



# Center for Dairy Research (CDR): *CDR Overview and Product Innovation*

*Professor John Lucey  
Center for Dairy Research  
University of Wisconsin-Madison*

**Center for Dairy Research** *“Solution Based Research Backed by Experience, Passion and Tradition”*





# Center for Dairy Research

*Our Vision:*

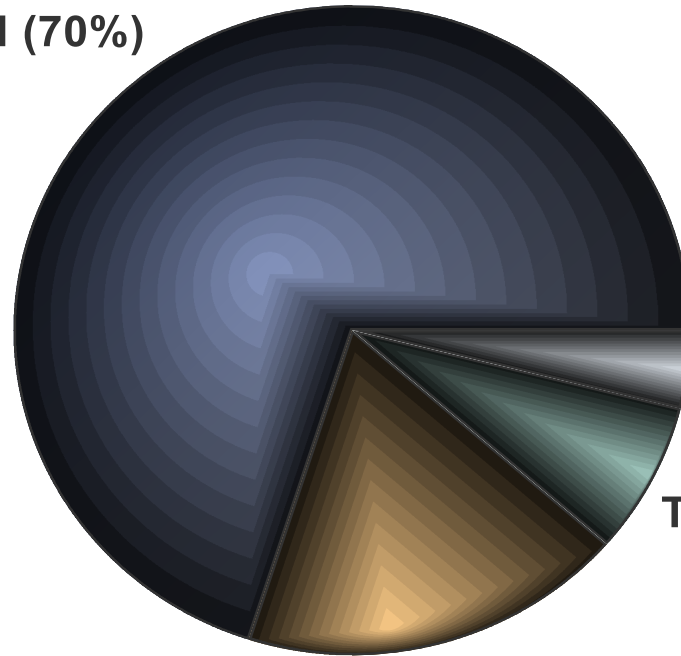
***“World Class Dairy Research & Education:  
Advancing the North American dairy industry by  
generating new knowledge and transferring  
insights to the industry”***



# CDR Annual Budget

**Checkoff: \$3.435M (70%)**

15¢/cwt on all milk produced, paid by farmers as checkoff



**UW/State: \$0.19M (4%)**

**Training: \$0.371M (8%)**

**Industry Projects: \$0.907M (18%)**



# CDR's Size Relative to Other Dairy Centers

	<b>Milk Production (billions of lbs)</b>	<b># Staff at Research Center</b>
<b>New Zealand (Fonterra Innovation Center)</b>	<b>50</b>	<b>&gt;350</b>
<b>Ireland (Moorepark Food Research Center)</b>	<b>16</b>	<b>&gt;200</b>
<b>Wisconsin CDR</b>	<b>30</b>	<b>40</b>

# CDR Functions



Training/  
Education

Applied Research



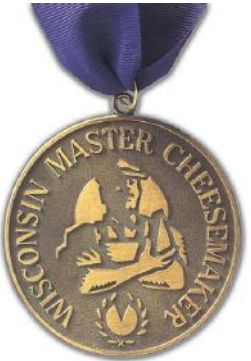
Product/Process  
Development

Trouble-shooting



Master  
Cheesemaker

Entrepreneurship





# Short Courses & Industry Training

- ~39+ per year
  - 19 open enrollment
  - 20+ customize for a company
- 1000+ attendees:
  - cheesemakers, chefs, buyers, converters, foodservice, retail
  - Wisconsin, U.S., International attendees
- Third year of online Certificate in Dairy Processing course – 2-3 classes/yr
- Exploring more online/blended course options

**CONTINUING EDUCATION OPPORTUNITIES FOR THE DAIRY INDUSTRY**

**2019 DAIRY SHORT COURSES**

- Milk Pasteurization ▶ January 8-9
- Certificate in Dairy Processing ▶ January 24-April 11
- Successful Retailing ▶ January 14-15
- Batch Freezer ▶ January 16-18
- Process Cheese ▶ February 19-21
- Business 101 ▶ March 5-6
- Cheese Technology ▶ March 11-15
- World of Cheese from Pasture to Plate ▶ April 22-26
- CIP ▶ April 30
- HACCP ▶ May 1
- Certificate in Dairy Processing ▶ May 2-July 25
- Applied Dairy Chemistry ▶ May 7-8
- Cheese Grading ▶ June 4-6
- Milk Pasteurization ▶ August 6-7
- Certificate in Dairy Processing ▶ September 4-November 27
- Cultured Products ▶ September 10-11
- Master Artisan Course ▶ September 17-19
- Cheese Technology ▶ October 7-11
- Dairy Ingredient Applications ▶ October 22-23
- Dairy Protein Beverages ▶ October 24-25
- Cheese Grading ▶ November 6-8
- Ice Cream ▶ December 3-5
- Making Consistent, Quality Cheese with Concentrated Milk ▶ Dec. 10-12

