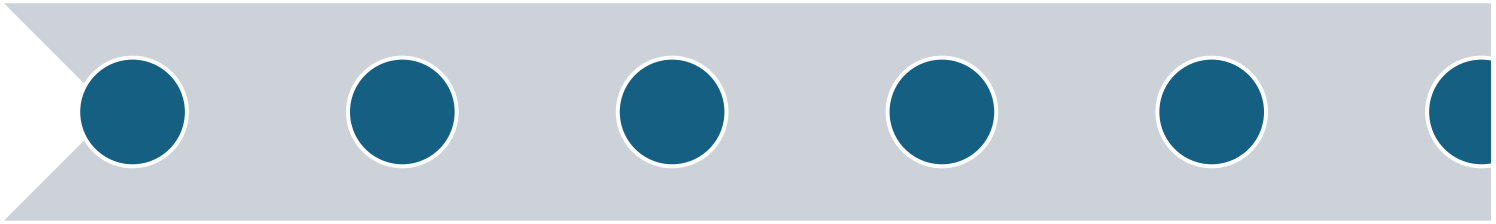
March 2025 – Began sampling fresh cows

April 2025 – Resampled fresh pen; >70% Strep ag, 30% Staph aureus

May 2025 – Began sampling fresh/breeding pens weekly

June-August – Strategically sampled pens, sorted, treated and resampled

July 2(Implem backflus medicate



Herd Summary Report For 20

POSITIVES

Month	Streptococcus agalactiae (1)	Staphylococcus aureus (3*)	Prototh
January	84	29	
February	626	263	
March	21	29	
April	173	83	
May	99	434	
June	73	206	
July	14	116	
August	10	28	
September	2	18	
October	2	21	
November	1	16	
December	3	12	
Total Positives	**1108**	**1255**	

A Word about Streps….

Very challenging to resolve on large dairies!

- *Strep dysgalactiae*
- *Strep uberis*
- *Lactococcus garviae*
- *Lactococcus lactis*
- *Enterococcus species*
- *And more*

Need to know:

- Culture accuracy is moderate at best → Maldi-ToF is King
- "Contagious like" – Bacterial load often high

HOW does knowing the species change management decisions?

Takeaways

- Germicides and backflush are your friends!
  - Manual backflush with medicated drop hose
- High bacterial loads on milking surfaces provide transmission opportunity
- Many infections will be subclinical
- Reduced antibiotic use allows opportunity
- High bacterial loads in bedding → Manure solids/recycled bedding WILL be a challenge!
  - Dryer is better
  - Killed with high heat is best
- Don't ignore chronic high SCC cows



On-Farm Lab Programs

Friend or Foe?

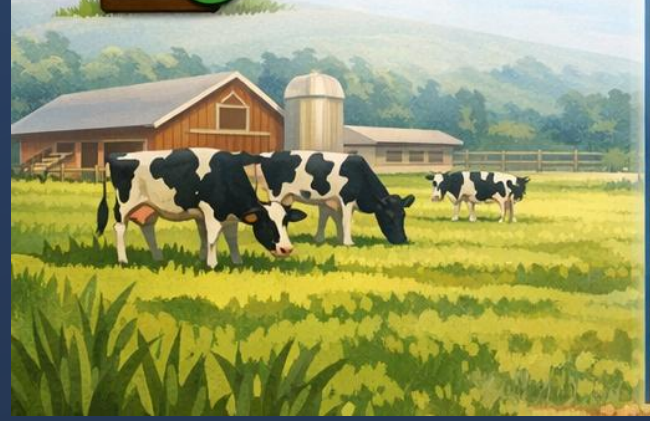
On-Farm Labs in Dairy Management

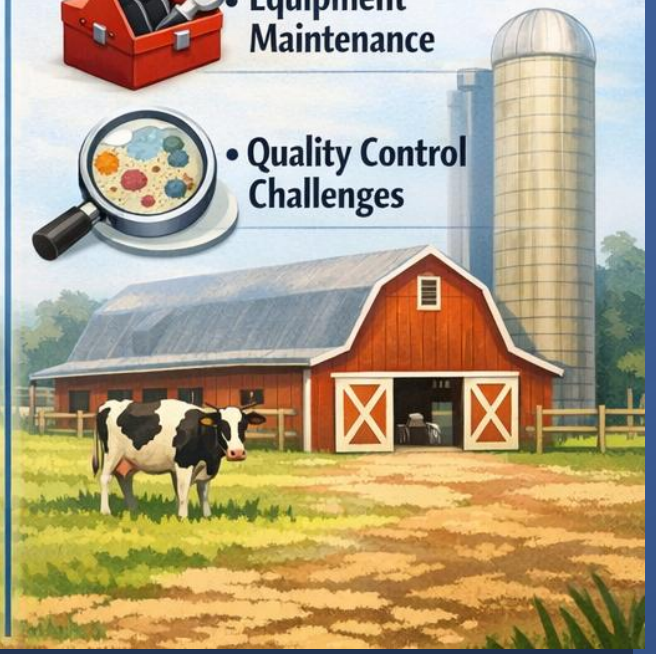
Advantages

- Faster Turnaround Time
- Cost Savings
- Convenience
- Immediate Decision-Making

Disadvantages

- Need for Specialized Training
- Risk of Misidentification
- Equipment Maintenance
- Quality Control Challenges





Scope of Service

- Contagious Mastitis Organisms
- Environmental Organisms
- Rare/low prevalence organisms
- Speciation
- Environmental testing
  - Water
  - Teat dips
  - Towels
  - Bedding

Organism	TNT	Level 1	Level 2	Level 3
Gram Positive	•			
Gram Negative	•			
Strep agalactiae		•	•	•
Strep non-ag		•		
Staph aureus		•	•	•
Staph spp		•	•	•
Mycoplasma		•	•	•
Coliform		•		
Bacillus		•	•	•
E coli			•	•
E-strep			•	
Strep spp			•	
Klebsiella pneumonia			•	•
Pseudomonas			•	•
Trueperella pyogenes			•	•
Strep uberis				•
Strep dysgalactiae				•
Serratia				•
Pseudomonas aeruginosa				•
Pasteurella				•
Proteus				•
Yeast				•
Corynebacterium bovis				•
Prototheca				•

Expanded On-Farm Testing

Options

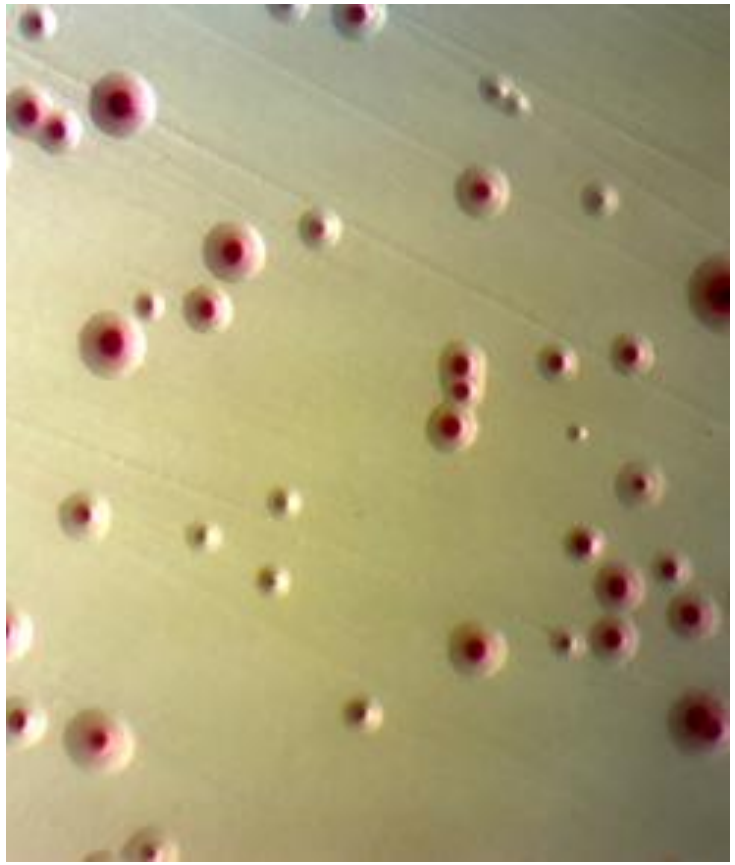
- Beyond the Bi-/Tri-plate
- Contagious: Staph aureus, Prototheca
- Mycoplasma? Gram-negatives?

What questions should you be asking?

- What is the primary goal for on-farm culture?
- Is there a target organism or group of organisms?
- Who will be responsible for oversight of the culture process?
- How will quality and accuracy be periodically audited?
- Can these objectives be met with on-farm or is a professional lab required to assist?

Selective Agar





Primary Isolation agar—Blood Agar

- Inexpensive plate
- Requires experienced analyst

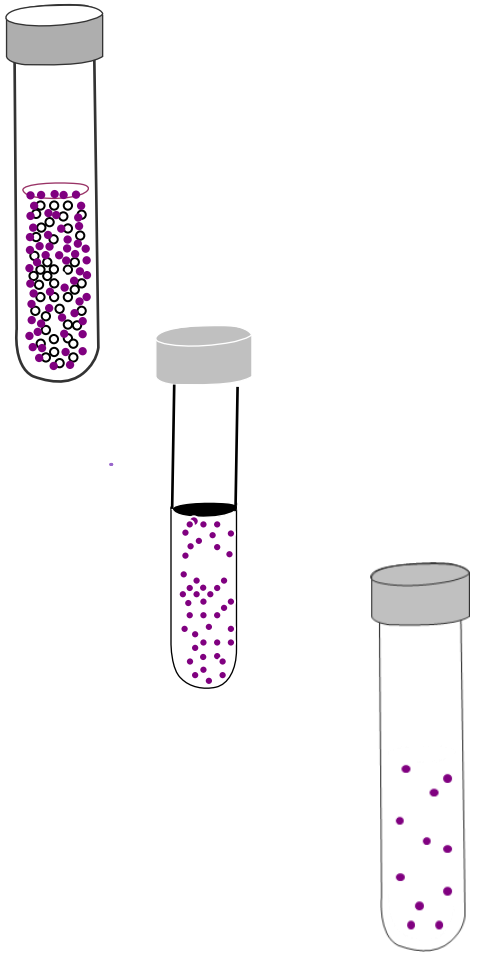
Allows ALL bugs to grow

Specialty Agars

- Selects for specific targets
- Increase sensitivity by allowing larger inoculation size
- Inhibit non-target growth
- Color detection (chromogenic)

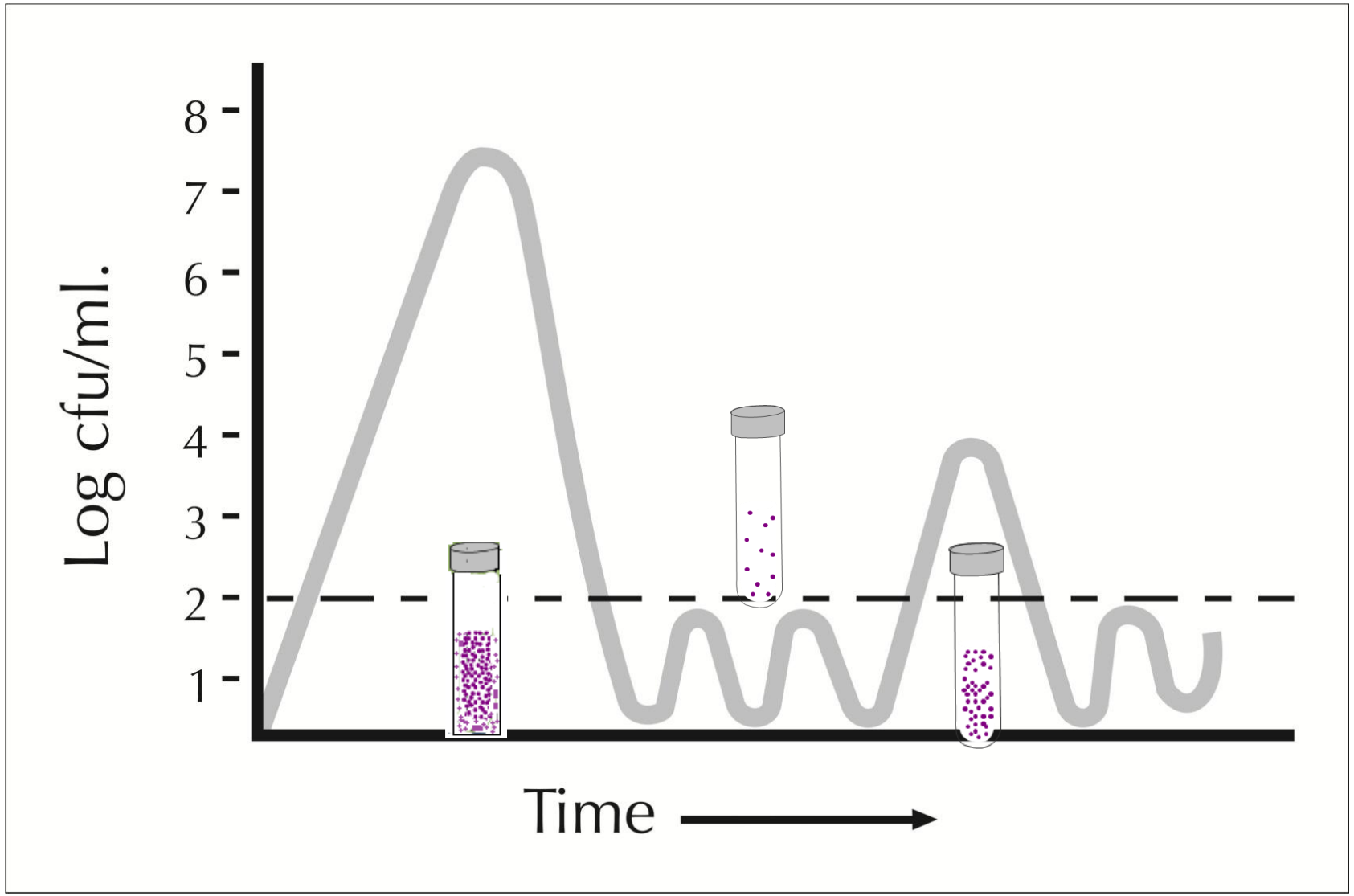
Selective agars have limitations!

Variation in Shedding



- Very High Shedding= Test Positive
  Counts 1000 to 1,000,000 CFU/ml
- Moderate Shedding= Test Positive
  Counts 1000 to 1,000,000 CFU/ml
- Low Shedding= Test Variable
  Counts <100 CFU/ml

Shedding Patterns



Ask yourself…..

…….What are you trying to achieve?



When to hold ‘em and when to fold ‘em

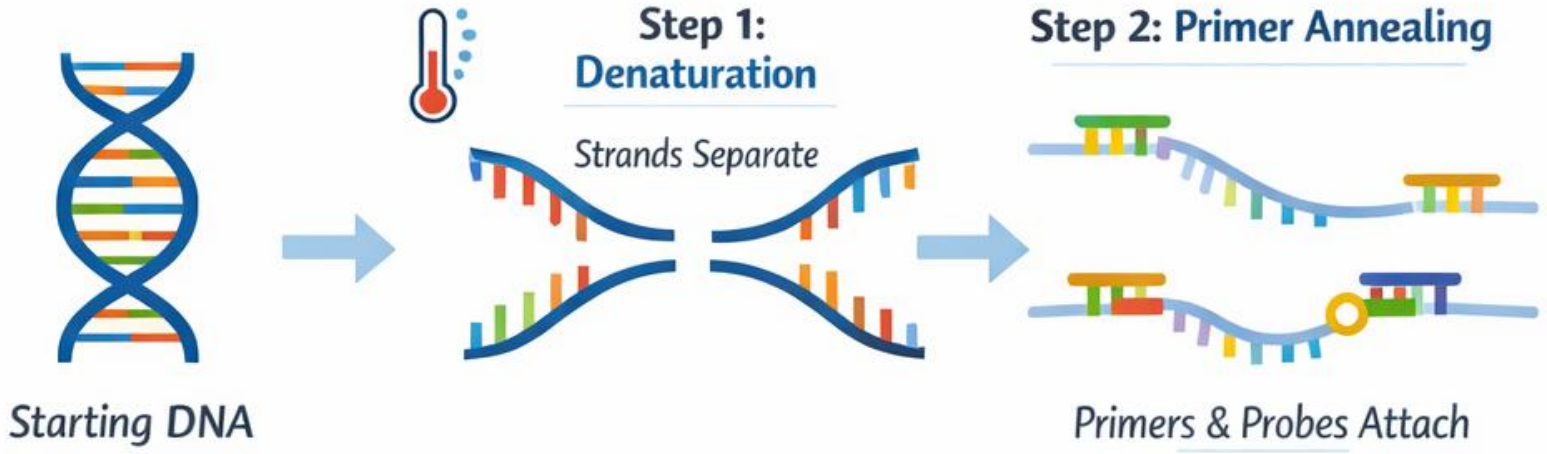
Not Ideal for On-Farm Lab:

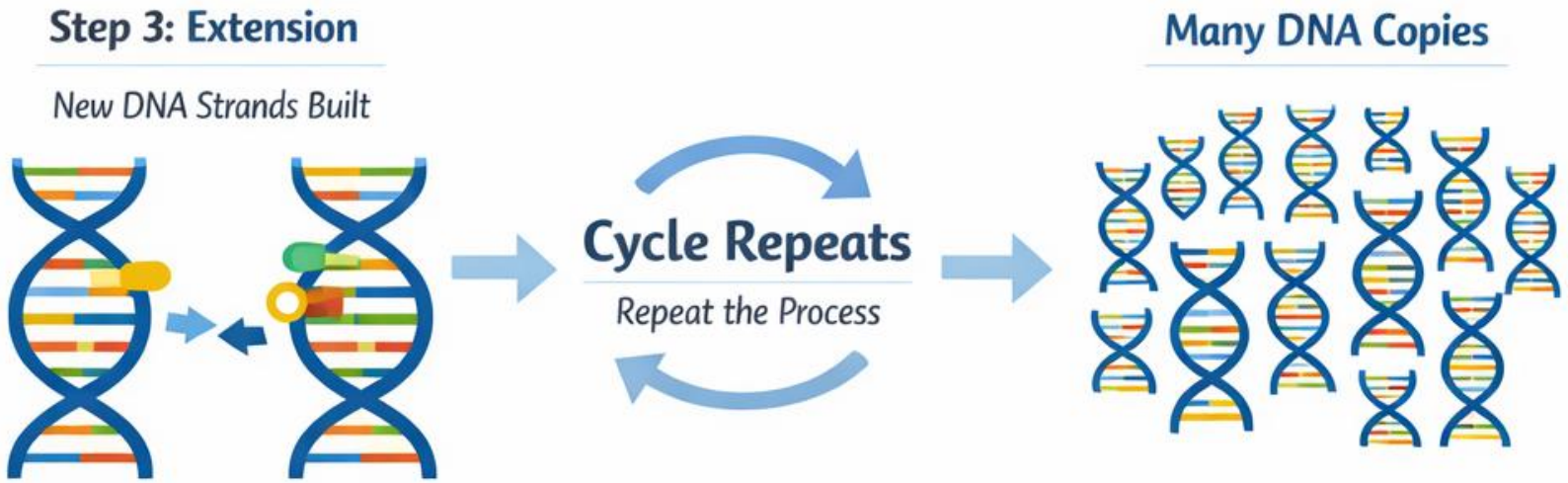
- Environmental samples
- Bulk tank cultures
- PCR
- Mycoplasma?

Use sophisticated external lab for these services!



PCR Basics





- Detection of DNA, not live bacteria
- If target is in sample, it WILL detect!
- Higher risk of cross-contamination…Why?
  - ➢ Amplification!

Heifers will spontaneously calve Myco positive

- Being closed helps but does not prevent
- Calving with Mycoplasma is a matter of “when”, not “if”
- May carry Mycoplasma in other body sites without expressing in the udder

Acholeplasma

- 40-50% of cow samples may be contaminated with Acholeplasma (soil organism)
- This false positive organism lives on ALL dairies

Speciation matters!

- M. bovis is not the only pathogenic Mycoplasma
- M. bovigenitalium is a very common, non-contagious Mycoplasma

Mycoplasma (lesser-known facts)

Mycoplasma species in the Udder

- *M. bovis*
- *M. californicum*
- *M. alkalescens*
- *M. canadense*
- *M. arginini*
- *M. bovigenitalium*



- *Acholeplasma spp.* ⟶ Non-pathogenic “false positive”

Mycoplasma Plate PCR Data

Outlab (2019-2025)		
Acholeplasma sp.	1665	41.59%
Undetermined	174	4.35%
M. alkalescens	102	2.55%
M. arginini	24	0.60%
M. bovis	1191	29.75%
M. bovigenitalium	404	10.09%
M. canadense	67	1.67%
M. californicum	364	9.09%
Mycoplasma sp.	12	0.30%
Total run	2164	54.06%
Total	4003	100.00%

UHS Plates (2019-2025)		
Acholeplasma sp.	6443	59.14%
Undetermined	354	3.25%
M. alkalescens	187	1.72%
M. arginini	61	0.56%
M. bovis	2455	22.53%
M. bovigenitalium	761	6.98%
M. canadense	139	1.28%
M. californicum	459	4.21%
Mycoplasma sp.	36	0.33%
Total myco	4098	37.61%
Total	10895	100.00%

Mycoplasma PCR

 Not all PCR assays are equal!	Machine & Assay determines capability → Why does this matter to you?
 PCR used for colony confirmation	Immediate differentiation of false positives (Acholeplasma) from Mycoplasma
 Same day or next day results of direct milk testing allows for faster response time	Identify infected animals sooner Shorten outbreak, save animals and reduce replacement cost
 Using PCR Results	***PCR does not differentiate between live and dead DNA***

Myco Outbreak – Hospital Transmission

- Hospital pen is involved in high percentage of outbreaks
- Non-mastitis cows may enter hospital and leave with Mycoplasma
- Intensive sanitation barely enough; clinical Mycoplasma cows shed extremely high load
- Hands, aprons, liners, etc. all can spread
- Freeze Hospital movement and sample ALL cows
- Repeat until no new positives

PCR Takeaways



Detects DNA, Not Live Bacteria



Environmental DNA Can Cause False Positives



Rapid Results Are Beneficial



Risk of Cross-Contamination

PCR Takeaways

- PCR will NOT differentiate between live and dead DNA
- Environmental DNA in the sample WILL be detected as positive
- DNA cannot be “killed” by germicides; must be denatured
- Rapid turnaround highly beneficial in appropriate situations
- Cross-contamination a real risk

Identifying the *agent* directs you to the solution to problem

- Biggest challenge of running a lab is training and quality management
- Bad information can be worse than no information
- Use **Cow Culture** to identify cause of clinical and subclinical mastitis.
- Use **Bulk Tank Culture** to monitor herd milk quality
- Eliminate contagious mastitis infected cows
- Identify and control environmental agents

“You don’t know what you don’t know!”

Preventing the Problem

Control programs will be more than the cost of the disease, *if they are done correctly*

- Key to success is compliance and consistency
  - Set the bar high; there will be slippage
  - Focus on what you can control
- Disease cost will far outweigh cost, if unmanaged
  - May take years!
- If you don't measure it, you can't manage it

If you don't have a plan for contagious mastitis, it has a plan for you!

Questions?

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(208) 409-1840



Smarter Udder Health Management

“Vaccines, Dry Cow Therapy, and High SCC Challenges”



January 2026

Georgia Dairy Conference

Brandon Treichler, DVM



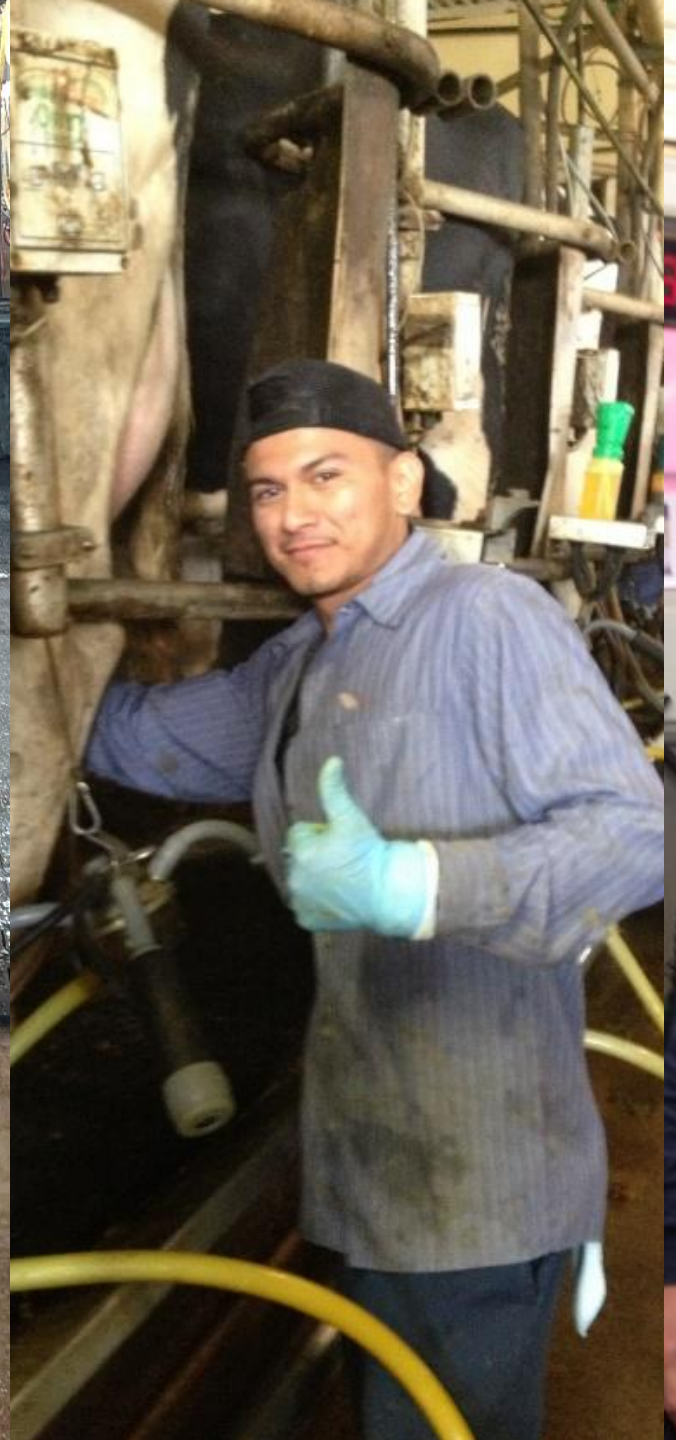
Immunology?

In vet school they tell you *X*% of what we teach you today will be wrong by the time you are 10 years in practice?

- *The rest of your career is essentially "Solve for X!"*

1. *How manage high SCC cows and clinical mastitis cows at freshening*
2. *Blanket Dry treat vs selective Pitfalls and how to monitor*
3. *How to manage chronic clinical and high SCC quarters*
4. *Treat or no treat clinical cases*
5. *Vaccines Is J5 needed if not seeing any coliform cases on dairy*
6. *New immune stimulating products*




What’s in a number?

181,000



How [to] manage high SCC cows and clinical mastitis cows at freshening?





Tale of Two Cows?

- Both cows are fresh 30d
- Cow A had a LOG1 of 2.0
- Cow B had a LOG1 of 4.0
- *Which one do you want to milk and why?*



Impact of First Test Day SCC on Cow Outcomes

- **In a review of over 165,000 recorded lactations in 22 commercial Holstein dairy herds, cows with a first test day SCC>200,000 cells/mL:**
  - Produced 1,583 pounds less milk over the lactation
  - ***Had 2.5X greater chance of having a clinical mastitis event***
    - 25% with first testday SCC >200,000 cells/mL had a clinical event in the first 60DIM!
  - Had increased risk of being culled in the first 60DIM
    - 2% versus 6.5% for first test day >200,000 SCC
  - Took 17 additional days to become pregnant
- ***Transition Cow Milk Quality Matters!***

Data courtesy of Dr. Mark Kirkpatrick Zoetis Animal Health



How [to] ma… …CC cows and clinical … …shening?

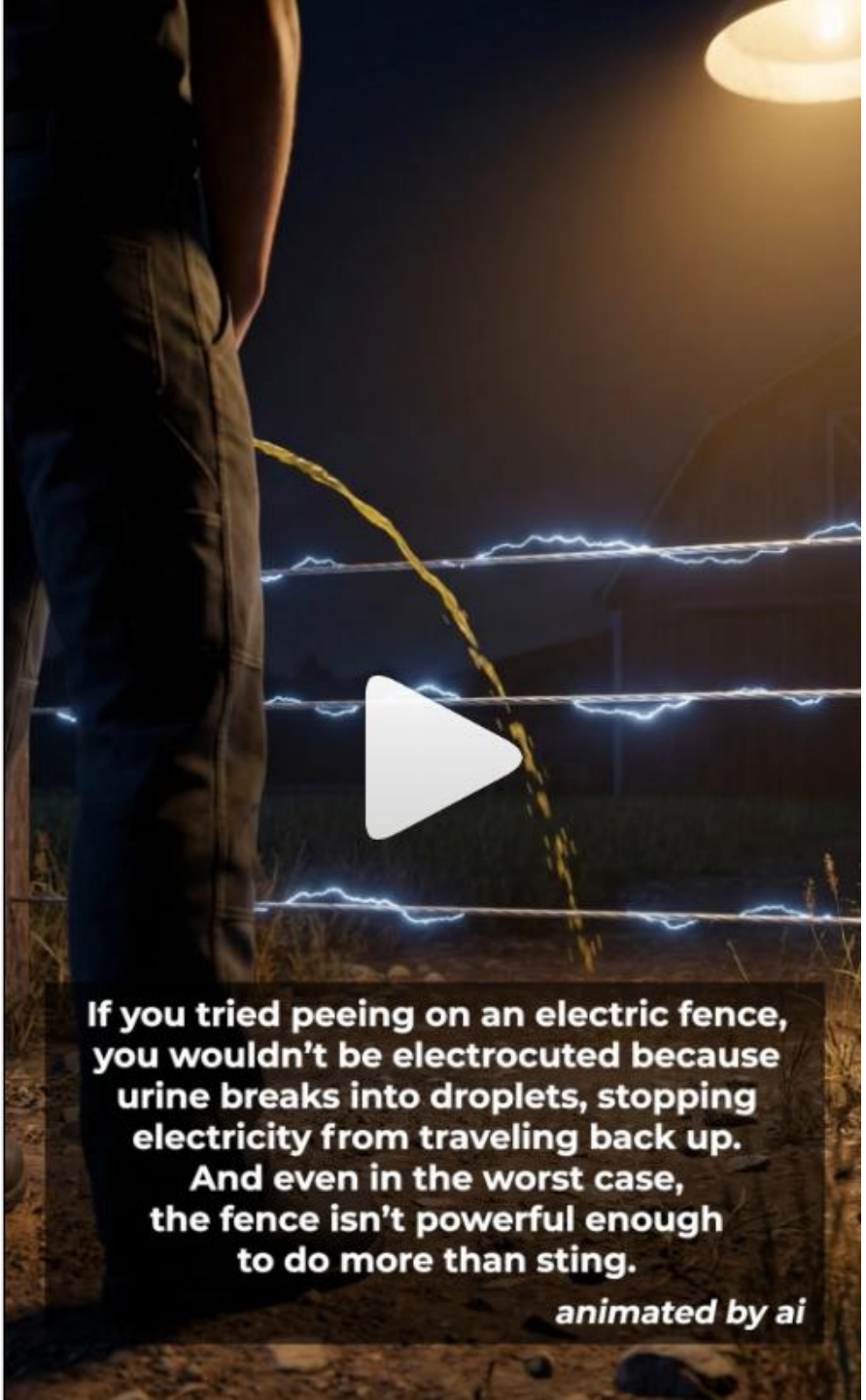




How [to] manage high SCC cows and clinical mastitis cows at freshening?

- ***Stop tolerating poor results!***
  - Transition cow milk quality is a huge driving factor of BTSCC!
  - Lact 1 LOG1 scores higher than L2 and sometimes L3
    - …*the udder never gets higher and the SCC never gets lower*
- **If I was building or remodeling any new facilities, I would be putting my transition and fresh in the best facilities.**
- **Late lactation cows can succeed in less-than-ideal facilities**





Brandon's Verdict?

- **It's not about managing the cows, it's about learning from our mistakes**
  - Pain of change has to be less than the pain of staying the same..It has to hurt!
- **We could theoretically segregate these cows and manage them differently, but practically speaking nobody does that.**



Blanket Dry treat vs Selective: Pitfalls and how to monitor?



Why should we do selective dry cow therapy

- **Decreased antibiotic use…*It is the right thing to do!***
- **Increase in the prudence and judiciousness of the antibiotics we use**
  - How would we justify treating all cows?
  - What does this say to the consuming public?
- **Reduce risk of any residues**
  - If ID recording becomes mixed up, it may actually lead to more risk of residues
- **Lastly, and least importantly, decrease expenses**
  - Selective dry cow therapy increases labor costs and decision making on the farm



Selective Dry Cow Therapy

- **I have had mixed results!**
  - ***Dairies that would have been great candidates did not see value in it***
  - ***Dairies that should not have been considering it were drawn to it***
  - ***When I started the conversation, several dairies just stopped dry treating all together!***



What would this program look like?

- **Cows would be sorted into two groups for dry off**
  - Treatment and Internal teat sealant for all four quarters
  - Teat Sealant only for all four quarters
    - We need to be very clean when infusing teat sealant without any use of IMM dry tube antibiotic
- **How far in advance of dry-off would you sort this list?**
- **Would you have to mark non-antibiotic cows differently?**
- **How would you decide what cows fall into which groups?**
  - Type 1 versus Type 2 error and your risk profile
- **How do we manage risk if using internal teat sealant?**



How should we choose the cows that get treated?

Option 1: All cows with an SCC>200 in the last 3 testdays ***OR*** any clinical mastitis events this lactation

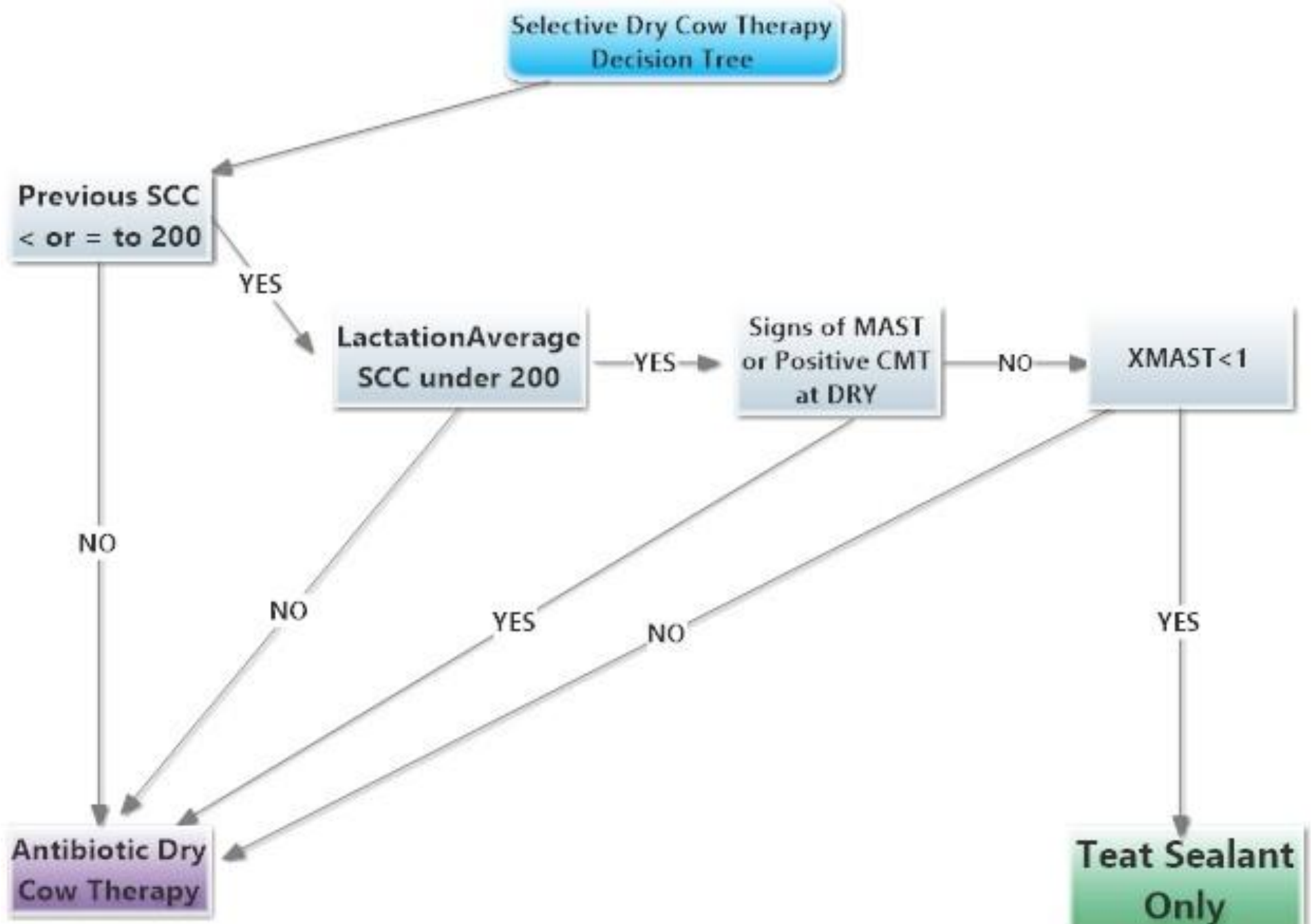
Option 2: Different SCC thresholds for LACT 1 versus LACT 2+ ***AND*** all cows with XMAST>0

- LACT 1 SCC>100,000
- LACT 2+ SCC>250,000

Option 3: Use of culture 24 hours prior to dry off in combination with treating all cows with SCC (>199,000) and/or XMAST>0

- 3 or more colonies with same appearance on blood agar
- Petri-Film with 5 or more colonies (50 cfu/mL)

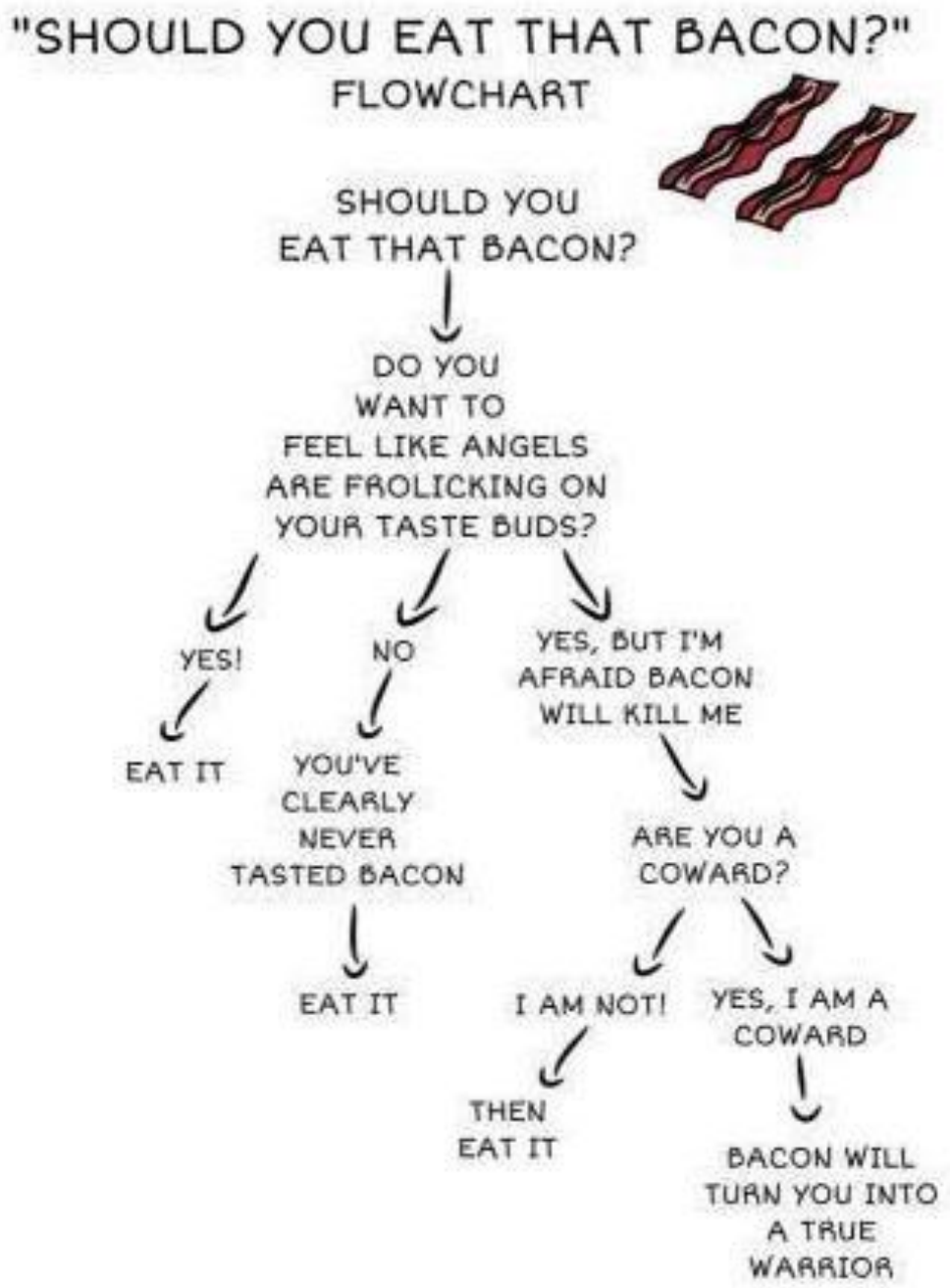



Selective Dry Cow Therapy Decision Tree
Previous SCC < or = to 200
YES
NO
LactationAverage SCC under 200
YES
NO
Signs of MAST or Positive CMT at DRY
YES
NO
XMAST<1
YES
NO
Antibiotic Dry Cow Therapy
Teat Sealant Only

Additional Odds and Ends

- **We have to give some thought to how we would record and mark cows**
  - Different color leg bands for sealant only cows
  - Must be accurate at recording which cow gets which protocol in DC305
- **How can we monitor our results**
  - All indicators are lagging indicators!
  - Monitor LOG1's or LS1 overtime for the herd
  - Could we incorporate use of CMT
    - *DRY versus FRESH, true NEW INFECTION and CURE*
    - *CMT only consistently flags higher SCC levels (SENSITIVITY?)*
    - *Many dairies struggle to interpret CMT and accurately perform the test.*





Brandon's Verdict?

- **It's about the people making the decisions**
- **Do you trust your people?**
- **Does it make sense for your dairy**
  - Current milk quality
  - Honest assessment of the risks you are currently taking and plan to undertake in the near future!



Treat or no treat clinical cases?



What is the best mastitis tube?









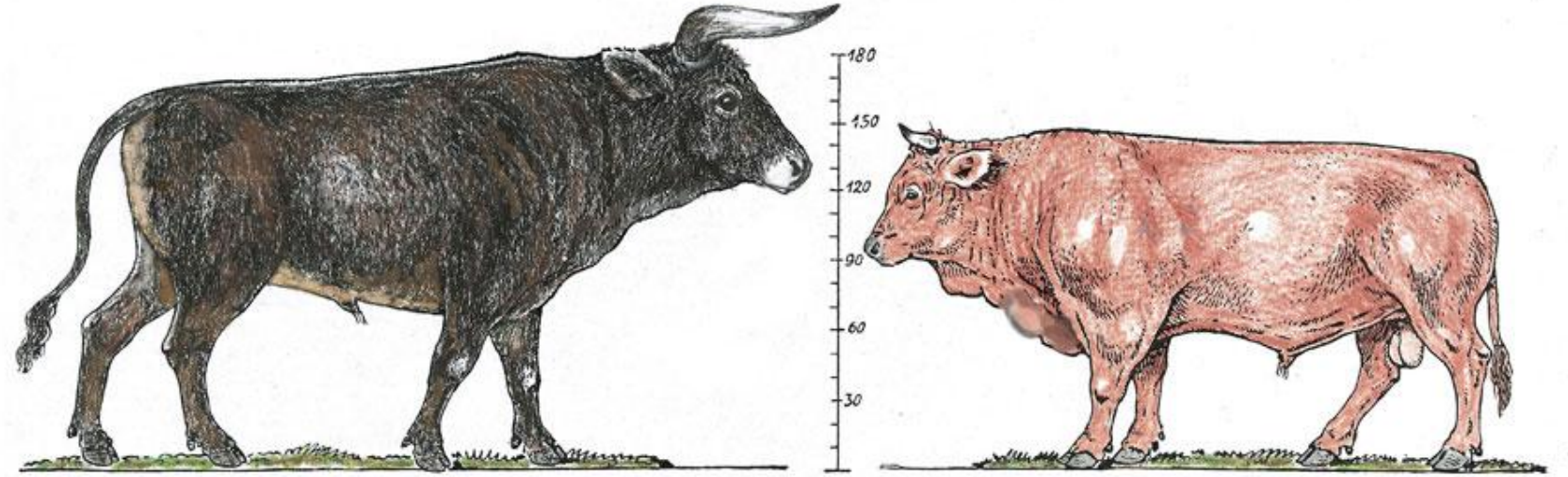






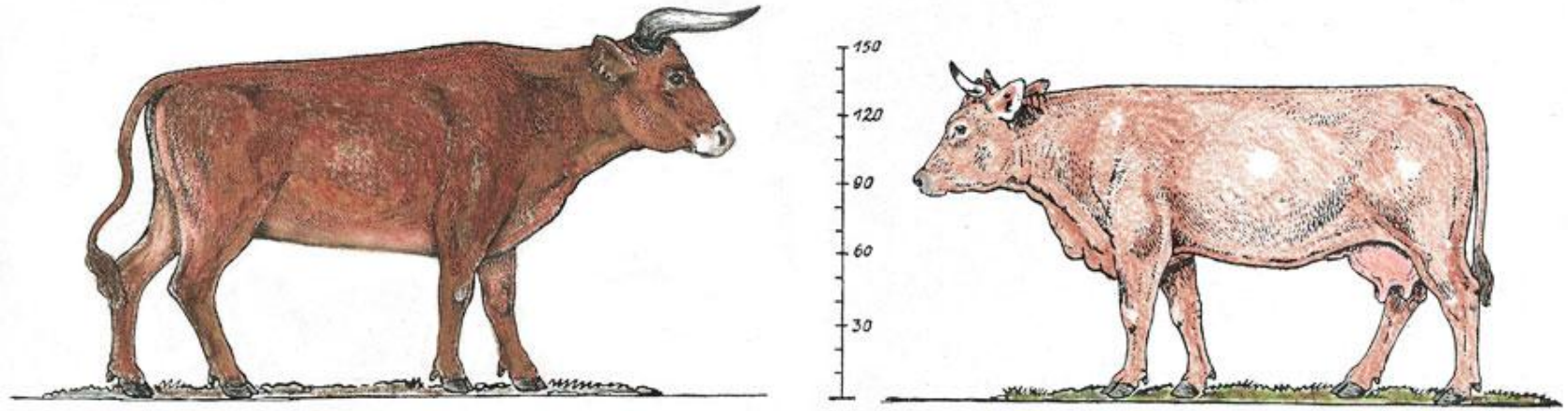


What happened approximately 9000 years ago?



Auroch

Bos Taurus



Antibiotics were invented in the late 1920's



Effective Treatments?

- No such thing as a stronger tube
  - Either it is effective or it is not!
  - Issue is frequently getting the drug to the bug!
- Duration of Therapy may be an important factor in success?
- Not All Treatments Come in a Tube
  - Mint Udder Creams
  - NSAID's and Pain Management
- Primarily Ineffective Treatments
  - Systemic Antibiotics***
  - Frequent Milking/ Oxytocin



Your Paradigm Shifted…

- **Choosing the right cases to treat will mean more than choosing the right mastitis tube!**

- ***It's not the drug the dairy chooses but the people who guide the cow level decisions that dictates success***

We need to shift the thinking from treating mastitis to managing mastitis!



Treatment of Mastitis

- There are three types of mastitis cases:
  - Those that are likely to cure no matter what we do
    - Simply do not make these worse
  - Those that will never cure no matter what we do
    - Don’t waste time and resources on these
  - Those that we can improve the outcome with treatment
    - We should be focused on these cases!
- How should we decide which category a cow falls into?



Cow Sense: What other factors affect cures?

- **Age**
- **Stage of Lactation**
- **History of prior treatment**
- **History of prior clinical or sub-clinical mastitis**
  - Including first test day
- ***Number of Quarters Involved***



Diagnostics







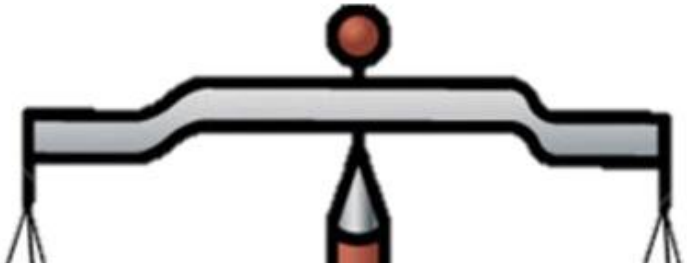
Brandon's Verdict

- **Treating some select cows is beneficial**
  - *ALL or NONE are not the right answer!*
- **Extended duration therapy outside of select cases is also probably not the answer**
- **Selective Treatment works best with culture results, but it takes more than a culture result**
- **If you do or do not culture clinical cases, you still need some pathogen surveillance**

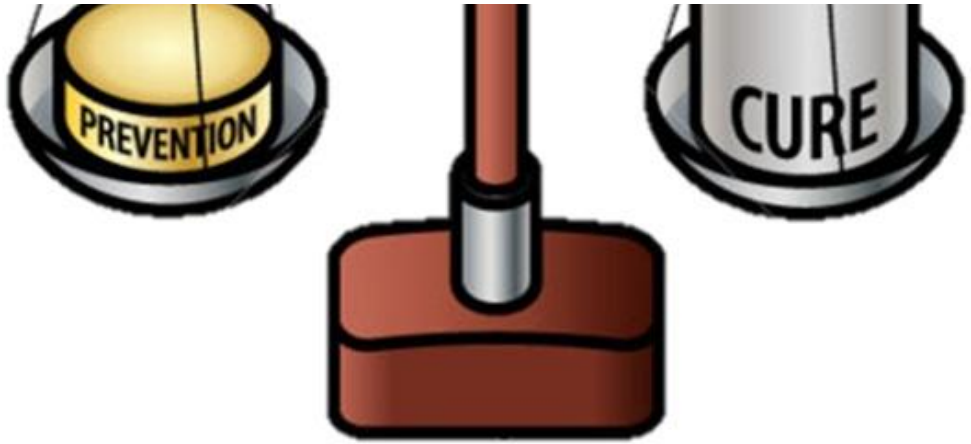
How to manage chronic clinical and high SCC quarters?



An ounce of prevention is worth a 100lbs. of cure



We Never Cure 100% of Cases We Create!





How to manage Chronic Cows and Quarters

- **Chronic cows and quarters happen on every dairy!**
  - We can never cure 100% of infections we create!
    - Regardless of treatment or not
- **The secret to managing Chronic cows is create less New Infections!**
  - That takes being ***consistently*** good at the common things
- **Outside of that there are few options**
  - All are band-aids…that's our only option after messing up
  - ***Do nothing, Treat, Cull the Cow, Cull the Quarter, Dry Period Cure?***





Famous Veterinary Quotes

- In food animal medicine, we EAT our mistakes!

Dairies tend to have the same approach!...



What is involuntary culling?





Why do cows leave dairies?

1. Infertility 23.3% +/-1.8
2. Mastitis 18.6% +/-1.3
3. Poor production 18.3% +/-2.2
4. Lameness 9.1% +/-0.7

- But we are fooling ourselves!





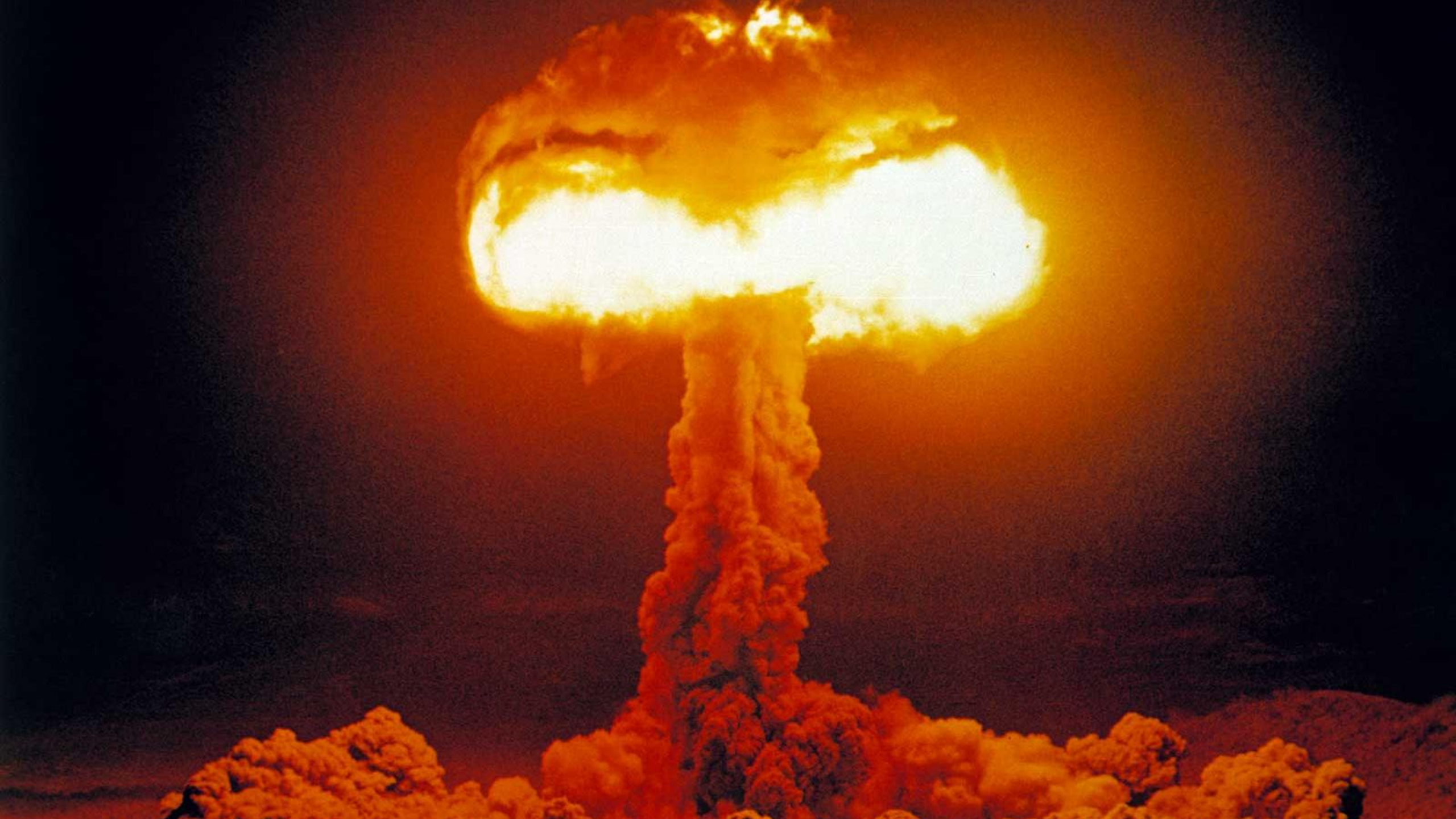
TOPICS

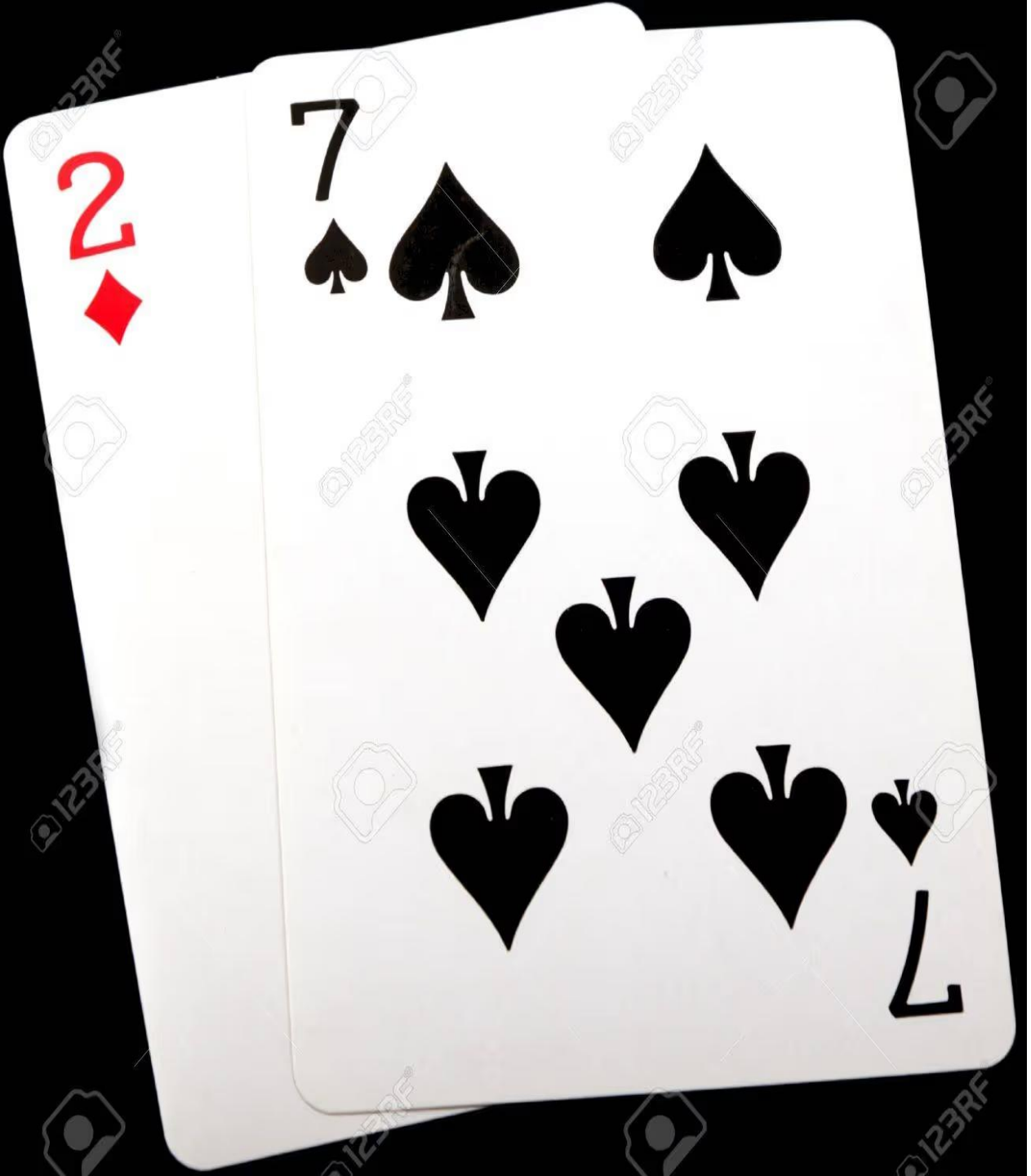
NEWS

NO DAIRY COW CULLING IN SIGHT

January 16, 2026 By Larry Lee Filed Under: 2026 Events, Beef, Dairy, Dairy, News







Brandon's Verdict

- Based on the unique economics, we are probably going to make a lot of decisions against the traditional odds
- That means taking calculated risk
- That means we have to get better at not breaking cows!



Vaccines: Is J5 needed if not seeing any coliform cases on dairy?




Vaccines
cause bad milk
prices!

If you had to give up a vaccines except one, which one do you keep?



But Seriously….

- **Who has no coliforms?**
- **And if so, how hard are you looking?**
  - Many will be no-growth
- **Does your bulk tank agree?**





Dairy Life Happens!

- Bedding Issues
- Manure Issues
- Water Issues
- Employee Turnover
- Overstocking
- Heat Stress



Core Antigen Vaccine Pro/Con Analysis

Pro

- ***Value of a cow has never been higher!***
- *Relatively Effective****
- ***ROI is relatively strong, even in low incidence herds***

Con

- ***Cost***
  - Dose plus labor
- ***On Average, we likely tend toward over vaccinating cattle***
- ***May be hard to incorporate in your vaccine protocol***
- ***Definite Milk Drop!***





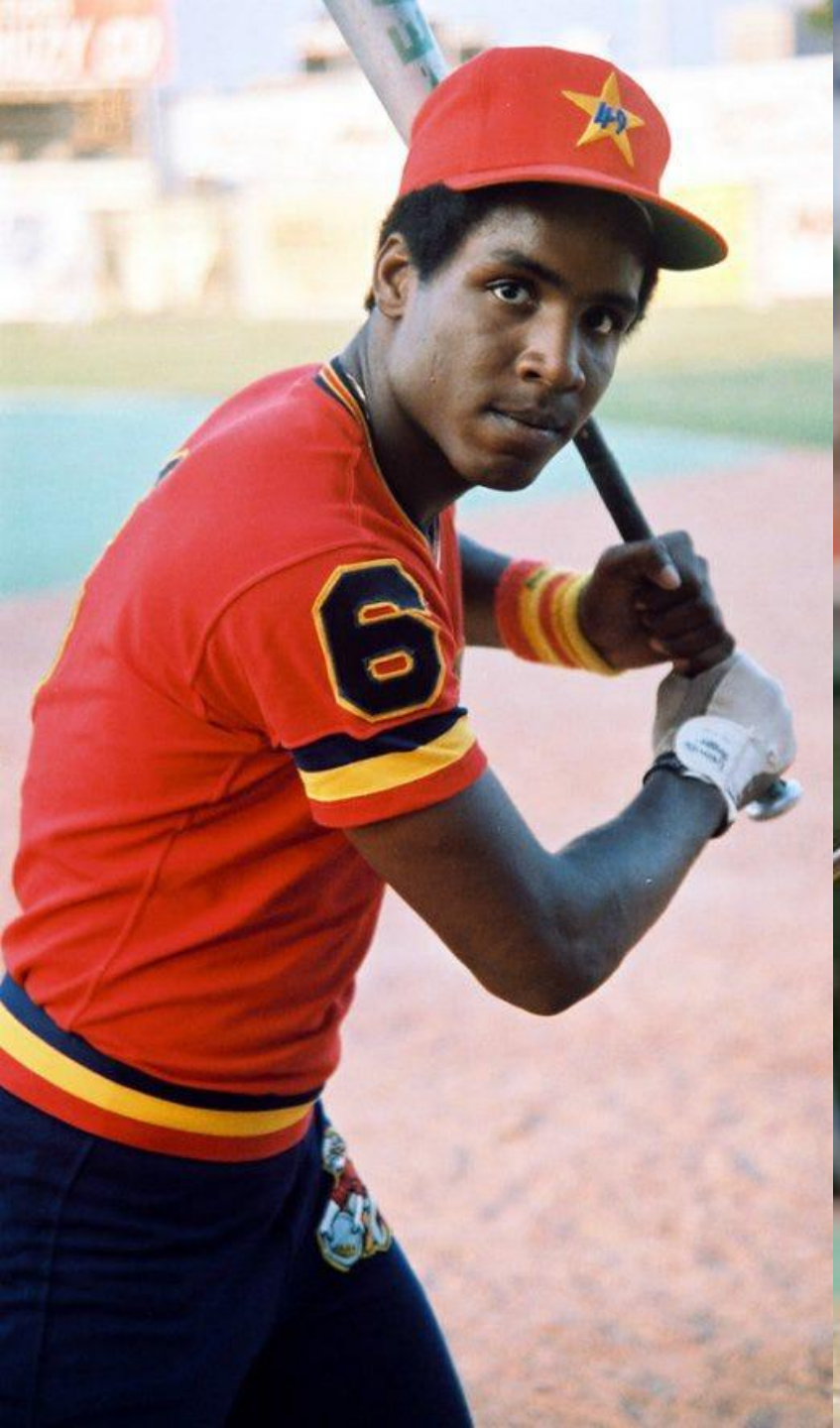
Brandon's Verdict?

- If I had one cow, I would still vaccinate her with core antigen vaccine
- But I am not sure I would do 4-5 shots/ hyper-immunity?
- And I might focus on fresh and peak only…



New immune stimulating products?




6


GIANTS


GIANTS

*I*mmune *E*nhancing *D*rug?







Been there..Done that?

- **Idea was and is sound…put more immune cells into circulation**
- **But it is obviously more complex**
  - How do we direct them toward the udder?
  - And if the low hanging fruit is more leukocytes in the udder then…
    - ***Are we wrong that SCC can get too low?***



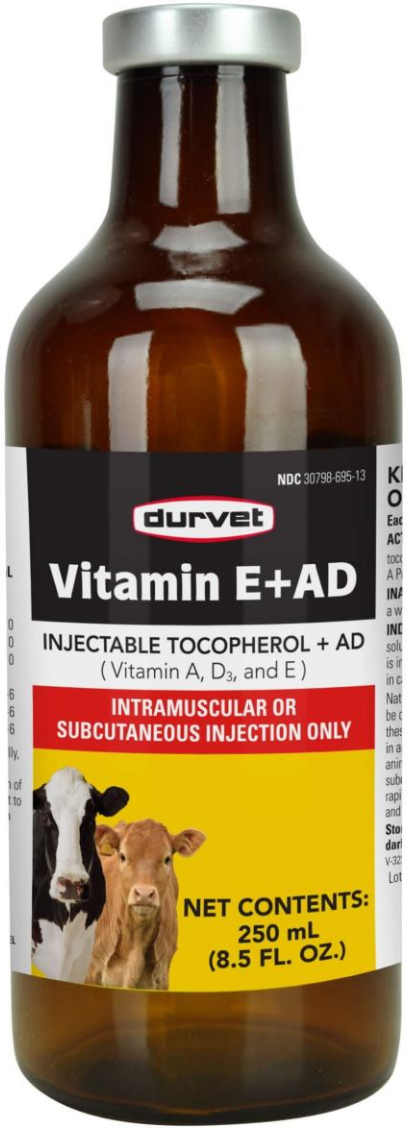

DNA
Immunostimulant
50 DOSES
BAYER
ZELNATE
INDICATION: ZELNATE™ is indicated for use as an aid in the treatment of Bovine Respir
in cattle 4 months of age or older, when administered at the time of, or within 24
FOR VETERINARY USE ONL
First Sterile Rehydration
ZELNATE
2 DNA Immunostimulant
ZELNATE
3 Final Sterile Solution
ZELNATE

Immune Supplement?











Supplement Facts

Serving Size 1 Tablet

	Amount Per Serving	% Daily Value
Calories	5	
Total Carbohydrate	1 g	<1%*
Vitamin A (as retinyl acetate)	2000 IU	40%
Vitamin C (as ascorbic acid)	1000 mg	1667%
Vitamin E (as dl-alpha tocopheryl acetate)	30 IU	100%
Magnesium (as magnesium oxide and magnesium sulfate)	40 mg	10%
Zinc (as zinc sulfate)	8 mg	53%
Selenium (as selenium amino acid chelate)	15 mcg	21%
Manganese (as manganese gluconate)	3 mg	150%
Sodium (as sodium bicarbonate)	150 mg	6%
Potassium (as potassium bicarbonate)	80 mg	2%
Proprietary Herbal Blend Maltodextrin, *Lonicera japonica* (flower), *Forsythia suspensa* (fruit), *Schizonepeta tenuifolia* (aerial), *Ginger* [*Zingiber officinale* (root)], *Vitex trifolia* (fruit), *Isatis tinctoria* (root), Echinacea purpurea (aerial)	350 mg	†
Proprietary Amino Acid Blend L-Lysine hydrochloride, L-Glutamine	50 mg	†

*Percent Daily Values are based on a 2,000 calorie diet.
† Daily Value not established.

Airborne Agrees to Pay $23.3 Million to Settle Lawsuit Over False Advertising of its "Miracle Cold Buster"

Updated: April 27, 2016





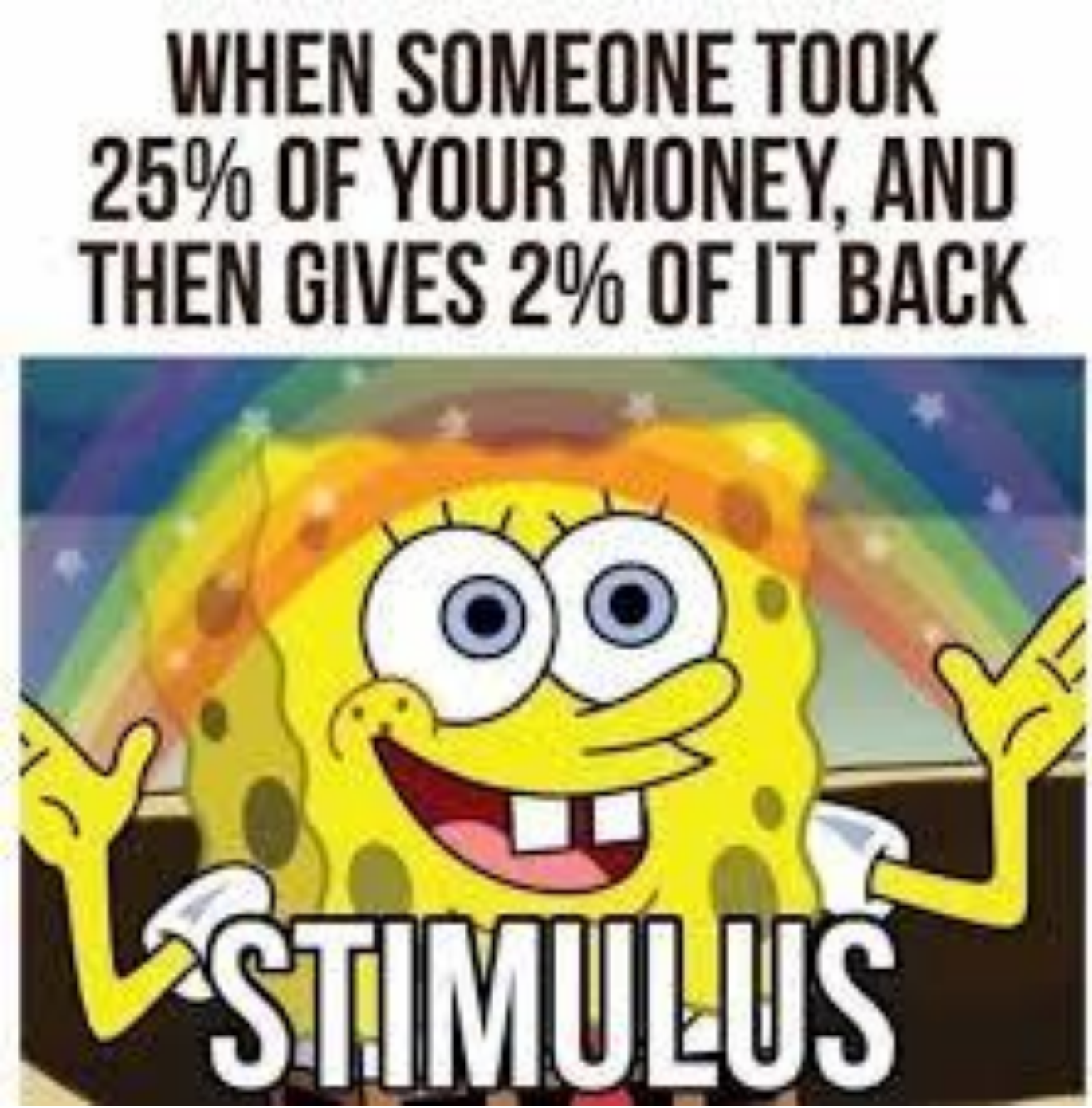
Disease by and large is a function of stress!

Our own experience proves this!

- **Ration Changes**
  - Time Off Feed
  - Dehydration?
- **Pen Moves**
- **Environmental**
  - Heat Stress
  - Cold Stress
  - Drought
- **Overcrowding**
- **Transportation (Shipping Fever)**

- ***What do Bred Heifers and late lactation cows have in common?***
  - Periods of the life cycle where there is little to no disease pressure due to being some of the lowest stress periods
- ***When in the dairy life cycle do we see the most disease occur?***
  - Weaning
  - Co-Mingling
  - Dry-off
  - Freshening





Verdict?

- ***If we don't break it in the first place, we won't have to stimulate it later!***
- ***If you want to improve mastitis immunity, include health metrics in your genetic plan!***





Questions?

Brandon Treichler DVM
qmlkdoc@gmail.com

Quality Milk: A Reality For ALL Dairy Farms

Georgia Dairy Conference
Savannah, Georgia

Dr. Andrew Johnson
Green Bay, WI 54313



Previous Speakers

Great information that every dairy operation in this room can benefit by

A lot of practical information for all dairies regardless of herd size




"The Udder Doctor"


DR·ANDY

The Udder Doctor

Work on milk quality
and cow comfort
in 30 countries and 47 states

Work on herds ranging from
20 cows to over 22,000 cows



Thank You

This is my fourth time speaking at this conference

Some of the best dairies in USA here in this group



Choke®

Official Soft Drink of



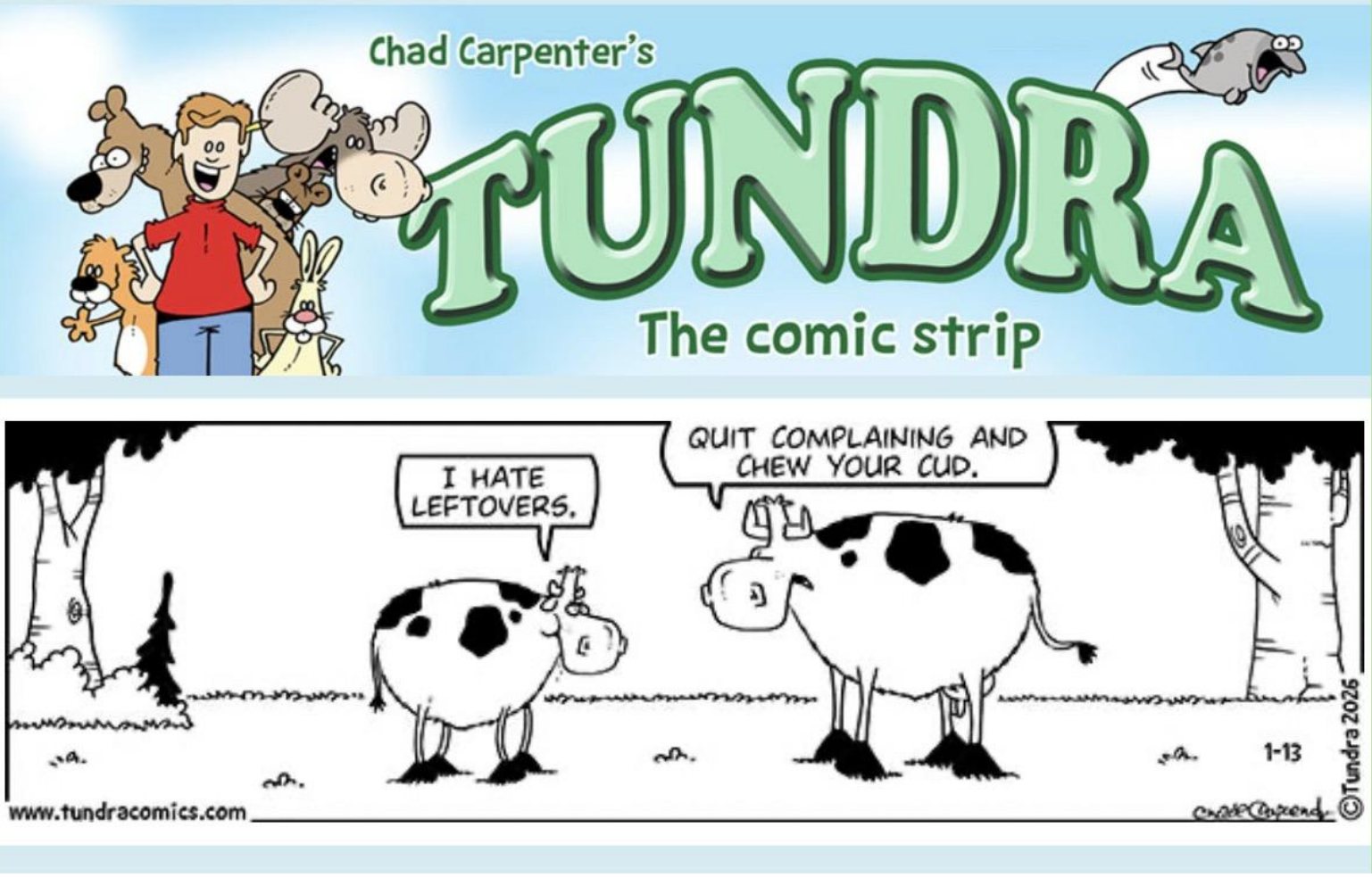

1970-2024:
THIS SEASON:
306-1
6-3
PACKERS RECORD WHEN LEADING BY 10+ POINTS
IN THE FINAL 5 MIN, INCLUDING PLAYOFFS

Been Painful

As stockholder and huge fan this has been a very difficult season

There is always next year!




Chad Carpenter's
TUNDRA
The comic strip
I HATE LEFTOVERS.
QUIT COMPLAINING AND CHEW YOUR CUD.
1-13
www.tundracomics.com
©Tundra 2026

Dr Andy

Such an old dinosaur in the industry but the story has been the same

So proud to see the great results in SE USA



Dr Andy

Over 25 years ago I was clearly told in SE you CANNOT have SCC under 300,000 due to weather



SE Dairies

12 dairy operations actual SCC averages for last 6 months 82,000

Range 52,000 to 92,000 SCC

Represents over 35,000 cows

Great Job!!



Most Important

Dairies must make their decisions based on FACTS and NOT on Assumptions

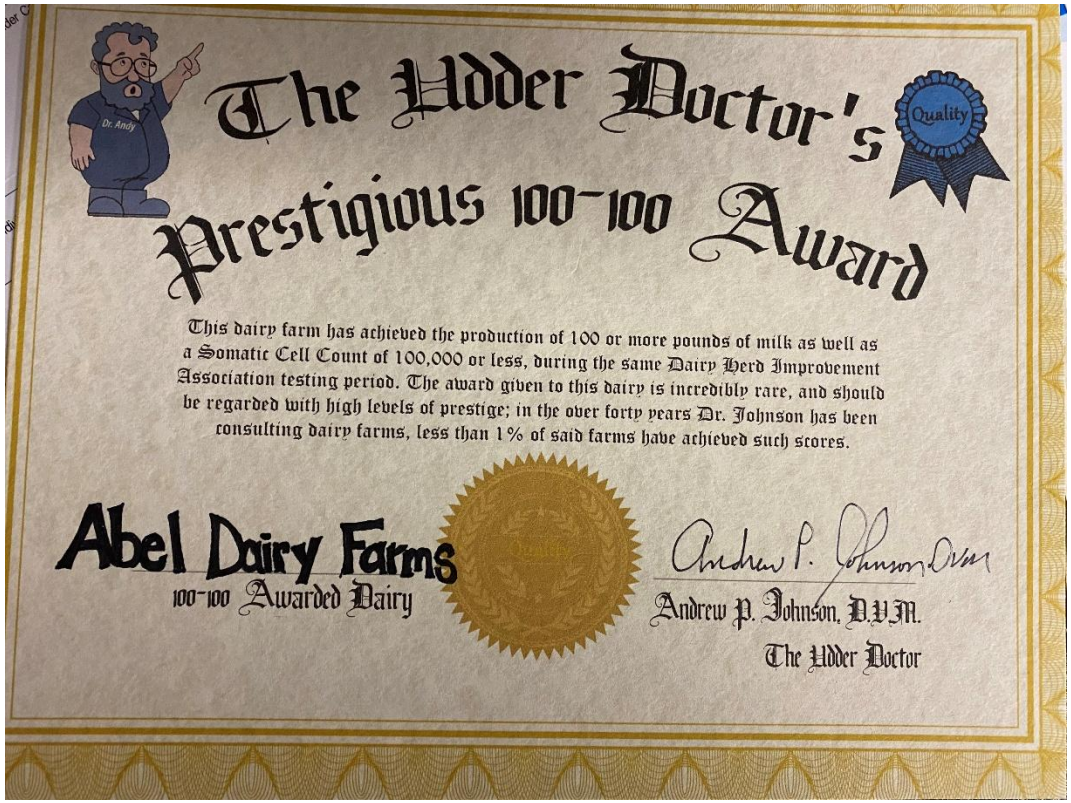
So many mistakes have been made for too many dairies



The Dairy Industry

Quality Matters

100-100 Club



Quality Matters

100-100 Club

In 15 years over 40 dairies have achieved this award
75% in last 5 years

8 dairies in this room have gotten this award



Quality Matters
100-100 Club

Dairies all locations USA
50 to 7,500 cows

Bed with sand, recycled sand, straw,
sawdust, mattress and
Manure Solids



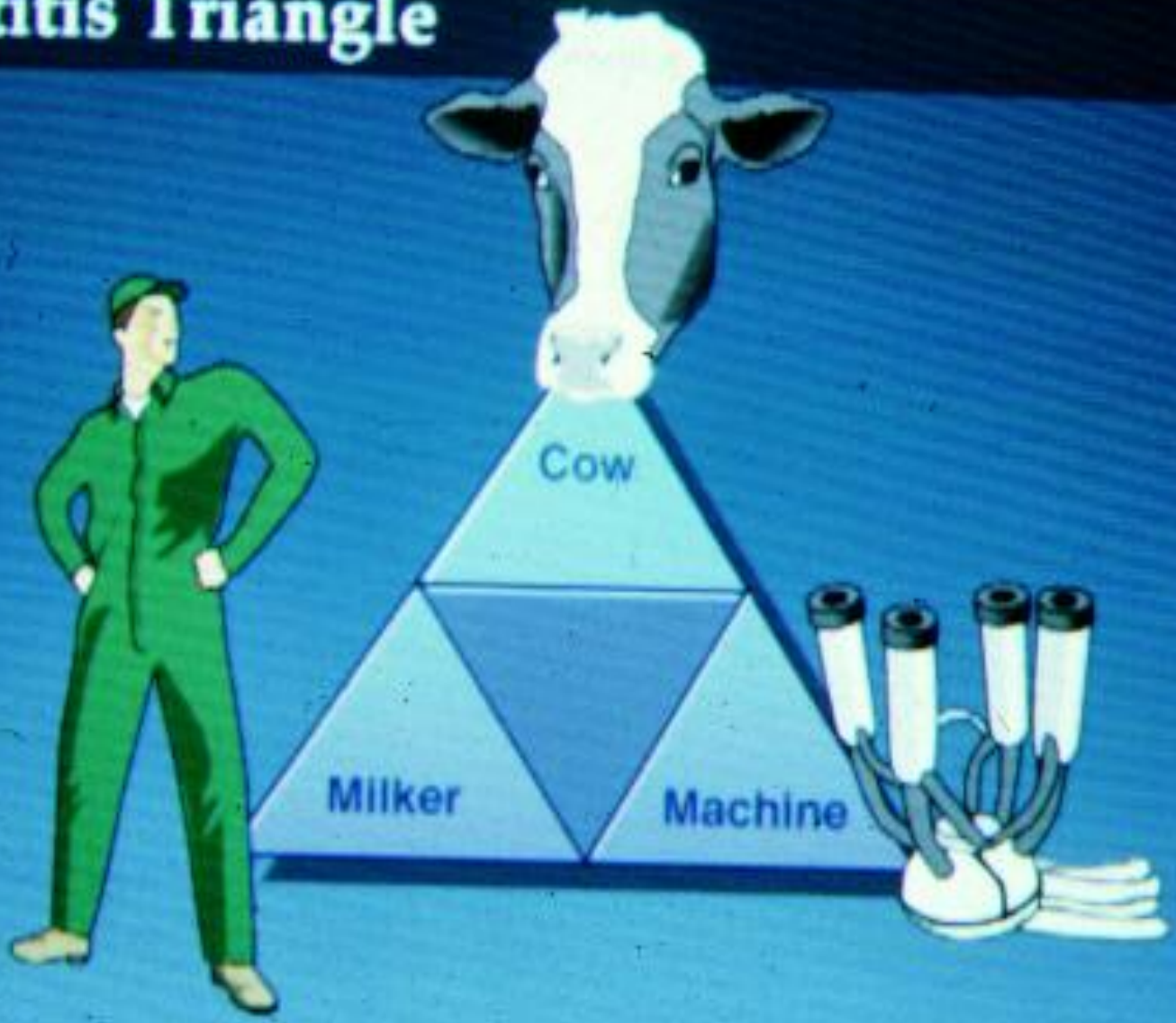
Quality Matters
100-100 Club

These dairies focus on doing the little things correctly every milking

They understand the importance of the MASTITIS TRIANGLE



The Mastitis Triangle



100,000 and Stay There

Key Issues:

Clean Cows
Correct Milking Routine
Correct Predip and Post Dip
Proper Milking Equipment Settings
Bedding Handling
Stall Care



The Quality of Milk is Determined at the Dairy



SCC of Each Dairy

1. Is exactly what they have decided it should be
2. **Reflects the management decisions of the dairy (housing, milking routine, milking equipment)**
3. **Truthfully, It reflects the true attitude of the dairy**



Herd SCC

Every herd is
capable of producing milk
with an SCC in the bulk tank
less than 150,000

Size doesn't matter,
attitude does!!



Herd Production

Where is the future going to be?

Think of the huge change the last 10 years and last 5 years
Been amazing and keeps getting bettetr



Herd Production

30,000 pound (13,636 kg) common now

Some dairies pushing 40,000 pound (18,182 kg)

Is 50,000 pound (22,727 kg) in our future



Herd Production

7 pounds (3.18 kg)
total solids were also a goal

Some dairies now achieving 9 pound (4.1 kg)

Higher milk and solids are more common



A Top Herd

13,626 cows through parlor

94 pounds/head/day (42.7kg)
69,000 SCC

Very few cows being treated for mastitis (less 0.5%)



Milk quality starts with the
Cow and her environment

Cows in a dirty environment will
Have a higher risk to new infections
Keep the cow clean, dry and
Comfortable 24 hours a day!



Most SCC and Clinical Mastitis issues are coming from the cow's environment

Not the milking routine or milking equipment



Most dairies do not like to admit their cows are dirty

My number one challenge is getting dairies to focus on Cow cleanliness



Most common issue with dirty cows is Strep species clinical mastitis cases

Strep species equals feces
Yes, it that simple

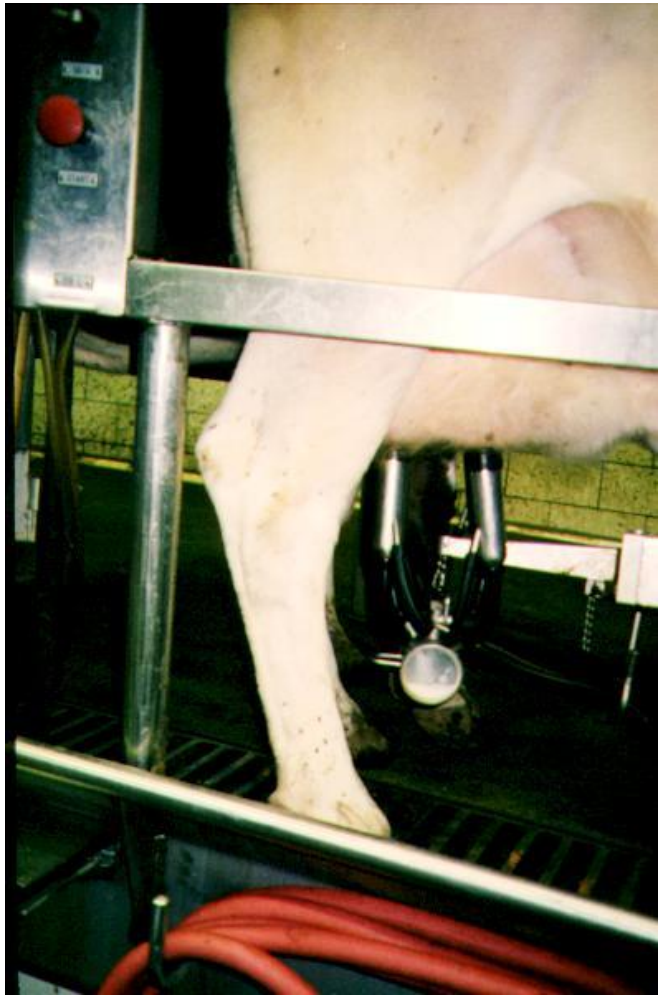


LISTEN TO THE COW!



They always tell the truth or the real story!!

Dirty Legs, Do They Matter?



Clean Legs



Very Dirty Legs



Does a dirty foot really matter?

Where is the leg located?



Right By the Udder!!

Grooming Stalls

Mechanical Grooming
Needed for sand and bio-solid
Stalls to keep dry and comfortable

Minimum 1X day while some dairies groom 3X a day

Grooming works great
Brush for mattress herds



Grooming Stalls

Mechanical Grooming

Many dairies find that grooming stalls also increases milk production by 1 to 3 pounds (0.45-1.36kg) per cow per day

That alone makes grooming worth thinking about



Free Stall Grooming





Mechanical methods work great


MAT MATE
DANGER
WARNING
DANGER

Heavy Bristle Broom



Best for Mattress Stalls

Proper Bedding Storage



Covering sand at least 1 week prior to going into the stalls will decrease clinicals. Wet sand a definite problem. Most SE dairies now doing this



Milking Routine

Huge impact on how fast and complete cows milk

It is not just about milking more cows but also producing excellent quality milk

Milking Routine

Proper training is the key

Not just one time

Continual training

Milking Routine

Consistency is key

Inconsistency is the problem

Best Milking Routine

What I recommend

- Step 1: Dry wipe and Predip
- Step 2: Strip and dry
- Step 3: Attach and Align

- Highest flow rates, fastest milking, and best milk quality



Best Milking Routine

The more physical time you put on the teat, the faster she lets down her milk and the shorter her total duration will be.

Common now for 100 pound (46kg) cows to have durations less than 4 minutes (Best 3.2 minutes)



Best Milking Routine

In my experiences, NO dairy can justify not stripping cows. Every farm that stops stripping sees an increase in SCC and less cows milked per shift

Florida dairy example



Best Milking Routine

What I recommend

- Stripping teats a must because starts the let down clock the best and detects abnormal milk
- EVERY dairy will benefit by stripping, it just takes an attitude change
- Lowest SCC herds with most cows milked per shift STRIP teats



Best Milking Routine

Proper drying of the teat is the biggest reason for lower clinical cases, lower SCC and faster milking.

Time spent here rewards the dairy more than most other steps of the milking routine



Best Milking Routine

I have many large rotary parlors that have added a person so they have two people drying

The results higher flow rates and more cows milked per hour

Huge return on the extra person investment

Not how few people but correct number of people



Best Milking Routine

The biggest buzz word in dairy industry at this time is eliminating people milking cows.

Great idea as long as the results are same or better

Most cases the results are much worse.



Best Milking Routine

What I recommend

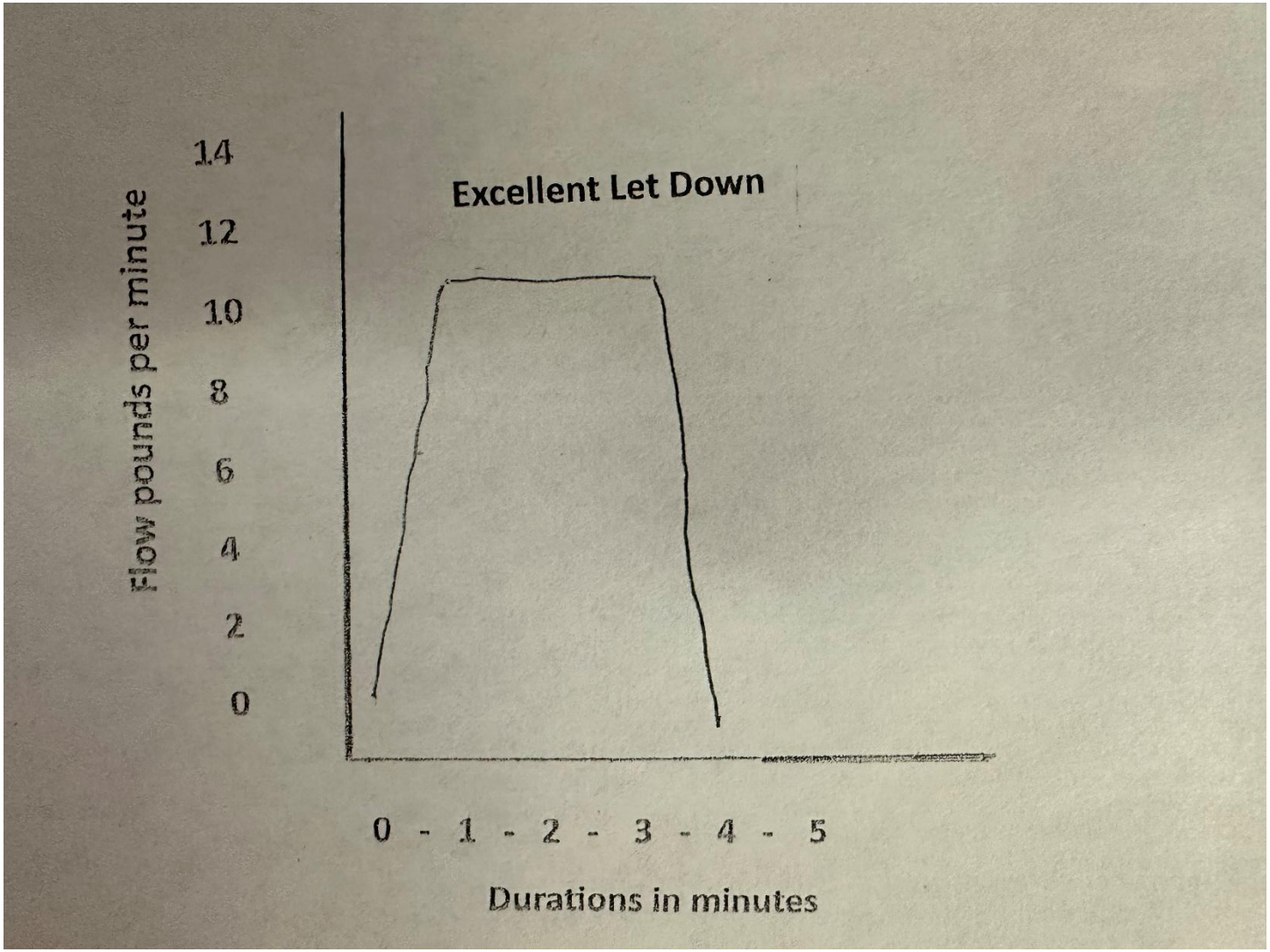
- Proper drying yields the best return to milk speed and lower clinical mastitis
- Wipe all four teats one side towels, then flip and dry all four teats again with rub across teat ends
- Focus here yields more positive results

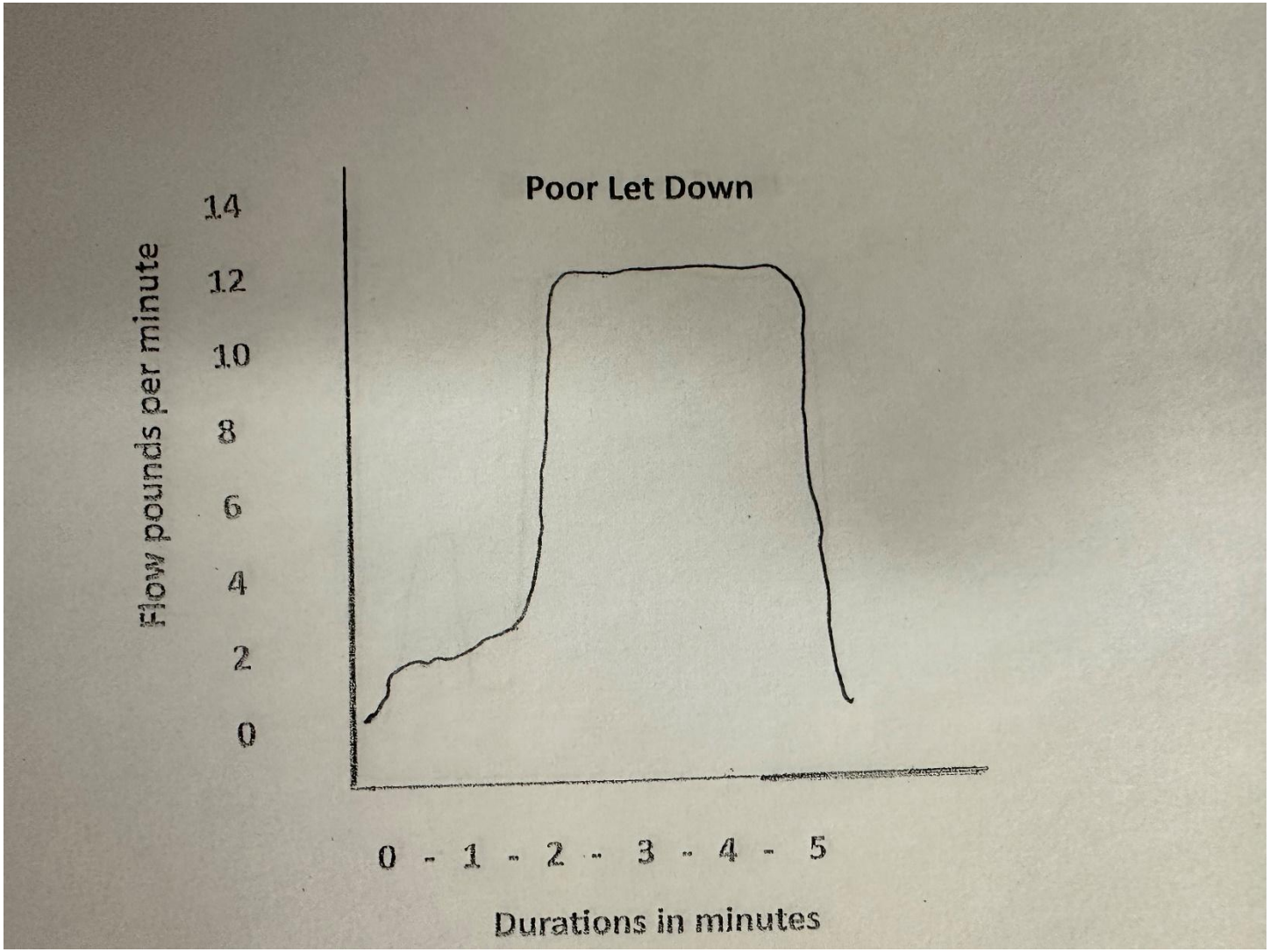


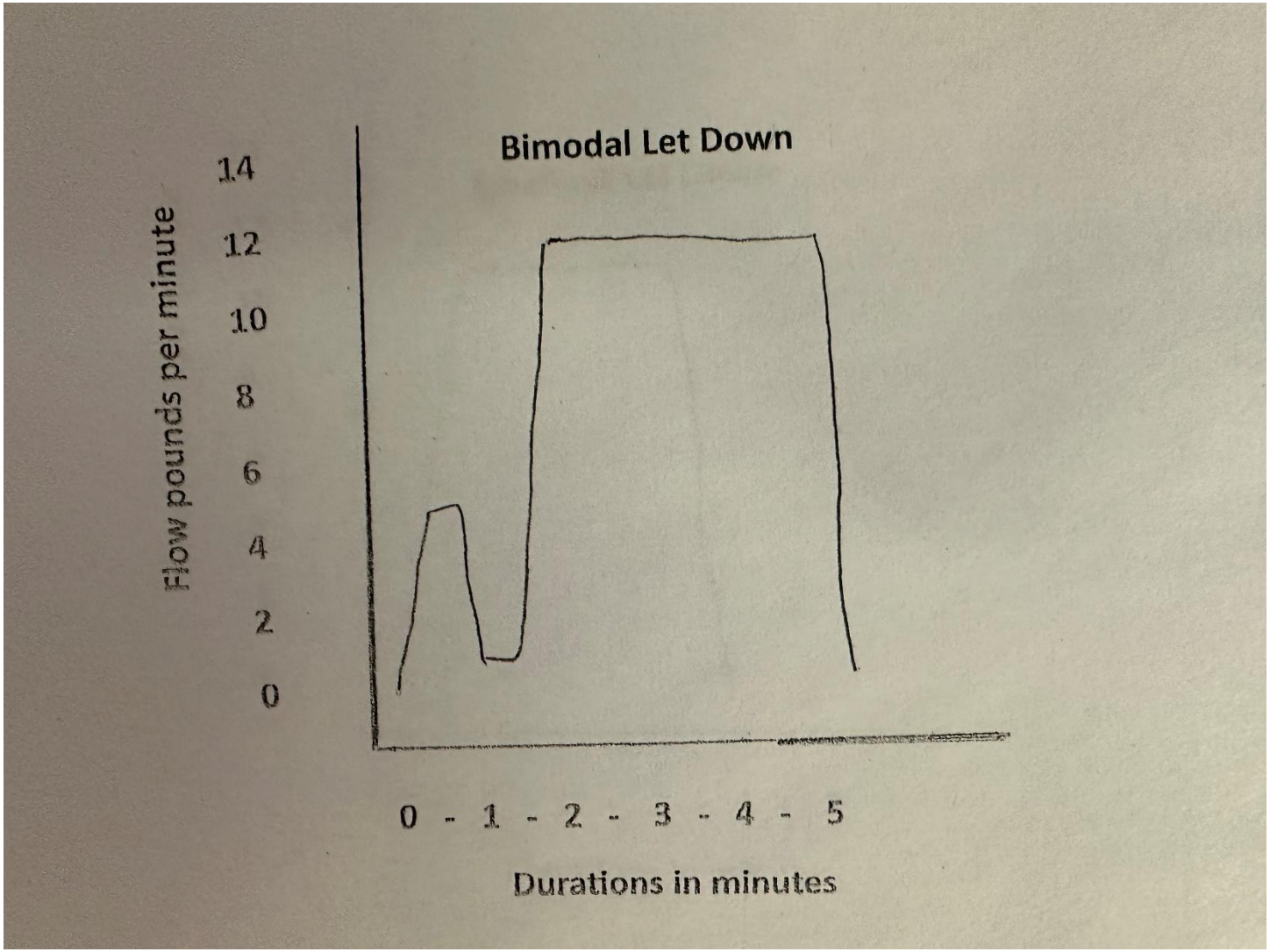
Proper Milking Practices Results in:

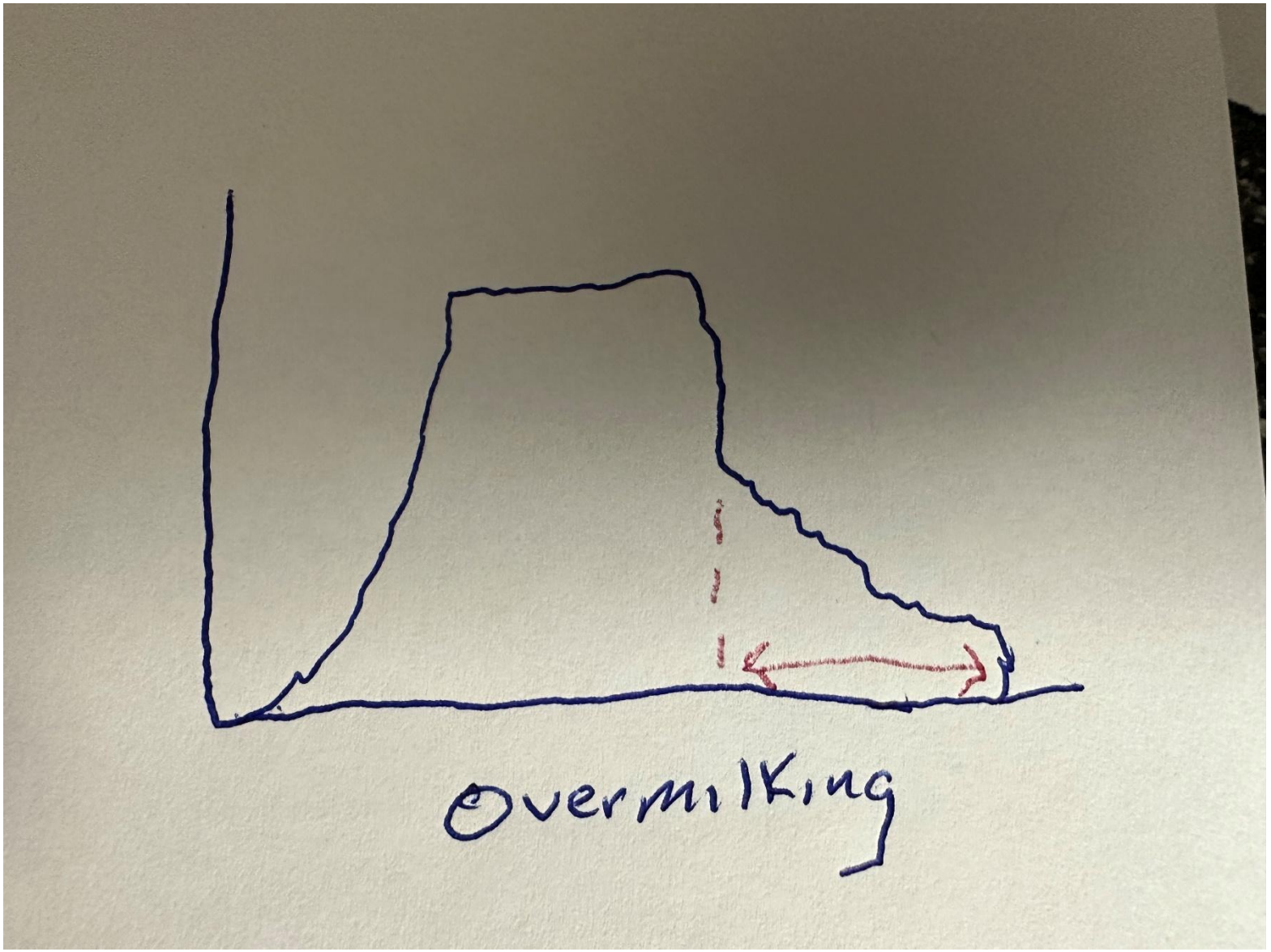
- Faster Milking
- More Milk Production
- Better Milk Quality




Excellent Let Down
Flow pounds per minute
14
12
10
8
6
4
2
0
0 - 1 - 2 - 3 - 4 - 5
Durations in minutes


Poor Let Down
Flow pounds per minute
14
12
10
8
6
4
2
0
0 - 1 - 2 - 3 - 4 - 5
Durations in minutes


Bimodal Let Down
Flow pounds per minute
14
12
10
8
6
4
2
0
0 - 1 - 2 - 3 - 4 - 5
Durations in minutes


Overmilking

Poor Advice

Is as worthless as a parachute that opens on the second bounce!