*For the most current short course schedule see our website.*

Sponsored by: Center for Dairy Research & Department of Food Science, University of Wisconsin-Madison  
Detailed information on each short course: [www.cdr.wisc.edu/shortcourses](http://www.cdr.wisc.edu/shortcourses)

7/18/18



# Wisconsin Cheese

World Cheese Production, 2015\*  
42.225 billion lbs.



If Wisconsin were a country, it would rank 4th in world cheese production.

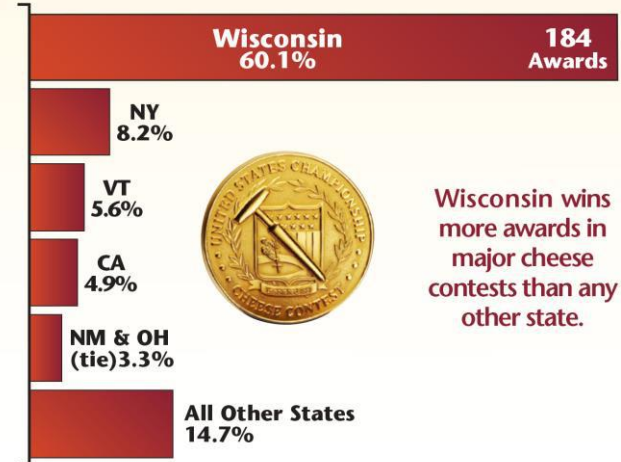
\*U.S. total includes WI production.  
Source: NASS; EuroStat Online Database; USDA Foreign Agricultural Service, Production, Supply and Distribution Online Database

2016



Wisconsin dominates the World Championship Cheese Contest and claims the World Champion Cheese title, judged the best cheese in the world. Wisconsin also won 42 out of 90 gold medals.

U.S. Championship Cheese Contest, 2017  
Percent of 306 Awards Given<sup>2</sup>



Wisconsin wins more awards in major cheese contests than any other state.

Wisconsin produces about 50% of specialty cheese in the U.S.  
**640 million pounds**



# Uplands Cheese Pleasant Ridge Reserve



- Best of Show at the 2001, 2005, and 2010 American Cheese Society conference \*\*first cheese to win 3 times
- U.S. Champion at the 2003 U.S Championship cheese contest
- 2007 Gallo Gold Medal Award for Best Artisanal Dairy Product





# Roelli Cheese Haus - Little Mountain Success Story



Search news stories

SCIENCE & TECHNOLOGY   STATE & GLOBAL   SOCIETY & CULTURE   HEALTH & WELLNESS   CAMPUS NEWS   UW IN THE NEWS   FOR MEDIA

## University experts help Roelli create champion cheese

February 20, 2017 | By David Tenenbaum | For news media



Master cheesemaker Chris Roelli discusses cheese at Roelli Cheese Haus in Shullsburg, Wisconsin. Roelli Cheese created an award-winning product, known as Little Mountain cheese, with the consulting and test-batch help of the Center for Dairy Research at UW-Madison. PHOTO: JEFF MILLER



Best of Show  
2016 American Cheese Society

# Product Development





# Applied Dairy Foods Research

- CDR staff are involved in up to 15 UW graduate student research projects
- Support about 30 undergraduate students in various positions within CDR
- Conduct > 20 industry projects/year
- Host an annual Research Forum related to campus research on dairy foods (>100 industry attendees)



To grow the WI dairy industry, do we need to grow volume or add more value to current volume?

**More milk production**

**Or Both?**

**Higher value from milk**



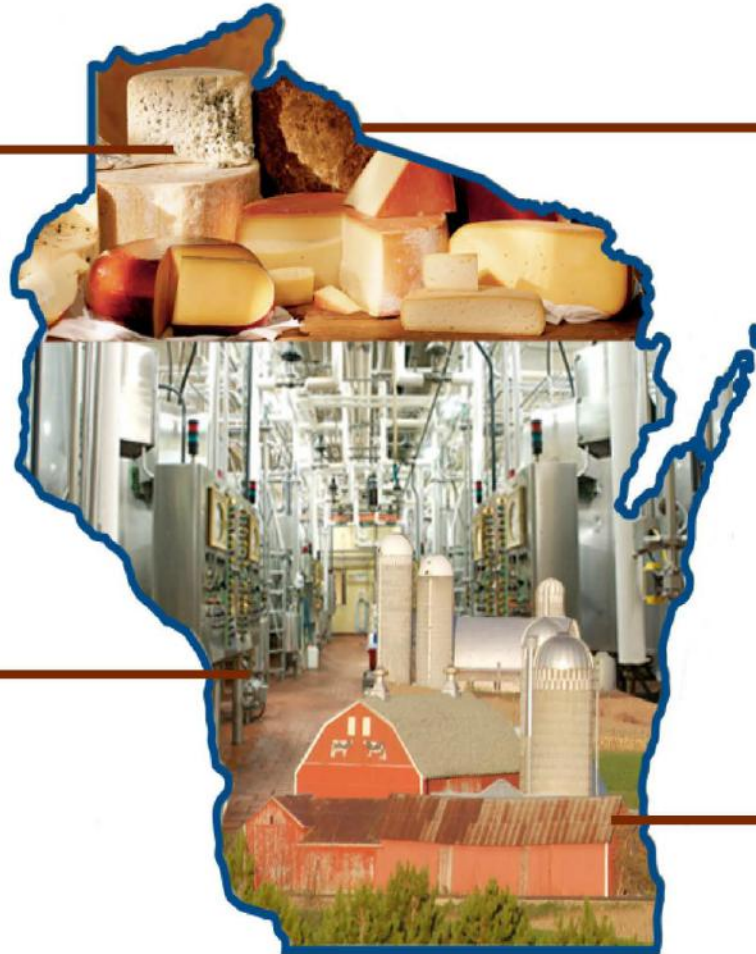
# WISCONSIN GROWTH OPPORTUNITIES



**SPECIALTY CHEESE**  
(increase to 50% of total WI cheese  
from the 23% current level)



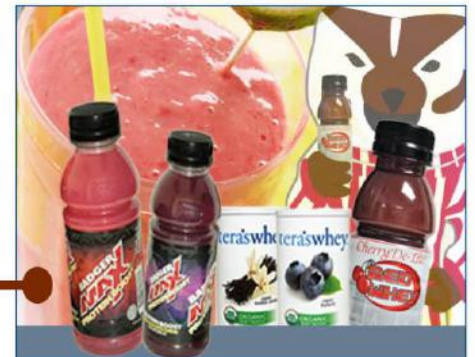
**DAIRY EXPORTS**  
(double current value of exports)



**DAIRY INDUSTRY**



**CULTURED PRODUCTS**  
(double per capita consumption  
of cultured/fresh products)



**NEW BEVERAGES**  
(new products to replace  
declining milk consumption)

# U.S. Dairy Exports

- U.S. Dairy exports have quadrupled since 2000 to \$5.5 billion in 2017
- Top five markets are (2016):
  - Mexico (\$1.2 billion)
  - Southeast Asia (\$671 million)
  - Canada (\$632 million)
  - China (\$384 million)
  - South America (\$280 million)
- About 15% of U.S. milk production ends up being exported (expressed as milk solids)





## WISCONSIN DAIRY EXPORTS BY THE NUMBERS

**9,520**  
dairy farms

**203**  
dairy plants

**10,254** Wisconsin jobs  
created by dairy exports

**\$685 million**  
in dairy exports

**\$1.5 billion** Wisconsin  
economic impact from dairy exports



# Dairy Exports

- About 15% of US milk solids exported, New Zealand exports >95% of its milk
- For perishable products like milk and cheese, need technologies to extend shelf life and tailored to local expectations
- Opportunities:
  - Focus on dairy as a component of local foods (providing excellent nutrition)
  - Blends of dairy protein with local plant sources (cheaper and more acceptable)
  - Products not bound by US Standards of Identity
- Research is exploring:
  - Modified manufacturing approaches (e.g., membrane filtration, high pressure processing, superchilling, novel concentration equipment) to increase shelf-life, improve performance and increase efficiency