Proper Lag Time

The single biggest factor
to rapid and complete milk outs.

GOAL = 90+ SECONDS

(Fore Strip to Unit Attachment)



Proper Lag Time

Goal: 90-180 seconds

Research shows up to 5 minutes without negative issues



Over Milking

Greater than 75% of
all over milking occurs
at the beginning of milking

NOT THE END OF MILKING!!



DIPS

- Proven products
- Right product for right job
- Right product for right bedding
- Predips different needs than post dips
- Results

DIPS

- Proper mixing
- Proper storage
- Proper Age of product

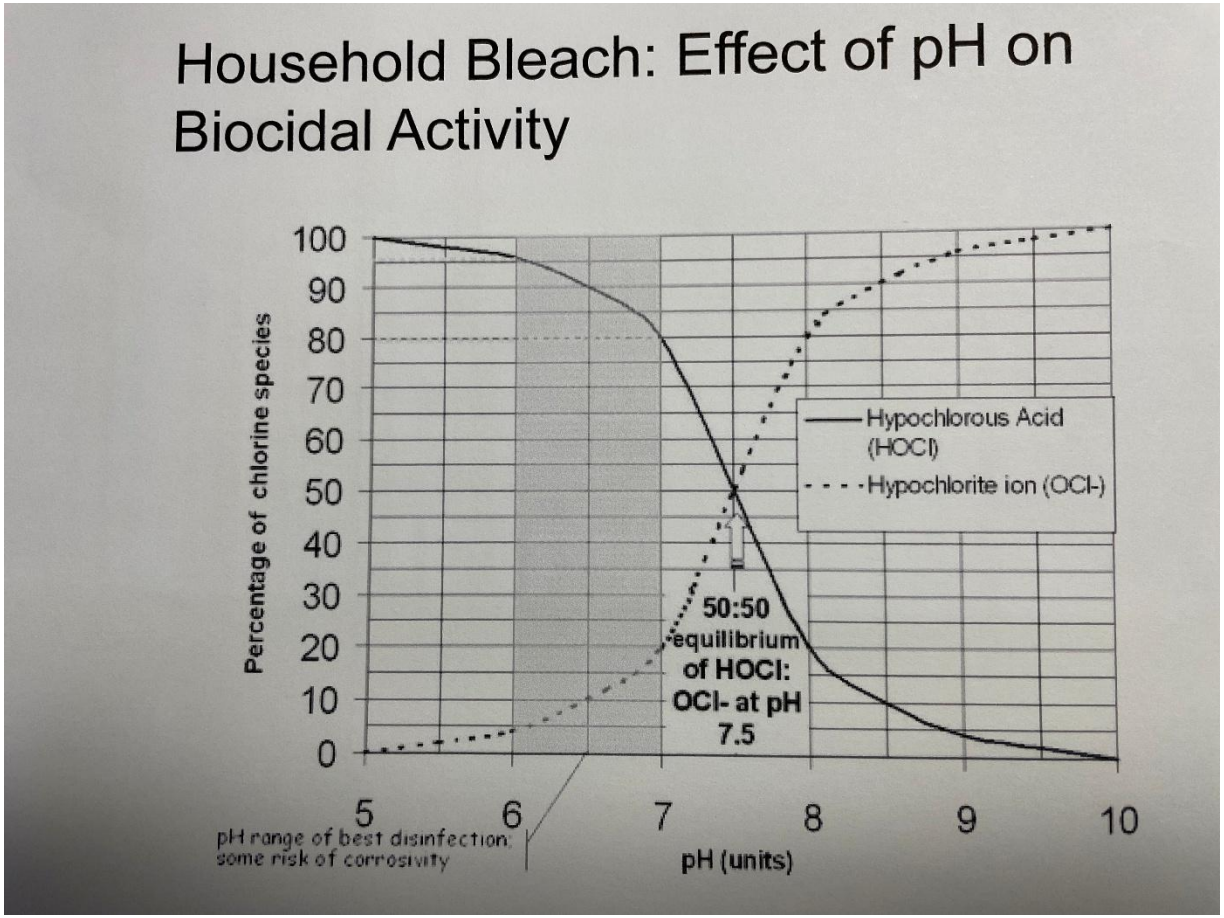
DIPS

- Dip prices are going crazy due to raw ingredient supply
- Many low price products available but may not be correct for your situation
- Select products based on results NOT just on price

DIPS

- 90% of my clients predip with chlorine
- Key is it must have correct pH to have best killing power
- Storage is critical Sunlight bad
- Sealed containers

DIPS



pH must be 6.5 to 6.8 for best killing power Most important!

DIPS



Improper mixing = poor results

Must be used by 24 to 48 hours

DIPS





Sunlight damages many types of Dips. Total coverage important

DIPS

- Robot predip and post dip can work but most DO NOT accomplish the basics of proper teat coverage yet use more dip
- Yes, they replace a person but over 50% of dairies I work with have shut them off and did not reduce people

Robot Dippers

- Very few get good coverage
- Use less dip but unfortunately to a point of terrible teat coverage
- Many automatic dip systems put dip everywhere but where you want it
- Must have a good monitoring system

Robot Dippers



Monitor the Results of Good Udder Prep





Might be some issues with teat cleaning??

Equipment Three Main Factors

Vacuum Setting

Pulsation Settings

Automatic Take Off Settings

Parlors Crowd Gate Operation is Critical Too



Equipment Three Main Factors

Vacuum Setting

Claw vacuum at peak milk flow the key

11.8 to 12.7 inches (38.2-42.3 Kpa)

Based on inflation being used



Equipment Three Main Factors

Vacuum Setting

REMEMBER: If your milking equipment has not been tested while cows are milking, it has NOT BEEN PROPERLY tested.

Production huge impact on this



Equipment Three Main Factors

Pulsation Setting

B phase 475-550 milliseconds

D phase 220 or higher milliseconds

When higher B phase, raise D phase

Changing rate and ratio to achieve



Equipment Three Main Factors

Pulsation Setting

We used to only pay attention to the pulsation ratio and rate

Now I only care about B and D phase and make changes to get proper numbers



Equipment Three Main Factors

ATO Settings

Huge changes based on milking routine and milk path

Now most dairies 2.2 lbs. (1kg) or higher

Some now 3.5 lbs. (1.6 kg)

Delay setting 3 seconds or less

Goal: Less 20 seconds low flow



Equipment Three Main Factors

ATO Settings

Every dairy different

Only ways to know if correct setting

Cow behavior end of milking

Teat end health

Strip yields



Equipment Three Main Factors

ATO Settings

Strip yields are important to check

Ideally 250-400 cc milk left evenly in the entire udder



Take Off Settings

Mainly helps improve milking efficiency and rarely a cause high SCC

Milk Flow Guidelines

- Flow rates increase across all time sets
- Average flow per minute >7.0 lbs. (3.2kg)
- Duration Less 4.0 minutes
- Peak Flow >9.0 pounds (4.1 kg)
- Time in Low Flow 20 seconds or less
- At least 15lbs. (6.8kg) milk in first 2 minutes



Milk Flow Guidelines

- Average flow per minute >7.0 lbs. (3.2kg)
  - May be most important number, better that peak flow because better indicator of what goes on during entire milking
  - Tells you about the entire milking process
  - Prep, equipment, cow handling



Parlor Performance

- Turns Per Hour 4/hour now

  5.5 to 6.5

  5 new minimum goal

- Pounds Per Hour 125 lb. (56.8 kg) but now 165-200 lbs. (75-91 kg)

New goal >150 lb. (68 kg)

These are all dependent on the people and their milking routine!



Parlor Performance

- Turns Per Hour now

  4 turns vs. 5.5 turns

- 33 lb. (15 kg) milking
- $0.18/lb. ($0.396 kg)
- Double 12 parlor 3X
- $1,616,630 more milk per year
- Huge for profits



Parlor Performance

- Turns Per Hour now

  4 turns vs. 5.5 turns
- Labor costs same
- Equipment same
- Changing attitudes the key
- Achieving using a FULL milking routine



One of Top Three Things affecting profitability

Pounds of milk harvested per stall per hour

Huge impact



Parlor Performance

Keys Are:

Milk clean cows

Good Milking Routine

Proper Equipment settings

Pay attention to Details



MOTTO FOR SUCCESS

"When ever you lose interest in being better at something, chances are you have already stopped being good at it!"



Days End

Sit down and enjoy a good cigar



Days End

Relax with your best buddy



Days End

OR my wife's idea





The end!!

CONTACT INFORMATION

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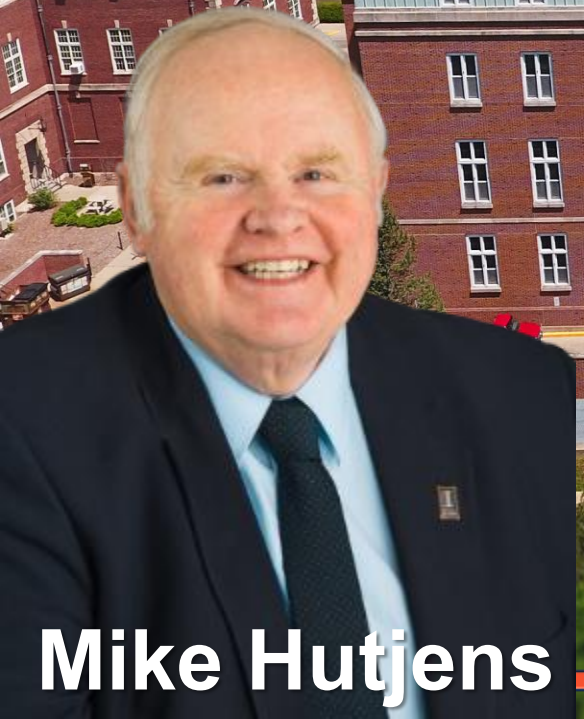
QUESTIONS

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Joining The Eight Pound Club: Focus On Milk Yield

George Dairy Conference



Mike Hutjens

ILLINOIS
College of Agricultural, Consumer & Environmental Sciences

What Is the Eight Pound Club?

- Pounds of milk fat and milk protein per cow per day as an index of milk production
  - Includes milk yield
  - Includes percent milk fat and milk protein
- Over 80 percent of U.S. production is based on pounds of milk fat and milk protein
- Focus on milk yield is important in Georgia
- U.S. exports (16-18%) of milk production

Value of Milk Components
(December, 2025)

- **Milk fat** **$1.58 / lb.**
- **Milk protein** **$2.46 / lb.**
- **Other solids** **$0.44 / lb.**

Why Is Export Important?

(Dec 26, 2025 prices)

Product	U.S.	E.U.	NZ
	----------$ / lb----------		
Cheese	1.34	1.59	2.09
Butter	1.40	2.22	2.27
Powder	1.18	1.08	1.12

Milk Yield



Driving Milk Yield

- Peak milk sets the lactation curve and yield.
- Dry matter intake sustains milk yield and components.
- Feed efficiency is a tool to connect milk yield to dry matter intake
- Body condition score can supply energy in early lactation (+) or reduce DMI (-)
- Transition management close-up and fresh cows.

Holstein Milk Production--2025

Lact #	Milk*	Peak Milk	Milk/Peak	Days in Milk			
				1 - 40	41 - 100	101 - 199	200 - 305
1	19,000	68	279	56	62	59	53
	23,000	79	291	63	72	70	64
	26,000	90	289	67	81	81	76
	30,000	98	306	70	87	91	85
2	19,000	84	226	72	76	67	55
	23,000	99	232	84	91	81	66
	26,000	114	228	94	104	95	78
	30,000	124	242	99	113	106	87
3+	19,000	90	211	75	81	71	57
	23,000	107	215	88	97	85	67
	26,000	123	211	97	111	100	80
	30,000	133	226	102	120	110	89

19,000 RHA n = 1,014 herds 23,000 RHA n = 1,998 herds
27,000 RHA n = 1,022 herds 30,000 RHA n = 292 herds

Jersey Milk Production--2025

Lact #	Milk	Peak	Milk/Peak	Days in Milk			
				1 - 40	41 - 100	101 - 199	200 - 305
1	15,000	54	278	45	49	46	42
	17,000	59	288	47	54	51	46
	19,000	65	292	53	60	57	52
	21,000	72	292	56	63	65	58
2	15,000	65	231	57	59	52	43
	17,000	73	233	63	66	59	49
	19,000	79	241	68	72	65	55
	21,000	85	247	71	76	71	59
3+	15,000	71	211	60	64	56	45
	17,000	79	215	65	71	62	51
	19,000	85	224	71	78	69	57
	21,000	92	228	73	81	75	62

15,000 RHA n=121
19,000 RHA n= 59
17,000 RHA n=92
21,000 RHA n=17

Milk Yield Targets For Feed Efficiency

Source:

The Ohio State University

Milk Yield		Feed Efficiency
lb	kg	
55	25	1.25
60	27	1.32
65	30	1.38
70	32	1.44
75	34	1.49
80	36	1.54
85	38	1.58
90	40	1.63

Economics of Feed Efficiency

(80 pounds milk and $0.13 cent pound DM)

Feed Efficiency (lb milk/ lb DM)	DMI (lb/day)	Difference (savings/day)
1.40	57.0	
		$0.52
1.50	53.0	
		$0.39
1.60	50.0	



Grouping Strategies

- Close up dry cow group
  - Manage blood calcium (DCAD or zeolite)
  - Increase amino acid level and energy
- Fresh cow group
  - Adjust nutrients based on DMI (amino acids)
  - Minimize metabolic disorders
  - Manage dry matter intake
- Late lactation group
  - Level of ECM
  - Days pregnant
  - BCS score cows over 3.5
- First calf heifer/1st lactation group

Managing Dry Matter Intake

- Optimizing dry matter intake to milk yield; feed efficiency is a tool
- Evaluating uNDF in ration dry matter
  - Too high limits total dry matter intake (> 12%)
  - Too low leads to rumen disfunction (< 8%)
- Forage quality is the focus area

2025 Corn Silage Results

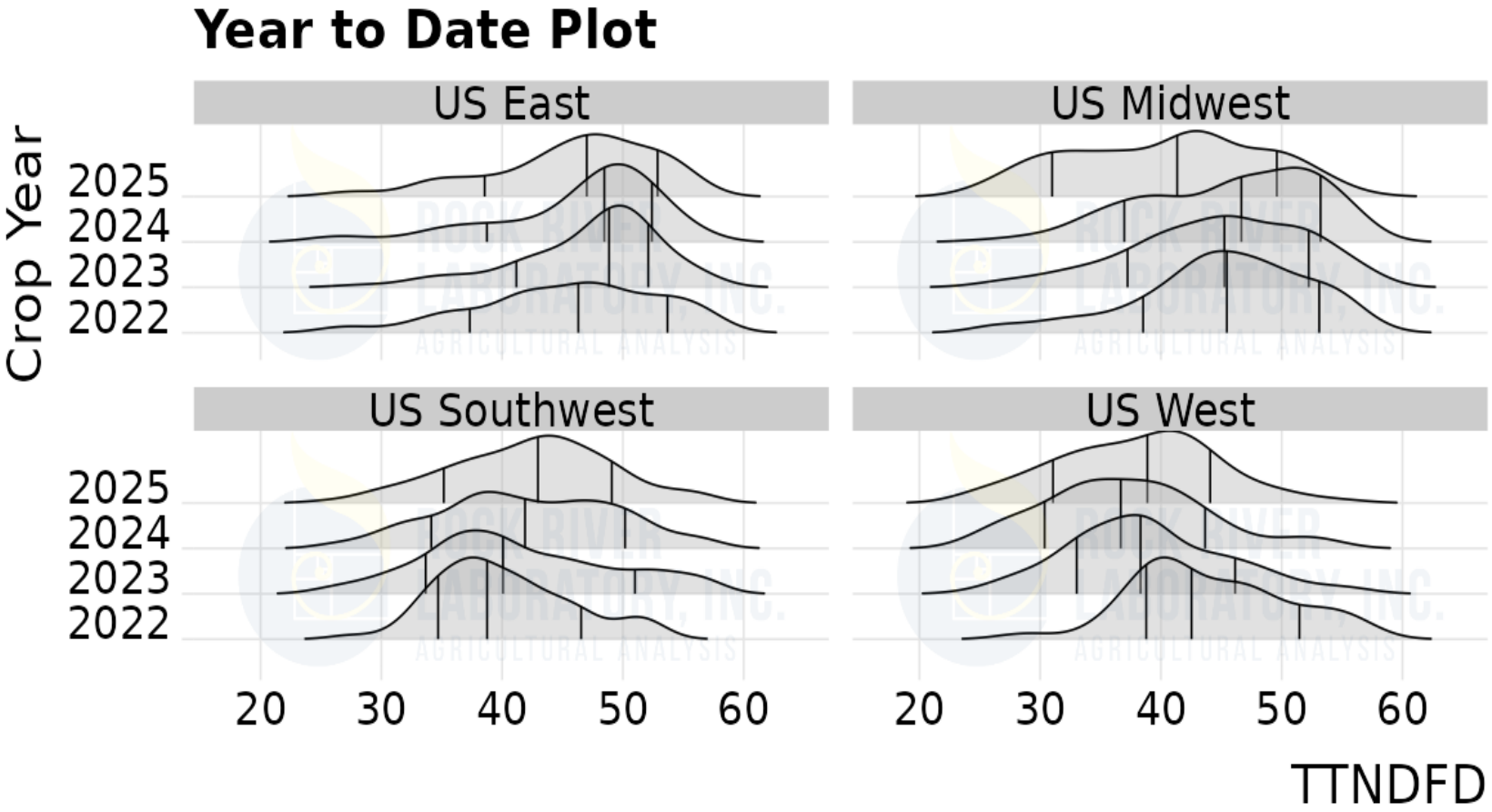
	Midwest CS		All Other Regions CS	
	2025	Prev 3 years	2025	Prev 3 years
Moisture	64.9	62.7	63.0	62.7
Starch	37.2	37.2	34.6	36.8
NDFD30	55.1	57.7	54.7	56.1
uNDFom240	10.3	10.2	11.4	10.5

DAIRYLAND Laboratories, Inc.

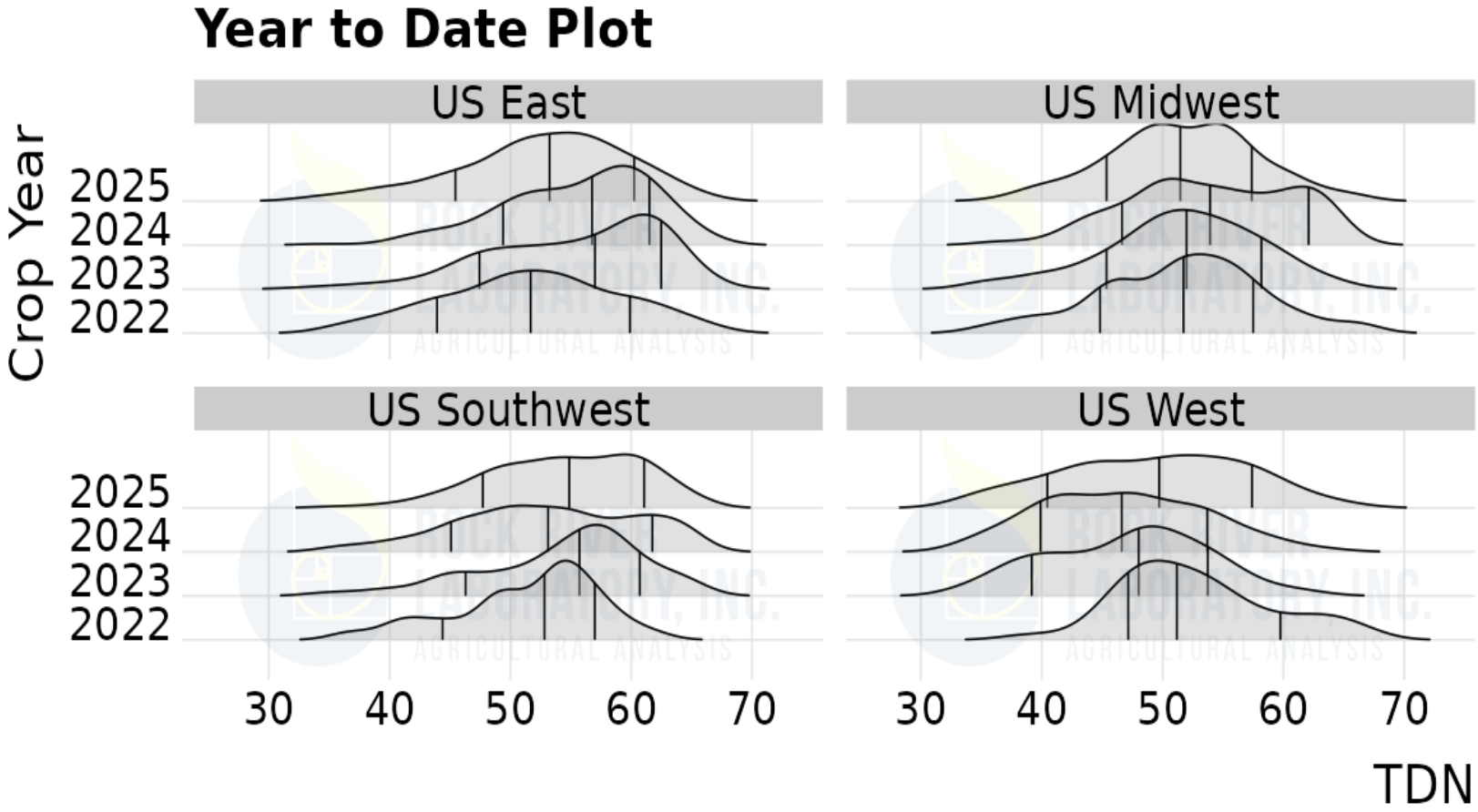
Sorghum Silage Interest

- Less water under drought conditions
- Lower seed costs
- Sources of sorghum silage
  - BMR (higher in fiber digestibility)
  - Brachytic (shorter internode and leafy)
  - Male sterile (no grain and less lodging risk)
  - Photoperiod sensitive (remains vegetative)
- Berry processors available with larger berry
- Research available from Texas A & M

Sorghum TTNDFD



Sorghum TDN


Year to Date Plot
US East
US Midwest
US Southwest
US West
Crop Year
2025
2024
2023
2022
30
40
50
60
70
TDN

Milk Production Economics

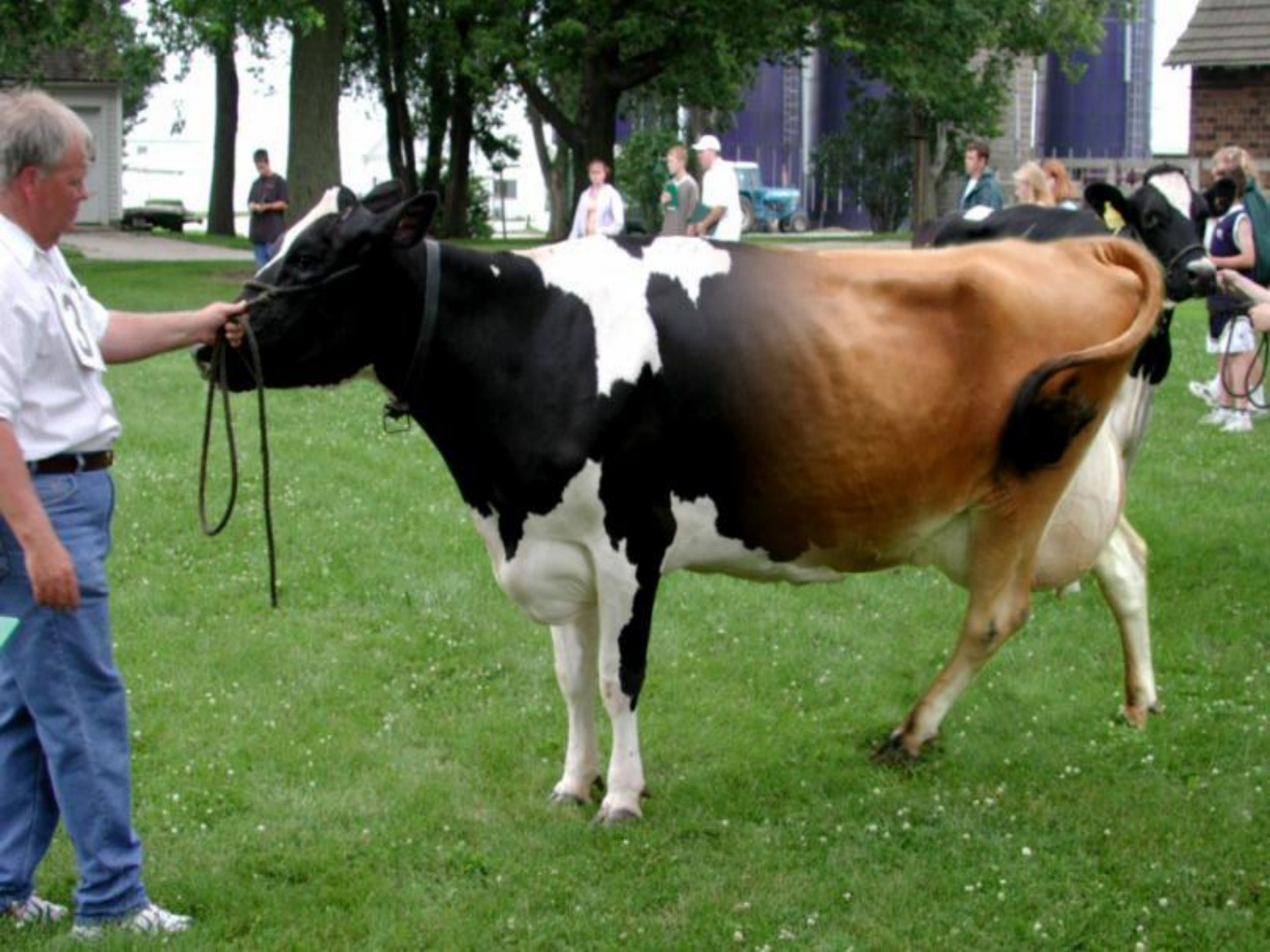
- High producing cows are most efficient and profitable
- Never give up milk
  - One pound of DM costs 13 cents
  - Milk prices at 20 cents per pound
  - One pound of DM can support 2+ pounds of milk ($0.40)
  - Profit of each pound of dry matter is +$0.27/cow/day

Focus On Milk Fat



Sources Of Milk Fat Change

- Genetics—selecting for pounds of milk fat and milk protein (not percent)
- Shifting to Jersey or crossbreeding
- High quality forages—increase acetate production and higher dry matter intake
- Improving rumen efficiency
- Feeding fat—palm fatty acids, soybeans, commercial dry fats, or other oilseed sources



Milk Fat Sources

- **50% - VFA acetate and butyrate (*de novo* synthesis)**
  - C4 to C16 fatty acids
  - Acetate and butyrate precursors
- **50% - Blood lipids (fatty acids)**
  - C16 to C18 (saturated and unsaturated)
  - Dietary fat / oil (oilseeds and commercial sources)
  - Body fat mobilization (NEFA)
  - Liver and microbial synthesis

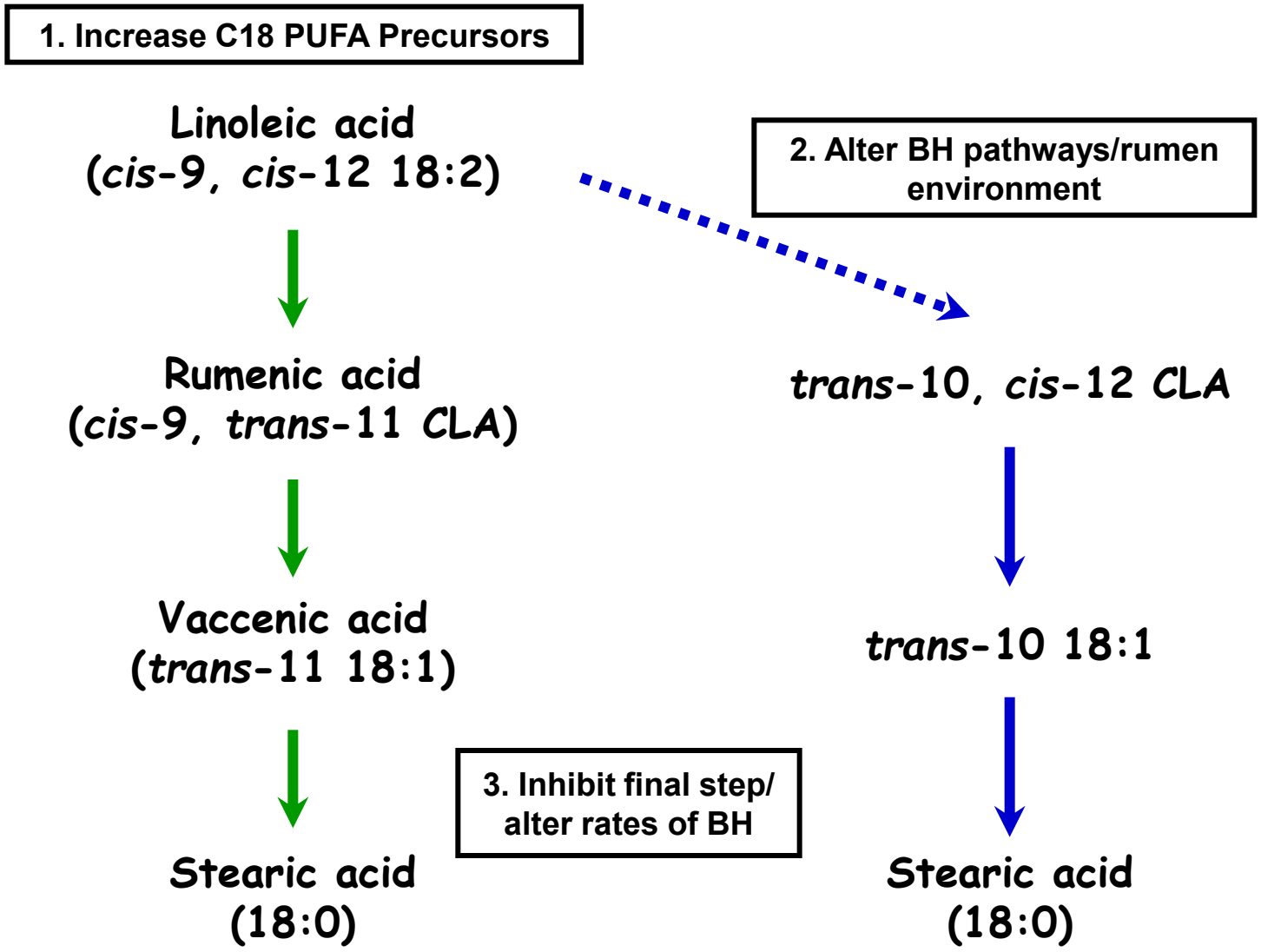
Proportion Fatty Acids (Dann, 2025)

- *De nova* fatty acids: 25% to 30%
- Preformed fatty acids: 40% to 45%
- Mixed fatty acids: Remaining
  - 50% from denova
  - 50% from preformed

High Oleic Soybeans

- Oleic fatty acid is rumen friendly (75% oleic and 7% linoleic); conventional 23% oleic and 54% linoleic.
- No yield reduction or higher cost seed
- Pioneer (Corteva) and Bayer, both GMO
- Recommend roasted soybeans (higher RUP and lysine)
- Reduce purchased protein sources

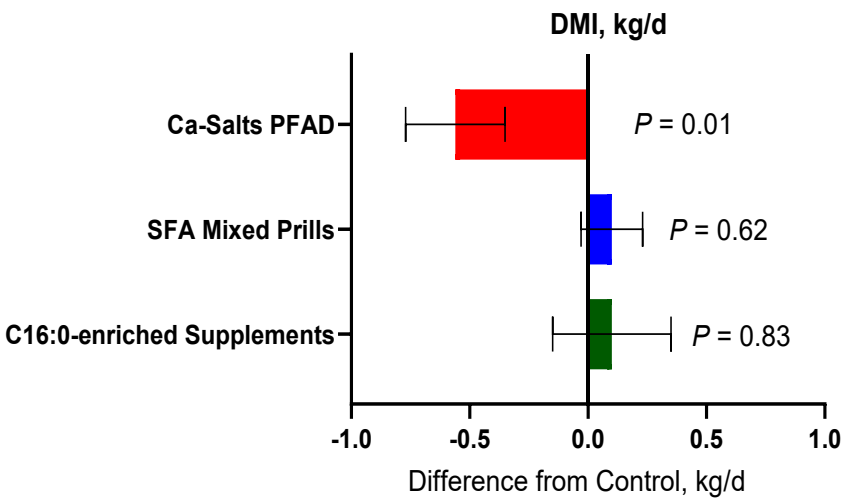
Fatty Acids Impact MFD

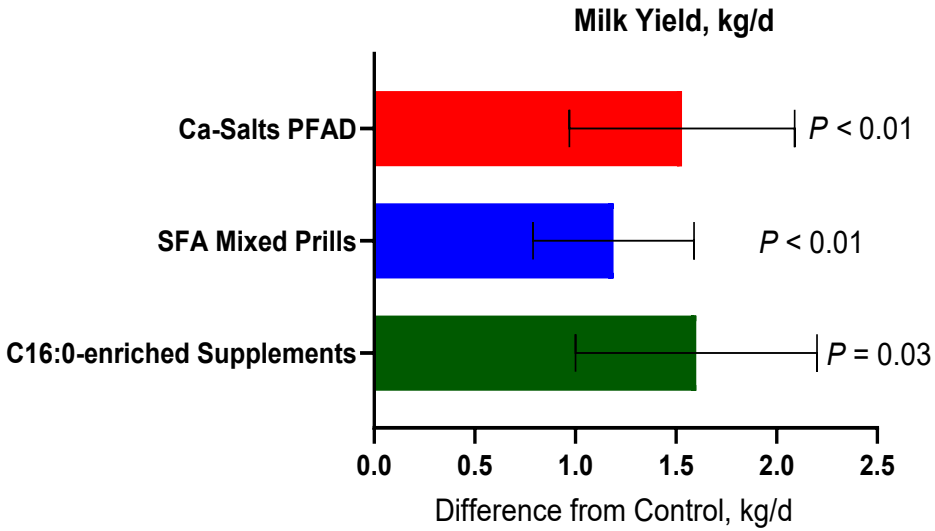


Michigan State Research

- Optimal level is 8 to 15% of the ration dry matter or 4 to 6 pounds per cow
- Adding sodium acetate to high oil soybeans was additive leading more milk
- Adding palmitic fatty acid to HOSB was additive leading to more milk
- Increase of $1 to $1.40 IOFC per cow per day compared to control diets (milk fat yield and lower feed costs)

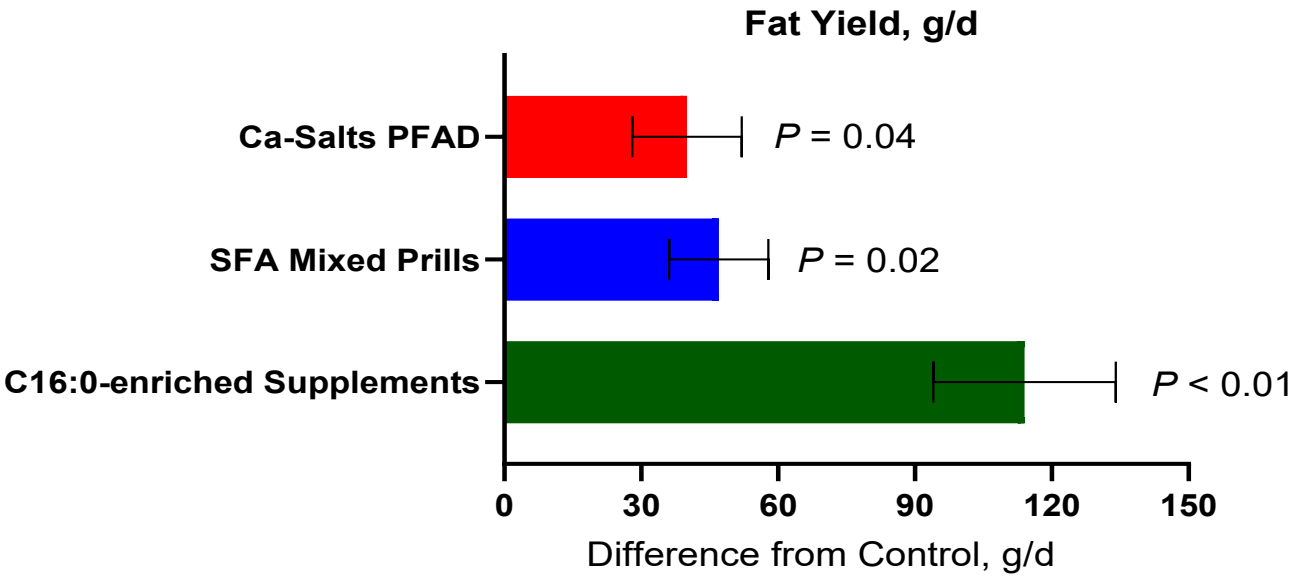
Response to Fat Supplements





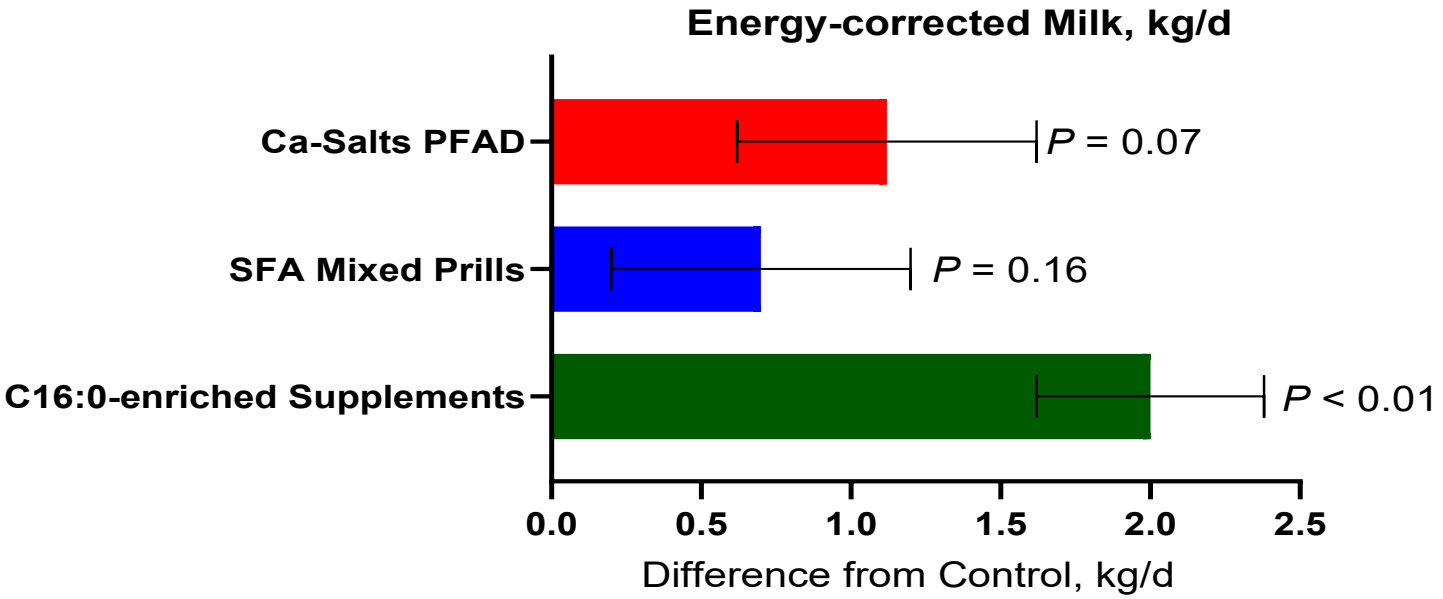
(Lock et al., 2025)

Response To Fat Supplements



(Lock et al., 2025)

Response To Fat Supplements



Summary Of Fat Supplements

- Under a scenario using $1400/ton for Ca-salts, $1600/ton for mixed prills, and $1800/ton for palmitic
  - Ca-salts of palm FA : – 10 cents/cow return
  - Mixed prill: – 35 cents/cow return
  - Palmitic acid: + 24 cents/cow return

Point 1 To Ponder

- Cost of dry fat product
  - 70 to 90 cents a pound
  - Added 1.8 to 2.0 percent of the diet
  - 1 pound of added fat (50 lb dry matter intake)
- Milk fat response (50 to 110 grams or 1/4 pound of milk fat)
- Farmers are paid currently is $1.58 a pound of milk fat
- Economics: 80 cents cost; 40 cents return

Point 2 To Ponder

- May not be able to consume or export excess U.S. milk fat
- Ratio of milk protein to milk fat for cheddar cheese is 0.82 (current Holstein milk is 0.73)
- Cheese makers must remove fat or add milk casein (both are not profit centers)
  - Potential milk fat quota in cheese regions
  - Limit milk fat < 4.5% (Holstein)

Focus on Protein / Amino Acids



The Ohio State University Trial

	LP	LP-AA
CP (%)	16.9	16.9
Milk (lb)	94.4	102.5
Protein (%)	2.99	3.09
MUN (mg/dl)	14.3	13.5

LP-aa: HDCB plus balanced lysine and methionine

Benefits Of Feeding Rumen-Protected Amino Acids

1. Milk protein increase
   - About 0.1 percentage unit
   - Usually occurs within 3 days
   - Occurs when ruman undegraded protein is low in methionine and / or lysine

2. Milk yield increase
   - 0 to 5lb/cow/day
   - Usually occurs only during early lactation

3. Milk fat increase
   - 0 to 0.2 % unit when RPMet is fed
   - Response may be restricted to RPMet products that are partially degraded in the rumen

On-Farm Tools and Interpretations



Milk Fat and Milk Protein Relationship

(Hoard's Dairyman—August, 2025)

	Fat %	Protein %	Protein vs Fat	Fat vs Protein
Ayrshire	3.93	3.15	80%	1.25
Brown Swiss	4.23	3.43	81%	1.23
Guernsey	4.62	3.34	74%	1.38
Holstein	4.22	3.20	76%	1.32
Jersey	5.08	3.77	74%	1.35

Holstein Milk Component--2025

Lact #	Fat %				Protein %				Milk (kg)
	1-40	41-100	101-199	200-305	1-40	41-100	101-199	200-305	
1	4.5%	4.1%	4.3%	4.67%	3.2%	3.0%	3.3%	3.5%	19.000
	4.6%	4.2%	4.3%	4.6%	3.2%	3.1%	3.3%	3.5%	23,000
	4.7%	4.2%	4.4%	4.6%	3.2%	3.1%	3.3%	3.5%	26,000
	4.8%	4.3%	4.4%	4.6%	3.2%	3.1%	3.3%	3.5%	30,000
2	4.4%	4.1%	4.3%	4.5%	3.2%	3.1%	3.3%	3.6%	19,000
	4,5%	4.1%	4.3%	4.68%	3.3%	3.1%	3.3%	3.6%	23,000
	4.6%	4.2%	4.3%	4.6%	3.3%	3.1%	3.3%	3.6%	26,000
	4.8%	4.2%	4.3%	4.6%	3.3%	3.1%	3.3%	3.6%	30,000
3+	4.5%	4.0%	4.2%	4.4%	3.2%	3.0%	3.3%	3.5%	19,000
	4.6%	4.0%	4.2%	4.4%	3.2%	3.0%	3.3%	3.5%	23,000
	4.6%	4.0%	4.2%	4.4%	3.2%	3.0%	3.2%	3.5%	26.000
	4.6%	4.0%	4.2%	4.4%	3.2%	3.0%	3.2%	3.5%	30,000

19,000 RHA n=1,288 herds, 23,000 RHA n=1,777 herds;
26,000 RHA n=1,786; 30,000 RHA n=399 herds

Jersey Milk Components--2025

Lact #	Milk (lbs)	Fat %				Fat/Prot	Protein %				Milk (kg)
		1-40	41-100	101-199	200-305	1-40	1-40	41-100	101-199	200-305	
1	15,000	3.1	3.7	4.3	4.8	1.29	2.4	2.8	3.3	3.6	6,804
	17,000	3.6	4.0	4.6	4.9	1.29	2.8	3.0	3.5	3.7	7,711
	19,000	4.1	4.3	4.8	5.2	1.32	3.1	3.2	3.6	3.8	8,618
	21,000	4.0	4.2	4.6	5.0	1.29	3.1	3.2	3.5	3.7	9,525
2	15,000	3.3	3.7	4.3	4.6	1.27	2.6	2.8	3.3	3.5	6,804
	17,000	3.6	4.1	4.6	4.9	1.29	2.8	3.1	3.5	3.7	7,711
	19,000	4.0	4.3	4.8	5.1	1.29	3.1	3.2	3.6	3.9	8,618
	21,000	4.2	4.3	4.6	5.0	1.20	3.5	3.3	3.5	3.8	9,525
3+	15,000	3.8	4.1	4.6	4.9	1.27	3.0	3.1	3.5	3.8	6,804
	17,000	4.3	4.4	4.8	5.0	1.30	3.3	3.3	3.6	3.8	7,711
	19,000	4.4	4.3	4.8	5.0	1.33	3.3	3.2	3.6	3.8	8,618
	21,000	4.3	4.4	4.6	4.9	1.26	3.4	3.3	3.5	3.8	9,525

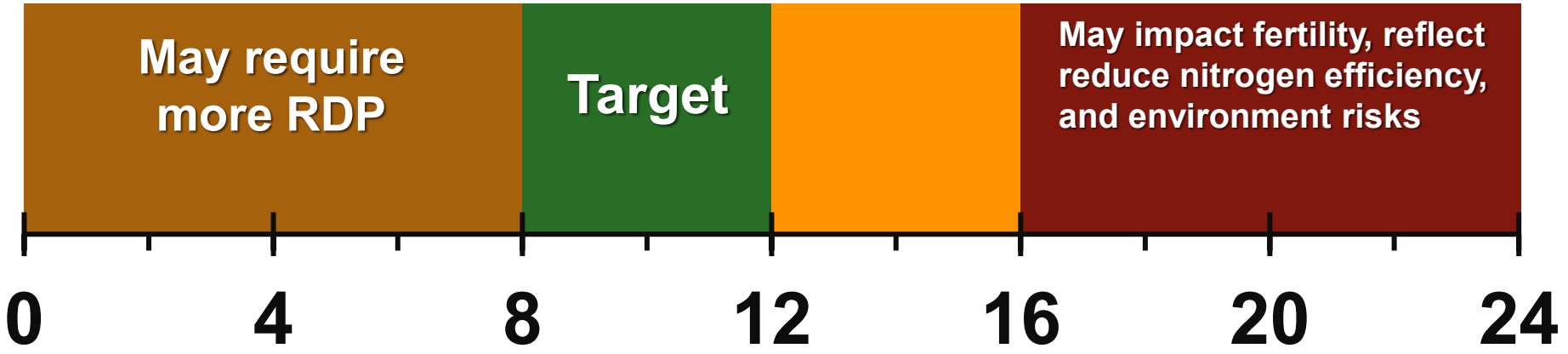
15,000 RHA n=121 17,000 RHA n=92
19,000 RHA n=59 21,000 RHA n=17

Evaluating Individual Fat Test

- **Milk fat inversions are cows that are 0.2% milk protein above milk fat percent. Example: Cows 3.2% milk protein and < 3.0% fat**

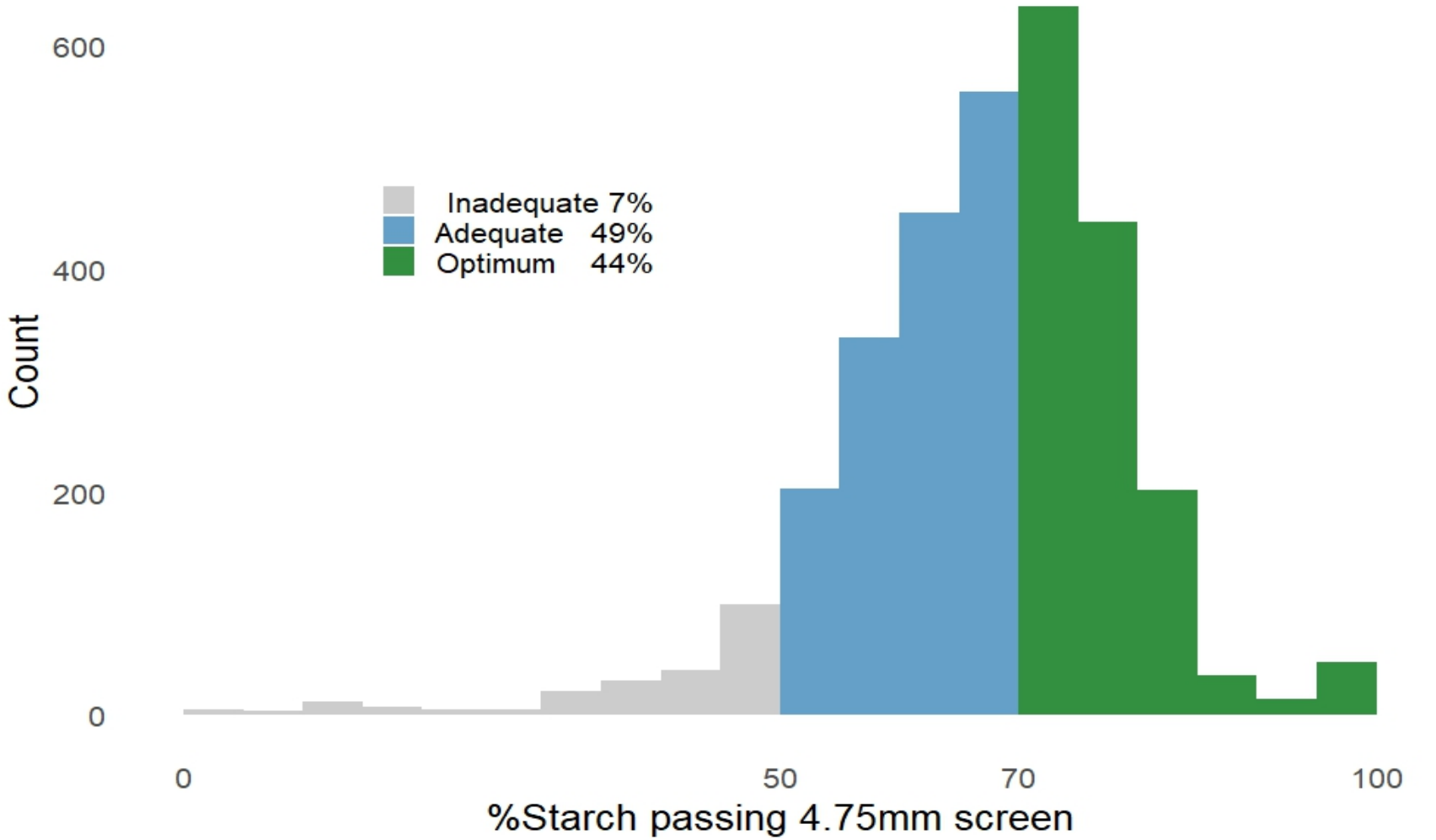
- **Milk fat depressions more than 1.0 fat percentage below the herd average. Example: Cows under 3.0% when the herd average is 4.0%**

Fine Tune MUN Levels



Corn silage processing score distribution

(2023-2024 crop years)

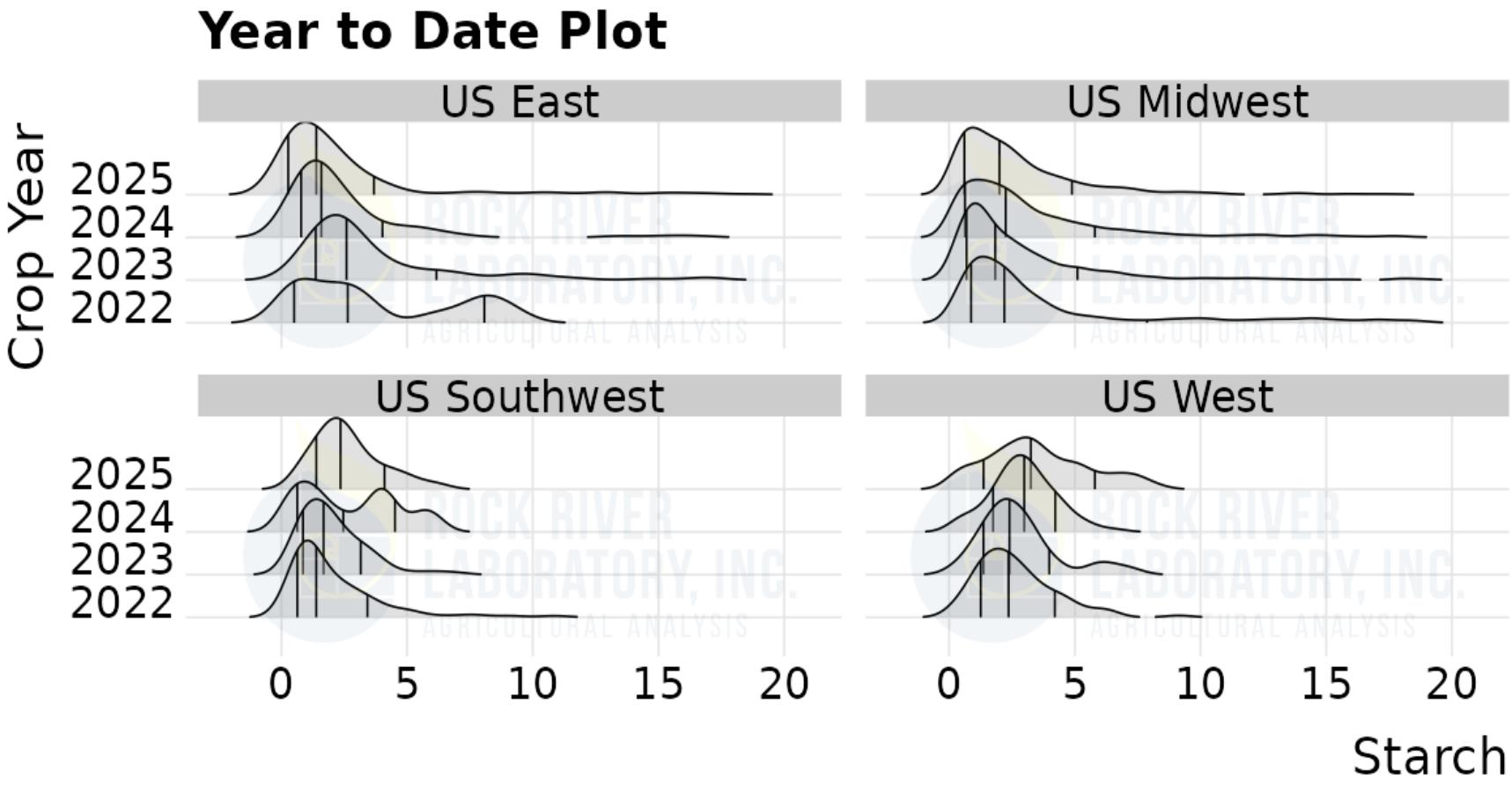


Date source: Dairyland Laboratories Inc.

Fecal Starch Goals

(less than 3 percent)

ROCK RIVER LABORATORY, INC.
AGRICULTURAL ANALYSIS



Penn State Box Separator Guidelines

		Top	2nd	3rd	Bottom
1.1mm 3rd Box	TMR	2 - 8	> 50	< 20	< 25
	Haylage	10-15	> 50	20-30	< 5
	Corn Silage*	3 - 8	> 50	< 30	< 5
4.0mm 3rd Box	TMR	2 - 8	> 50	< 20	< 25
	Haylage	10-15	> 50	20 - 30	< 5
	Corn Silage*	3 - 8	> 50	< 20	< 5

*3/4" (1.9 cm) TLC-Process

Feed Benchmarks 2026 — Illinois

Feed costs per cow day	**$6.42**	
1. Feed cost per lb. DM	0.13	
	Milk Production	
	80 lb.	**70 lb.**
2. Feed cost per 100 lb. milk	$8.04	$9.17
3. Income over feed costs/cow	11.90	$10.83
4. Feed efficiency (lb. milk/lb. DM)	1.63	1.43

Is 8+ Pounds Possible?

- Top Illinois Holstein herd
- 421 lactating registered cows
- Averaging 110 pounds of milk
- Producing 132 pounds of ECM
- 4.8% milk fat test
- 3.3% true protein test
- 173 days in milk
- 8.9 pounds of fat / protein

Take Home Messages

- Milk yield will continue to be important.
- Evaluate lactation number and days in milk
- Use tools to measure your herd
  - Breed average vs. your herd (keeping up)
  - Ratio of milk protein to milk fat (risks)
  - Feed efficiency (milk conversion)
  - MUN value (using amino acids)
  - Fecal starch (using starch)
  - Corn silage processing optimal (rumen health)


Question?

Understanding and preventing embryonic loss in dairy cows

Matt Lucy

Division of Animal Sciences

University of Missouri, Columbia, USA

Getting them bred!

Start with a clean, comfortable, healthy cow in good body condition.

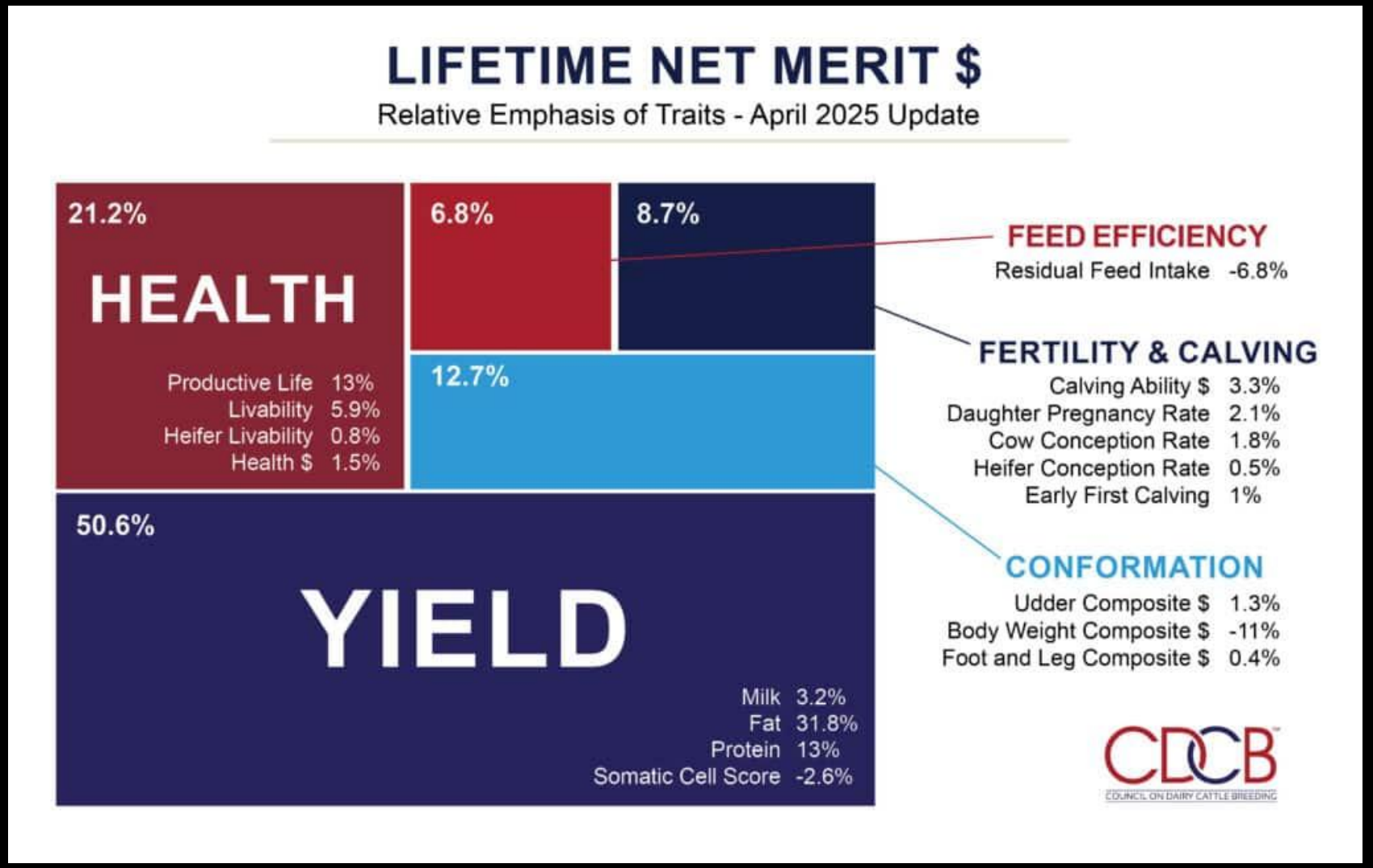
(Management!)



“Good cows” make a difference!

Superior genetics!

Modern genetic selection indices are designed to increase the health, fertility, longevity, efficiency, and productivity of dairy cows.



Do everything possible to reduce the incidence of postpartum disease, particularly metritis and endometritis, after calving

A clean environment is important and should reduce the incidence of metritis.



Photo: Drost Project

Three steps to getting cows pregnant:

Step 1: Healthy uterus

Step 2: Healthy ovary

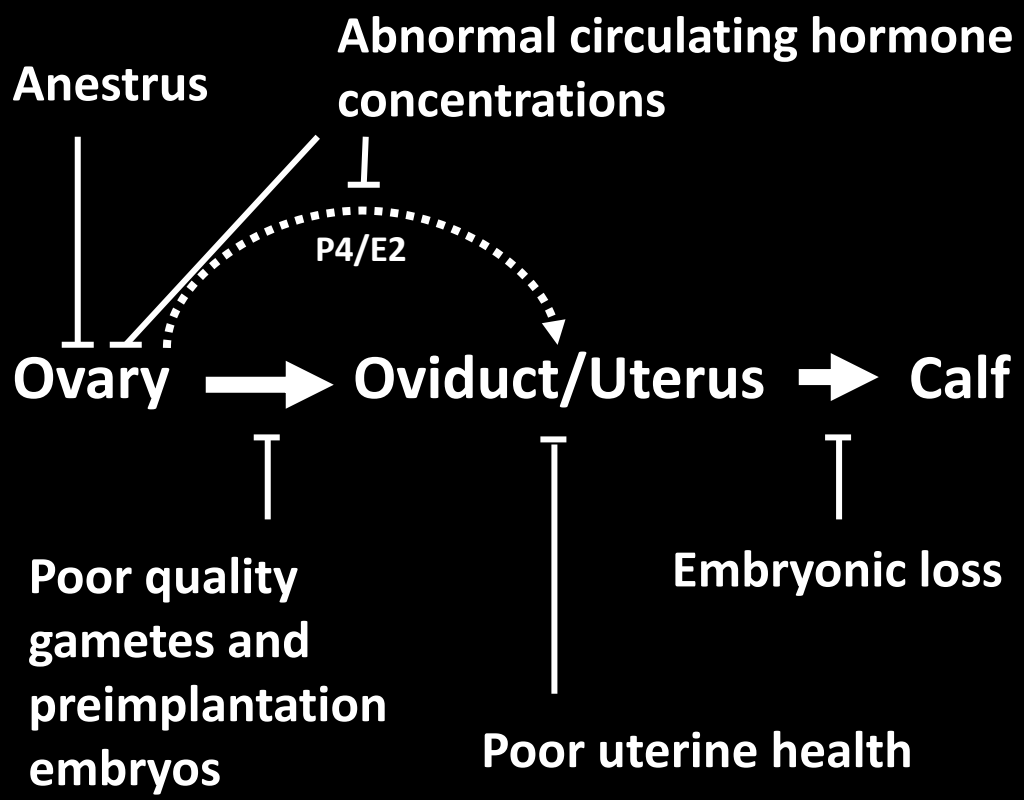
Step 3: Put semen in the cow

Three steps to getting cows pregnant:

Steps 1 and 2 are heavily dependent on management as well as the endocrine and metabolic state that supports milk production.

Everything depends on PEOPLE including Step 3 (unless the bull is doing it)!

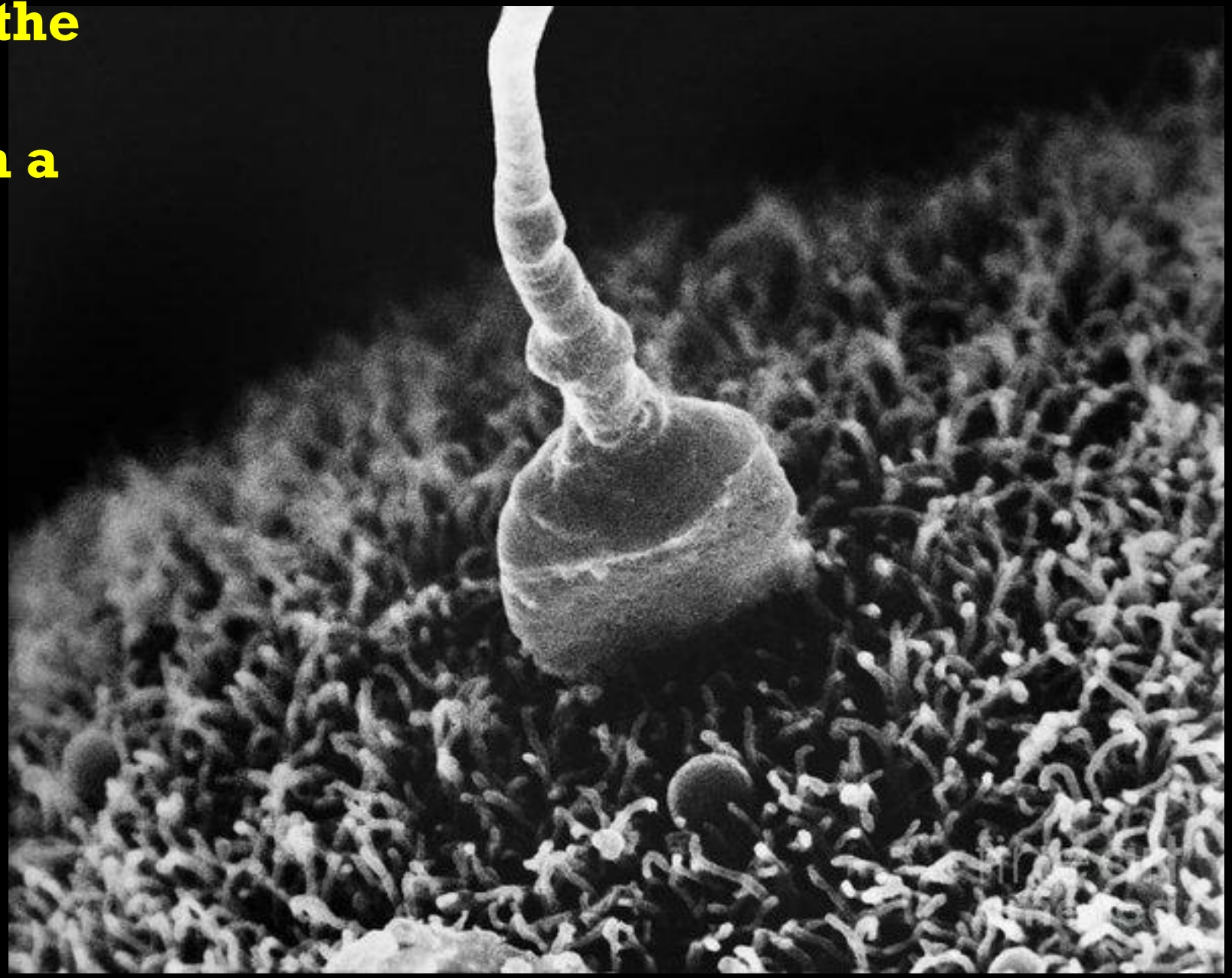
Dairy Cow Fertility





Fertilization

Fertilization is the union of sperm and egg to form a zygote.

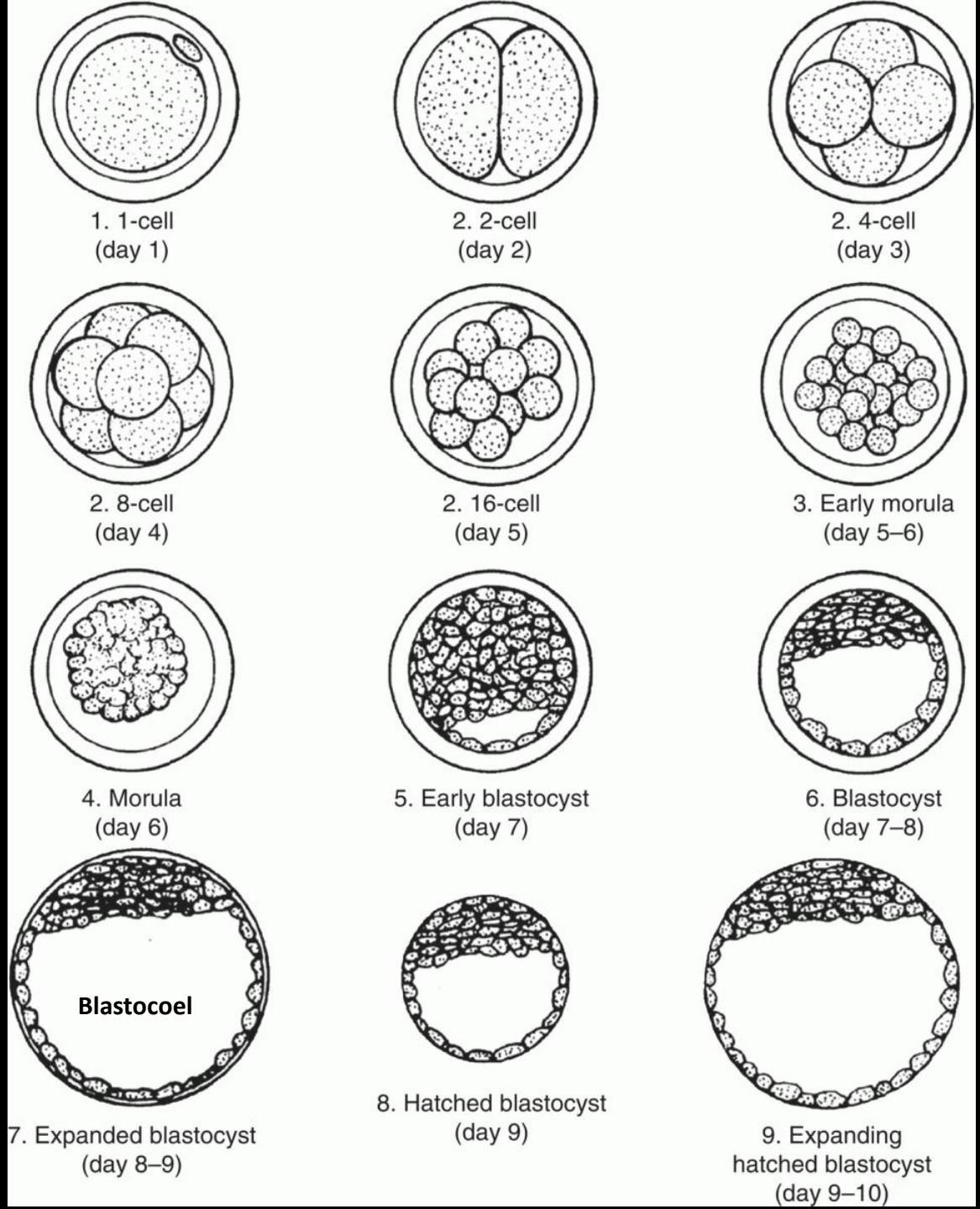


Photograph by David M. Phillips

Early embryonic development

Stages of early embryo development

- Cleavage
- Genome activation
- Compaction
- Cavitation
- Hatching

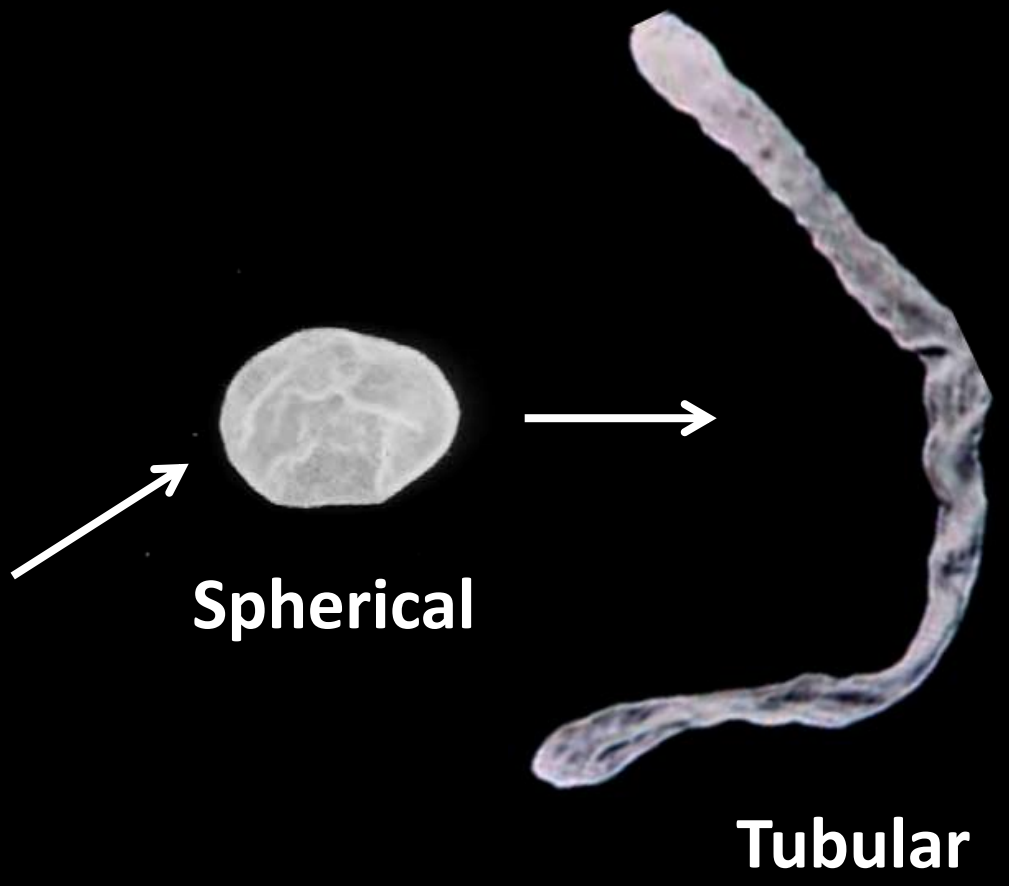


Early embryonic development
Hatching and elongation

Embryo development in the bovine



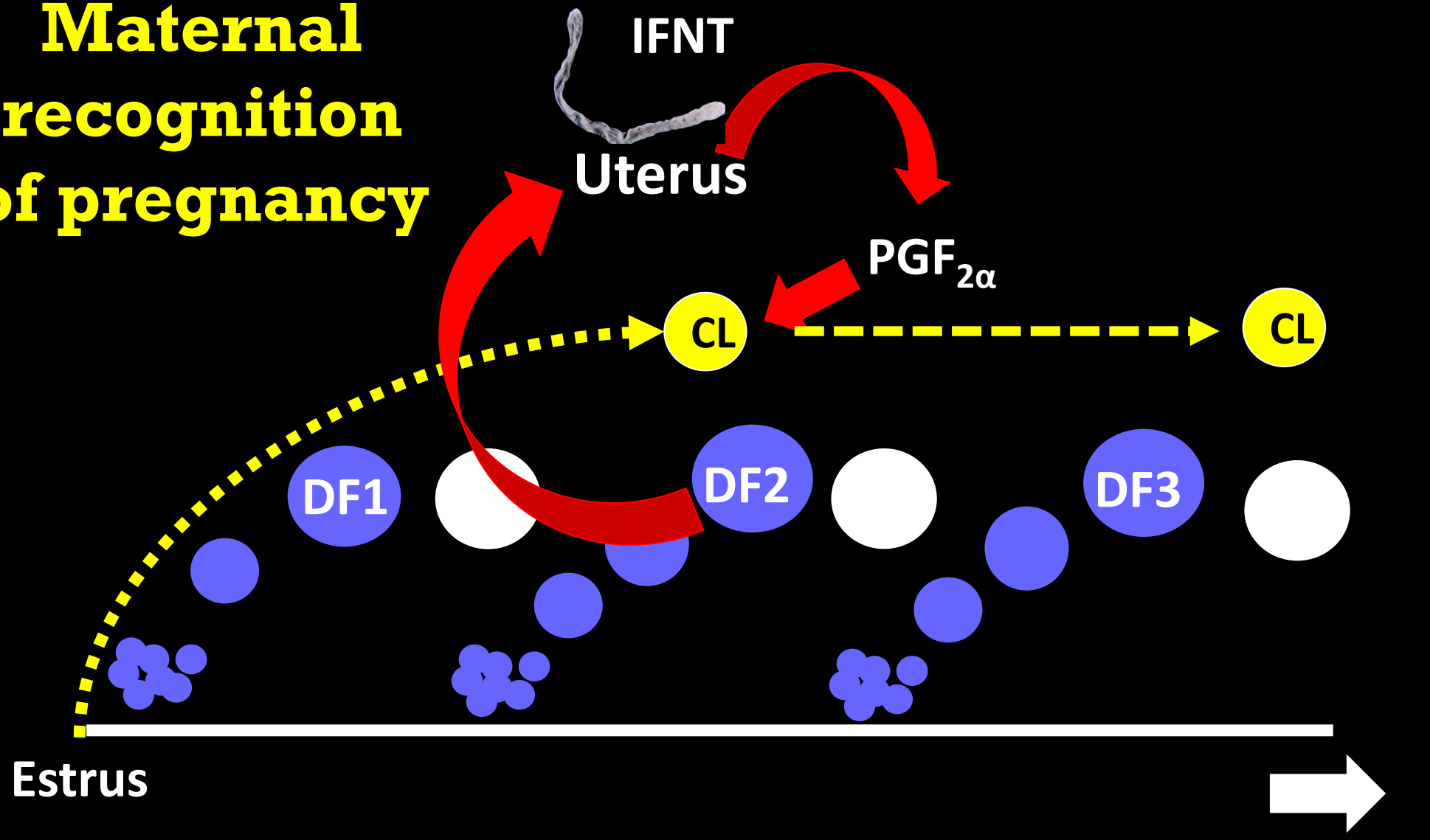
Morula – blastocyst – hatched blastocyst



Photos courtesy of
The Drost Project (University of Florida)

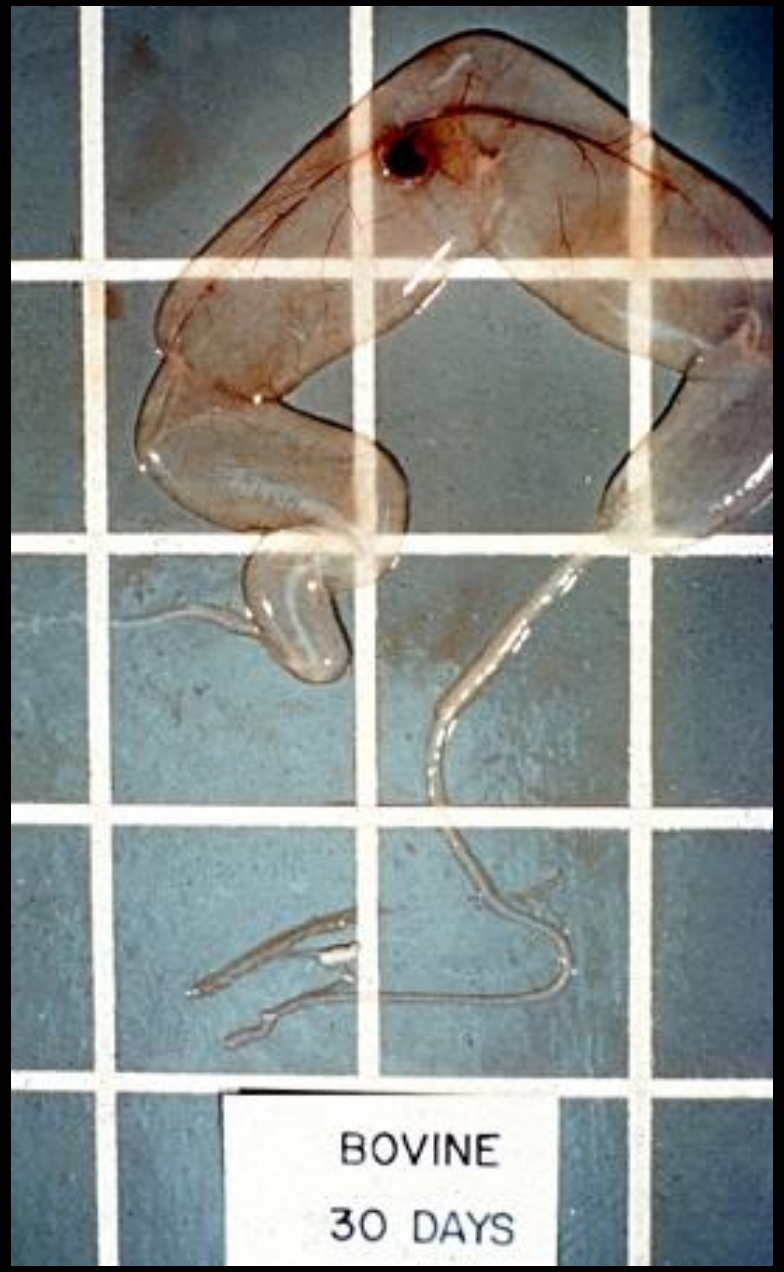
Interferon tau and maternal recognition of pregnancy

Maternal recognition of pregnancy



28 to 30 d pregnancy

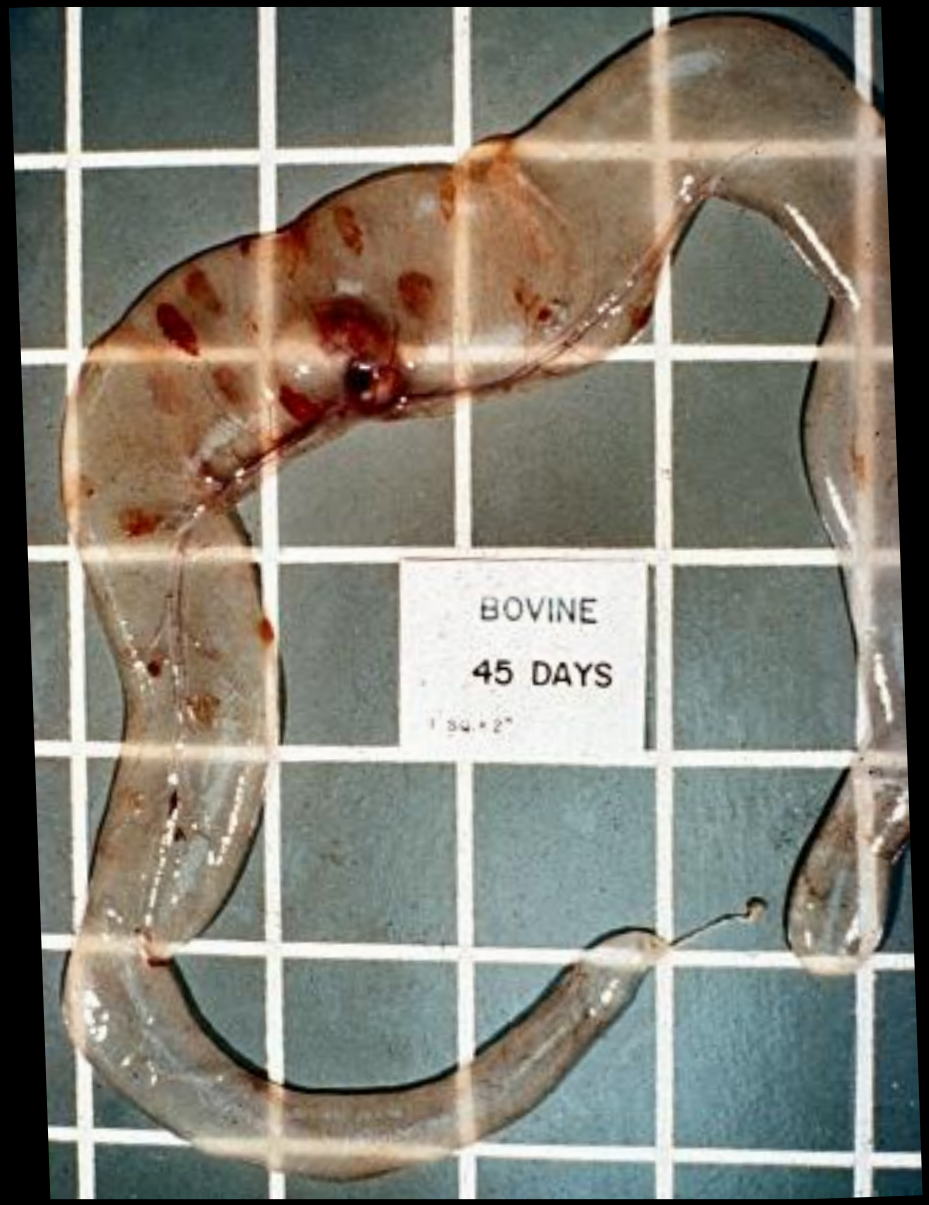




Photos from The Drost Project; Contributed by Peter Chenoweth

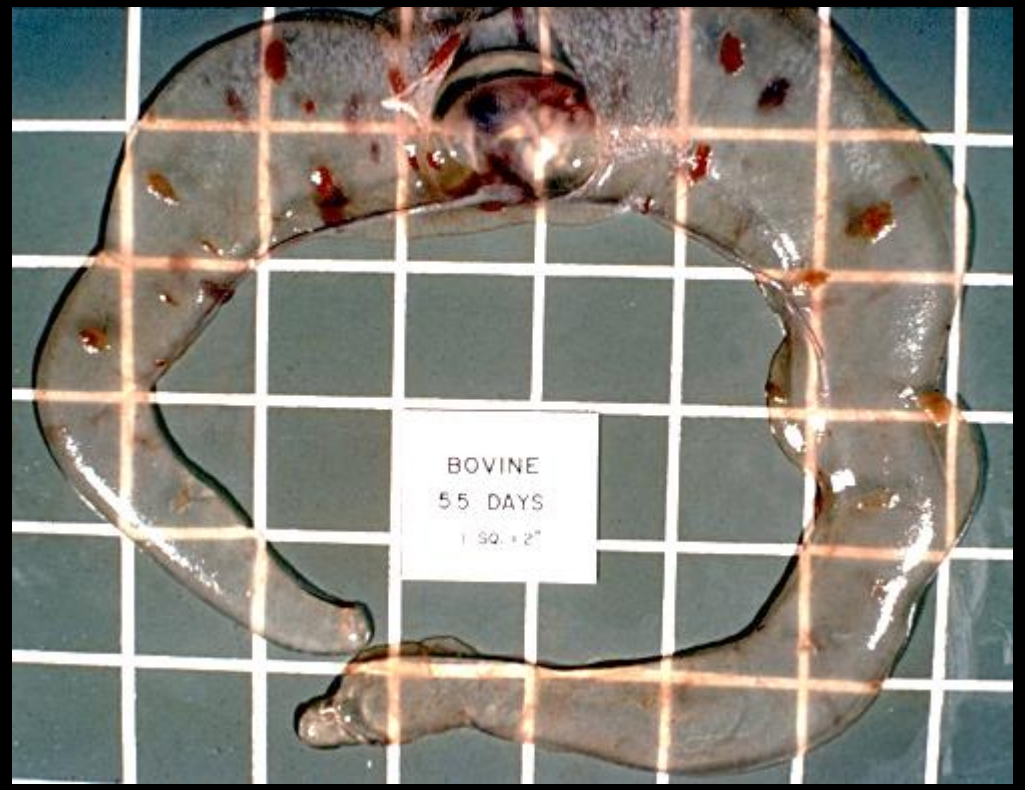
40 to 45 d pregnancy

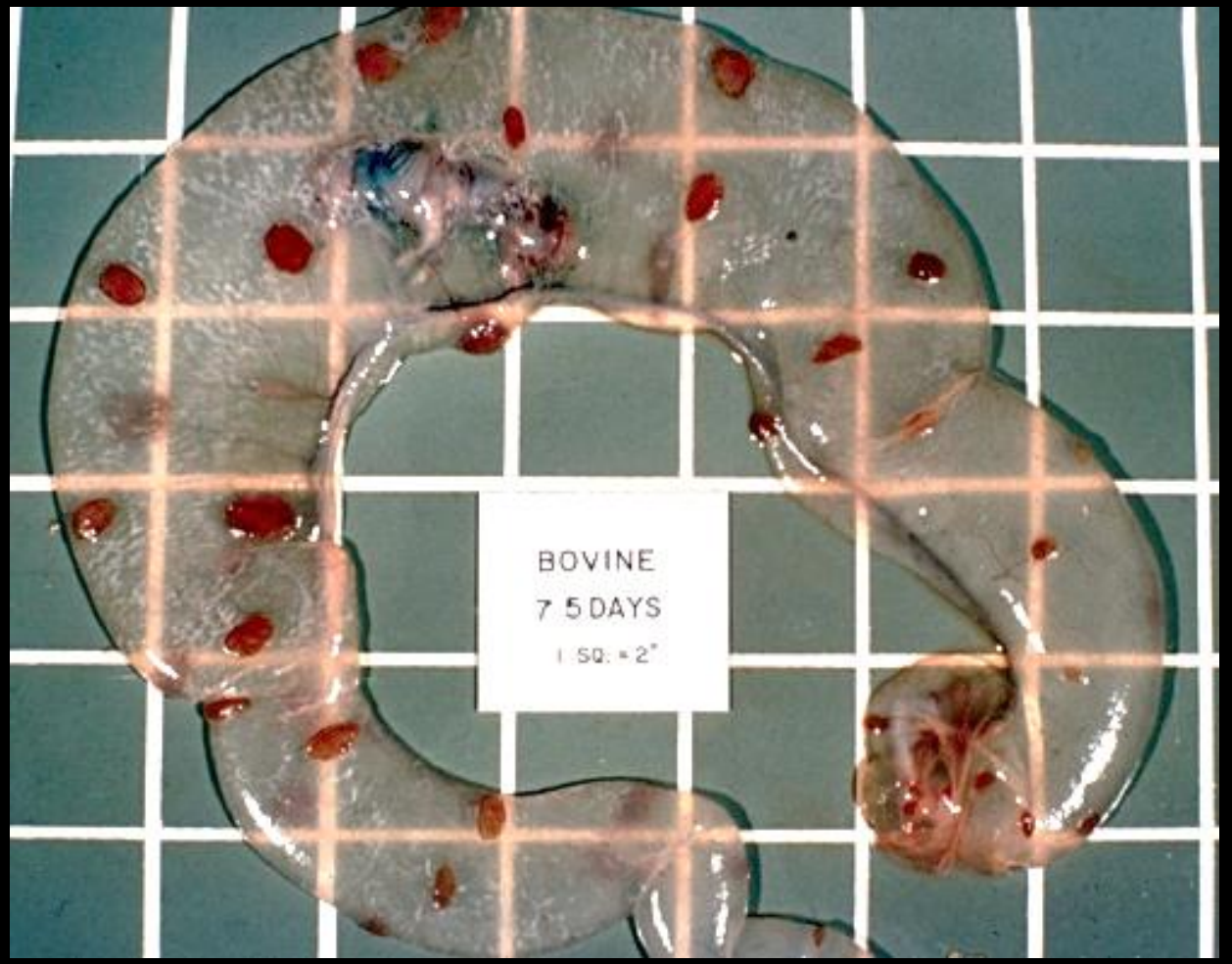




Photos from The Drost Project; Contributed by Peter Chenoweth

55 to 75 d pregnancy

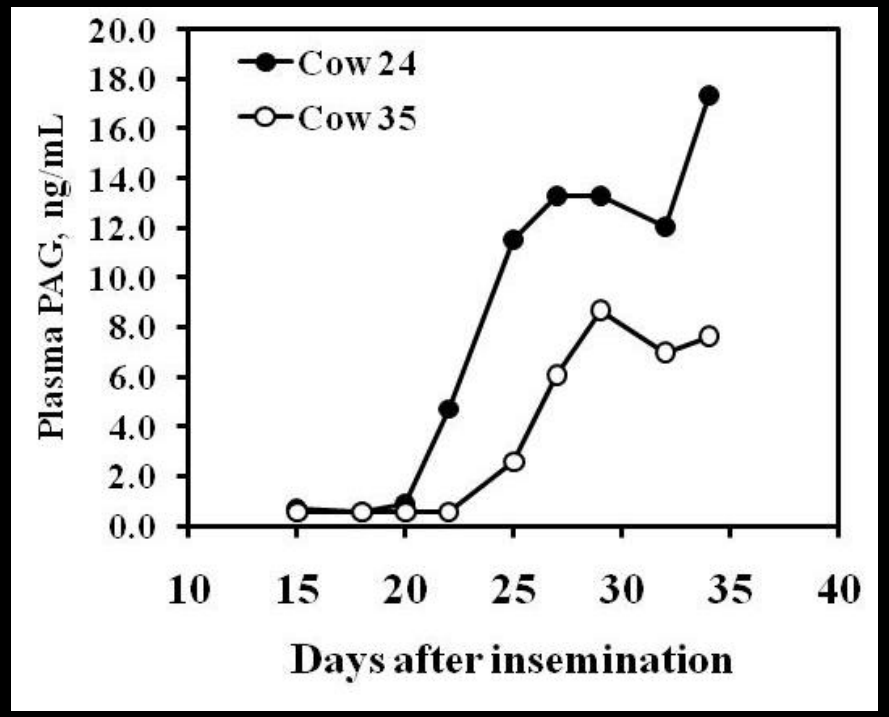




Photos from The Drost Project; Contributed by Peter Chenoweth

35 d pregnancy

Day 35 bovine fetuses





Lactating; Pregnant at 2nd AI

Not lactating; Pregnant at 1st AI

Green et al. (2012) Reproduction 143:699-711

Embryonic loss – when?