# Host USDEC/DATCP/DFW Foreign Trade Missions





# New Milk Beverages

## SKIM *ultra-filtered milk*

fairlife® fat-free ultra-filtered milk has 50% more protein, 30% more calcium and 50% less sugar than typically found in milk. With its rich and creamy flavor, some people even say it tastes like low fat milk! Treat yourself to goodness.



### NUTRITION COMPARISON

Per Serving	Protein	Calcium	Sugar	Lactose free
<b>fairlife® skim</b>	<b>13g</b>	<b>370mg</b>	<b>6g</b>	<b>YES</b>
organic milk	8g	276mg	12g	NO
almond milk*	1g	451mg	15g	YES
soy milk*	7g	299mg	6g	YES

\*compared to the leading brand of almond and soy milk

- Using filtration technologies to increase the protein (50%) and calcium (30%) and lactose free
- Backed by Coca-Cola  
Sales in 2017: > \$250M



# Another opportunity for dairy beverages beyond adjusting composition by processing?

- “*Designer Milk*”: Selecting and breeding cows with unique concentrations of components, for example:
  - Increased CLA content (health benefits like anti-cancer, obesity)
  - Reduction in content of allergenic milk proteins (e.g.,  $\beta$ -lactoglobulin)
  - Increased lactoferrin content (antibacterial)
  - Enhanced immunoglobulin levels (helps immune function)
  - Increased Vitamin B12 (milk might be the main source for this in a vegan household)

TECHNOLOGY

## Designer milk to protect against tooth decay

25 Jun, 2006 1:08pm

0:2 minutes to read



Researchers are immunising cows to create bacteria-busting milk products.

NZPA



Agricultural researchers are immunising cows against human illnesses so they will produce milk with enhanced protective qualities for the people who drink it.

## Holy Cow! 'Daisy' Makes Hypoallergenic Milk

By Trevor Stokes, LiveScience Contributor | October 1, 2012 03:14pm ET



# Possible Opportunities (to add value and/or take additional volume)

## Product Innovation

- Specialty cheese
- Improved functionality
- Nutritional ingredients
- Uses for by-products
- High protein snacks
- Products for export
- Products made with blends of other proteins
- New cultured products

## Process Innovation

- Filtration technologies
- New cheesemaking approaches
- New dryers
- Fermentation technologies
- Sensors and controls
- Use of big data
- Non-thermal processes (high pressure, etc)