Wiltbank et al. (2016) defined four periods of loss:

- First week of pregnancy – fertilization to blastocyst
- Days 8 to 27 – Elongation and maternal recognition of pregnancy
  - 8 to 18
  - 18 to 27
- Placentation (days 28 to 60)
- Embryo/placental growth (d 60 to 90)

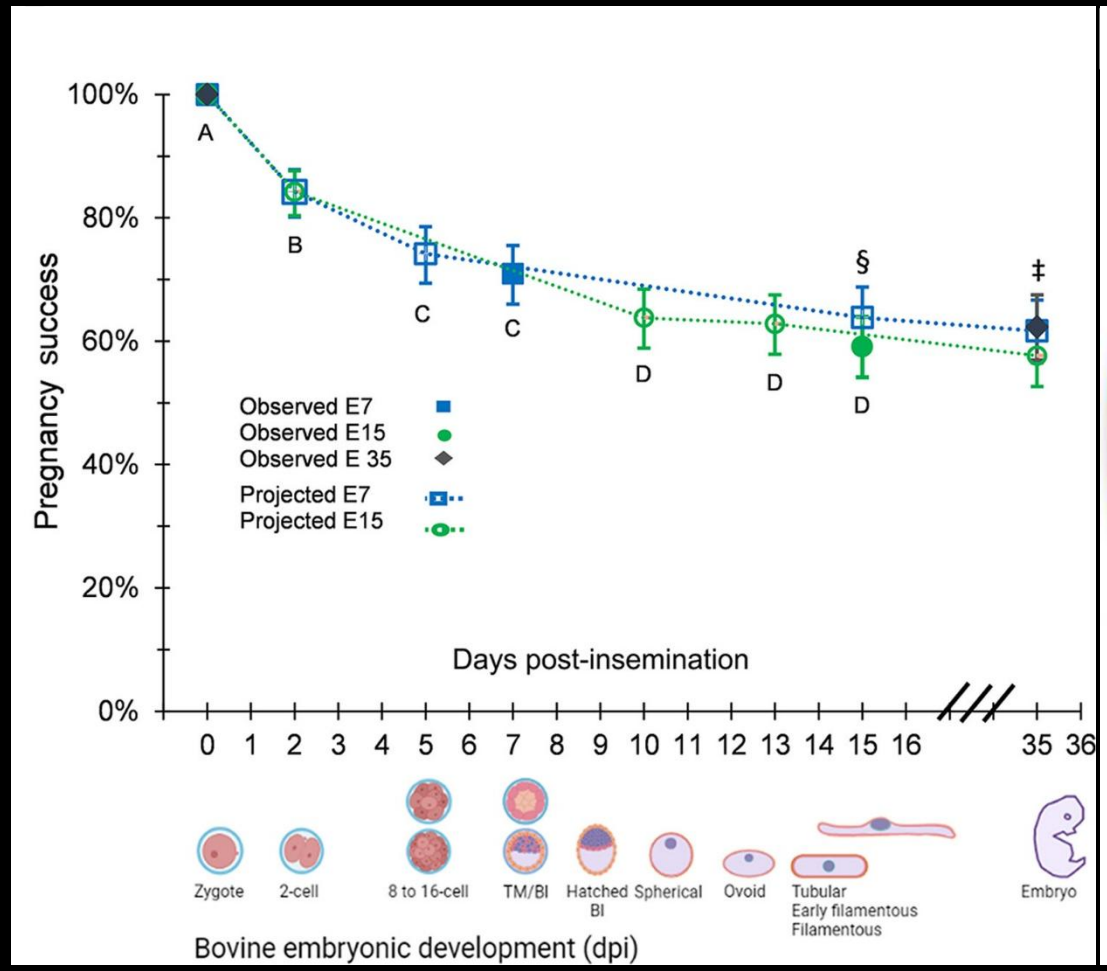
Embryonic loss – the numbers

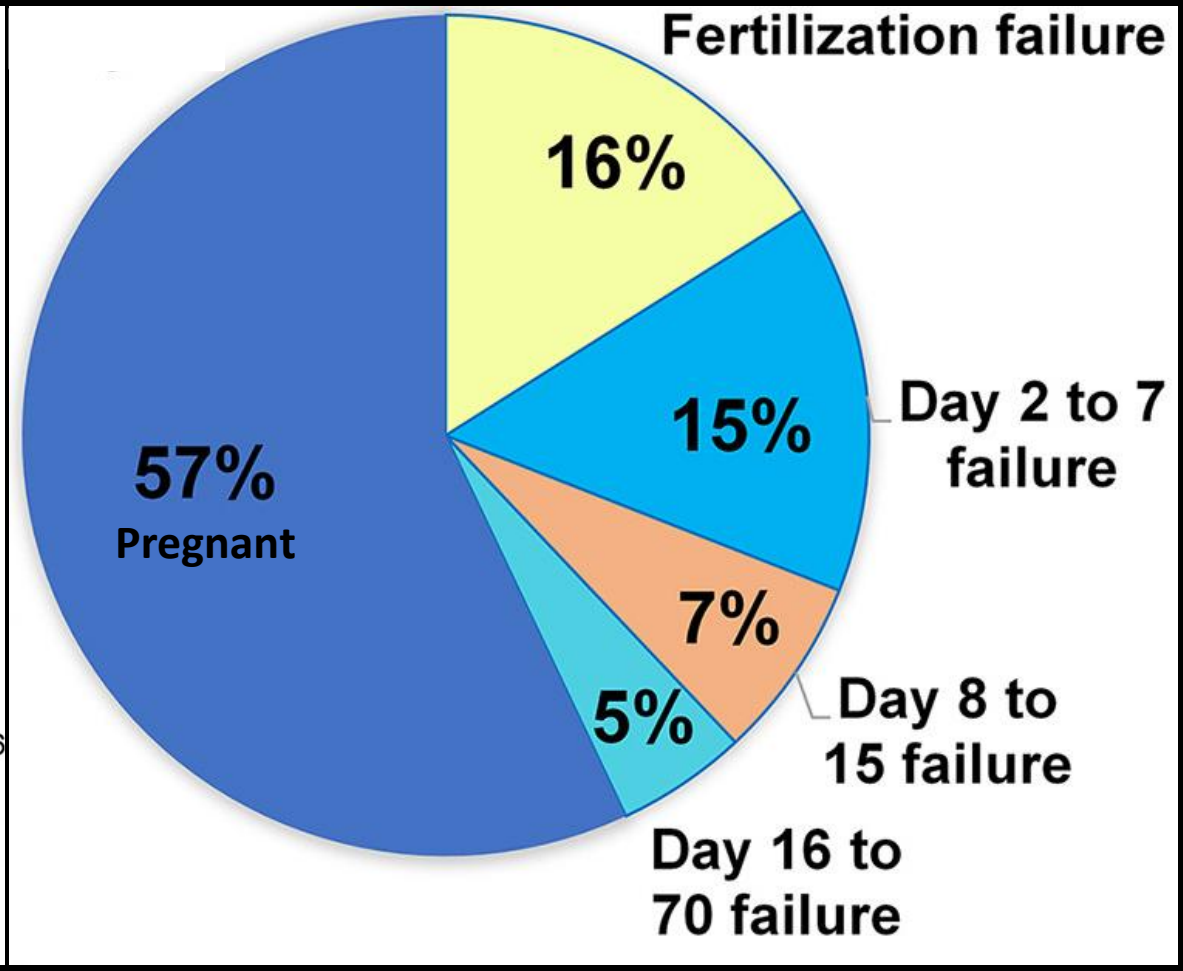
Conclusion from Wiltbank et al. (2016)

- First week of pregnancy – fertilization to blastocyst (20 to 50% loss)
- Days 8 to 27 – Elongation and maternal recognition of pregnancy (~30% loss)
- Placentation (days 28 to 60) (12% loss)
- Embryo/placental growth (d 60 to 90) (~2% loss)

Wiltbank et al. (2016) Theriogenology 86:239-253

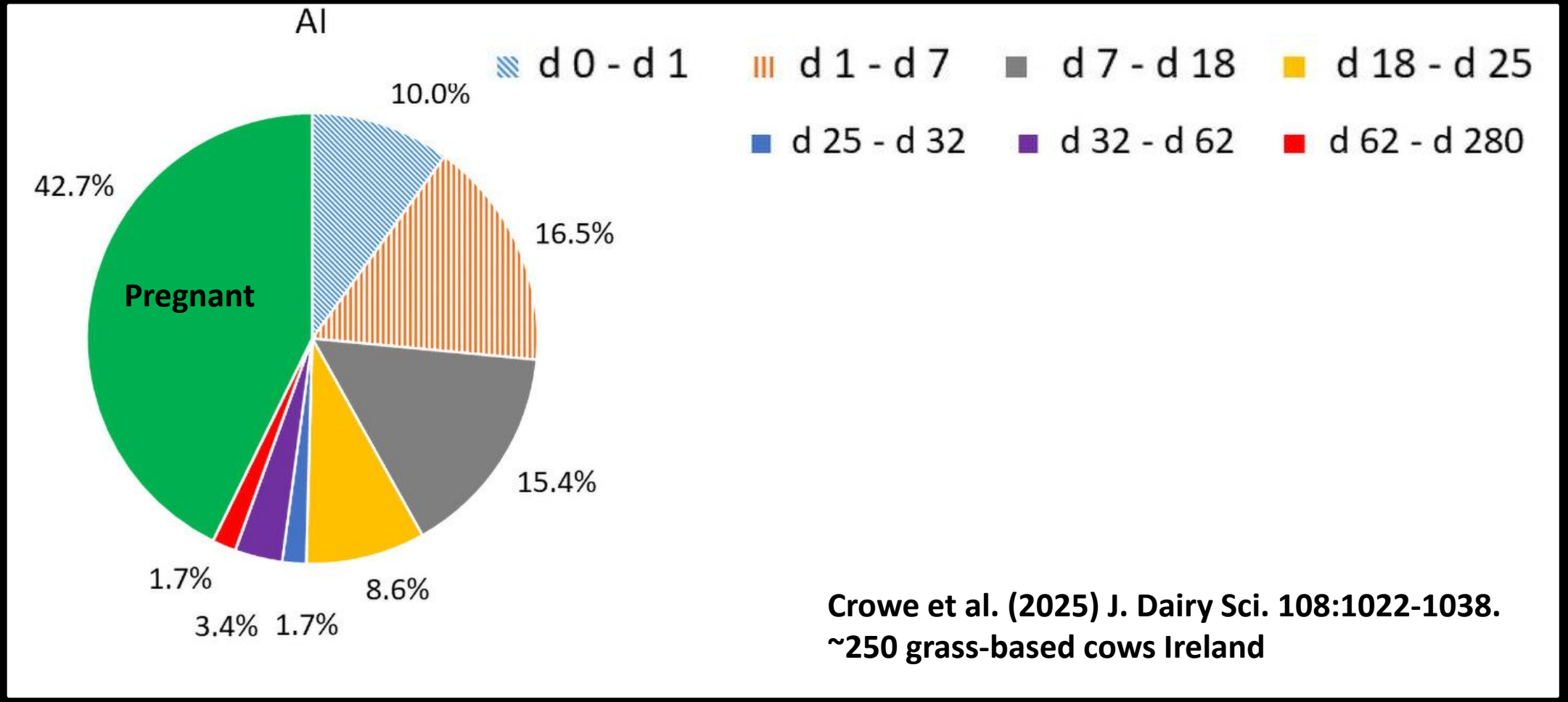
Embryonic loss (recent studies)





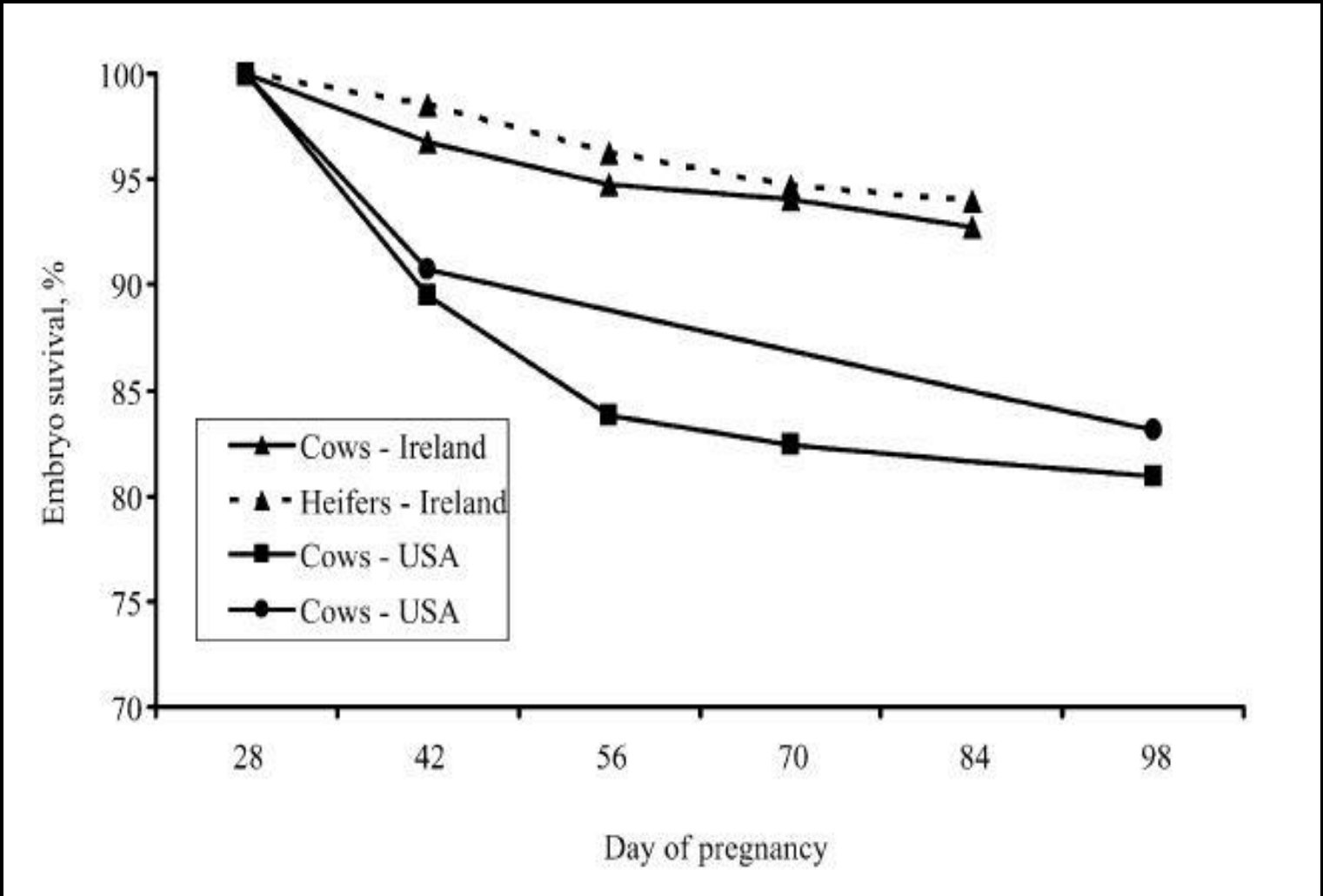
Berg et al. (2022) J. Dairy Sci. 105:9253–9270.
~1500 grass-based cows in New Zealand

Embryonic loss (recent studies)



Crowe et al. (2025) J. Dairy Sci. 108:1022-1038.
~250 grass-based cows Ireland

Embryonic loss (Ireland versus USA)



Santos et al. (2004) Anim. Repro. Sci. 82-83:513-535.

Embryonic loss – Why?

The “why” of embryonic loss depends on “when.” There is a progressive decline in the number of viable embryos over time. This progressive decline ends after the placenta is fully formed. The reasons for embryonic loss differ across different times.

Embryonic loss – When?

Wiltbank et al. (2016) defined four periods of loss:

- First week of pregnancy – fertilization to blastocyst
- Days 8 to 27 – Elongation and maternal recognition of pregnancy
  - 8 to 18
  - 18 to 27
- Placentation (days 28 to 60)
- Embryo/placental growth (d 60 to 90)

The sire – fertilization loss - No

- Assuming an appropriate timing of insemination with sires of proven fertility, there isn't a lot of evidence that the sire has a major effect on fertilization rates.

- Lethal haplotypes exist in AI sires and can explain < 1% of early embryonic mortality (Charlier et al. 2016).

Charlier et al. (2016) Genome Res. 26:1333-1341.

Sire conception rate

Sire Conception Rate

May represent the sum of multiple effects on embryonic development

NAME	NAAB_CODE	AI_STATUS	NM$_PTA	NM$_REL	PERCENTILE	SCR_PTA	SCR_REL	BREEDINGS
PEAK ZYMURGY-ET	097HO42850	G	1081	75	95	5.6	79	961
OCD CONNOR-ET	200HO12667	G	993	75	84	5.3	79	977
DUCKETT DIESEL-ET	007HO16954	G	725	74	49	4.9	77	867
SIEMERS PARX-ET	200HO12909	G	876	77	69	3.9	76	808
PROGENESIS ELLIOT	200HO12567	I	839	76	63	3.8	60	382
BERRYRIDGE SSI H FRYSKY-ET	250HO16839	G	1054	75	92	3.6	63	445
WINSTAR ALTAPLAYBONUS-ET	011HO15981	G	1084	76	95	3.3	74	745
PEAK ALTAZALEZ-ET	011HO15710	A	922	81	75	3.3	77	879
FLY-HIGHER MOONLAND-ET	777HO12806	G	1148	75	98	3.3	79	977
SIEMERS POST-ET	777HO12823	G	1122	77	97	3.3	62	432
S-S-I SIEMERS GS REAPER-ET	007HO16570	G	1081	76	95	3.2	84	1402
BOMAZ NIKOLAO-P-ET	001HO15649	I	989	85	84	3.1	92	3042
PEAK ALTABRONTIDE-ET	011HO15872	G	997	76	85	3.1	81	1098
VOGUE ZIRCON-P	200HO12521	G	602	76	36	3.1	72	661

CDCB December 2024

The Britt Hypothesis (1991)

Oocyte



Britt, JH. "Effect of short-and long-term changes in energy balance on reproduction." *Proceedings of the Mid-South Ruminant Nutrition Conference*. 1995.

Theoretical Explanation for Latent Effect of Nutrition on Progesterone and Fertility

In an effort to understand how losses in body condition (negative EB) could affect fertility several weeks later, a theoretical model was developed (Britt, 1991; Britt, 1992) based on the rates of follicular growth estimated by Lussier and colleagues (1987). The theory proposed that preantral follicles exposed to adverse environmental conditions would have altered gene expression leading to impaired or altered development. Impaired developing follicles would then result in formation of dysfunctional mature follicles, which would produce poorer oocytes and result in the formation of weakened CL. Adverse environmental conditions that might exacerbate the metabolic perturbations accompanying severe negative EB include heat stress or toxic conditions associated with postpartum disease. The temporal scenario associated with exposure of developing follicles to metabolic perturbations is illustrated in figure 4.

The Britt Hypothesis (1991)

- Toxic to the follicle/oocyte:
  - Elevated BHB and NEFA (Aardema et al. 2019).
  - Inflammatory cytokines and other molecules arising from uterine or mammary infection (Sheldon et al. 2019).
  - Elevated body temperature (Al-Katanani et al. 2002).



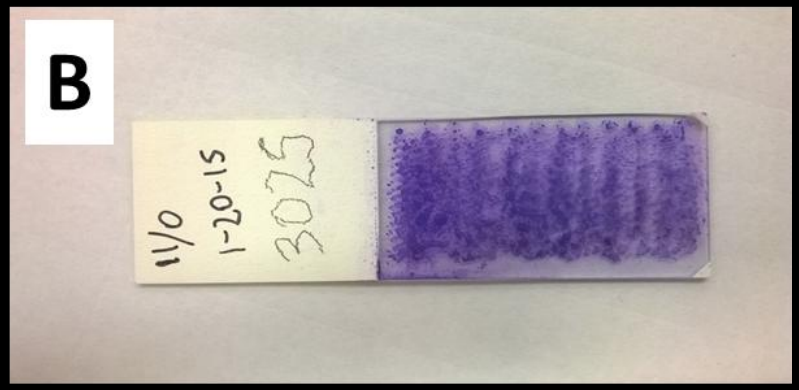
Oocyte

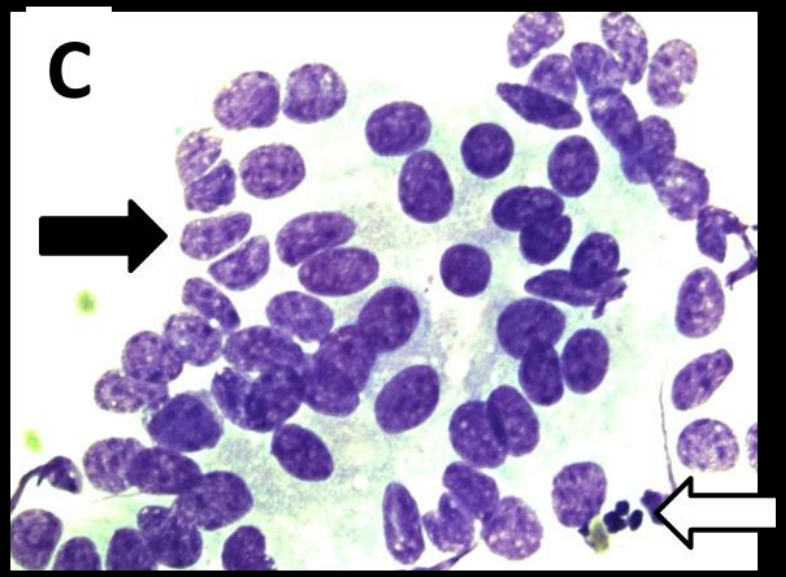
Aardema et al. (2019) Anim. Reprod. Sci. 207:131-137.
Sheldon et al. (2019) Ann. Rev. Anim. Biosci. 7:361-384.
Al-Katanani et al. (2002) J. Dairy Sci. 85:390-396.

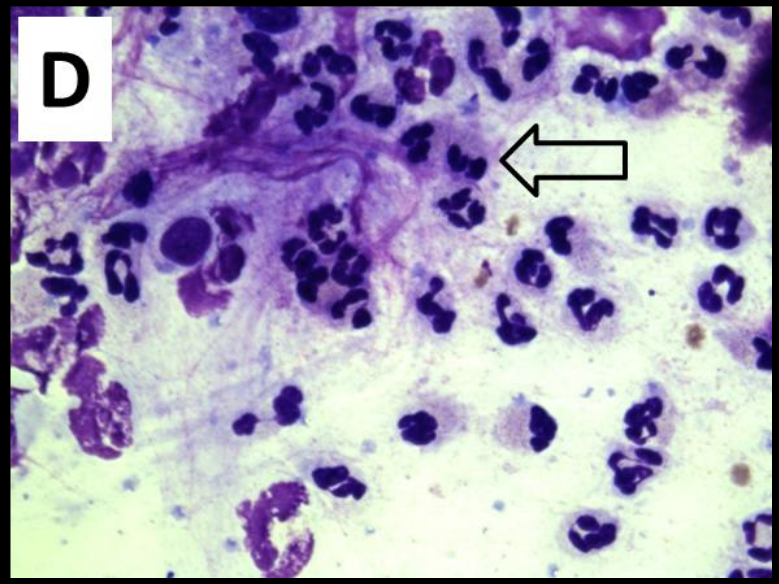
Uterine cytology

Cytobrush exam for diagnosis of subclinical endometritis









Uterine disease → embryo

Effect of uterine disease on embryo development

(Lactating Holstein Cows – Wisconsin; 70 DIM)

Table 3
Effect of uterine PMNs on ova/embryo recovery, fertilization, and number of transferable/freezable embryos.

Endpoint	PMN <1% ($n = 40$)	PMN 1%–5% ($n = 13$)	PMN >5% ($n = 12$)
CL number	17.7 ± 1.4	15.8 ± 2.3	17.2 ± 1.7
Total ova/embryos recovered	7.8 ± 1.1	9.2 ± 2.4	4.7 ± 1.1
% Recovery	41.5 ± 4.3[a,b]	55.5 ± 8.5[a]	28.4 ± 6.3[b]
Fertilized structures	5.9 ± 7.7[a]	7.4 ± 1.9[a]	2.3 ± 0.7[b]
% Fertilized structures	82.3 ± 3.4	81.8 ± 8.8	62.1 ± 11.4
Transferable embryos	4.6 ± 0.7[a]	5.9 ± 1.7[a]	1.8 ± 0.6[b]
% Transferable/total	62.3 ± 5.5	61.3 ± 11.6	52.0 ± 12.5
% Transferable/fertilized	74.9 ± 5.4	71.3 ± 11.2	72.5 ± 12.7
Freezable embryos	4.4 ± 0.7[a]	5.3 ± 1.6[a]	1.8 ± 0.6[b]
% Freezable/total	59.4 ± 5.4	56.3 ± 12.2	48.9 ± 12.5
% Freezable/fertilized	71.4 ± 5.3	65.4 ± 12.0	69.1 ± 13.3

[a,b] Means within a row with different superscripts differ ($P < 0.05$).

Carvalho et al. (2013) Theriogenology 80:1074-1081.

Uterine disease → Conception rate

J. Dairy Sci. 100:588–597
https://doi.org/10.3168/jds.2016-11529
© American Dairy Science Association®, 2017.

Cytological endometritis at artificial insemination in dairy cows: Prevalence and effect on pregnancy outcome

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*Department of Reproduction, Obstetrics and Herd Health, Faculty of Veterinary Medicine, Ghent University, Merelbeke 9820, Belgium
†CRV Holding BV, Van Thorenburghlaan 14, Oosterzele 9860, Belgium

Conception rate (AI at ~60 DIM)

Cytology positive at AI (> 1% PMN): 32.7%

Cytology negative at AI (< 1% PMN): 47%

Pascottini (2017) J. Dairy Sci. 100:588-597.

AMERICAN SOCIETY OF ANIMAL SCIENCE

Journal of Animal Science, 2020, Vol. 98, No. 11, 1–20

doi:10.1093/jas/skaa288
Advance Access publication November 3, 2020
Received: 20 July 2020 and **Accepted:** 27 August 2020
Reproduction

REPRODUCTION

The incompletely fulfilled promise of embryo transfer in cattle—why aren't pregnancy rates greater and what can we do about it?

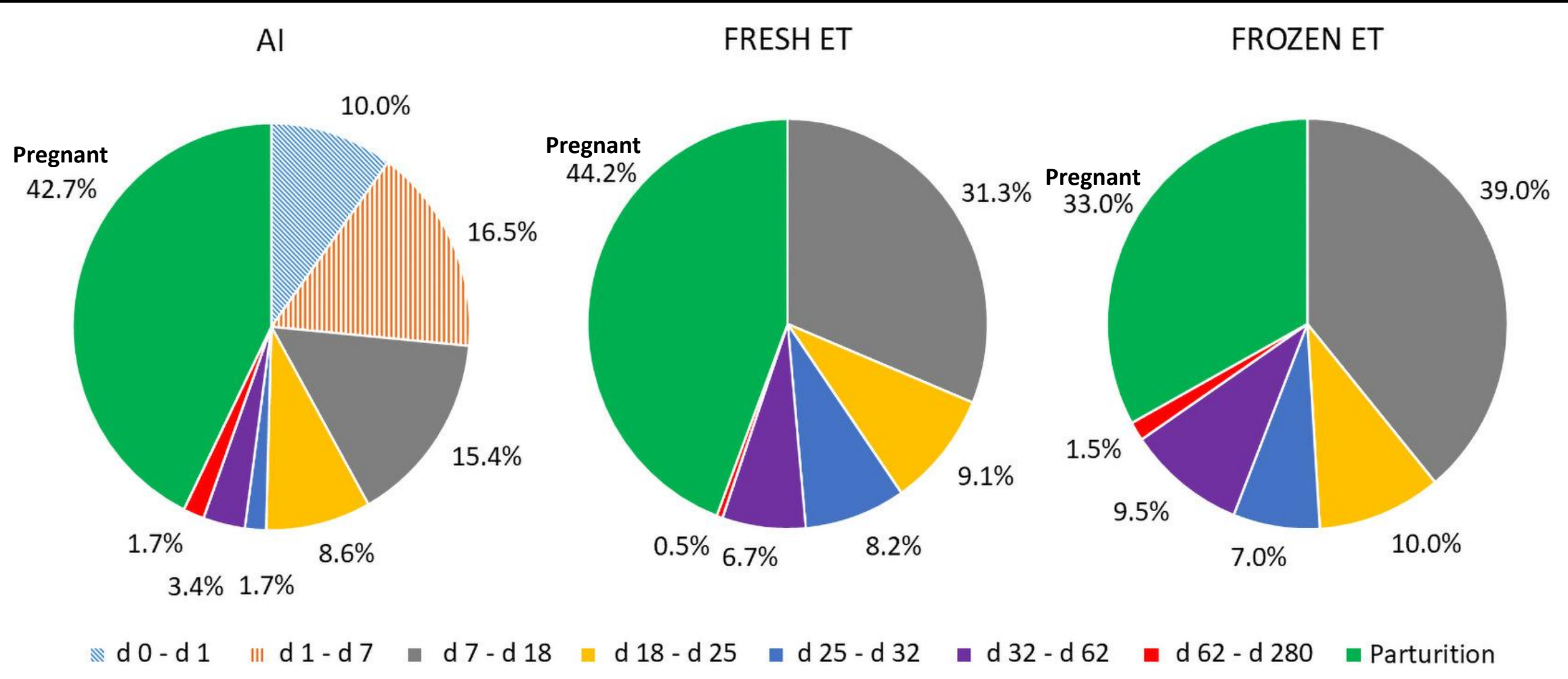
Peter J. Hansen

Department of Animal Sciences, D.H. Barron Reproductive and Perinatal Biology Research Program, and Genetics Institute, University of Florida, Gainesville, FL 32611-0910

Corresponding author: pjhansen@ufl.edu

ORCiD number: 0000-0003-3061-9333 (P. J. Hansen).

Embryonic loss (recent studies)

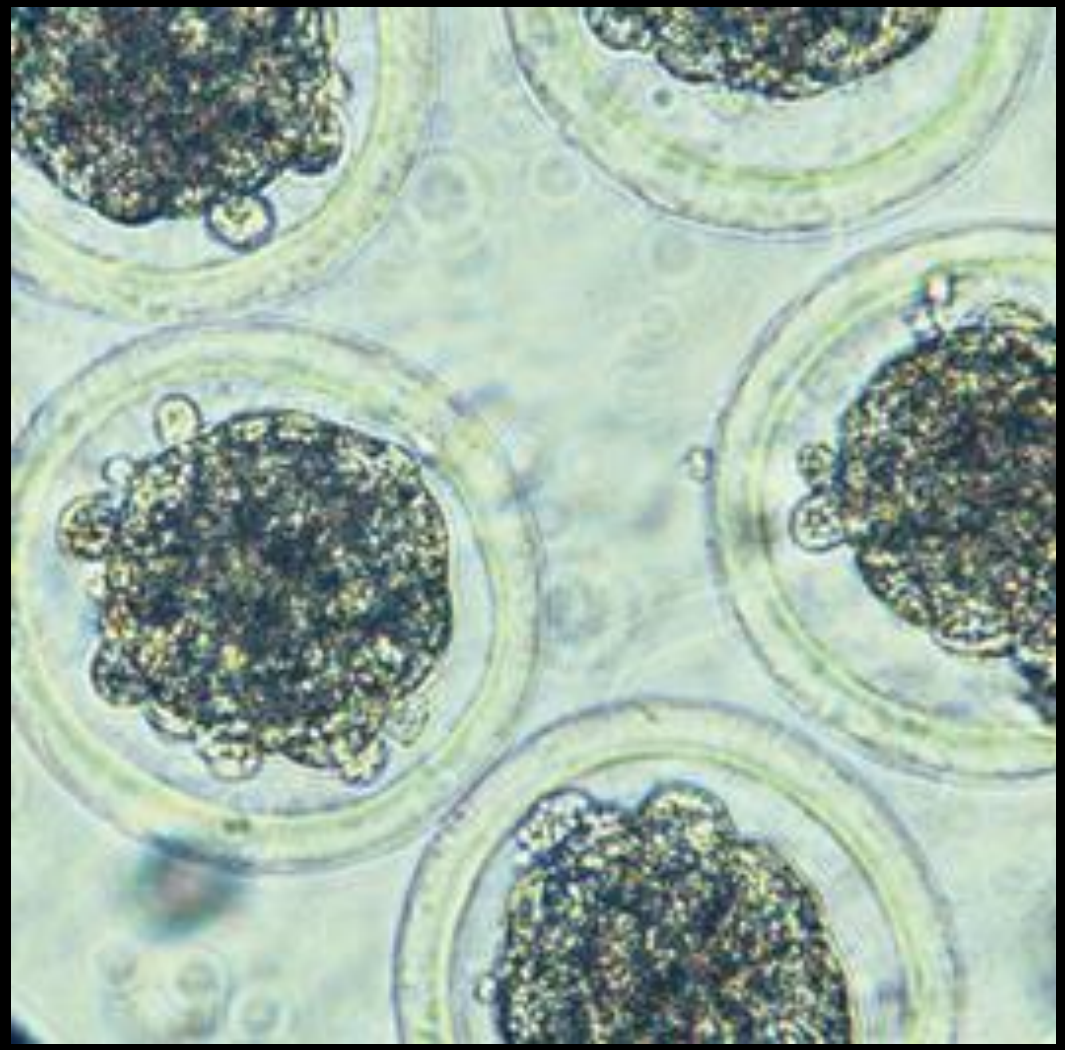


Crowe et al. (2025) J. Dairy Sci. 108:1022-1038.
~1100 grass-based cows Ireland

Morphological assessment of fertility

Is the microscope good enough?



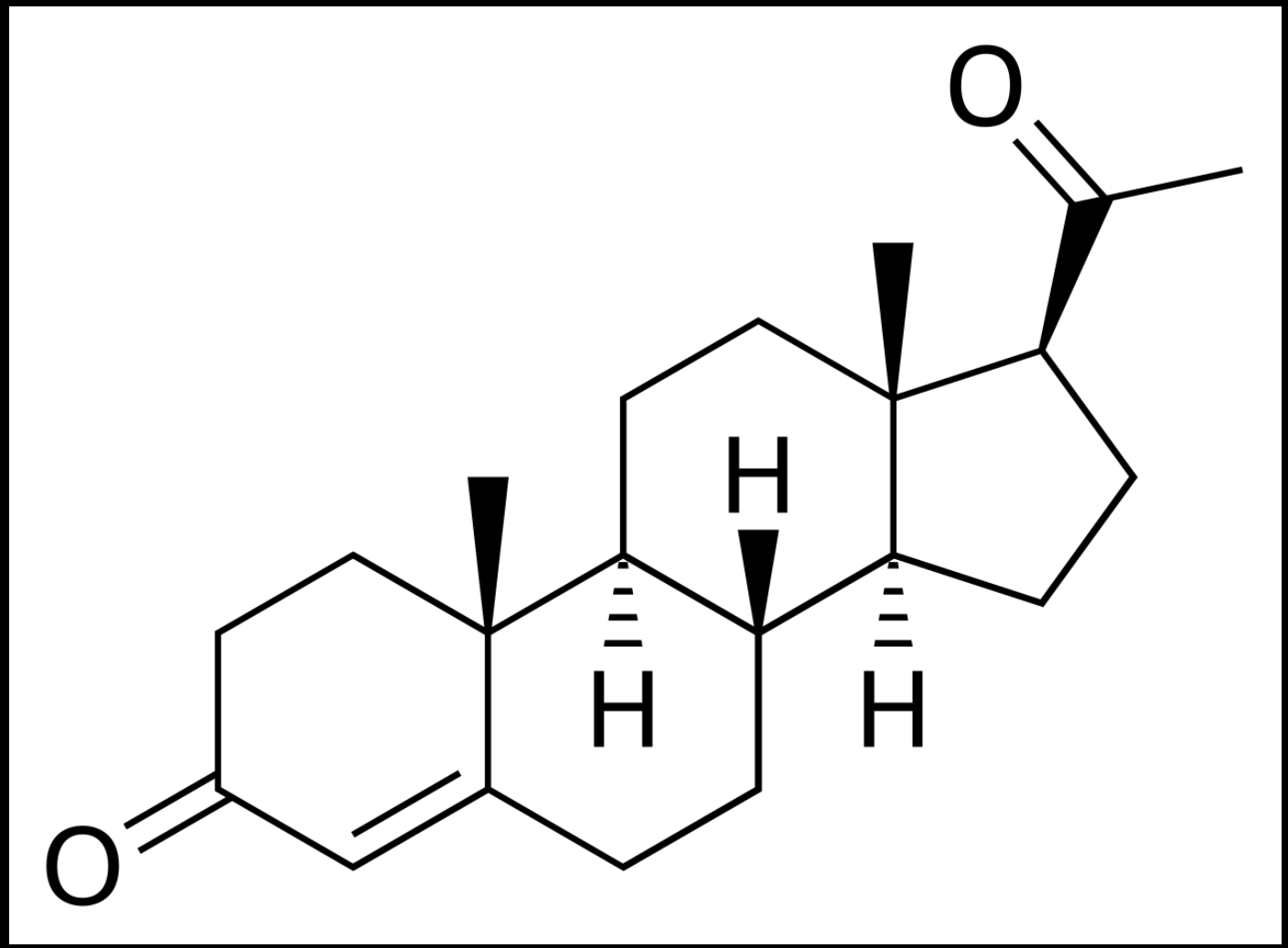


Embryonic loss – when?

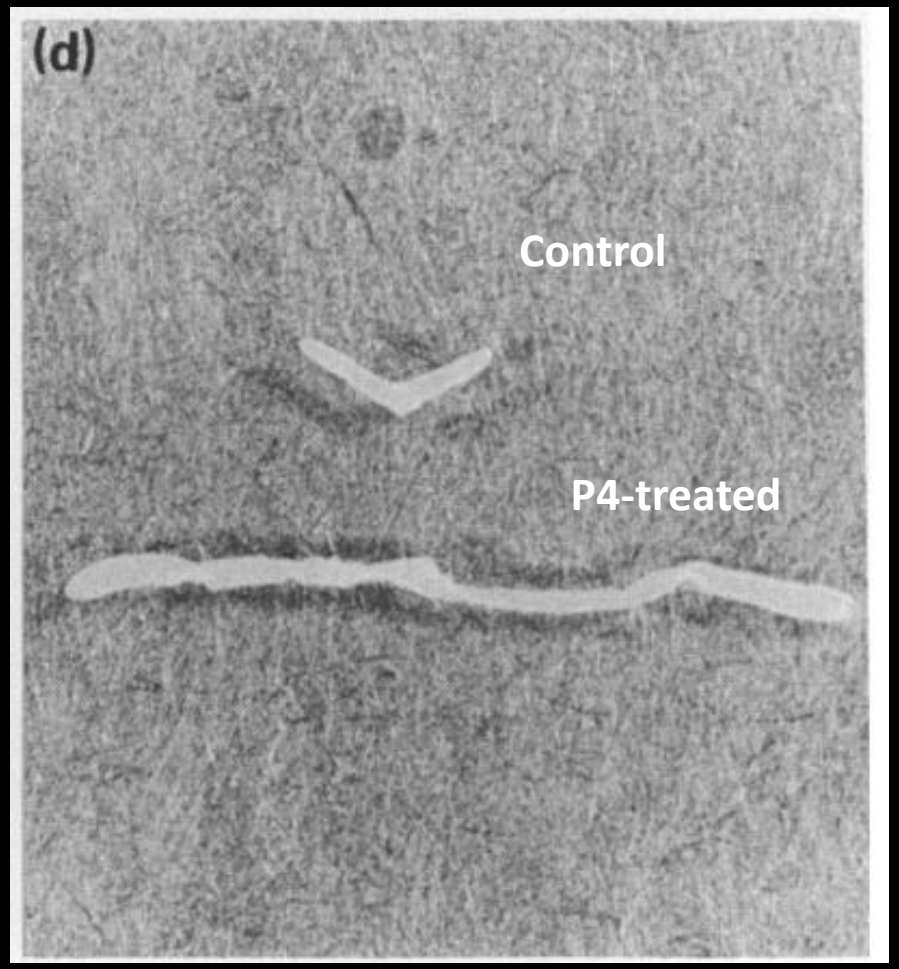
Wiltbank et al. (2016) defined four periods of loss:

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  - **18 to 27**
- Placentation (days 28 to 60)
- Embryo/placental growth (d 60 to 90)

Progesterone!



Progesterone supplementation
(first week after AI)



Conceptuses

Garrett et al. (1988)
J. Rerod. Fertil. 84:437-466

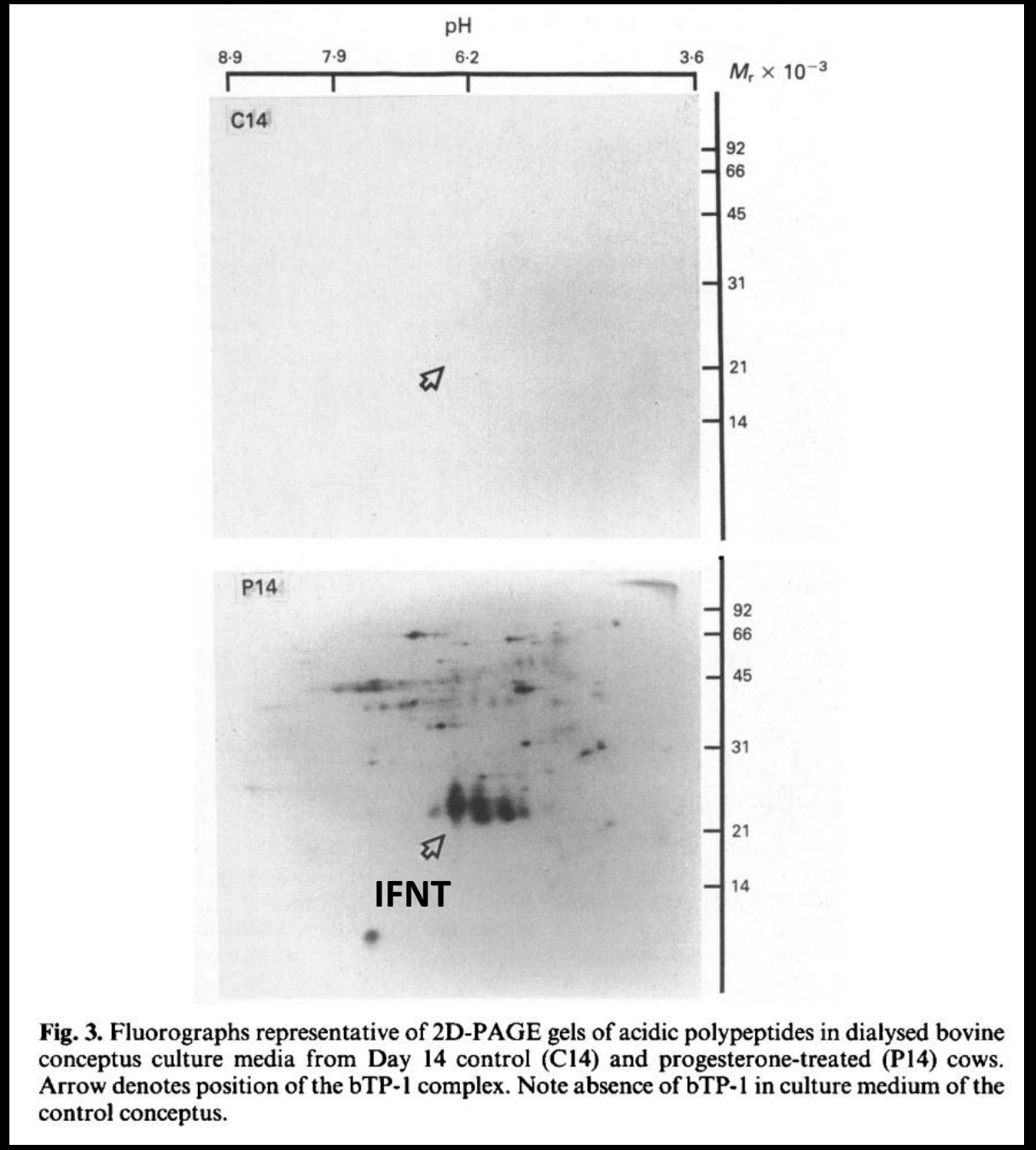


Fig. 3. Fluorographs representative of 2D-PAGE gels of acidic polypeptides in dialysed bovine conceptus culture media from Day 14 control (C14) and progesterone-treated (P14) cows. Arrow denotes position of the bTP-1 complex. Note absence of bTP-1 in culture medium of the control conceptus.

Progesterone to improve fertility – yes or no?

Theriogenology 85 (2016) 1390–1398

Contents lists available at ScienceDirect

Theriogenology

journal homepage: www.theriojournal.com



Efficacy of progesterone supplementation during early pregnancy in cows: A meta-analysis

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[b] *School of Veterinary Medicine and Science, University of Nottingham, Sutton Bonington Campus, Loughborough, Leicestershire, UK*
[c] *Division of Animal Sciences, School of Biosciences, University of Nottingham, Sutton Bonington Campus, Loughborough, Leicestershire, UK*

Progesterone after AI – yes or no?

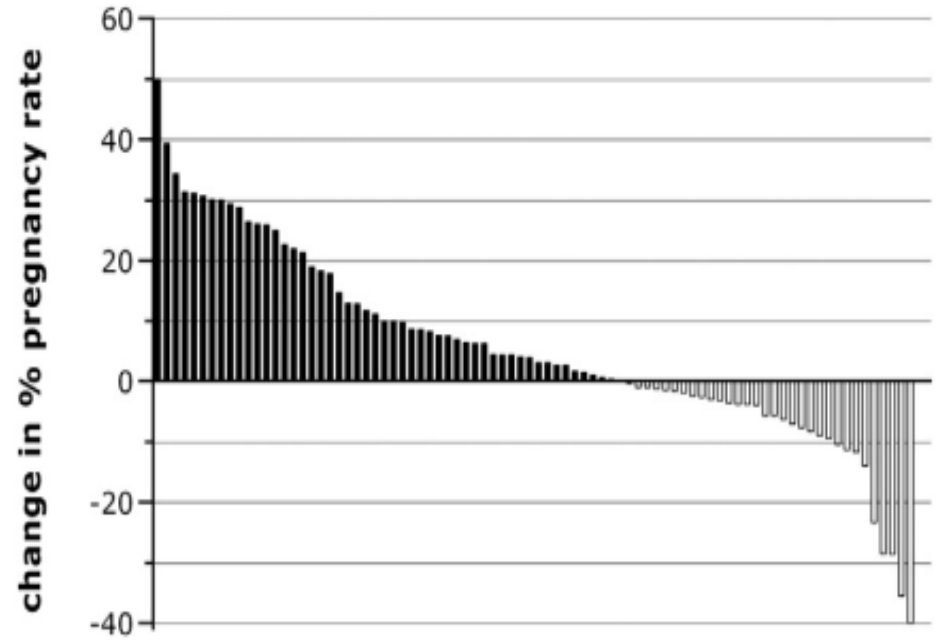


Fig. 1. Summary diagram illustrating the overall variation in the change of pregnancy rate associated with progesterone treatment in 84 experimental studies included in current meta-analysis. The vertical lines show the changes in pregnancy rate after postinsemination progesterone supplementation in individual study. A total of 51 treatments increased, 32 treatments decreased pregnancy rate, and one treatment has no effect resulting in an overall mean increase in pregnancy rate of 1.2% points.

4.1. Conclusions

The results clearly demonstrate that the administration of progesterone treatment too early (<Day 3) or too late (>Day 7) or to cows with relatively good reproductive performance delivers no benefit in terms of pregnancy rate. Furthermore, treatment of cows after cycle or ovulation synchronization is also ineffective. However, the results have clearly demonstrated a consistent increase in the chance of pregnancy in animals of relatively poor fertility supplemented with any form of progesterone by any route of administration during the period of the postovulatory progesterone rise (Day 3–7) after mating at natural estrus.

(Studies were either vaginal or injected P4)

GnRH or hCG after AI – yes or no?

GnRH or hCG – yes or no?

Associa
releasir
the lute

M. Besbac
[1]Laboratory of
[2]High Nationa
[3]Department
[4]IHAP, Univers
[5]Université Cl

CONCLUSIONS

The present meta-analysis quantifies the change in P/AI in cases of treatment with GnRH and hCG compared with no treatment. The meta-analysis suggests that in certain circumstances GnRH and hCG may produce significant benefits. It did not show any difference between GnRH and hCG. Treatment with GnRH and hCG improved P/AI in primiparous cows with low fertility, whereas treatment of cows with good fertility did not gain any benefit. A buserelin treatment above 10 μg, with an hCG dose above 2,500 IU and a GnRH treatment after d 10 post-AI, were associated with higher P/AI compared with lower doses and earlier treatment.

in-
during
alysis

Embryonic loss – when?

Wiltbank et al. (2016) defined four periods of loss:

- First week of pregnancy – fertilization to blastocyst
- Days 8 to 27 – Elongation and maternal recognition of pregnancy
  - 8 to 18
  - 18 to 27
- **Placentation (days 28 to 60)**
- Embryo/placental growth (d 60 to 90)

Embryonic loss

Wiltbank et al. (2016) defined several risk factors for embryonic loss (d 28 to 60):

- Failure to cycle by the start of the breeding season
- Parity (first parity > multiparous)
- Farm
- Change in BCS (greater BCS loss →more loss)
- Uterine disease
- Non-uterine disease (i.e., mastitis)

Wiltbank et al. (2016) Theriogenology 86:239-253

Embryonic loss

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Wiltbank et al. (2016) Theriogenology 86:239-253

Embryonic loss and uterine disease

Mechanisms

What are the mechanisms connecting uterine disease with embryonic loss?

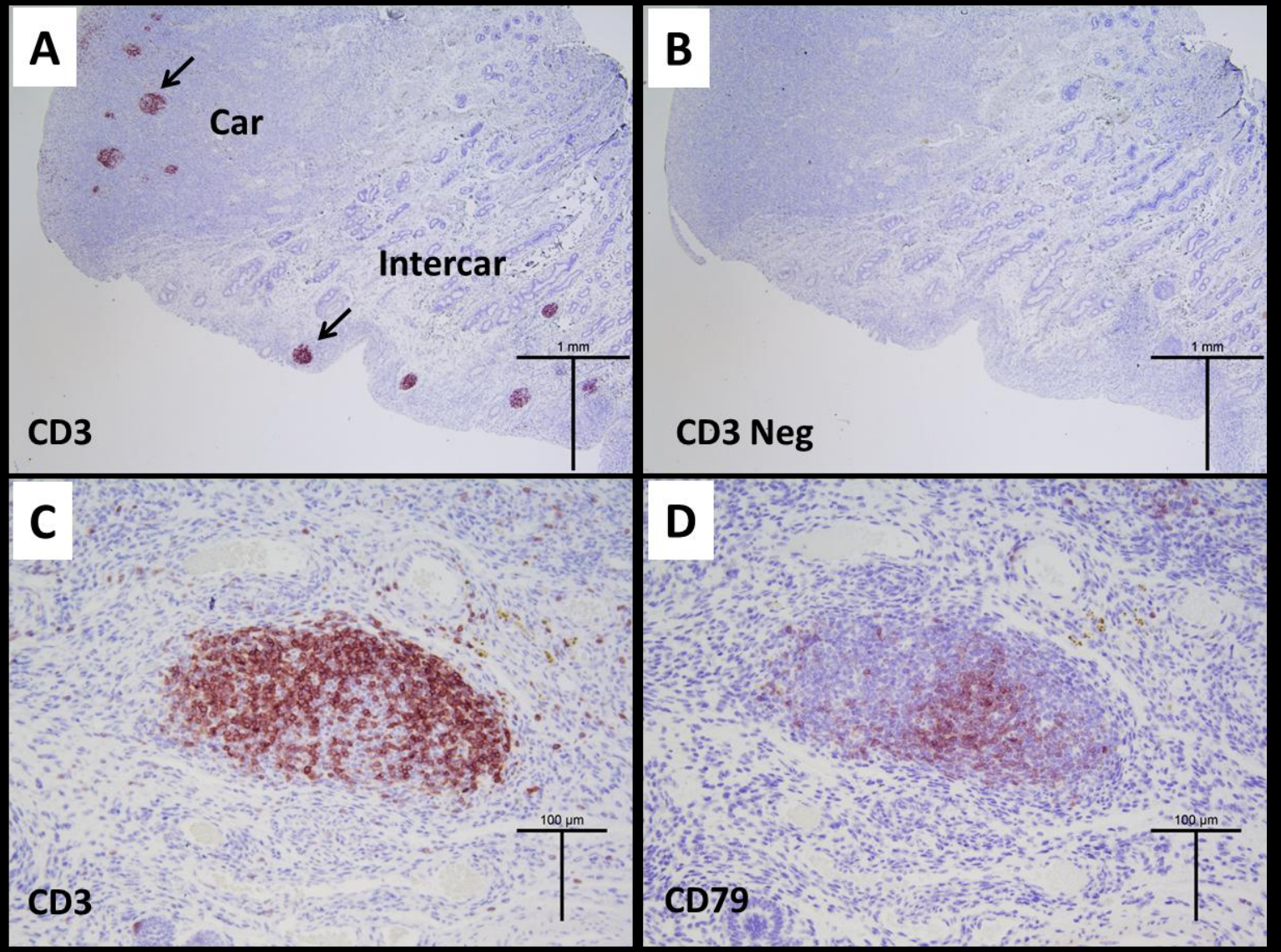
- Residual infection (microbiome; probably not)
- Morphological memory (yes)
- Residual inflammation (yes, probably fades over time)
- Cellular memory (yes)

Lymphocytic foci – postpartum cow

Residual inflammation

Lymphocytic foci in bovine endometrium

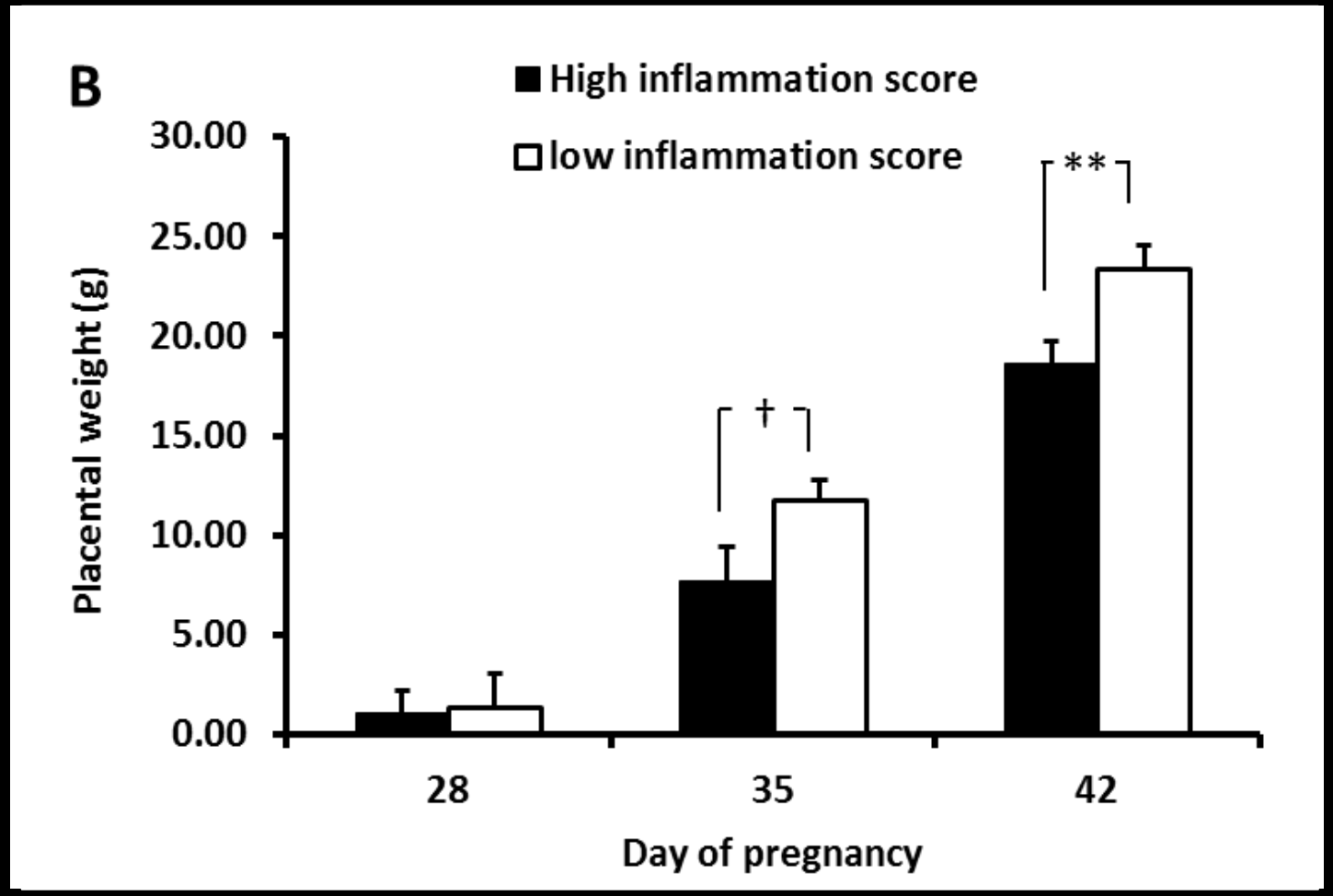
CD3: T cell
CD79: B cell



Lucy, Evans and Poock (2016)
Theriogenology 86:1711-9

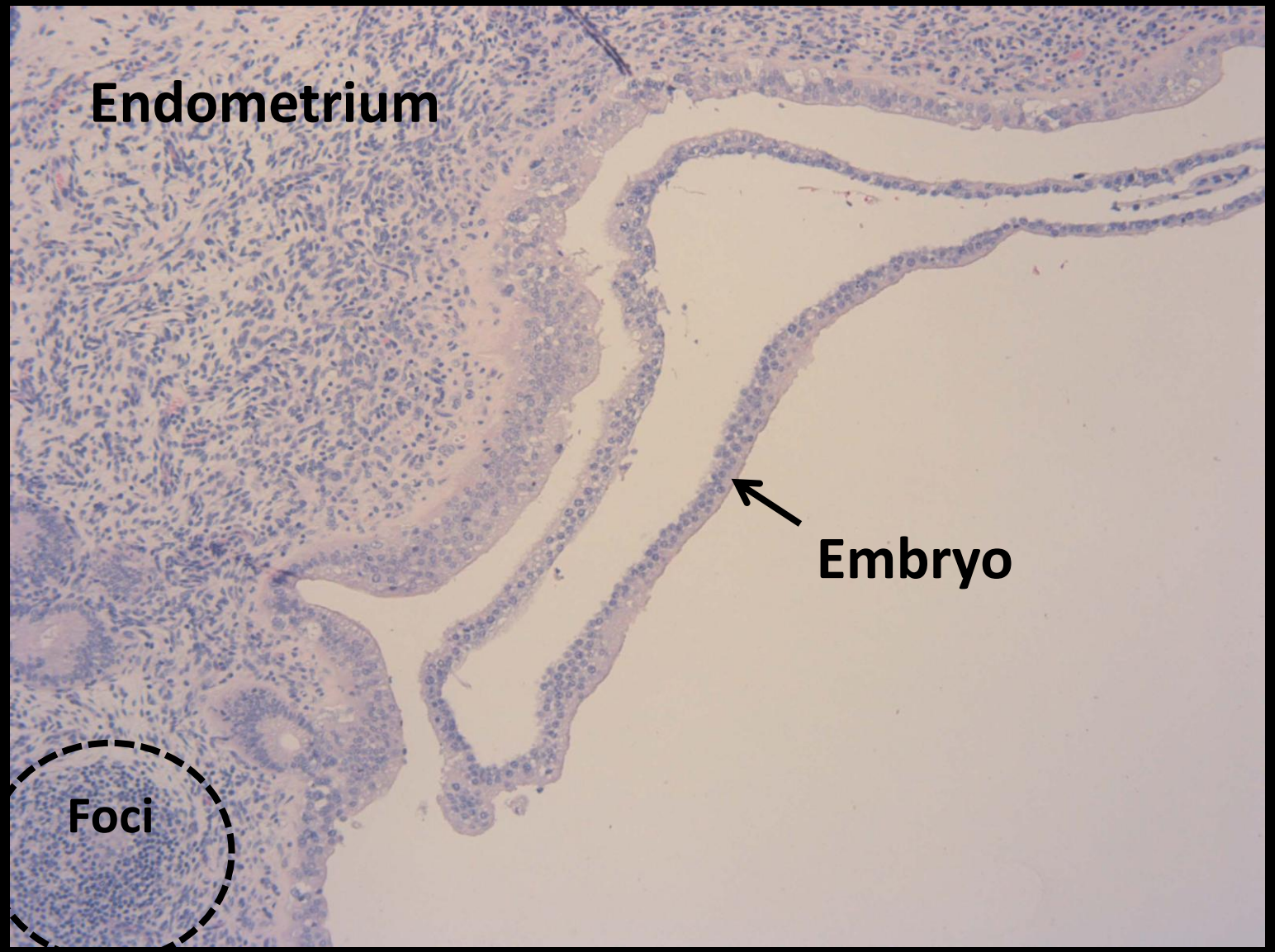
Foci and inflammation in the bovine uterus

Effect on placental weight



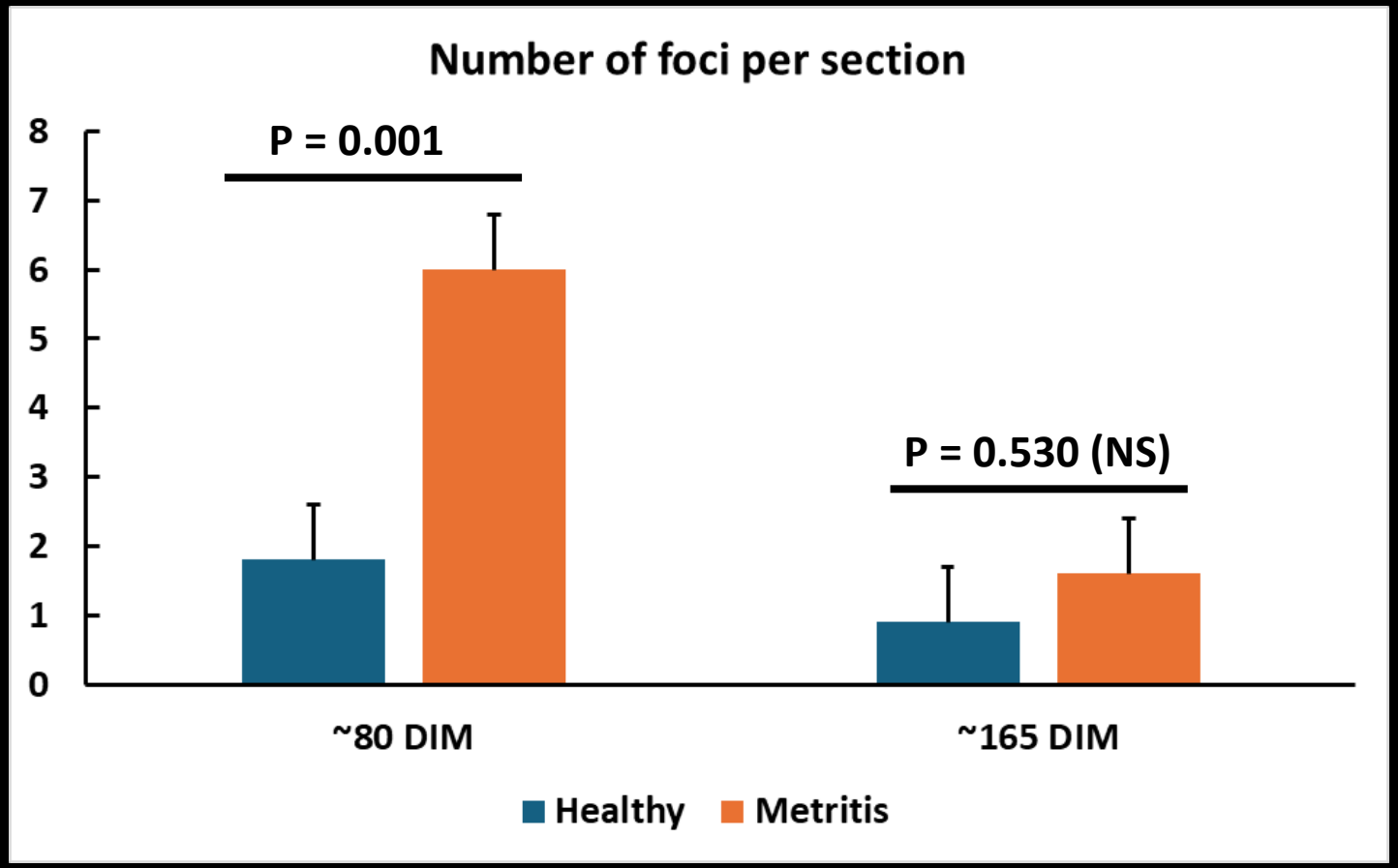
Lucy, Evans and Poock (2016)
Theriogenology 86:1711-9

Bovine embryo and endometrium with foci



Lymphocytic foci go away over time

Effect of DIM on the number of uterine foci in metritis versus healthy control cows



Dada and Lucy (unpublished)

Cellular memory

Cellular memory

Biology of Reproduction, 2024, **111(2)**, 332–350
https://doi.org/10.1093/biolre/ioae067
Advance access publication date 5 May 2024
Research Article

OXFORD

Metritis and the uterine disease microbiome are associated with long-term changes in the endometrium of dairy cows†

Josiane C. C. Silva[1], Monica O. Caldeira[1], Joao G. N. Moraes[2], Isabella Sellmer Ramos[1], Tamara Gull[3], Aaron C. Ericsson[3], Scott E. Poock[3], Thomas E. Spencer[1] and Matthew C. Lucy[1,*]

[1]Division of Animal Sciences, University of Missouri, Columbia, Missouri, United States of America
[2]Department of Animal and Food Sciences, Oklahoma State University, Stillwater, Oklahoma, United States of America
[3]College of Veterinary Medicine, University of Missouri, Columbia, Missouri, United States of America

*__Correspondence:__ 160 Animal Science Research Center, 920 East Campus Drive, University of Missouri, Columbia, Missouri 65211, United States of America. Tel: 573-882-9897; E-mail: lucym@missouri.edu

†__Grant Support:__ This study was supported by the National Institute of Child Health and Human Development of the National Institutes of Health under the award number R01HD092254.

J. Dairy Sci. 106:6593–6596
https://doi.org/10.3168/jds.2023-23445
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Perspective: Can early embryonic losses be reduced in lactating dairy cows?

P. J. Hansen*
Department of Animal Sciences, D.H. Barron Reproductive and Perinatal Biology Research Program, and Genetics Institute, University of Florida, Gainesville, FL 32611-0910

Yes!

- Through adopting best management practices for dairy reproduction
- Developing new and innovative tools based on sound science

While we wait for the science . . .
follow Fricke's rules for getting cows pregnant

Quotes from 2014 International Cow Fertility Conference (Westport, Ireland)

Paul Fricke (University of Wisconsin)

How to get cows pregnant

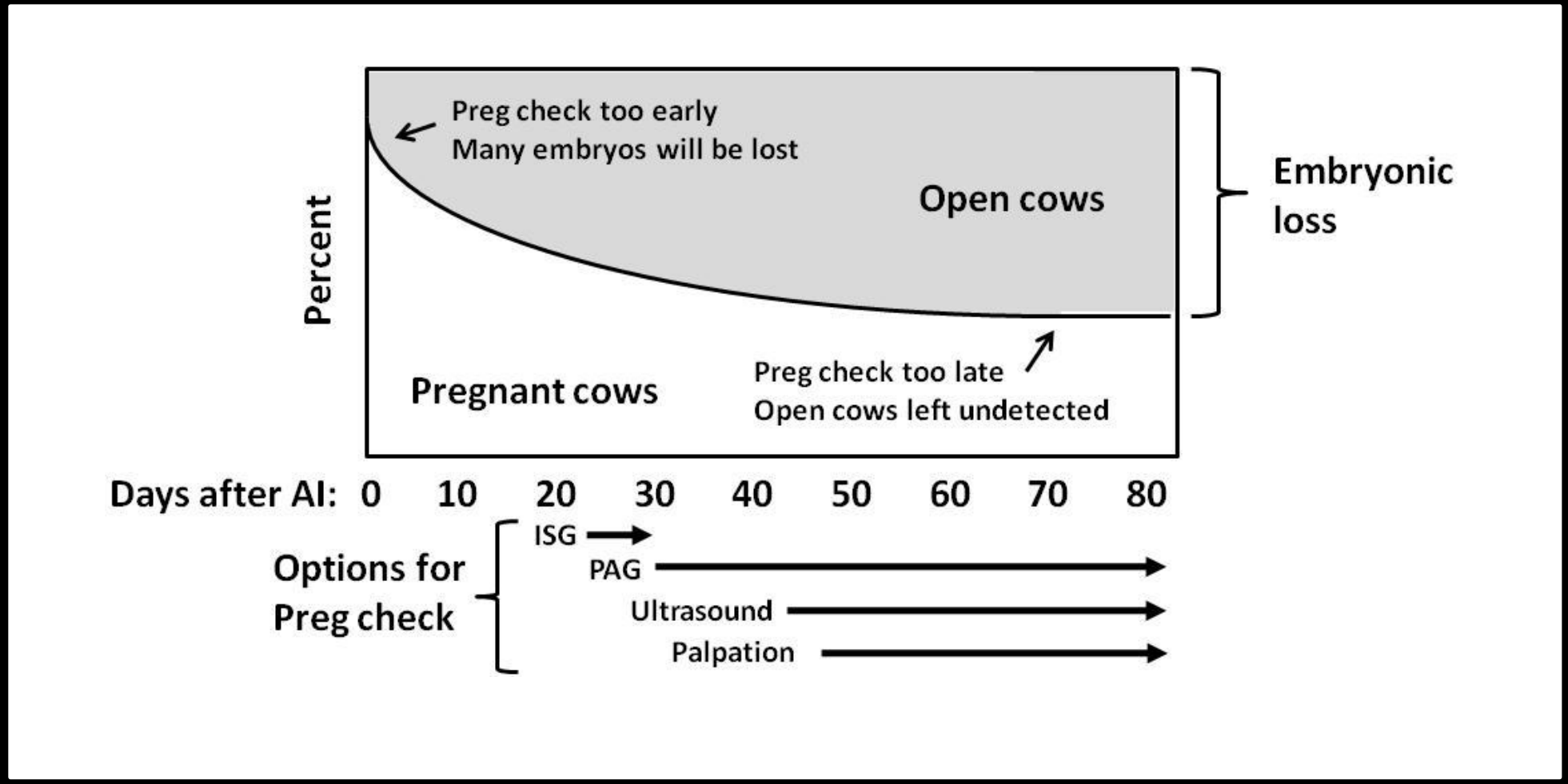
Rule 1: Put semen in the cow.

Rule 2: If she is not pregnant … refer to rule one.

Cows with embryonic loss are not pregnant!
You should apply Rule 2!

Decisions, decisions, decisions

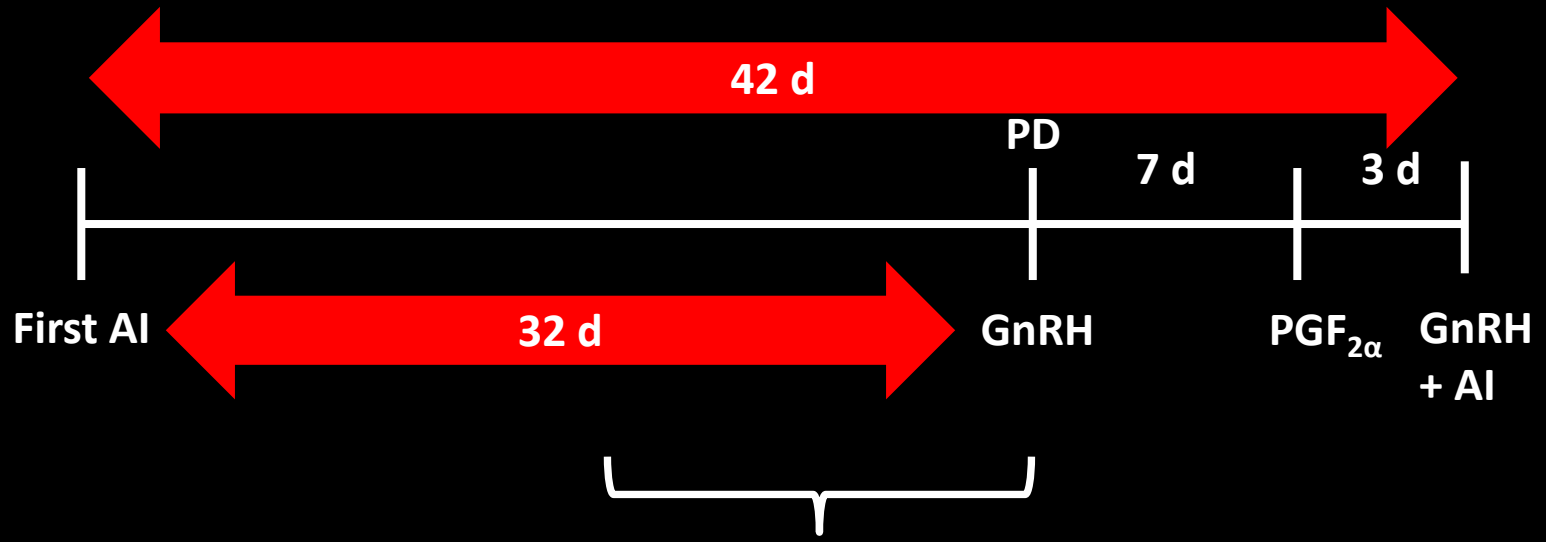
When should I put semen back into non-pregnant cows?



Lucy et al. DCRC Proceedings Fall 2009

Activity systems compliment resynchronization programs

Day 32 Ovsynch is popular for
second insemination resynch



Activity systems (neck collars, ear tags, etc.) are important for catching heats on “return to service” cows.

Biology of Reproduction, 2025, **112(5)**, 981–995
https://doi.org/10.1093/biolre/ioaf066
Advance access publication date 28 March 2025
Research Article

Early identification of bovine pregnancy status and embryonic mortality†

Jeanette V. Bishop[1,‡], Aydin Guzeloglu[1,‡], Tom Scheller[2], Joshua J. Docheff[3], Carolina L. Gonzalez-Berrios[1], Hana Van Campen[1], Terry M. Nett[1], Abigail L. Zezeski[4], Thomas W. Geary[4], William W. Thatcher[5] and Thomas R. Hansen[1,*]

[1]Animal Reproduction and Biotechnology Laboratory, Department of Biomedical Sciences, Colorado State University, Fort Collins, CO, USA
[2]PTSAgLLC, Fort Collins, CO, USA
[3]Blue Sky Dairy, Mead, CO, USA
[4]United States Department of Agriculture, Agricultural Research Service, Fort Keogh Livestock and Range Research Laboratory, Miles City, MT, USA
[5]University of Florida, Department of Animal Sciences, Gainesville, FL, USA
***Correspondence**: Animal Reproduction and Biotechnology Laboratory, Department of Biomedical Sciences, Colorado State University, 3107 West Rampart Road, Fort Collins, CO 80523, USA. E-mail: thomas.hansen@colostate.edu

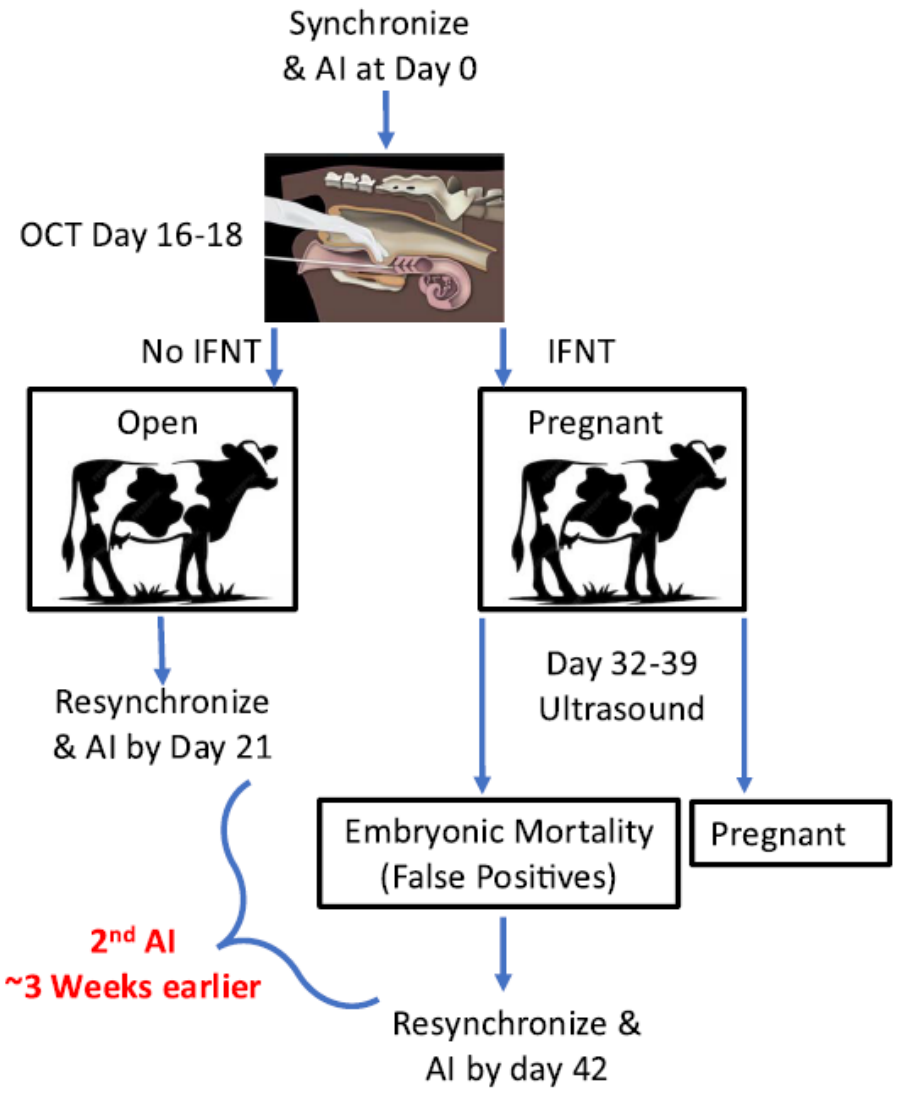
†**Grant Support**: Supported by the Hatch/Multi State Research Accession No. 1011648, W114 Project No. COLO0220C, Colorado Agricultural Experiment Station from the United States Department of Agriculture-National Institute of Food and Agriculture, Colorado Economic Development and International Trade Award number 010077-00002/Sponsor Award #DO 2021-2633, CSU STRATA Award 010077-00002/Sponsor Award #DO 2021-2693, and the Animal Reproduction and Biotechnology Laboratory (Translational Reproductive Biotechnology) grants program to TRH.
‡JVB and AG contributed equally to this work.

Day 16 to 18 Open Cow Test

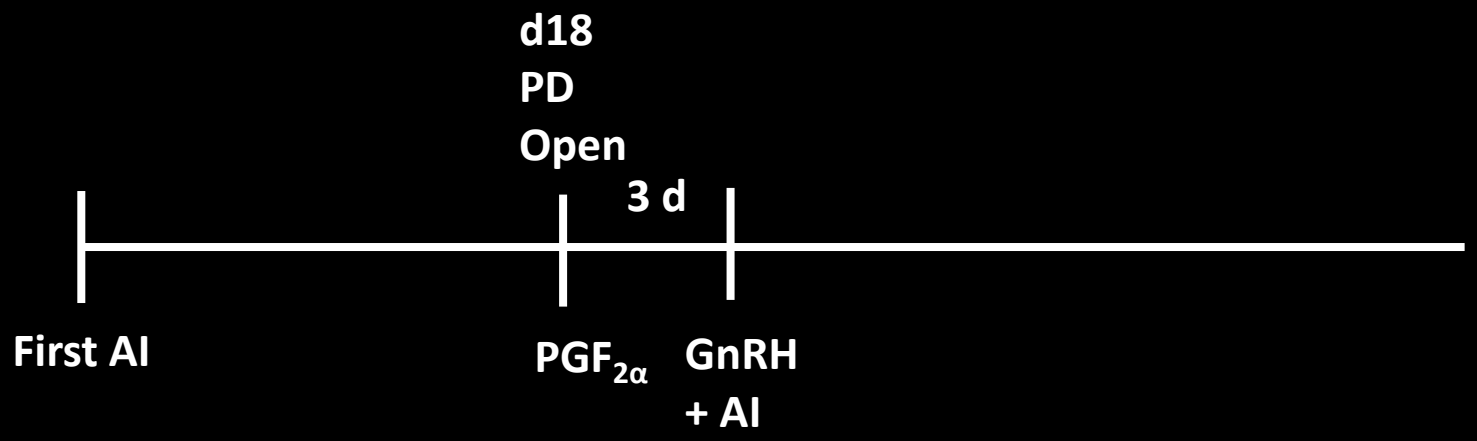
Bishop et al. (2025)
Biology of Reproduction 112: 991-995

Graphical Abstract

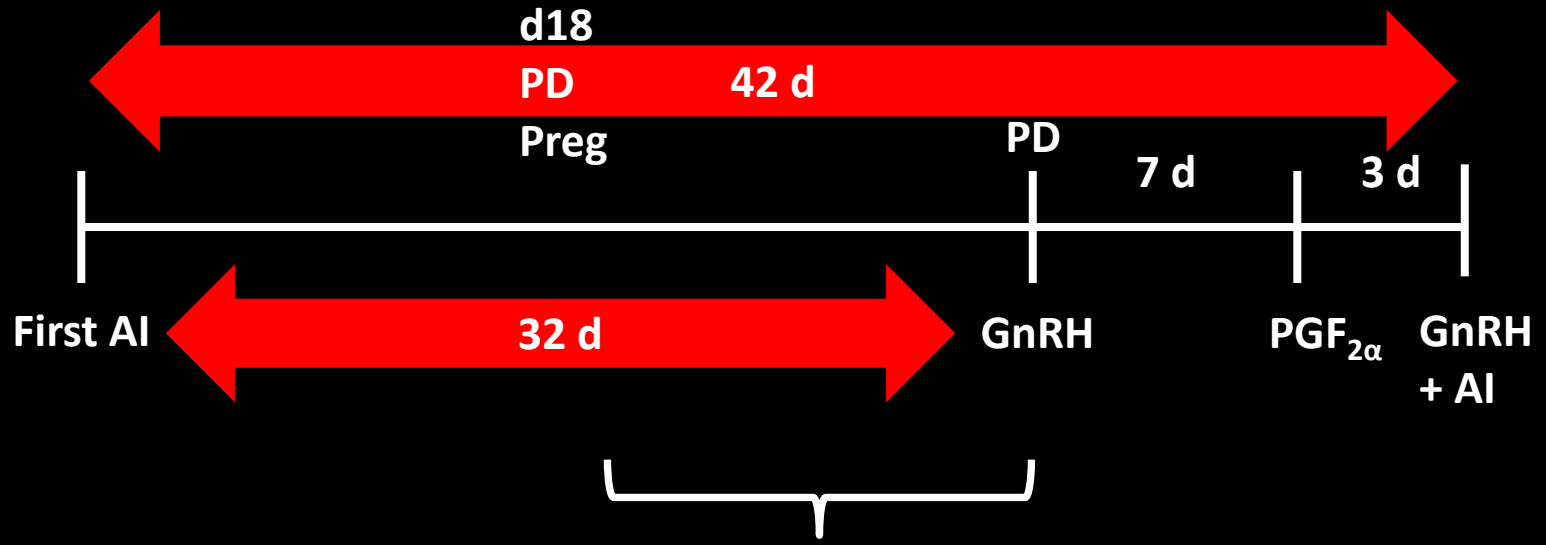
Open Cow Test (OCT) to Manage Open Cows, and to Study/Manage Embryonic Mortality



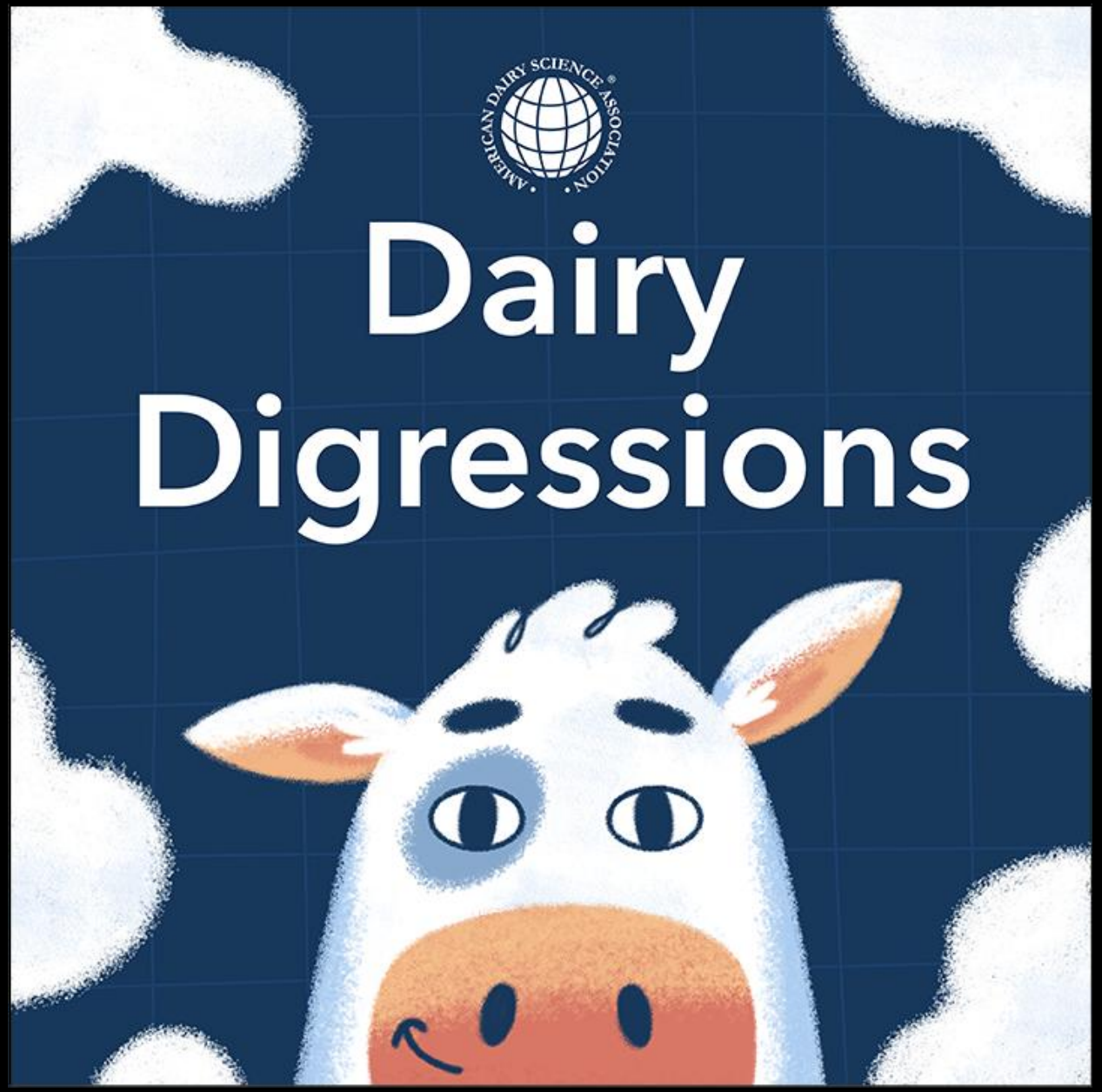
Future resynchronization programs



Future resynchronization programs



Activity systems are important for catching heats on “return to service” cows.



Thank you!

For the latest in dairy science research listen to Dr. Lucy's podcast "Dairy Digressions." *We do science right!*

Matt Lucy
University of Missouri
Columbia, MO
USA
lucym@missouri.edu

IT'S NOT THE MARKETS, IT'S MANAGEMENT

CONTROL WHAT DRIVES PROFIT

PICTURE THIS

- IT'S 2018, AND IT'S BAD FOR JONAH
- MID 20'S, RUNNING 4K ACRES FOR 11 FAMILIES.
- LOSING MONEY EVERY HOUR HE WORKS…

NO SLEEP, DISASTER PENDING

- JONAH DIDN'T HAVE:
  - MENTOR
  - MANAGEMENT CAPABILITIES
  - EXECUTION
  - KNOW-HOW

THE GAME HAS CHANGED

- CAN'T GROW HIS WAY OUT OF THE PROBLEM, SO NOW WHAT?
  - PRICE DOESN'T MATTER, ELIMINATE AT ALL COSTS
  - 'NICE TO HAVE' DOESN'T COUNT
  - NO MARIE KONDO HERE (SPARKED JOY)
  - FROM BIG TO LITTLE, THE FAMILY HEIRLOOMS ARE GONE

IT CONTINUES







PRINCIPLES OF BUSINESS

1. HIRE SLOW, FIRE FAST

GRANT WIESE –FARM640

- FARM RAISED IN NEBRASKA
- 1,000'S OF FINANCIAL STATEMENTS
- 5,000+ WEEKLY NEWSLETTER

PRINCIPLES OF BUSINESS

1. HIRE SLOW, FIRE FAST

ENCOURAGE GROWTH AND STRONG FINANCES

KEEP OVERHEAD LOW, EVERYONE OVERWORKED

HIRE AT THE LAST POSSIBLE MOMENT

THIS WORKS WITH PEOPLE, AND EQUIPMENT OVERHEAD TOO

TOP 5 PRIORITIES IN LIFE

#1 GOD

#2 FAMILY

#3 EXTENDED FAMILY

#4 FRIENDS AND COMMUNITY

#5 MY BUSINESS

LOYALTY

- JONAH HAD THE RIGHT PRIORITIES
- IS YOUR FEED, SEED, AND CHEMICAL PROVIDER NAMED ON YOUR LIST?
- JONAH'S NEXT STEPS
  - 3RD PARTY CHECKS
  - FOUND LACK OF LOYALTY
  - NO STONE LEFT UNTURNED, REAFFIRMING HIS PRIORITIES

PRINCIPLES OF BUSINESS

1. HIRE SLOW, FIRE FAST

ENCOURAGE GROWTH AND STRONG FINANCES

KEEP OVERHEAD LOW, EVERYONE OVERWORKED

HIRE AT THE LAST POSSIBLE MOMENT

THIS WORKS WITH PEOPLE, AND EQUIPMENT OVERHEAD TOO

2. LOYALTY

MAKE #1 YOUR #1

YOU CAN BE LOYAL AND STILL DOUBLE CHECK

YOU HAVE AN OBLIGATION TO RUN YOUR BUSINESS WITH THE BEST MARGINS AVAILABLE TO YOU

JONAH'S 2019

- $2.98/BU FOR OTHERS
- FIRST EARNINGS IN 4 YEARS FOR HIM
- WASTE IS GONE, WHAT MORE IS THERE TO DO?
- FRUITS OF THE MIDNIGHT BRAINSTORMS

CHASING A UNICORN

- NOT=TRUCKS, CUSTOM OR SEED
- MORE=PAPERWORK, LAWYERS, APPLICATIONS, HEARINGS AND MONEY
- BREAKTHROUGH=BE THE GO-TO

PRINCIPLES OF BUSINESS

1. HIRE SLOW, FIRE FAST

ENCOURAGE GROWTH AND STRONG FINANCES

KEEP OVERHEAD LOW, EVERYONE OVERWORKED

HIRE AT THE LAST POSSIBLE MOMENT

THIS WORKS WITH PEOPLE, AND EQUIPMENT OVERHEAD TOO

2. LOYALTY

MAKE #1 YOUR #1

YOU CAN BE LOYAL AND STILL DOUBLE CHECK

YOU HAVE AN OBLIGATION TO RUN YOUR BUSINESS WITH THE BEST MARGINS AVAILABLE TO YOU

3. INSANE VALUE

SOMETHING NO-ONE ELSE WOULD DO (HARD)

EVERYONE NEEDED HIM, EVEN IF THEY DIDN'T KNOW IT YET (HALF THE COUNTRY)

HE NAMES HIS PRICE, THEY GLADLY PAY

SILENCE WAS THE KEY

- CONTEMPLATING, THINKING, AND BRAINSTORMING
- GIVING THE BRAIN ROOM TO PROCESS WHAT YOU ALREADY KNOW
- 3 MINUTES FOR YOUR 1 TAKEAWAY

WWW.FARM640.COM

@GWIESEFARMS

CASH FLOW+

1. CASH FLOW STATEMENTS
2. DECREASE EXPENSES
3. IMPROVE INCOME
4. MANAGE MARKETING
5. DEBT STRUCTURE

Fluid Milk Outlook 2026: Navigating Headwinds and Tailwinds

Farrah Newberry, CEO

The Dairy Alliance



Today we will review:

- Fluid milk's performance in the Southeast against national trends
- Headwinds and Tailwinds for the SE fluid milk industry
- How The Dairy Alliance defends, invests, and leverages regional strengths to maintain market and relevance

THE DAIRY ALLIANCE

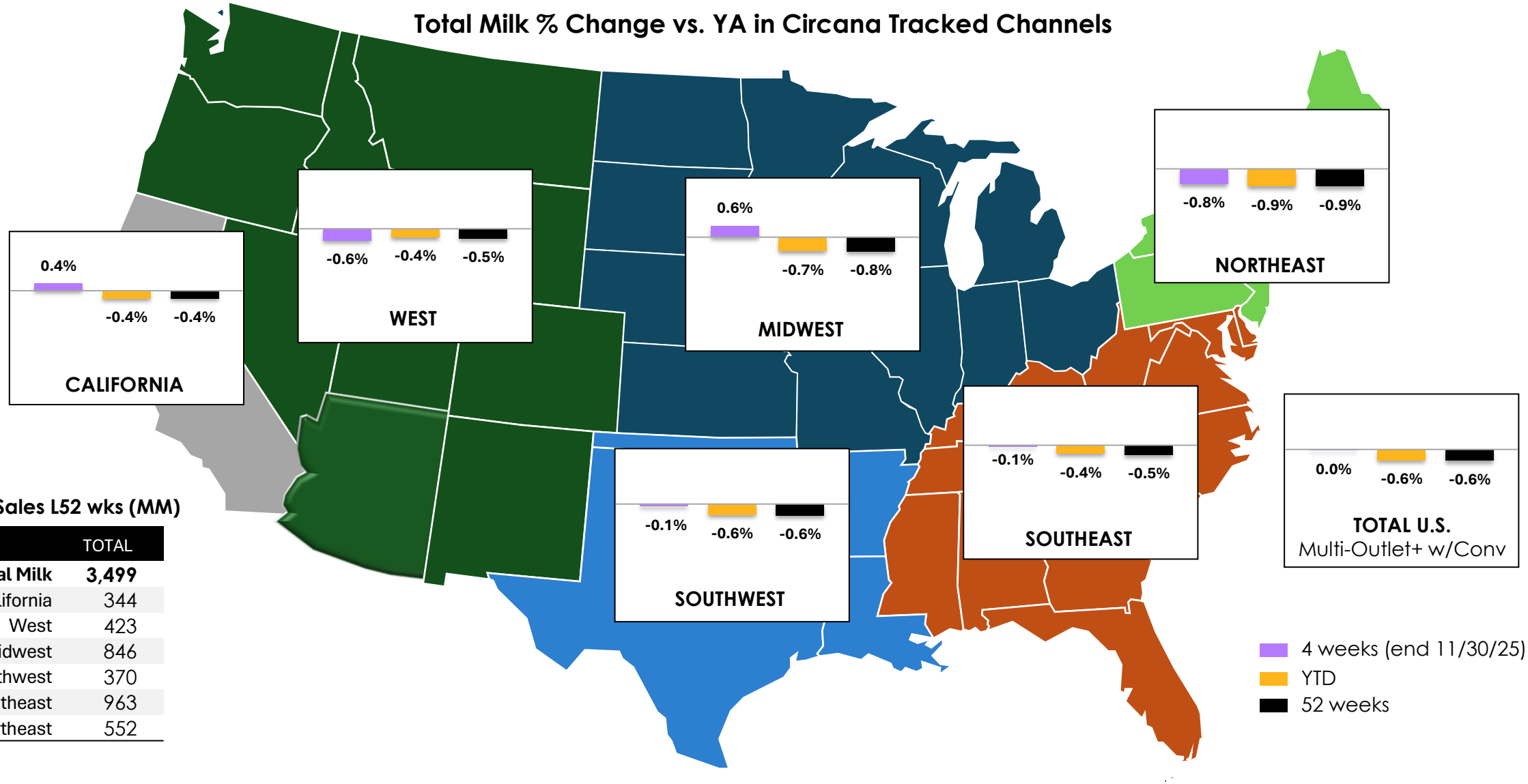
MARKET LANDSCAPE AND TRENDS

THE DAIRY ALLIANCE

National Fluid Milk Consumption Trends

YEAR	PER CAPITA FLUID MILK (LBS)	% CHANGE VS PRIOR DECADE
1975	247	-
2000	134	-46%
2010	128	-4%
2023	128	-28% since 2010

Total Milk: All 6 Regions were Close to Flat



Volume Sales L52 wks (MM)

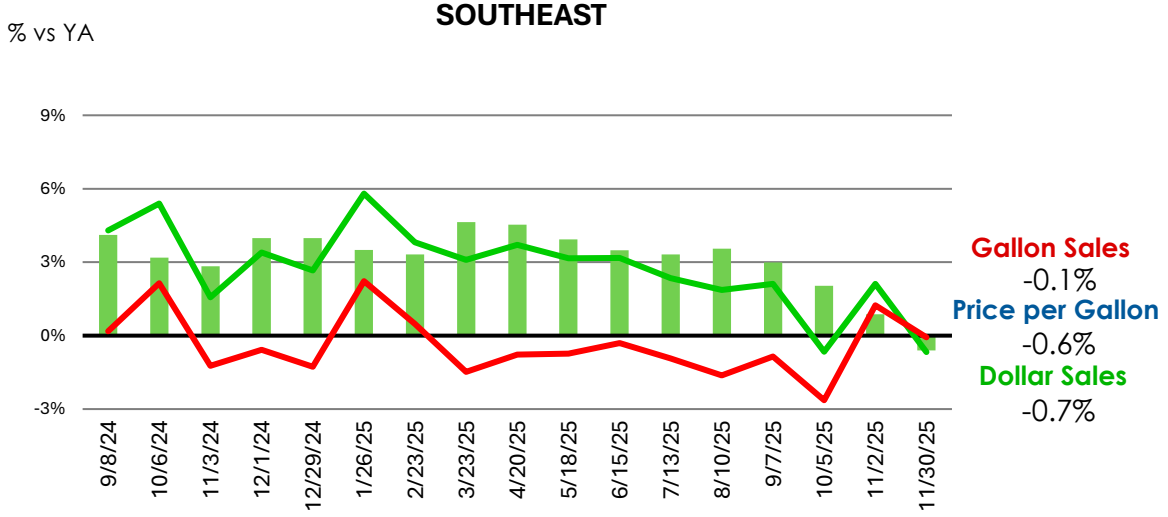
	TOTAL
Total Milk	**3,499**
California	344
West	423
Midwest	846
Southwest	370
Southeast	963
Northeast	552

Regional Trends: Southeast

Milk volume sales were -0.1% vs. YA. in the Southeast.