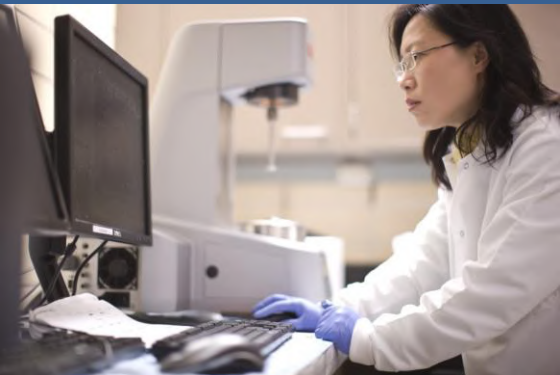
World Class Research University



University of Wisconsin



World Class Dairy Research



Center for Dairy Research

T  
U  
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Networking events

IP Licensing

Prototypes

TURBO website

Technology Portfolio

Promote  
Commercialization  
of Dairy-Related  
Research



*“From Research  
Projects to*

*Consumer Products”*

# How CDR/Partners Promote Innovation, Tech Transfer and Entrepreneurship



**Training**



**Cutting-Edge Research**



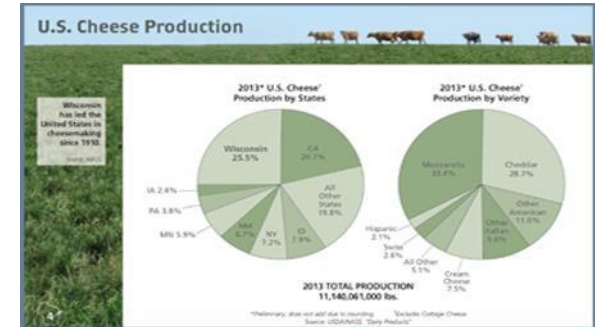
**Business Planning**



**Product Development**



**Technical Assistance**



**Access to Market Research**



**Scale-Up Assistance**



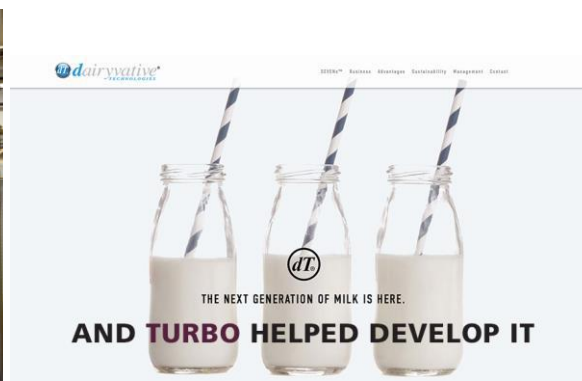
**Promote New Technologies**



**Economic Development**

# Selected TURBO Accomplishments

- Successful rural focused econ. dev. program
- Provided 102 companies various levels of assistance.
- Awarded a \$200,000 grant equipment reimbursement grants from WEDC
  - Renewed in 2018 again for another \$200,000
- Established a flexible business Accelerator network to respond to a variety of client's needs
- Jobs: 54 created and 49 projected in one to two years
- Technology Transfer:
  - 43 entrepreneurs/companies evaluated technologies
  - 13 technologies commercialized, >5 under development



# \$200,000 in Grants to Wisconsin Dairy Companies to Support Expansions, Equipment Purchases or New Product Innovations (from a partnership with WEDC)







# TURBO Charging the Food Technology Sector (a showcase of new technologies/products)

**Guest speakers:** Chancellor Blank and Tera Johnson

**15 booths** highlighting technologies | **75+** attendees

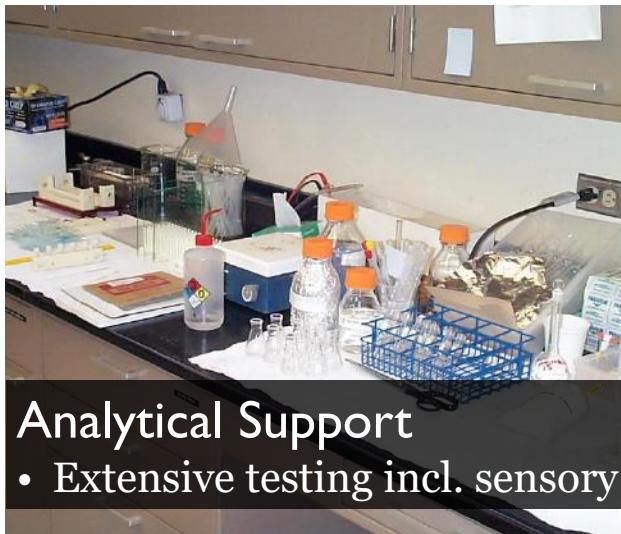




# Center of Excellence Application (submitted to WEDC for FY19)

- To support an Entrepreneurial Food and Beverage Center within CDR
- Two components
  - Beverage Innovation Facility
    - Request of \$400k out of an estimated cost of \$900k, the rest provided by private sector funds
    - To create a unique, small-scale, value-added beverages for clients
  - Support entrepreneurial clients for use of CDR services
    - Request of \$350k
    - Greater access of startups to licensed food manufacturing space in new CDR facility

# New Beverage Innovation Facility





# Babcock Hall Dairy Plant Renovation and Center for Dairy Research Addition



# Various Research Areas in the New CDR Facility



- Cheese
  - Production spaces for natural, processed, and specialty cheese
  - Ripening rooms for specialty cheese
- Fractionated milk proteins (e.g. purified proteins with membrane filtration)
- Dried dairy ingredients (e.g. powders)
- Cultured products (e.g. Greek yogurt)
- Beverages (e.g. UHT aseptic, juices containing dairy proteins)
- Food research and culinary kitchens
- New auditorium for training purposes