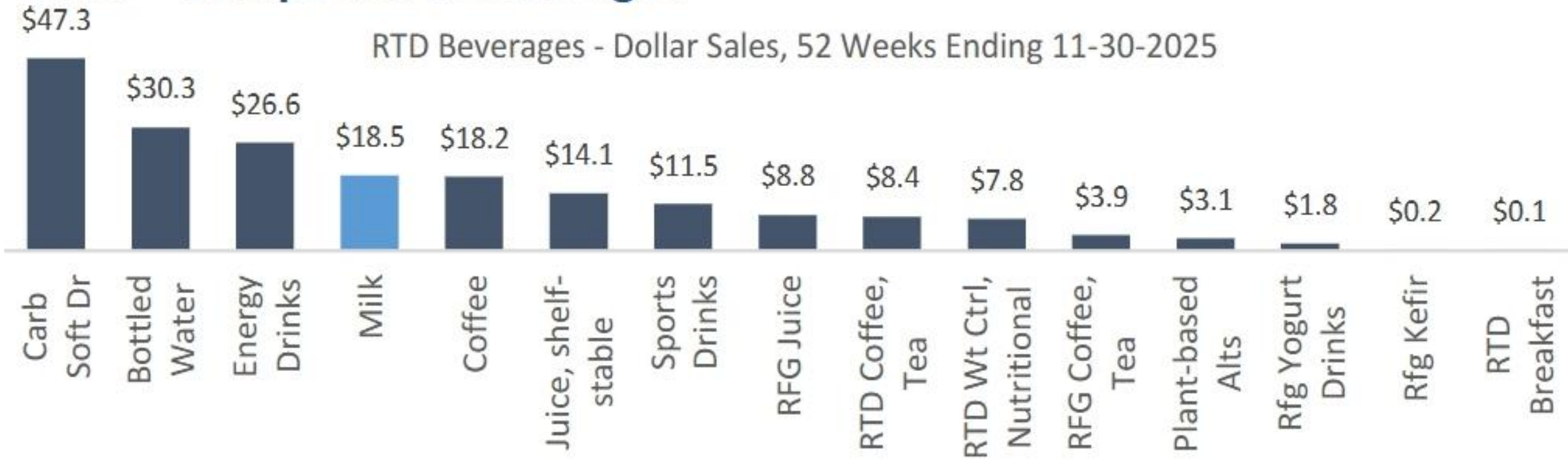
Traditional White was -0.8% and VA grew +3.7%.

VA growth was led by Enhanced at +9.7% vs. YA, followed by Organic at +0.9% and Lactose Free at +5.8%.



Multi-Outlet+ w/Conv Data thru 11/30/25	Volume (Gal)		Volume Share		Volume Growth Trend % vs YA				Price per Equiv Gal ($)			
	2024	L52 Weeks	2024	L52 Wks	4 wk	13 wk	YTD	52 wk	4 wk	13 wk	YTD	52 wk
TOTAL MILK	**967,388,313**	**963,450,529**	**100%**	**100%**	**-0.1%**	**-0.5%**	**-0.4%**	**-0.5%**	**$5.31**	**$5.26**	**$5.18**	**$5.20**
TOTAL TRADITIONAL	**802,442,535**	**791,102,253**	**82.9%**	**82.1%**	**-0.7%**	**-1.4%**	**-1.5%**	**-1.6%**	**$4.03**	**$4.08**	**$4.12**	**$4.12**
Traditional White	757,987,202	746,960,289	78.4%	77.5%	-0.8%	-1.5%	-1.6%	-1.7%	$3.77	$3.81	$3.86	$3.86
Traditional Flavored	44,455,333	44,141,964	4.6%	4.6%	-0.4%	0.6%	-0.8%	-0.8%	$8.57	$8.54	$8.53	$8.53
TOTAL VALUE-ADDED	**150,314,006**	**157,879,950**	**15.5%**	**16.4%**	**3.7%**	**3.9%**	**5.5%**	**5.6%**	**$10.33**	**$10.34**	**$10.14**	**$10.12**
Organic	63,442,500	64,411,232	6.6%	6.7%	0.9%	0.3%	1.7%	1.7%	$10.49	$10.50	$10.07	$10.03
Organic White	61,843,324	63,074,481	6.4%	6.5%	0.6%	0.1%	2.2%	2.2%	$10.26	$10.26	$9.84	$9.79
Organic Flavored	1,599,177	1,336,751	0.2%	0.1%	18.6%	9.7%	-17.4%	-18.7%	$19.81	$20.15	$20.96	$21.02
Non-Organic	86,871,506	93,468,718	9.0%	9.7%	5.8%	6.5%	8.3%	8.4%	$10.22	$10.23	$10.19	$10.18
Non-Organic White	76,654,223	83,194,951	7.9%	8.6%	6.7%	7.6%	9.3%	9.4%	$9.73	$9.73	$9.72	$9.70
Non-Organic Flavored	10,217,283	10,273,767	1.1%	1.1%	-1.6%	-1.5%	0.6%	1.0%	$14.47	$14.46	$14.04	$14.02
BUTTERMILK & EGGNOG	**14,631,772**	**14,468,325**	**1.5%**	**1.5%**	**-1.5%**	**-0.7%**	**-1.4%**	**-1.7%**	**$11.89**	**$11.09**	**$9.70**	**$10.22**
TOTAL FLAVORED (Trad & Value-Added)	**56,271,793**	**55,752,483**	**5.8%**	**5.8%**	**-0.1%**	**0.4%**	**-1.0%**	**-1.0%**	**$9.96**	**$9.94**	**$9.85**	**$9.84**
TOTAL LACTOSE F/R (Organic & Non-Organic)	**84,608,971**	**89,108,479**	**8.7%**	**9.2%**	**5.8%**	**5.3%**	**5.8%**	**5.9%**	**$10.09**	**$10.10**	**$10.07**	**$10.05**
Lactose F/R Non-Ultra Filtered	56,976,380	58,331,390	5.9%	6.1%	7.4%	5.6%	2.6%	2.4%	$8.34	$8.36	$8.40	$8.40
Lactose F/R Ultra Filtered	27,632,591	30,777,089	2.9%	3.2%	3.0%	4.8%	12.4%	13.2%	$13.43	$13.44	$13.22	$13.17
TOTAL ENHANCED (Organic & Non-Organic)	**43,723,592**	**51,813,012**	**4.5%**	**5.4%**	**9.7%**	**12.5%**	**20.2%**	**20.4%**	**$12.54**	**$12.52**	**$12.37**	**$12.36**

Milk – Competitive Beverages



THE DAIRY ALLIANCE

Fluid Milk: A Multifaceted Story

Fluid milk isn't driven by one trend—it's shaped by context: where, how, and why consumers choose it.



THE DAIRY ALLIANCE

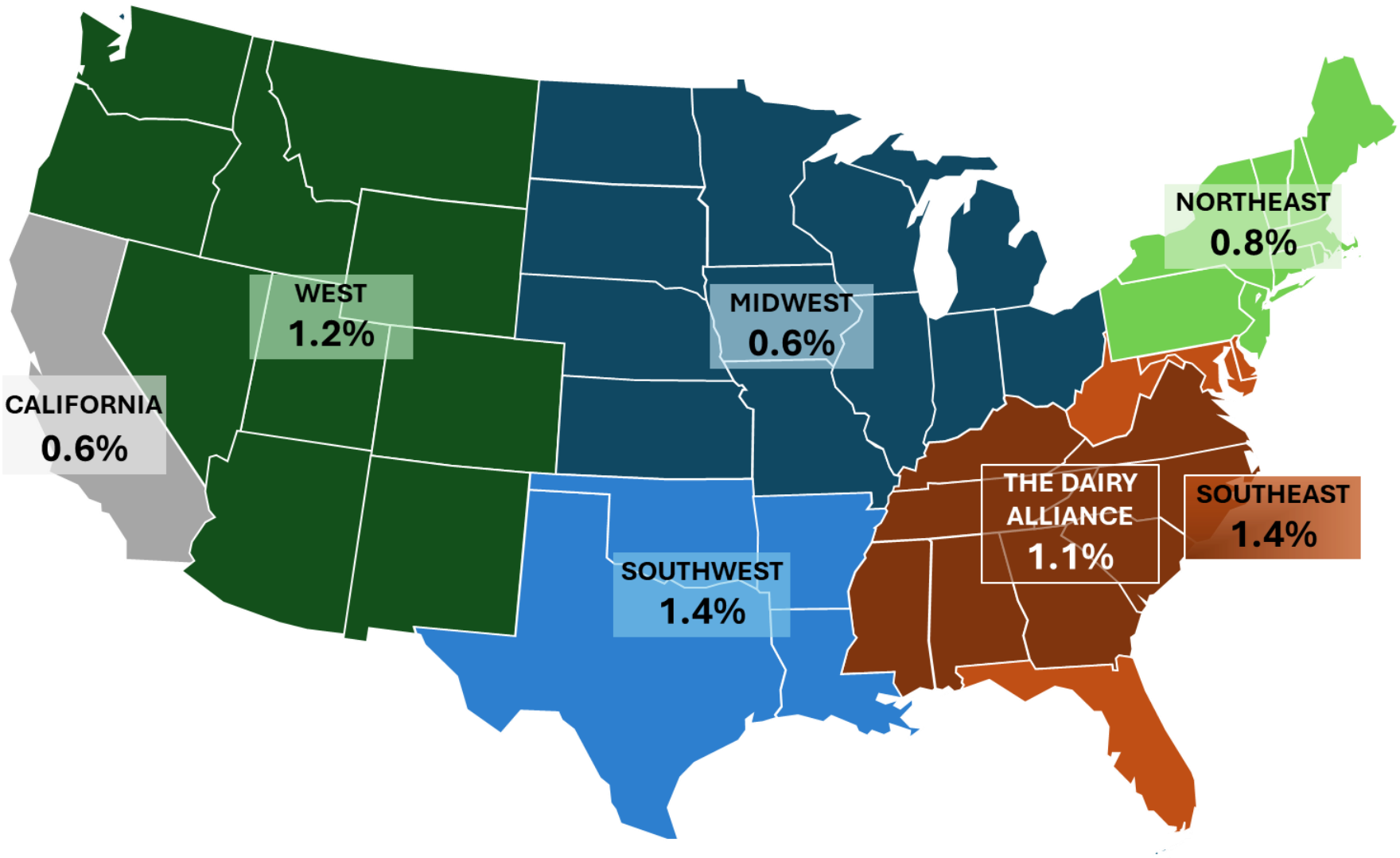


TAILWINDS DRIVING FLUID IN SE

THE DAIRY ALLIANCE

Southeast Population Growth Advantage

Population Growth 2023 - 2024



POPULATION GROWTH AND FAMILY DYNAMICS

South's Population Growth

The South's 1.6% growth rate leads U.S. regions, driven by migration and more people with children. *(U.S. Census)*

Family Demographics Drive Milk Demand

Families with children are our core milk-consuming group, supporting potential demand despite national declines.

Strategic Opportunities

Focus on family needs with affordability, nutrition, and cultural relevance.







PROTEIN AND PERFORMANCE

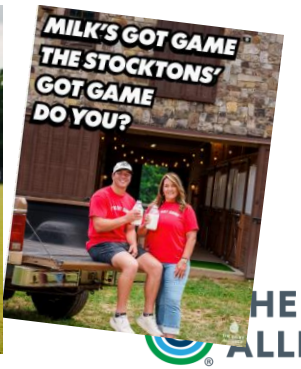
Dairy Marketed as Food Medicine
Consumers view protein intake as a proactive health strategy, not just nutrition – aligning with the "food as medicine" trend.

Milk Starts With a Built-In Protein Edge
Naturally occurring, complete protein – supported by a strong household base across The Dairy Alliance region.

Protein Demand is Sticking
Protein is part of everyday routines around wellness, strength, and recovery and is the thread that carries into performance next – because recovery is where nutrition credibility gets tested.







THE DAIRY ALLIANCE

SOUTHERN FOOD CULTURE

Milk in Southern Food Culture

Milk, whether it's whole or buttermilk, remains deeply embedded in Southern food culture - breakfast, cooking, and baking traditions.

Pour One More

Southern food trends consistently inspire national menus, drive restaurant innovation, and dominate social media food conversations. Moments that celebrate authenticity, indulgence, family, and hospitality, are values consumers crave – leading to more pours each day.

In 2026, we're not just launching a campaign, we're igniting a cultural movement. We are partnering with a Celebrity Chef, Georgia Grown Chefs, and the Georgia Food & Wine Festival to elevate dairy milk from an ingredient to an experience, one that inspires incremental usage and celebrates Southern tradition





MORE PEOPLE, MORE RETAIL, MORE SCHOOLS

Retail Infrastructure Continues to Grow

Large-format grocery stores and supercenters dominate the Southeast retail landscape, benefiting fluid milk sales. Strong retailer and local processor collaboration enhances milk's role as a traffic-driving staple.

Building a Better School Milk Experience

Moo Brew, Milk Dispensers, smoothie programs and now, Smart Swaps, provide better tasting milk, add more usage and provide nutritious options that keep milk in front of our future milk purchasers.

Whole Milk for Healthy Kids Act/Dietary Guidelines for Americans

Signed into law January 14th, WMHK Act brings whole milk and 2 % options back to school cafeterias. By exempting milk from saturated fat limits, school nutrition staff can work quicker to adjust menus that continue to meet school meal nutrition guidelines.

Strategic Opportunities

Aligning with channel dynamics helps sustain and grow volume and maintain market relevance despite category declines.
 Foodbank distribution centers are being explored as driver in 2026 and beyond.









PARTNER INVESTMENT

Powerful Partnerships Will Be The Foundation of a Thriving Southeast Dairy Industry

Powerful partnerships are driving the Southeast dairy industry forward by connecting schools, health professionals, and farmers. Collaborations in schools enhance the milk experience for children, while community wellness efforts promote dairy's role in balanced nutrition and lifelong health. Sustainability initiatives further strengthen the industry by showcasing dairy's commitment to responsible farming and environmental stewardship.

Our Choices Reflect Future SE Generations:

- **Make Decisions That Honor And Uplift Our Southeast Farmers.**
- **Make Decisions That Reflect The Interests Of Our Investors.**
- **Make Decisions That Embody A Spirit Of Collaboration – Preserving Our Distinctiveness While Uniting Us In Pursuit Of Market Success.**

THE DAIRY ALLIANCE



HEADWINDS CHALLENGING FLUID GROWTH IN SE

THE DAIRY ALLIANCE

Southeast States
Milk Production and Dairy Farms

Year	Milk (mil. lbs.)	Dairy Farms
1980	14,440	
1990	14,418	10,261 (1992)
2000	12,042	6,105
2010	9,013	3,260
2020	8,455	1,650
2021	8,201	1,490
2022	8,112	1,345
2023	8,024	1,255
2024 (projection)	7,890	1,160

Southeast States
Dairy Farms and Milk Sales*

Herd Size	Number of Dairy Farms	Percent of Total Dairy Farms	Percent of Milk Sales
Less than 100 cows	722	51%	8%
100 – 500 cows	546	39%	28%
500 – 2,499 cows	118	8%	32%
2,500 cows or more	22	2%	32%
Total	1,408		$2.04 billion
	140 farms	10% of dairy farms	64% of Milk Sales
* 2022 Census of Agriculture			

Source: Calvin Covington, 2025 Georgia Dairy Conference



LOSS OF FARMS, LOSS OF MARKET

Southeast Market Dependence
The Southeast heavily depends on fluid milk with high Class I utilization rates but faces production stagnation.

Production and Supply Challenges
Southeast milk production declined overall, causing supply deficits and increased reliance on imports.

Emerging Consumer Trends
Consumers are shifting towards whole milk and value-added products like lactose-free and organic milk –*a minuscule amount processed in the Southeast*

Packaged Milk Volume Shares (%) in the SE

	Traditional Milk	Value-Added Milk
2023	**83.4 %**	**14.6 %**
2024	**83 %**	**15.5 %**
2025	**82.2 %** **as of 11/30/25*	**16.3 %**





PROCESSING AND INNOVATION CHALLENGES

Older Infrastructure & Milk Deficit Hinders Investment
Reliance on out of area milk raises operating cost and risk, discouraging expansion and innovation in older HTST plants.

Value-Added Packaged Milk Replacing HTST
Sourcing packaged milk offers a significantly more cost-effective and efficient solution compared to the substantial investment required to build new processing facilities.

Growth Stalls Without Alignment
Investors need reliable milk supply to justify processing investments, and farmers need secure processing and fair prices to grow production. Without alignment, expansion on both fronts remains limited.

Without investment in new processing equipment or facilities, innovation in fluid milk will remain stalled—limiting growth and competitiveness in the market.





PROTEIN NOISE; CROWDED SHELF SPACE

Protein is EVERYWHERE – More Products Will Try To Sound Like Dairy Without Being Dairy
Consumers want complete protein – 36% say they want to see it in food and drink products – so brands are racing to claim it.

Alternatives Grasping for Sales
With 36% of consumers wanting to see protein in their food and beverages, plant-based milk substitutes will push ‘complete/whole protein’ callouts more aggressively to reassure shoppers about nutritional adequacy.

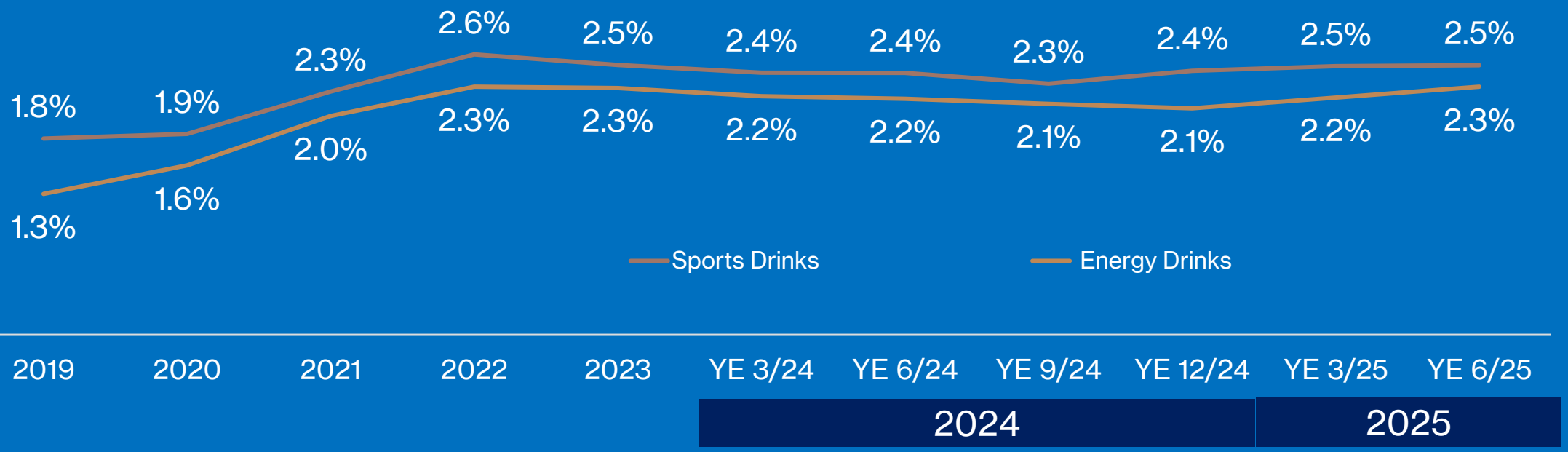
Shelf Space is Crowded and Competitive
Sports drinks, functional refreshers, energy-forward products, and high-protein options are all chasing the same post-workout moment. Milk competes not just on nutrition, but on relevance and visibility in a market that refreshes constantly.



THE FITNESS BEVERAGE SHELF IS CROWDED

All beverage companies are chasing the same post workout moment

Y/o/Y Growth Sports & Energy Drinks





CHANGES TO DIETARY GUIDELINES AND SCHOOL MEAL PROGRAM

- **Dairy foods including milk, cheese and yogurt – at all fat levels – are encouraged for the first time**, moving away from one-size-fits-all low-fat recommendations. Dairy foods with no added sugars are encouraged which will impact flavored low-fat milk offerings *(currently most consumed option).*

- The legislation makes offering whole and 2% milk an option, not a requirement.

- **Guidance and collaboration from USDA to state agencies, schools and dairy processors is coming** to support implementation of whole and 2% milk options.

- As with any regulatory change to school meals, there are several logistical factors that go into decision making, including product availability, price, student acceptance, and menu nutrient standards.

Smart Swaps is a nationwide hub of recipes, tools and training designed to help schools meet evolving guidelines and inspire delicious, nutrient-rich choices for students. ***Two of The Dairy Alliance staff*** *proudly serve on the Federation Strategy Team, helping shape and implement Smart Swaps across the country.*

SMART SWAPS



2026 PRIORITIES

THE DAIRY ALLIANCE

Priorities for 2026: *Fluid milk will remain at the center of what The Dairy Alliance does*

- **Milk & Performance:** Fueling the Southern Athletes and Active Lifestyles
- **Southern Culinary Heritage:** Milk in the Kitchen
- **Community Access & School Milk Programs:** Building Strong Dairy Habits
- **Navigating Consumer Perception**: Natural Protein, Simple Nutrition
- **Category Resilience & Innovation Within Dairy Milk:** Clean and Clear

THE DAIRY ALLIANCE

THE DAIRY ALLIANCE



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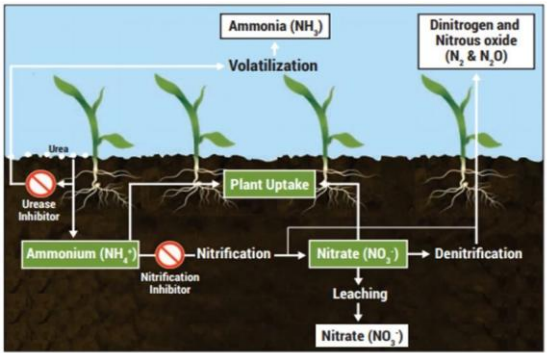
Beyond the NMP: Using Real-Time Nitrogen Tracking to Inform Applications

Outline

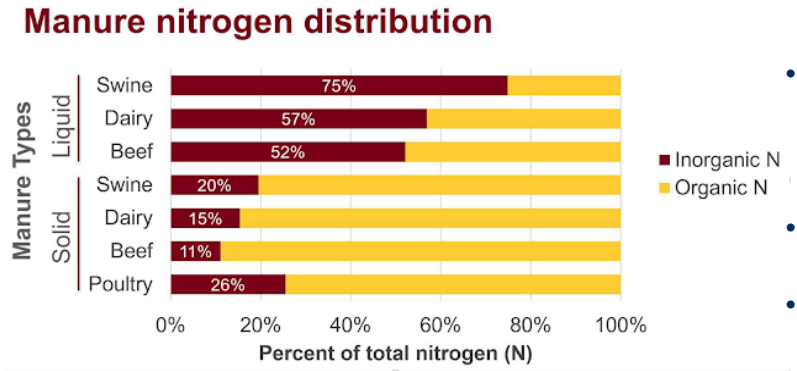
1. Nitrogen management with manure
2. Nutrient management plans – BMPs
3. Determining Agronomic N Rates
4. Justifying Crop Appropriate N
5. In-Season Crop N Tracking
6. Future Opportunities and Needs

N: The Agronomy Challenge

- Nitrogen availability and utilization is dependent on many factors
  - Moisture
  - Temperature
  - pH
  - Forms and concentrations
  - Biological activity
- Transformations are invisible, *unlike water*
- Multiple loss pathways
- Environmental factors, uptake, and availability don't always align



Manure Composition



- Composition varies:
  - By source
  - By state
  - By time, lot, etc.
- Beef/Dairy are 50:50 as liquid, organic as solid
- Swine is mostly inorganic
- Poultry is mostly organic

Nitrogen availability of different manure types: What we know and what we are researching, Minnesota Crop News, University of Minnesota Extension, Sept 23, 2024

Manure Availability

- Inorganic N
  - Ammonium (NH4+) - fixes to soil exchange sites
  - Nitrate (-NO3) - loose in soil-water solution
- Organic N (carbon linked)
  - Must mineralize first to be plant available (feed, bedding, forage)
  - Converts to NH4+ first

Organic-N Available this Year[2]	
All solid, slurry and liquid manures, municipal biosolids, composts and organic industrial by-products (See exceptions below[3]):	0.40
Layer Manure (no bedding)	0.45
Composted Feedlot Manure[4]	0.15

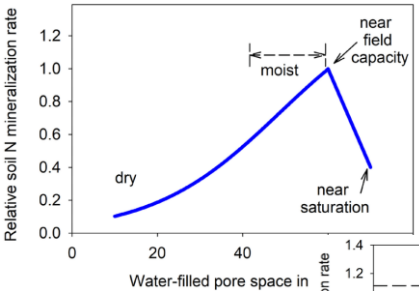
Organic-N Available in Subsequent Years	
Next Year	0.20
2 Years from Now	0.10
3 Years from Now	0.05

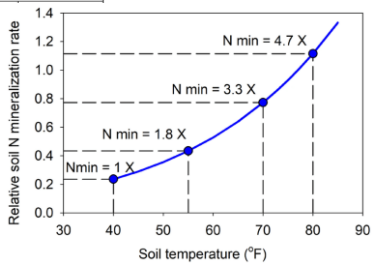
Determining Crop Available Nutrients from Manure, Nebraska Extension, G1335

Mineralization

Graphs attributed to Dan M. Sullivan et al. - *Baseline soil nitrogen mineralization: measurement and interpretation*

- Conversion of a nutrient from an organic form into a form available for plant use.
- Microbial activity is driven by temperature, soil moisture, pH, incorporation, and depth
- Ammonium (NH4+) is produced from nitrogen mineralization
- Opposite function is immobilization





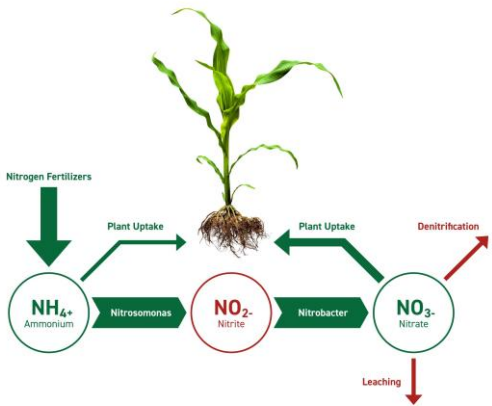
Nitrification

Process

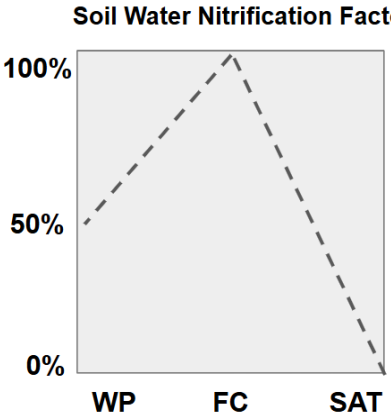
- Conversion of Ammonium (NH4+) to Nitrate (-NO3) by bacteria
- Driven by:
  - Soil Temperature
  - Soil Moisture
  - pH

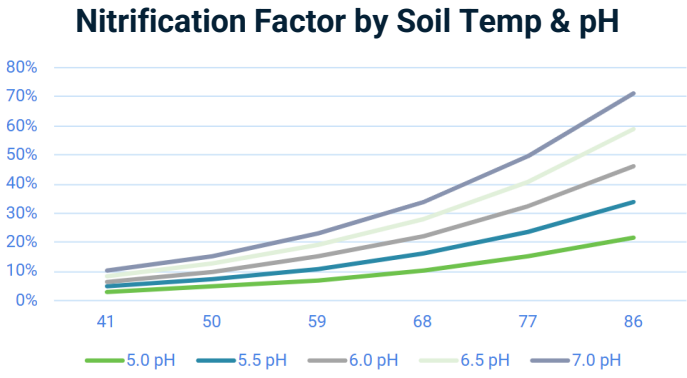
Puts N at “Risk”

- Nitrate may stay in the soil, but may be lost
- Nitrate susceptible to leaching
- AEC should be considered



Nitrification Drivers





What conditions create the greatest risk for leaching?

Denitrification

Process

- Nitrate (-NO3) is converted to N2 gas
- Can produce nitrous oxide (N2O), a greenhouse gas
- Occurs under anaerobic conditions (no air)
- Increased with higher soil temperatures

Prime Conditions

- Low hydraulic conductivity soils
- Warm conditions
- Local elevation minimums
- High water tables
- High soil nitrate concentrations





Manure Management is Difficult

Agronomics are challenging enough. Other factors like logistics make it even harder.



Many factors affect N management with manure.

- Manure is a variable N source
- Product application rate
- Total nitrogen concentration
- Nitrogen form %
- Inorganic vs organic, NH_4/NO_3, organic sources
- Application method, depth, incorporation %
- Soil moisture, temperature, pH

Pre-determining your nitrogen needs is nearly as difficult as pre-determining irrigation needs or forecasting seasonal amount and timing of rainfall.

Nutrient Management Planning

- Farm & Manure System Description
- Land Base & Land Characterization
- Testing & Baseline Data
- Nutrient Budgets & Application Plans
- Operational Rules & Risk Controls
- Record Keeping & Accountability

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Tyler Harper, Commissioner www.agr.georgia.gov

Nutrient Management Plan Check List

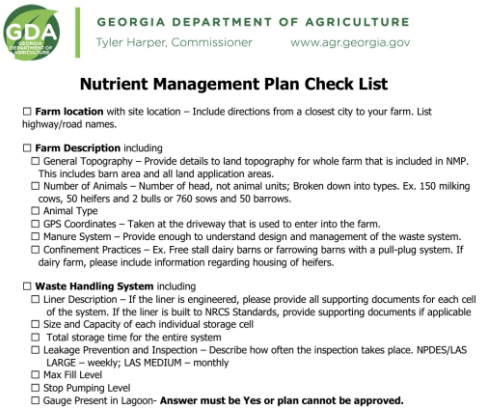
☐ **Farm location** with site location – Include directions from a closest city to your farm. List highway/road names.

☐ **Farm Description** including
- ☐ General Topography – Provide details to land topography for whole farm that is included in NMP. This includes barn area and all land application areas.
- ☐ Number of Animals – Number of head, not animal units; Broken down into types. Ex. 150 milking cows, 50 heifers and 2 bulls or 760 sows and 50 barrows.
- ☐ Animal Type
- ☐ GPS Coordinates – Taken at the driveway that is used to enter into the farm.
- ☐ Manure System – Provide enough to understand design and management of the waste system.
- ☐ Confinement Practices – Ex. Free stall dairy barns or farrowing barns with a pull-plug system. If dairy farm, please include information regarding housing of heifers.

☐ **Waste Handling System** including
- ☐ Liner Description – If the liner is engineered, please provide all supporting documents for each cell of the system. If the liner is built to NRCS Standards, provide supporting documents if applicable
- ☐ Size and Capacity of each individual storage cell
- ☐ Total storage time for the entire system
- ☐ Leakage Prevention and Inspection – Describe how often the inspection takes place. NPDES/LAS LARGE – weekly; LAS MEDIUM – monthly
- ☐ Max Fill Level
- ☐ Stop Pumping Level
- ☐ Gauge Present in Lagoon- **Answer must be Yes or plan cannot be approved.**

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Best Management Practices: 4R

1. Right Rate – University recommendations are the most common basis for agronomically appropriate N rates
   - Most university N recommendations provide a total N limit
   - Some university N recommendations define a second N limit from manure
2. Right Time – Align availability and presence of nutrients in the soil with crop uptake requirements
3. Right Place – Apply nutrients only in locations of the field where they are needed, and place nutrients at the appropriate soil depth and proximity to the crop
4. Right Source – Appropriate sources balance plant availability requirements (timing of availability with demand), environmental stability, and enhance soil function

MN Agronomic N Rate Definition

MN PCA wq-f6-26 – Manure Application Rate Guide | MDA – MN Nitrogen Fertilizer Management Plan

Nitrogen application rates should be consistent with the appropriate University of Minnesota "maximum return to N" (MRTN) value to limit the likelihood of N leaching/loss. N application rates should not exceed the N needs values for the 0.05 MRTN

The NFMP established that nitrogen fertilizer BMP adoption is voluntary in Levels 1 and 2 and required in Levels 3 and 4. The rule keeps this concept and additionally states that ***in level 3, the MDA also may require the use of Alternative Management Tools (AMTs)*** provided that a source of funding for increased costs related to the AMTs is available.

WI Agronomic N Rate Definition

Conservation Practice Standard – Nutrient Management Code 590 – NRCS, WI

Available N from all sources shall not exceed the annual N requirement of non-legume crops consistent with UWEX Pub. A2809, or the annual N removal by a legume crop or a legume and companion crop. See Technical Note WI-1, Part III.B for additional nitrogen utilization planning guidance.

Where excessive rainfall has caused crop N deficiency, ***up to 46 pounds per acre of in-season supplemental N may be applied if the need for rescue N is documented using "Guidelines for Adaptive Nutrient Management"***, Technical Note WI-1, Appendix 3. To justify applying ***more than 46 pounds per acre, two different methods must be used to document the need.***

FL Agronomic N Rate Definition

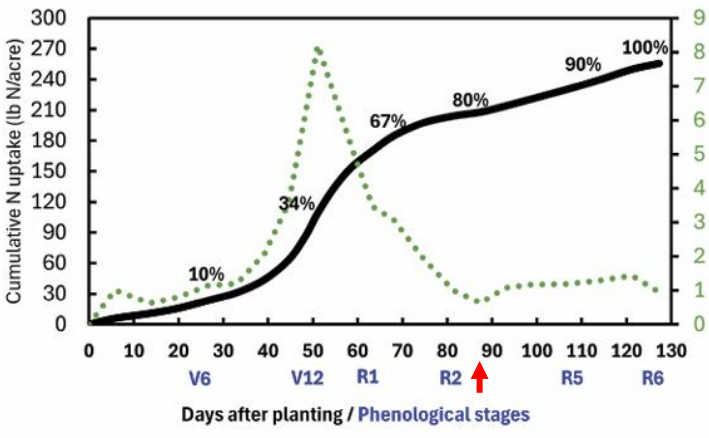
FDACS-P-02008 Rev. 11/24 – Florida Dairy Operations: Water Quality and Water Quantity BMPs

Base the N fertilization rate on recommended rates in the crop-specific UF/IFAS publication(s), where available, or another credible source with scientific support (e.g., a calibrated crop response curve for the soil type and crop).

Supplemental application may be justified based on current tissue testing results, results from other technological testing methods, cultivar specific requirements, or other substantiated production data that demonstrate crop need. Maintain documentation to support application amounts, particularly documentation used to justify application amounts above the recommended rates.

Aligning with Crop Utilization

In-season Nitrogen Management for Corn by Ferguson et al. 2024



33% of uptake after R1

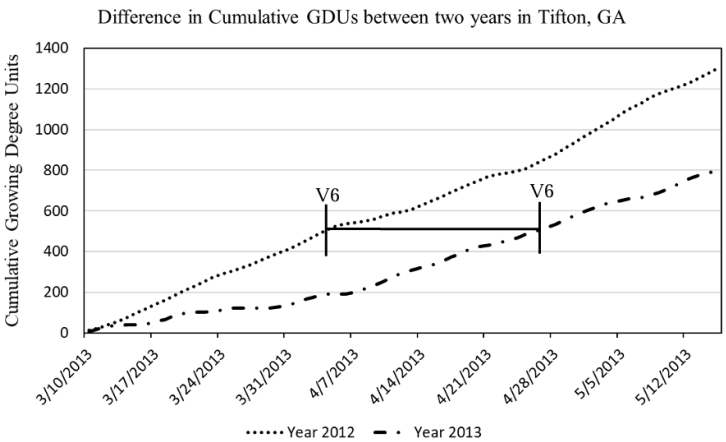
33% of uptake V12 to R1

24% of uptake V6 to V12

10% of uptake before V6

Seasonal Variability

Georgia Corn Production Guide by Tubbs et al. 2024



24 days between growth stages in consecutive years.

24-day difference in N:

- Utilization
- Availability
- Loss mechanisms

Yield potential differences likely

How does this change the total N need? What about timing?

Convergence in Approaches

Data collected in-season can be used to justify, document, and inform additional N applications.

Justify **Adaptive** **Alternative** **Evaluate**
Reactive **Document** **In-season**

Agile Nitrogen Stewardship is needed because predictive (pre-plant) agronomic nitrogen rate recommendations poorly predict N needs (NebGuide G2365).

Commonly accepted justification methods:

1. Soil Nitrate Tests
2. Plant Tissue Tests
3. Sensors
4. Models

Soil Nitrate Tests

This is sometimes referred to as a pre-sidedress nitrate test or PSNT.



Assessment of nitrate concentrations in the soil at the depth(s) sampled.

Advantages	Disadvantages
• Quantitative measure of immediately plant available N • Low barrier to entry • Detective of impact of accumulated losses • Fits in easily to university rate algorithms • Can be scaled up to include other nutrients	• If only assessing nitrate, a major component of imminently and potentially plant available N is missing. • Labor intensive • Spatially dismissive • Does not capture crop status information • Expensive per information gained

Plant Tissue Tests

Plant tissue tests can be collected and analyzed multiple different ways.



Assessment of nitrogen (and other nutrient) concentrations in plant tissue.

Advantages	Disadvantages
• Reveals concentrations of multiple nutrients • Can provide partitioning information within the plant • Low barrier to entry • Sap analysis can provide some measure of predictivity	• Not predictive • Ignores soil supply (current and future) • Labor intensive • Spatially dismissive • Highly generalized (not hybrid/variety-specific) • Uncalibrated to crop N response • Slow turnaround time

Nitrogen Models

Process-based and empirical models have been developed to help understand soil and crop N dynamics.



Use of mathematical models to predict nitrogen availability and uptake under anticipated weather and crop conditions for informing nitrogen applications.

Advantages	Disadvantages
• Not impeded by poor atmospheric conditions • On-demand recommendations • Planning and prediction are inherent	• Lack of in-season calibration/correction • Require recalibration under new conditions • Substantial data is required for success

Sensor-Based Algorithms

Nitrogen's role in biomass development and photosynthesis make it quantifiable with optical sensors.



Measurement and interpretation of crop reflectance to assess crop nitrogen status and imminent needs.

Advantages	Disadvantages
• Readily calibrated in-season • High-resolution* • Site-specific and crop-specific response • Frequent data collection • Little data required to get started	• May be impeded by environmental conditions • Limited ability to provide multi-nutrient insights • Generally not predictive*

NE Agronomic N Rate Definition

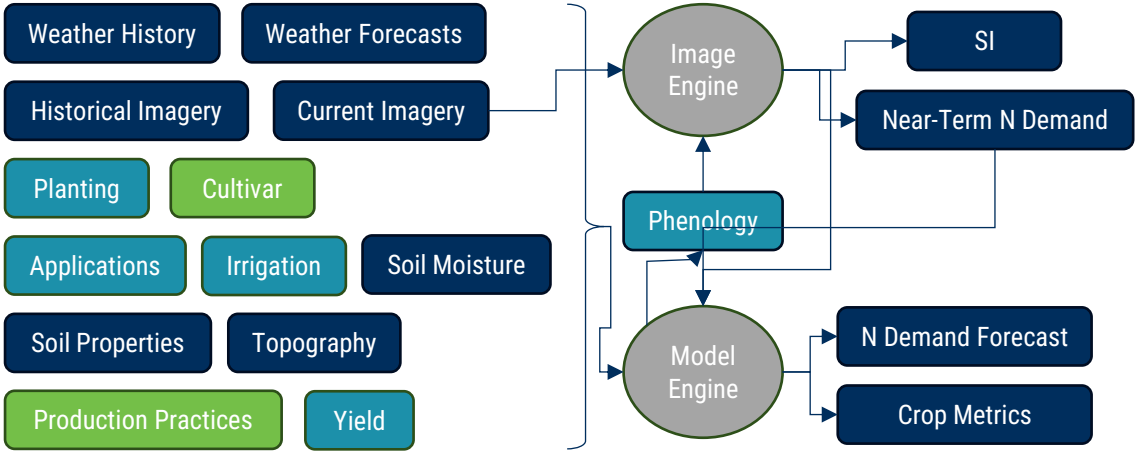
In-Season Nitrogen Management for Irrigated Corn – NebGuide G2365

With developments in sensor technologies and fertilizer application systems over the past 10 years, the ***University of Nebraska-Lincoln (UNL) recommends that irrigated corn growers adopt sensor-based in-season nitrogen (N) management. This approach offers clear advantages in profitability and N use efficiency (NUE) compared to traditional N management approaches.***

Fall N application, and significant N application prior to planting in the spring, is not recommended for irrigated corn. In-season application of the majority of fertilizer N through the irrigation system (fertigation) or with a high-clearance applicator is encouraged to maximize N use efficiency and profit. A base rate of 50–100 lb N/acre should be applied at or near planting, with the majority of fertilizer N applied during the growing season between V8 and R2 growth stages. In-season N application is an effective strategy to maximize the profitability of N fertilizer use and reduce the environmental impact of corn production in Nebraska.

Integrating Sensors and Models

This approach combines relevant data into simple and actionable metrics.



Advantages of an Integrated System

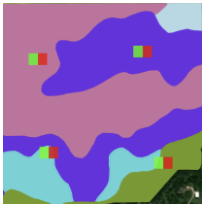
Integrated sensing and modeling offers unmatched predictability, frequency, and spatial resolution.

	Sensors + Models	Sensors	Models	Plant/Tissue Testing	Soil Testing
Near-Daily Insights & Recs	✓	✓	✓		
Low Barrier to Entry	✓	✓		✓	✓
No Yield Goal	✓		Some	✓	
No Labor	✓	✓	✓		
No Historical Data	✓	✓		✓	✓
Measures N Credits	✓	✓			
Pre-visible Demand Detection	✓			Some	
High-Res Full-Field Data	✓	✓			Grid or Zone
Hybrid/Variety Specific Recs	✓				

Make Decisions That Win Seasons

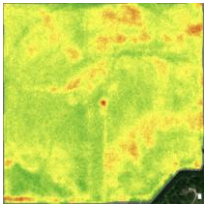
Every season comes down to how conditions are read and plans are adjusted to achieve an outcome.

Prepare



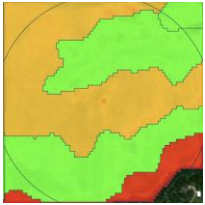
Anticipate seasonal risk and build a nitrogen plan designed to adapt.

Read



Continuously read crop demand and field conditions.

Adjust



Refine timing and rates to align applications with real yield potential.

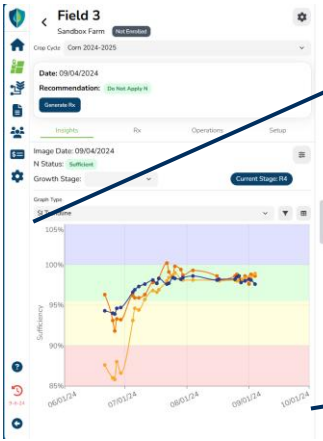
Deliver

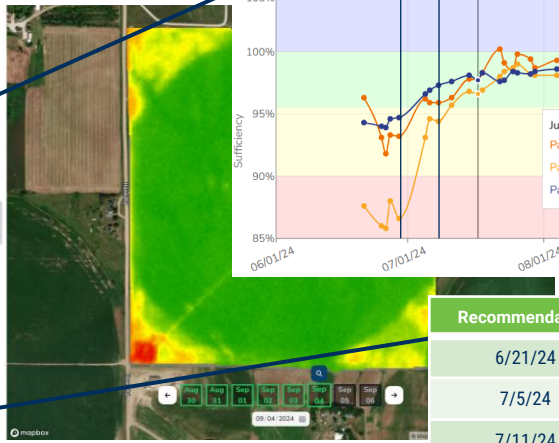


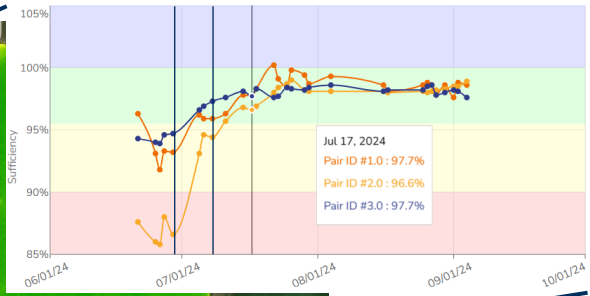
Turn informed adjustments into measurable outcomes.

Detect N Demand

Leveraging near-daily satellite imagery with modeling enables daily nitrogen status measurements.







Recommendation	Application
6/21/24	6/29/24
7/5/24	7/5/24
7/11/24	7/14/24

Different sensitivities of detection available for different goals.

Spatially Assess Leaching Risk

Demonstrable occurrence of a leaching event can often justify additional nitrogen application.

- Leaching risk factors
  - Current soil moisture
  - Anticipated precipitation
  - Form of nitrogen
  - Soil hydraulic conductivity
- Identify potential leaching events
- Only replace N where needed
- Leverage alongside other detection sources



Select Fields for Application

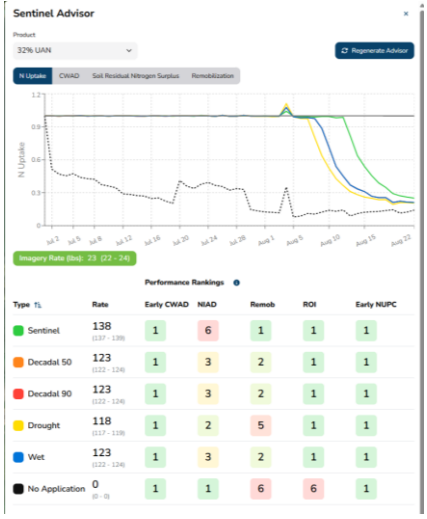
Select, justify, and document fields to receive N/manure based on current or accumulated deficiency.

Field	Irrigation	Image Date	N Sufficiency	Rate
UNL TAPS North Platte - Team 16 Not Enrolled	Irrigated	07/01/2025	Apply N 91.4%	
Smith 80 Not Enrolled	Irrigated	06/27/2025	Apply N 85.5%	
North 80 Not Enrolled	Irrigated	06/27/2025	Apply N 93.3%	
Gillham Not Enrolled	Irrigated	07/01/2025	Apply N 97.0%	
Lubash Not Enrolled	Irrigated	07/01/2025	97.6%	
South Dons Not Enrolled	Irrigated	07/01/2025	Apply N 94.4%	
Home Place Not Enrolled	Irrigated	07/01/2025	Apply N 96.4%	
Henry's Pivot Not Enrolled	Irrigated	07/01/2025	97.9%	
Home Place Pivot Not Enrolled	Irrigated	07/01/2025	101.0%	

- Nitrogen sufficiency per field and subfield
  - Rank by nitrogen sufficiency status
  - See the current application recommendation
  - Current rate for target growth stage
- Select fields to receive manure in/out of season
  - Fields with current deficiency/negative trend
  - Chronically deficient fields
- Measure success of applications

Quantify Agronomic N Rates

Integration of sensing and modeling creates a complete decision support and justification system.

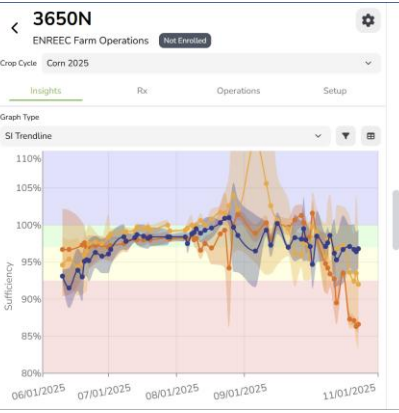


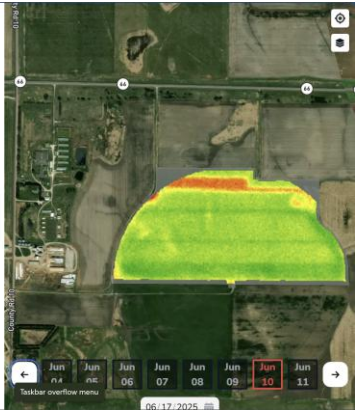
- Model anticipated conditions and nitrogen rates
- Assess N rate impacts on crop metrics
- Select rates that prioritize yield building factors that matter to your operation
- Choose your goals
- Generate spatially appropriate nitrogen rates



Spatial & Manure Variability

Full-field, near-daily nitrogen status measurements can be used to correct spatial variance in N need.





- Subfield regions may not have received adequate nitrogen
  - Inherent soil variability
  - Variability in applied manure
- Justification of subfield applications
  - Additional manure-receiving acres?
  - Targeted commercial N?

Maximizing the Utility of Justification

How does an in-season application strategy help you manage tradeoffs and improve profit?



Integrated sensing and modeling provides at least two methods of justification in one while providing a complete tool to support timing, rate, and placement decisions.

- How much commercial N can you eliminate from your program?
  - Our data suggests 45 lb-N/ac, even without manure usage
- How does reducing commercial N help you achieve two objectives?
  - Eliminating cost of N in your operation
  - Creating more opportunity for manure application
- Can you save most of your commercial N application for in-season justification?
  - If only 10% of N uptake happens by V6, can you rely on mineralization?

It is possible to simultaneously be profitable, productive, and environmentally responsible.

Importance of Analysis and Records

Maintaining records – preferably digitally – puts you in a stronger position of leverage.

- Manure analysis is important for properly characterizing it as a product
  - Relative proportions of N, P, and other nutrients
  - Organic vs. inorganic fraction
- Record keeping in real-time has your back and helps you forecast
  - Improves performance of models, sometimes sensor algorithms
  - Increases likelihood of accurate recording
  - Connects record of action to justification for action
- Consider manure rate control using closed-loop systems
  - JD Harvest Lab

GA Agronomic N Rate Definition

The definition of agronomically appropriate N in GA does not offer enough flexibility to meet needs.

Fertilizer recommendations depend on the soil fertility level as determined by soil tests and the yield goal. Fertilization programs not based on soil tests may result in excessive and/or sub-optimum rates of nutrients being applied. Take soil samples each fall to monitor the current fertility level. Use the yield goal to determine the quantity of nitrogen, phosphate, and potash to apply. At high yield levels, the balance of nutrients in relation to one another also is important.

In sandy Coastal Plain soils, nitrogen is very mobile. If excessive rainfall occurs or excessive amounts of water are applied through the irrigation system, leaching losses of nitrogen can be quite drastic during the growing season. To increase the efficiency of nitrogen recovery during the season, split applications of nitrogen are recommended.

Relevant Opportunities



Phosphorus

- When you manipulate N with manure, you manipulate P
- Tissue testing is currently required to isolate P
- There are opportunities with P
  - Trend tracking with tissue testing
  - Hyperspectral sensing
  - In-season P correction

Modeling

- Develop pre-season agronomic N rates with modeling
- Forecast different scenarios to compare application plans

Appendix

Ancillary Benefits to Optimal N

Academic literature and our private dataset is developing around optimal nitrogen management benefits for crop and soil health, both of which may lead to better attribute marketability for ag products.

Crop Health

Numerous crop health benefits are being associated with optimal nitrogen management.

- Reduced disease pressure
- Reduced insect pressure
- Improved standability*
- Enhanced root development
- Plant growth control

Soil Health

Soil health benefits of optimizing nitrogen applications are also being identified through groups like the Soil Health Institute and NE Soil Health Coalition.

- Microbe activity
- Soil pH consistency
- Leveraging mineralization

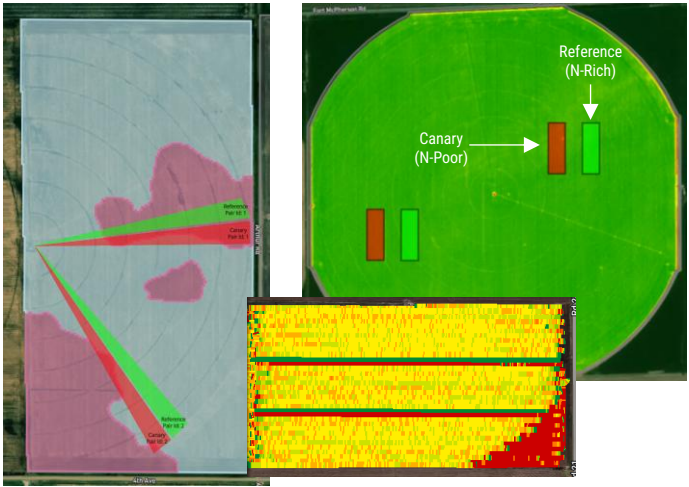
Attribute Marketability

As international agriculture continues to evolve, American products will increasingly need to gain value through better attributes.

- Crop quality
- Processability
- Digestibility
- Carbon Intensity
- Water Intensity

Sentinel Plots

We isolate the impact of Nitrogen on crop yield potential and calibrate every image using paired N-rich (reference) and N-poor (canary) plots in the field.



Sentinel plots help you see:

1. The crop's potential with extra N
2. N demand before it occurs

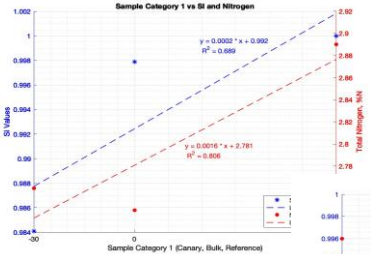
Sentinel plots can be established in any operation using:

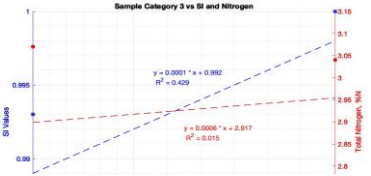
- Plots
- Slices
- Field-length Strips

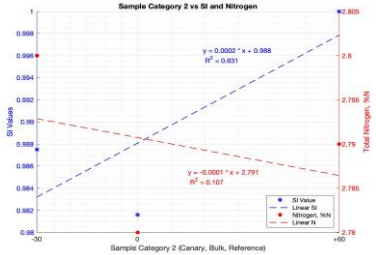
Sentinel plots should be established prior to mid-vegetative growth:

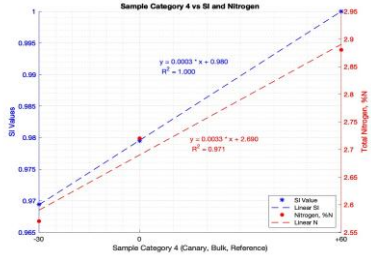
- Lighter soils – at or after planting
- Heavier soils – any application

Sensor-Based vs. Plant Tissue



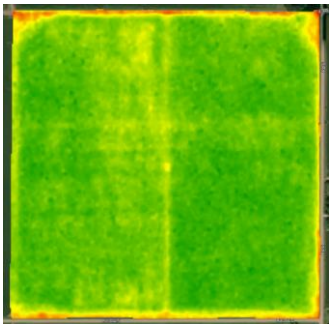




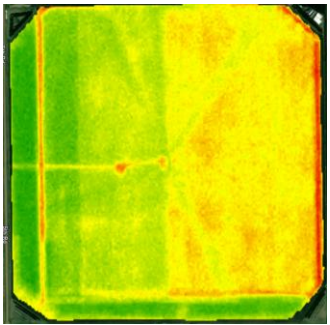


Use Case: Products and Practices

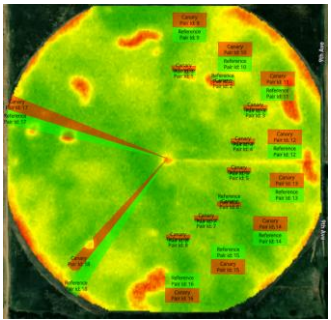
Biologicals, Stimulants, Alternatives



Nitrogen Replacement



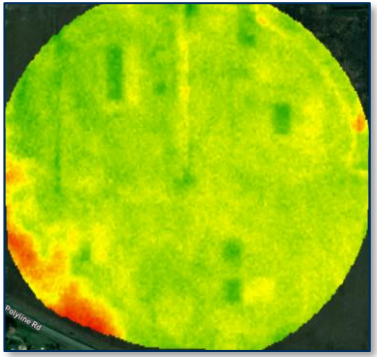
Biological



Biological

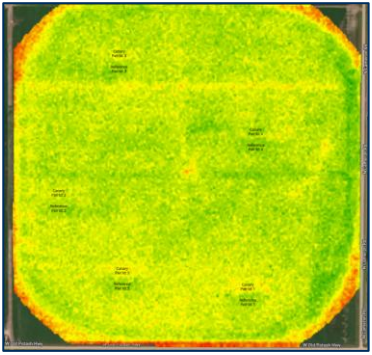
Use Case: Products and Practices

Regenerative Practices & Practice Changes



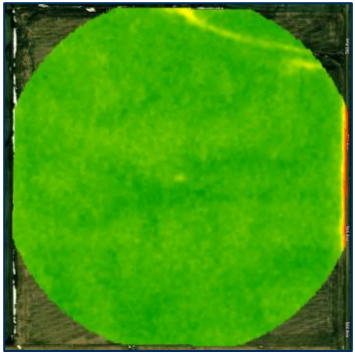
Cover Crop

Recommended early N application



High Residual

Triggered rec late June, 66 lb N applied, .28 NUE



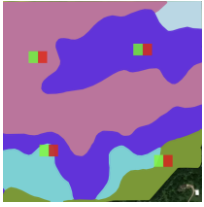
Last Pass

No trigger since 2022!

Make Decisions That Win Seasons

End the guesswork –Sentinel Ag™ uses your crop's data and advanced modeling to guide your decisions.

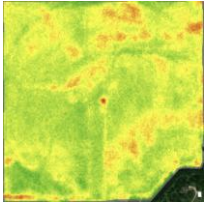
Prepare



Anticipate seasonal risk and build a nitrogen plan designed to adapt.

ALL-N™ Planner

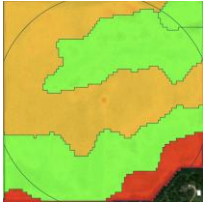
Read



Continuously read crop demand and field conditions.

N-TIME® HydroFLOW™

Adjust



Refine timing and rates to align applications with real yield potential.

ALL-N™ Advisor

Deliver



Turn informed adjustments into measurable outcomes.

- + $40/ac
- + 23% NUE

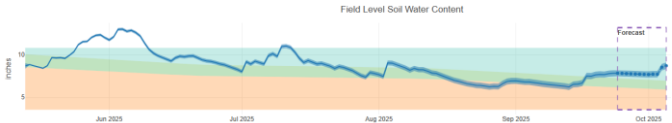
HydroFLOW™ Insights

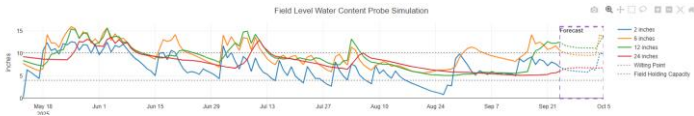
Sentinel Irrigation and Sentinel Complete provide soil moisture and crop water use insights.

- Probeless soil moisture and crop water use insights
- Captures spatial variability in crop and soil water metrics
- Guaranteed daily insights
- 93% alignment with soil moisture probes

SENTINEL IRRIGATION

SENTINEL COMPLETE





powered by NAVE

ALL-N™ Advisor: Audible

Sentinel provides the tools and analytics necessary to call the right audibles in-season.



See rate recs for different weather scenarios.

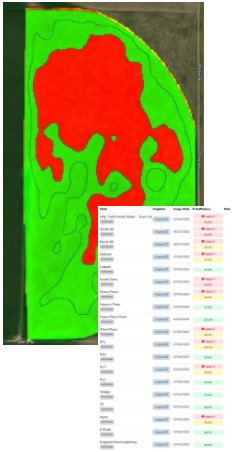
- See how precipitation impacts uptake.
- Assess potential ROI from the application.

Assess rates based on tradeoffs.

- 5 key tradeoff factors included
- Integrates quantitative reasoning with your intuition.

Manage complexity at scale.

- Recs with Rx's regenerated daily
- Dashboards quickly digest all fields





Georgia Dairy Smart Roadmap

Advancing Sustainable Dairy Practices Across Georgia

January 23, 2026

Roadmap Overview

NEWTRIENT™
INNOVATIVE SOLUTIONS IN RESOURCE RECOVERY



NEWTRIENT'S MISSION

To reduce the environmental footprint of U.S. dairy and make it economically viable to do so

NEWTRIENT
INNOVATIVE SOLUTIONS IN RESOURCE RECOVERY

NEWTRIENT MEMBERSHIP

Who We Are

Owned by the U.S. Dairy Industry:

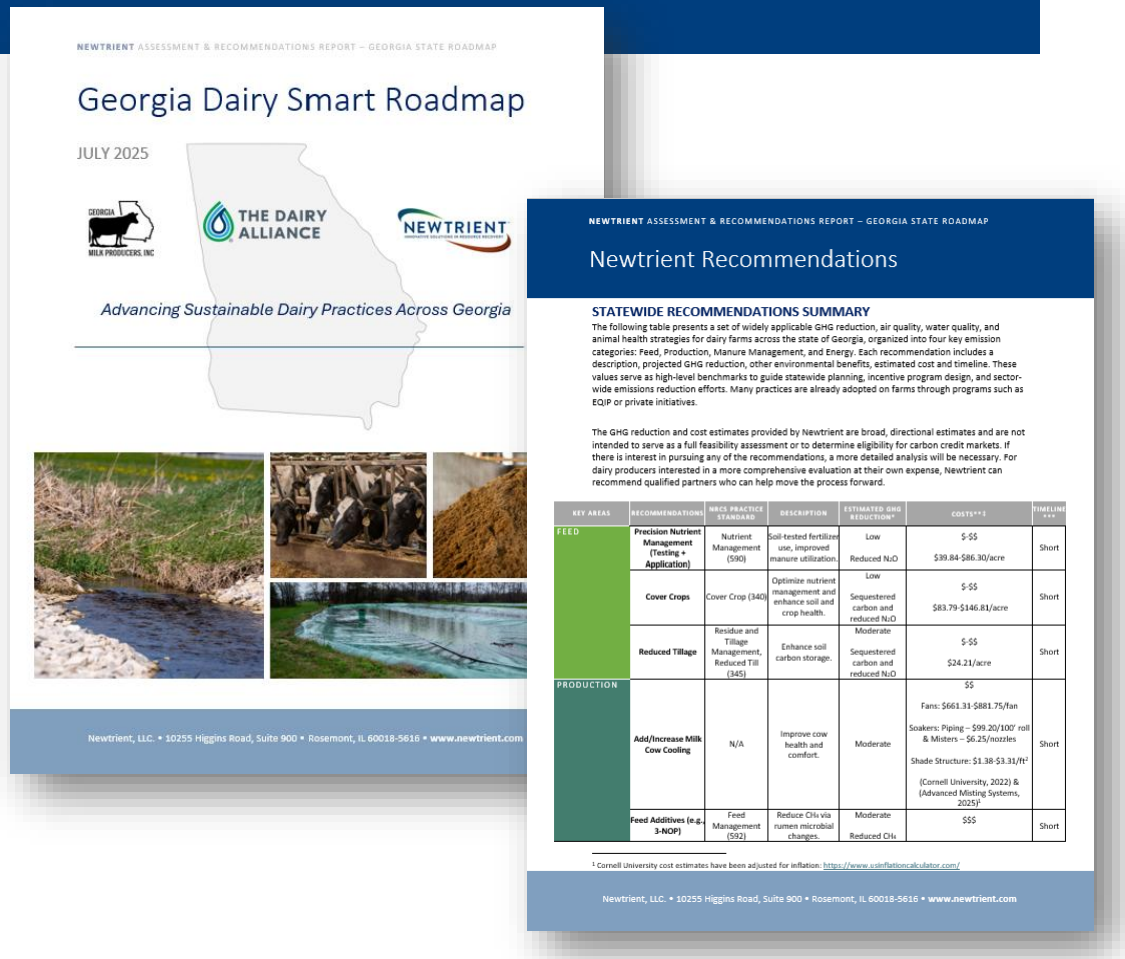
~64% Dairy Cooperatives

~36% National Checkoff



WHAT IS THE GEORGIA DAIRY SMART ROADMAP?

- A sustainability assessment of 10 representative Georgia dairies
  - Evaluation of four key areas of the farm: Feed, Production (enteric), Manure, and Energy
- Highlights proven practices that deliver the greatest operational and environmental benefit
- Gives each farm size prioritized recommendations
- Funded by a USDA-NRCS technical assistance grant
- **Goal:** Improve environmental outcomes and maintain farm profitability



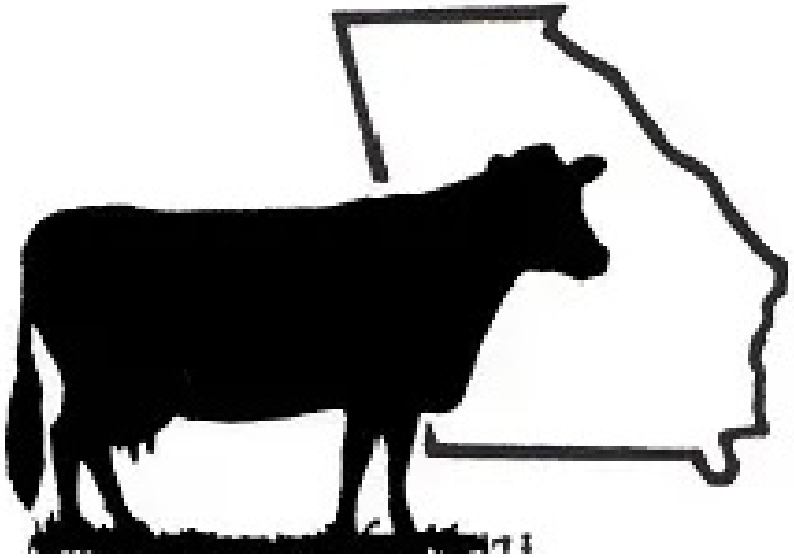
CHALLENGES DRIVING THE NEED FOR A GEORGIA DAIRY ROADMAP

- **Rising regulatory pressure** around manure, nutrients, and GHGs
- Increasing **heat stress risk**
- **High** fertilizer and feed **costs**
- Need to protect **long-term economic viability** as milk production grows in the southeast
- **Limited access** to federal funding, technical assistance, and agriculture engineering
- Producers want **practical and data-driven solutions**, not paperwork
- Roadmap provides **clear, phased actions** that work on Georgia dairies
- Highlights **high-impact investment** opportunities for funders



GEORGIA DAIRY OVERVIEW

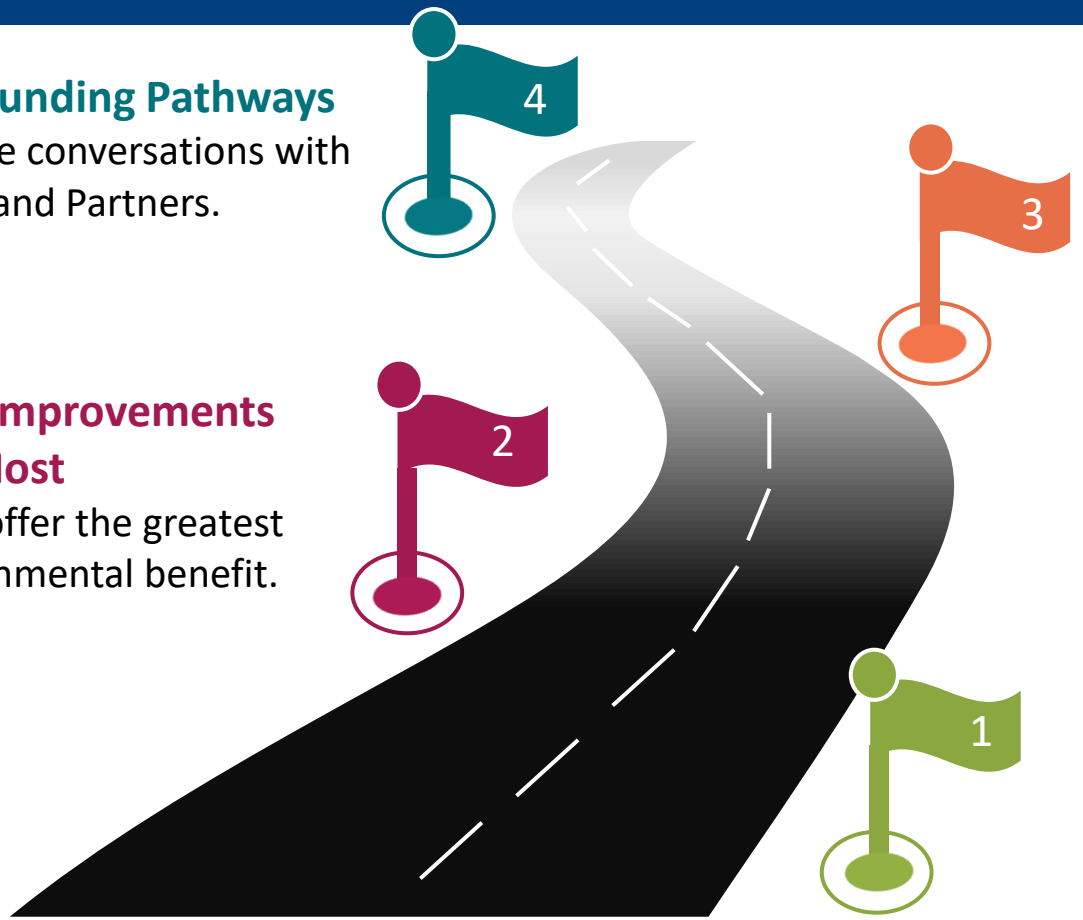
- ~ 74 dairies statewide
- Three major regions: Coastal Plain, Piedmont, Blue Ridge/Ridge & Valley
- 10 farms participated
- Cohorts:
  - Small (< 250 cows): **4 farms**
  - Medium (251-700 cows): **2 farms**
  - Large (> 701 cows): **4 farms**
- Total herd represented: **12,958 cows**
- Total acres: **7,800+**



HOW THIS ROADMAP HELPS YOUR FARM

Access Support and Funding Pathways
Use the Roadmap to guide conversations with NRCS, Extension, and Partners.

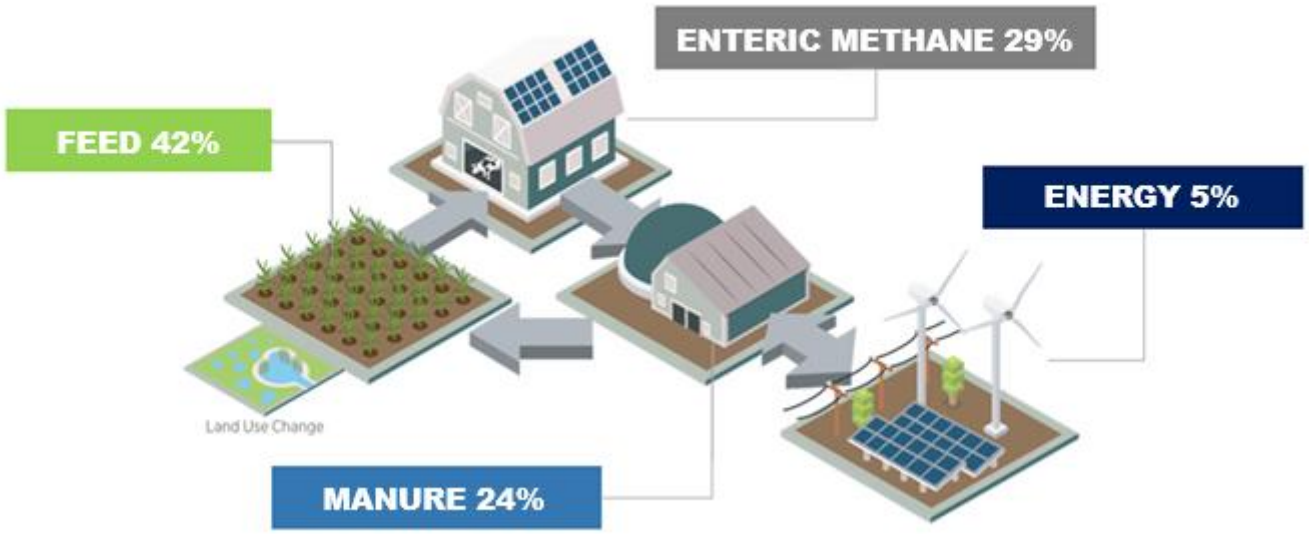
Understand Which Improvements Matter Most
Learn which upgrades offer the greatest operational and environmental benefit.



Know Where To Start
Get a clear starting point for planning and prioritizing improvements.

Identify What Fits Your Farm
See which practices and technologies apply to your farm size and region.

DAIRY'S ENVIRONMENTAL FOOTPRINT



(Calculated from Pelton et. al, 2025. Spatially Resolved Greenhouse Gas Emissions of U.S. Milk Production in 2020. Environ Sci Technol.)

The Average GHG Footprint of a Southeast Dairy Farm

Metric	Southeast	National
GHG Footprint	2.67 lbs. CO_2e/lb. FPCM	2.23 lbs. CO_2e/lb. FPCM
GHG per Cow	23.67 $MTCO_2e$	24.53 $MTCO_2e$
Milk Production	19,000-20,000 lbs./cow/year	24,200 lbs./cow/year
Milk per Cow	63.9 lbs./cow/day	79.3 lbs./cow/day

Lower milk production explains 122% of the observed GHG increase.

Statewide Findings & Priority Recommendations

NEWTRIENT™
INNOVATIVE SOLUTIONS IN RESOURCE RECOVERY

LEARNINGS ACROSS GEORGIA DAIRIES

Key Challenges

- Heat stress reduces productivity and increases carbon intensity
- Limited solids separation reduces storage and increases methane
- Manure storage often insufficient for agronomic timing
- Soil and manure testing inconsistent across farms
- Many low-cost, high-impact practices underused
- Economics remain the biggest barrier to adoption

Priority Statewide Recommendations

Feed
Precision nutrient management
Cover crops
Reduced tillage

Production
Milk cow cooling
Feed additives
Precision feeding
Manage grazing

Manure
Coarse/fine solids separation
Waste holding pond
Comprehensive Nutrient Management Plan (CNMP)

Energy
Solar shades/panels
Hot water heat recovery
Energy efficiency upgrades

LARGE FARMS TOP OPPORTUNITIES

Key Areas	Recommendations	Estimated GHG Reduction*	Costs **	Timeline***
Feed	Integrate Manure Application and/or Add Wastewater Center Pivot Irrigation	Low	$$$	Short
	Add Transfer Piping to Pivots/Irrigation System	Low	$$	Midterm
Production	Add/Increase Milk Cow Cooling	Moderate	$$	Short
	Add Freestall Barn(s)	Low to Moderate	$$$$	Midterm
	Convert to Manure Solids for Bedding	Moderate	$$$	Short

NOTES:
*Estimated GHG Reduction: Low = Low Reduction Potential; Moderate = Moderate Reduction Potential; High = High Reduction Potential
**COSTS: $ = MINIMAL INVESTMENT; $$ = MODERATE INVESTMENT; $$$ = SIGNIFICANT INVESTMENT; $$$$ = LARGE-SCALE INVESTMENT
***TIMELINE: SHORT = <12 MONTHS; MIDTERM = 12-24 MONTHS; LONG = >24 MONTHS

LARGE FARMS TOP OPPORTUNITIES

Key Areas	Recommendations	Estimated GHG Reduction*	Costs **	Timeline***
Manure Management	Add/Improve Coarse Solids Separation	Moderate	$$-$$$	Short
	Add/Upgrade Concrete Surface for Solids Management	Low	$$	Short
	Add/Improve Sand Separation	Low	$$-$$$	Short
	Add Waste Holding Pond	Low to Moderate	$$$	Midterm
	Cover Holding Pond and Flare Emissions	High	$$$$	Long

NOTES:
*Estimated GHG Reduction: Low = Low Reduction Potential; Moderate = Moderate Reduction Potential; High = High Reduction Potential
**COSTS: $ = MINIMAL INVESTMENT; $$ = MODERATE INVESTMENT; $$$ = SIGNIFICANT INVESTMENT; $$$$ = LARGE-SCALE INVESTMENT
***TIMELINE: SHORT = <12 MONTHS; MIDTERM = 12-24 MONTHS; LONG = >24 MONTHS

MEDIUM FARMS TOP OPPORTUNITIES

Key Areas	Recommendations	Estimated GHG Reduction*	Costs **	Timeline***
Feed	Integrate Manure Application and/or Add Wastewater Center Pivot Irrigation	Low	$$$	Short
	Add Transfer Piping to Pivots/Irrigation System	Low	$$	Midterm
	Begin or Increase Cover Crops	Low	$	Short
Production	Add/Increase Milk Cow Cooling	Moderate	$$	Short
	Add Freestall Barn(s)	Low to Moderate	$$$$	Midterm

NOTES:

*Estimated GHG Reduction: Low = Low Reduction Potential; Moderate = Moderate Reduction Potential; High = High Reduction Potential

**COSTS: $ = MINIMAL INVESTMENT; $$ = MODERATE INVESTMENT; $$$ = SIGNIFICANT INVESTMENT; $$$$ = LARGE-SCALE INVESTMENT

***TIMELINE: SHORT = <12 MONTHS; MIDTERM = 12-24 MONTHS; LONG = >24 MONTHS

MEDIUM FARMS TOP OPPORTUNITIES

Key Areas	Recommendations	Estimated GHG Reduction*	Costs **	Timeline***
Manure Management	Add/Improve Coarse Solids Separation	Moderate	$$-$$$	Short
	Add/Upgrade Concrete Surface for Solids Management	Low	$$	Short
	Add Waste Holding Pond	Low to Moderate	$$$	Midterm
	Add/Upgrade Waste Transfer Pump	Low	$$	Short
Energy	Add Hot Water Heat Recovery	Moderate	$	Short

NOTES:
*Estimated GHG Reduction: Low = Low Reduction Potential; Moderate = Moderate Reduction Potential; High = High Reduction Potential
**COSTS: $ = MINIMAL INVESTMENT; $$ = MODERATE INVESTMENT; $$$ = SIGNIFICANT INVESTMENT; $$$$ = LARGE-SCALE INVESTMENT
***TIMELINE: SHORT = <12 MONTHS; MIDTERM = 12-24 MONTHS; LONG = >24 MONTHS

SMALL FARMS TOP OPPORTUNITIES

Key Areas	Recommendations	Estimated GHG Reduction*	Costs **	Timeline***
Feed	Integrate Manure Application and/or Add Wastewater Center Pivot Irrigation	Low	$$$	Short
	Add Transfer Piping to Pivots/Irrigation System	Low	$$	Midterm
	Begin Soil and Manure Testing	Low	$	Short
Production	Add/Increase Milk Cow Cooling	Moderate	$$	Short
	Manage Grazing	Moderate	$	Short
	Add Waterers	Low	$$	Midterm

NOTES:

*Estimated GHG Reduction: Low = Low Reduction Potential; Moderate = Moderate Reduction Potential; High = High Reduction Potential

**COSTS: $ = MINIMAL INVESTMENT; $$ = MODERATE INVESTMENT; $$$ = SIGNIFICANT INVESTMENT; $$$$ = LARGE-SCALE INVESTMENT

***TIMELINE: SHORT = <12 MONTHS; MIDTERM = 12-24 MONTHS; LONG = >24 MONTHS

SMALL FARMS TOP OPPORTUNITIES

Key Areas	Recommendations	Estimated GHG Reduction*	Costs **	Timeline***
Manure Management	Add/Improve Coarse Solids Separation	Moderate	$$-$$$	Short
	Add/Upgrade Concrete Surface for Solids Management	Low	$$	Short
	Add/Upgrade Waste Transfer Pump	Low	$$	Short
	Develop a Comprehensive Nutrient Management Plan (CNMP)	Low	$	Short
Energy	Add Solar Shades	Moderate	$$$$	Long

NOTES:
*Estimated GHG Reduction: Low = Low Reduction Potential; Moderate = Moderate Reduction Potential; High = High Reduction Potential
**COSTS: $ = MINIMAL INVESTMENT; $$ = MODERATE INVESTMENT; $$$ = SIGNIFICANT INVESTMENT; $$$$ = LARGE-SCALE INVESTMENT
***TIMELINE: SHORT = <12 MONTHS; MIDTERM = 12-24 MONTHS; LONG = >24 MONTHS

Environmental & Financial Impact

NEWTRIENT™
INNOVATIVE SOLUTIONS IN RESOURCE RECOVERY

ENVIRONMENTAL BENEFITS

Across all farm types, the recommended practices improve on-farm efficiency, and those efficiency gains directly translate into better environmental outcomes.

What the improvements deliver:

- **More efficient manure systems** → lower methane from storage
- **Nutrient-use efficiency**→ lower nitrous oxide from soils, reduced runoff and leaching
- **Improved cow comfort**→ increased milk production
- **Healthier, better-managed soils** → increased soil carbon content
- **More efficient energy use and heat recovery** → reduced energy-related GHG

PRODUCER ECONOMICS

The Roadmap emphasizes improvements that:

- Reduce input costs (e.g. fertilizer, bedding, labor)
- Increase milk production
- Lower transport and handling costs
- Improve nutrient-use efficiency
- Offset costs through NRCS and carbon credit programs
- Saves energy or reduce energy costs
- Increase crop yield and quality
- Allow ongoing improvements that build on eachother



POTENTIAL FUNDING AVAILABLE

Federal Programs:

- Conservation Stewardship Program (CSP)
- Environmental Quality Incentives Program (EQIP)
- Georgia Natural Resources Conservation Service

State and Local programs may also be available to provide grants, cost-share programs and low-interest loans

- University of Georgia Cooperative Extension
- Southern Cover Crops Council
- Georgia Association of Conservation Districts
- Southern Sustainable Agriculture Research & Education
- Georgia Power



THE ROLE OF CARBON INSETS

- Dairy Product Companies, our customers, increasingly want to invest in dairy methane reduction
- Inset markets help dairy producers gain **direct revenue** from the dairy product supply chain
- Most promising areas:
  - Manure methane capture
  - Solids separation
  - Feed management
- This is an early but growing long-term opportunity



NEXT STEPS AND ONGOING EFFORTS

- Identify state and national funding opportunities to match recommendations and farmer interests
- Capture farmer-to-farmer and consumer testimonial stories from participating farms
- Advise Southeast NRCS Technical Committee's on barriers dairy farmers face
- Look to expand roadmaps to other Southeast states or dairy producing areas with specific challenges



Newtrient Resources

NEWTRIENT™
INNOVATIVE SOLUTIONS IN RESOURCE RECOVERY

NEWTRIENT SOLUTIONS CATALOG





EVOLUTION OF THE SOLUTIONS CATALOG

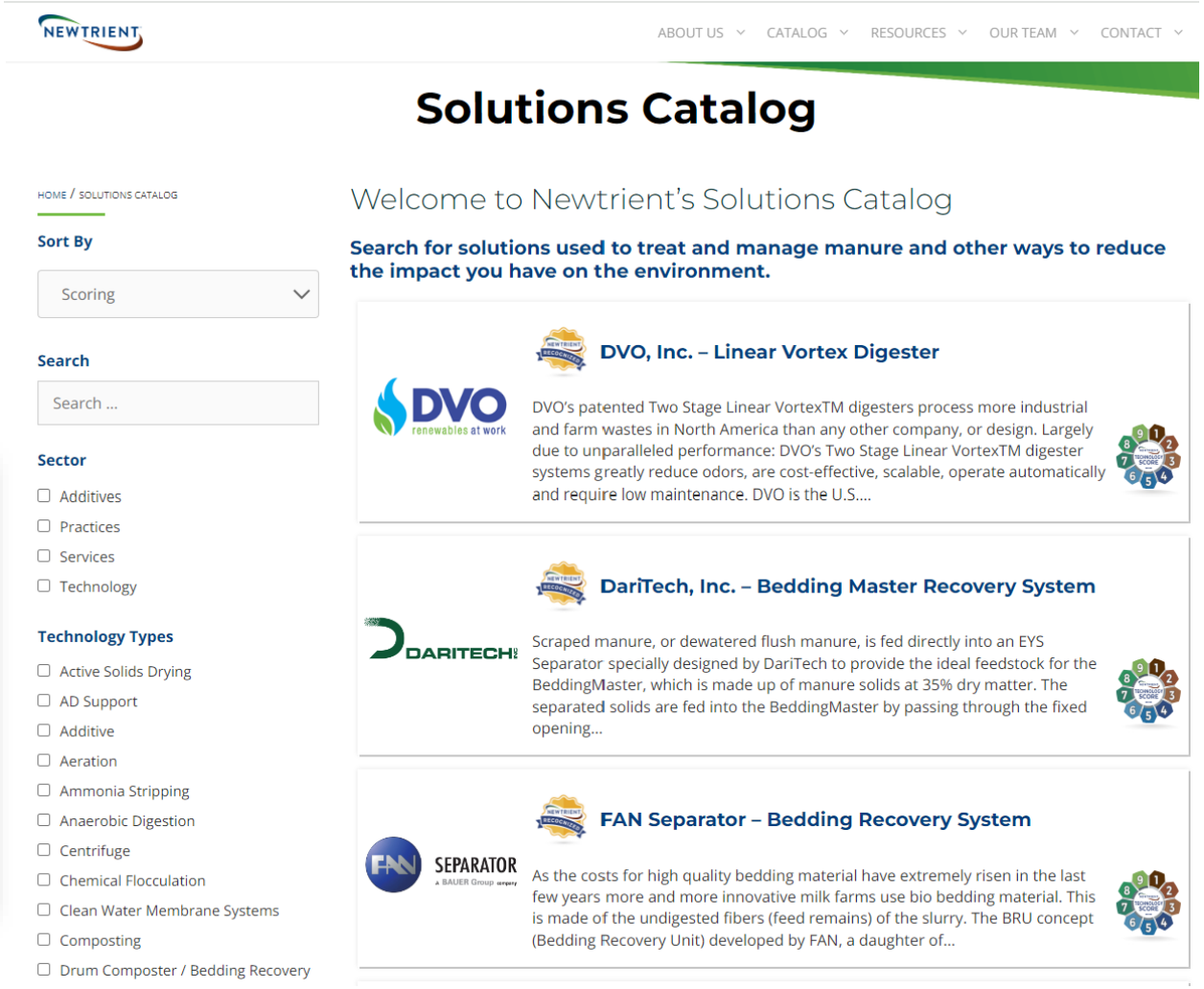
521 SOLUTIONS

- **40+** Manure Additive Companies
- **50+** NRCS Practice Standards
- **100+** Service Providers
- **300+** Technology

Newtrient Solutions Catalog

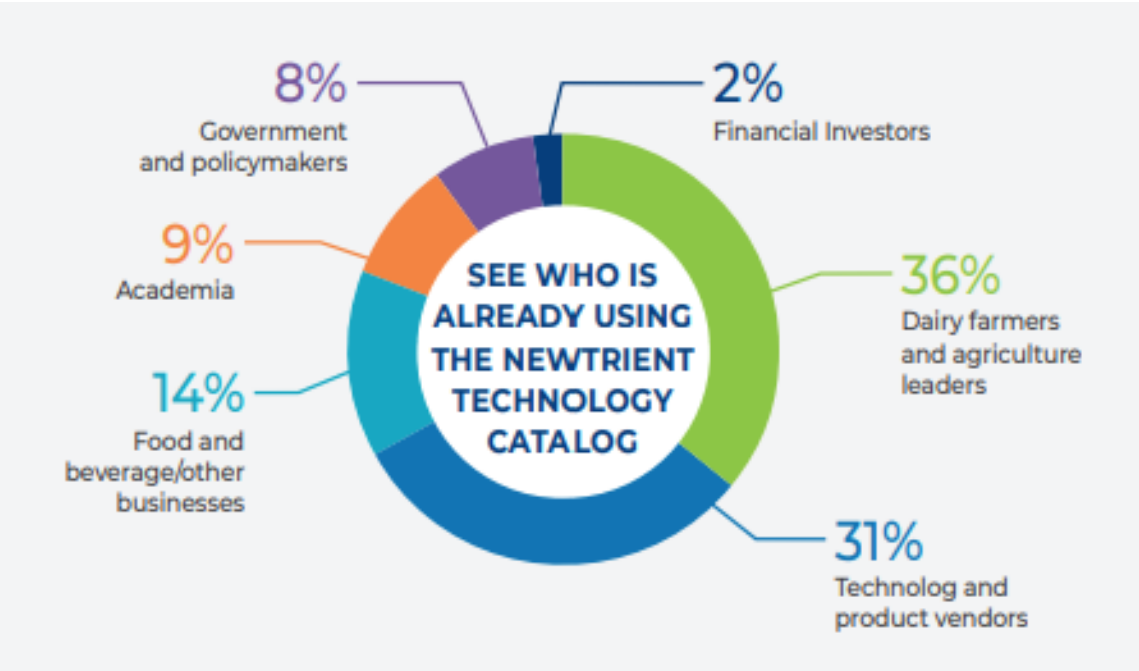
Sector

- Additives
- Practices
- Services
- Technology



NEWTRIENT
INNOVATIVE SOLUTIONS IN RESOURCE RECOVERY

HOW IT WORKS



NEWTRIENT RECOGNIZED

NEWTRIENT EMERGING TECHNOLOGY

NOT VENDOR VERIFIED

Technolog Catalog Vendor Page Details



Technology Vendor Information
Access company information and background.

Technology Description
Understand the technology and what it will do for you.

Technology Reviews
Get insight into how the technology works.

9-Point Scoring System
Get a quick look at how we've rated the technology based on operational and financial viability.

Newtrient Recognized Designation Seal
Given only to the top-performing technologies.

Business Insights, Technical Insights, Case Studies, and Photos
Download additional information about the technology and how its worked on other dairy farms.

NEW!
Critical Environmental Indicators
See how a technology rates on factors most important to your farm – odor reduction, pathogen control, GHG reduction, phosphorus recovery and more.

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RESOURCES & OUTREACH


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NEWTRIENT SNAPSHOT

Agrilab Technologies Inc.
Compost Aeration and Heat Recovery (CAHR) Technology

agrilab TECHNOLOGIES

BUSINESS OVERVIEW

Based in northern Vermont, Agrilab Technologies Inc. (AGT) comprises a team of compost engineers, dedicated to advancing innovative agricultural practices. Committed to building healthy soil and reducing waste, AGT assists its customers in elevating their composting operation to the next level. Following initial research and development efforts in Canada, AGT successfully introduced its Compost Aeration and Heat Recovery (CAHR) technology in Vermont in 2006. AGT has now implemented CAHR systems in seven states and consults on projects nationally and internationally.

PROJECT

TECHNOLOGY OVERVIEW

By employing aerated static pile (ASP) or turned aeration windrow (TAW) practices and optimizing oxygen levels, the CAHR system enhances composting efficiency while also capturing renewable thermal energy generated during the process. This heat can be utilized for heating facilities, pre-heating wash water, drying products before screening and distribution, and enables composting operations to continue even in freezing winter conditions.

PROJECT SIZE

The scale at which a composting system on a dairy can operate depends on the manure management system, size of the operation, and feasibility. Based on a feedstock bulk density of 1,000 lbs/yd³, a typical batch size of feedstock ranges from 110 to 300 yd³, depending on the mixture. The most popular equipment models can accommodate operations with feedstock volumes ranging from 1,000 to 30,000 yd³/year, making them adaptable for various scales. Batch retention times range from 2 to 16 weeks. The expanded product line serves small dairies with as little as 100 yd³/year, or the larger modular units can process over 100,000 yd³/year.

REQUIREMENTS

For optimal implementation, farmers need a concrete or gravel working pad for windrows, power and data connections, and a consistent source of a raw, organic by-product to be used as feedstock, such as bedded manure, dewatered manure solids, or spoiled feed. Proper planning and regulatory compliance are crucial along with routine maintenance, monitoring, record keeping, and training for personnel to keep the system running effectively and efficiently.

KEY CALL-OUTS

Energy and Cost Savings: 25-50% labor cost reduction and decreased heating oil, propane, and/or diesel consumption. Versatile thermal energy capture for on-farm applications and less space needed for processing than traditional windrow composting.

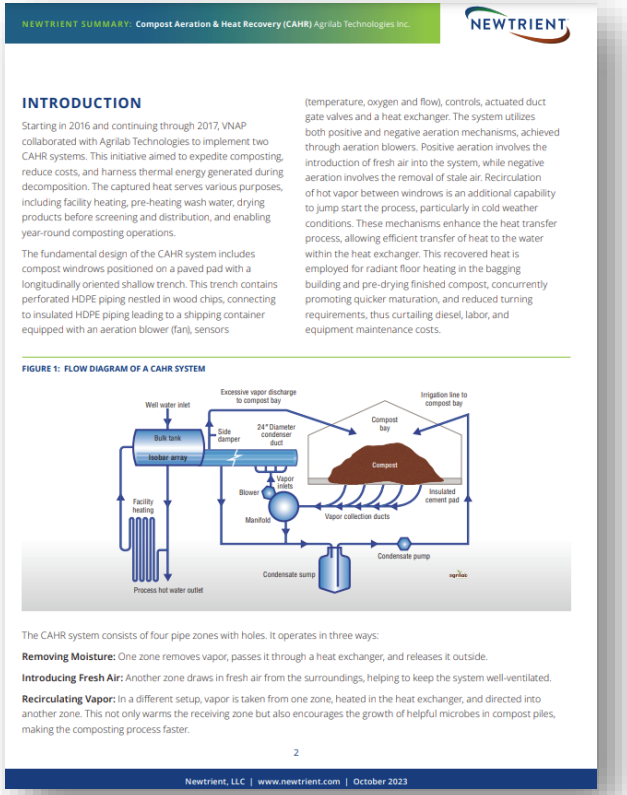
Accelerated Compost: Compost treated with a CAHR system was suitable for market in approximately 25-75% of the time as conventionally turned windrows, with less nitrogen loss.

Improved Water Quality: Reduces space required for composting and stormwater management. Mitigates nutrient leaching and pollution, enhancing overall water quality.

Findings are based on an evaluation conducted under a Conservation Innovation Grant awarded to Newtrient. To view a more detailed description of these results, visit the Agrilab CAHR Evaluation Summary on the Newtrient website.

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Vendor Snapshots


NEWTRIENT SUMMARY: **Compost Aeration & Heat Recovery (CAHR)** Agrilab Technologies Inc.

NEWTRIENT

INTRODUCTION

Starting in 2016 and continuing through 2017, VNAP collaborated with Agrilab Technologies to implement two CAHR systems. This initiative aimed to expedite composting, reduce costs, and harness thermal energy generated during decomposition. The captured heat serves various purposes, including facility heating, pre-heating wash water, drying products before screening and distribution, and enabling year-round composting operations.

The fundamental design of the CAHR system includes compost windrows positioned on a paved pad with a longitudinally oriented shallow trench. This trench contains perforated HDPE piping nestled in wood chips, connecting to insulated HDPE piping leading to a shipping container equipped with an aeration blower (fan), sensors (temperature, oxygen and flow), controls, actuated duct gate valves and a heat exchanger. The system utilizes both positive and negative aeration mechanisms, achieved through aeration blowers. Positive aeration involves the introduction of fresh air into the system, while negative aeration involves the removal of stale air. Recirculation of hot vapor between windrows is an additional capability to jump start the process, particularly in cold weather conditions. These mechanisms enhance the heat transfer process, allowing efficient transfer of heat to the water within the heat exchanger. This recovered heat is employed for radiant floor heating in the bagging building and pre-drying finished compost, concurrently promoting quicker maturation, and reduced turning requirements, thus curtailing diesel, labor, and equipment maintenance costs.

FIGURE 1: FLOW DIAGRAM OF A CAHR SYSTEM

The CAHR system consists of four pipe zones with holes. It operates in three ways:

Removing Moisture: One zone removes vapor, passes it through a heat exchanger, and releases it outside.

Introducing Fresh Air: Another zone draws in fresh air from the surroundings, helping to keep the system well-ventilated.

Recirculating Vapor: In a different setup, vapor is taken from one zone, heated in the heat exchanger, and directed into another zone. This not only warms the receiving zone but also encourages the growth of helpful microbes in compost piles, making the composting process faster.

2

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Evaluation Summaries


NEWTRIENT

APPLICATION FOR COMPONENT ADDITION TO NRCS

NRCS Practice Standard 317 (Evaluation Followed Process Standard 629 Protocol)

For Acceptance of Compost Aeration

STUDY PREPARED BY:

Mark Stoermann
Newtrient Technology Advancement Team

June 2022

Comprehensive Reports

www.newtrient.com

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RESOURCE LIBRARY



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January 23, 2026

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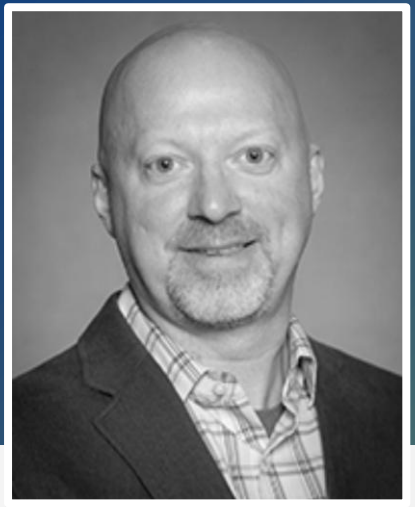
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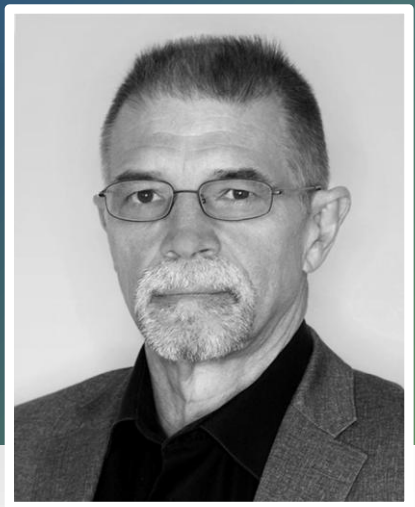
January 23, 2026

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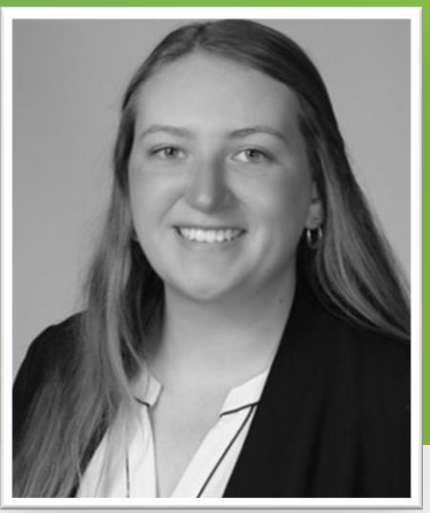
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Questions?

October 20, 2024