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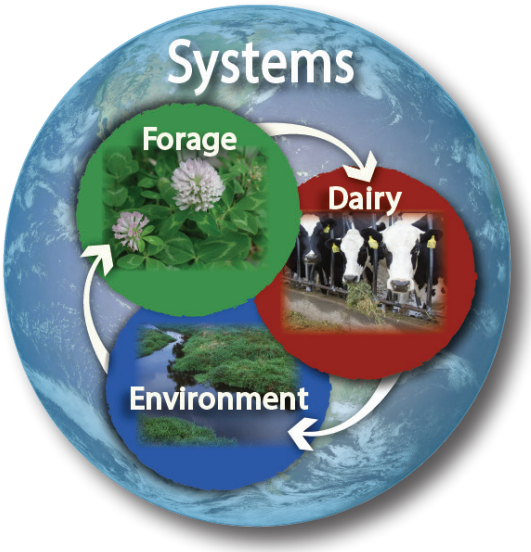
CRIS projects

(Current Research Information System)

U.S. Dairy Forage Research Center

CRIS is the United States Department of Agriculture's documentation and reporting system for ongoing and recently completed research projects in agriculture, food and nutrition, and forestry.

Research at the U.S. Dairy Forage Research Center falls under these five major CRIS projects.



Leading the world in integrated dairy forage systems research.

U.S. Dairy Forage Research Center, USDA Agricultural Research Service
1925 Linden Dr., Madison, WI 53706; phone 608-890-0050; www.ars.usda.gov/mwa/madison/dfrc

Forage characteristics that alter feed utilization, manure characteristics and environmental impacts of dairy production.

Scientists:

J. Mark Powell
Kenneth Kalscheur

Start Date: November 1, 2012
End Date: October 31, 2017

Objectives:

1. Determine the effects of dietary crude protein and forage type on feed utilization by dairy cows and heifers, in-barn methane and ammonia emissions, the production and chemistry of manure, and the impacts of these outcomes on manure nutrient availability in soils.
2. Characterize polyphenol-containing plant extracts and determine how they can be used to alter dairy cattle nitrogen efficiency, reduce in-barn emissions of ammonia and greenhouse gases and modify manure nitrogen availability in the soil.
3. Determine how silage feed additives alter rumen fermentation and feed utilization in dairy cattle.
4. Develop techniques and technologies to better estimate the digestion and physical function of forages and other feedstuffs in the rumen and overall utilization by the cow.

Determining influence of microbial, feed, and animal factors on efficiency of nutrient utilization and performance in lactating cows.

Scientists:

Mary Beth Hall
Ronald Hatfield
Paul Weimer
Geoffrey Zanton

Start Date: October 10, 2012
End Date: October 9, 2017

Objectives:

1. Maximize nitrogen use efficiency and animal performance by determining the optimal levels and qualities of dietary protein appropriate for differing base forages in dairy cattle diets, and determining the influence of polyphenol (o-quinones, tannins) or other feed additives on feed nitrogen use efficiency.
2. Determine the relationships between ruminal microbial communities, animal genotype, and/or methane production with feed/nutrient use efficiency and/or lactation performance in response to varying nutritional regimens in beef or dairy cattle.
3. Determine how the interactions among dietary components influence product formation by ruminal mi-

crobes and implications for effects on digesta passage from the rumen in order to optimize meeting animal nutrient requirements and enhancing animal performance.

4. Evaluate residual feed intake (RFI), or other measures of nutrient use efficiency, as a measurement and selectable trait for feed efficiency in dairy heifers and lactating dairy cattle; and identify and characterize genetic and physiological factors contributing to its variation.
5. Determine the relationship between measures of nutrient use efficiency in dairy heifers and subsequent nutrient use efficiency as lactating cows; including the evaluation of selection for improved nutrient use efficiency during heifer development on reproduction, lactation performance, stayability, health and milk traits in the lactating cow for potential development of estimated breeding values.

Removing limitations to the efficient utilization of alfalfa and other forages in dairy production, new bioproducts, and bioenergy.

Scientists:

Ronald Hatfield
Michael Sullivan
Wayne Zeller

Start Date: January 25, 2013
End Date: January 24, 2018

Objectives:

1. Increase profitability, improve animal welfare and reduce manure production by improving the digestibility and energy conversion efficiency of forages in dairy rations by manipulating forage cell-wall biosynthetic pathways to lower indigestible residue formation, lower waste production, and develop more efficient tools for evaluating forage quality.
2. Increase profitability and reduce the amount of nitrogen-containing wastes that enter the environment by reducing protein loss during the post-harvest storage and livestock consumption of alfalfa and other forages through manipulation of forage phenolic metabolic pathways.
3. Develop novel alfalfa harvesting & management technologies & strategies that increase forage biomass quality & quantity; increase nutrient availability for dairy; decrease forage input costs in integrated dairy systems; promote novel bio-products; & reduce nutrient losses (N&P) to the environment.

Redesigning forage genetics, management and harvesting for efficiency, profit, and sustainability in dairy and bioenergy production systems.

Scientists:

Michael Casler
Heathcliffe Riday
Geoffrey Brink
John Grabber

Start Date: January 25, 2013
End Date: January 24, 2018

Objectives:

1. Develop appropriate defoliation (grazing and harvested) and nitrogen application management guidelines for temperate grass-legume pastures of the North Central and Northeastern USA to improve seasonal yield distribution, extend the grazing season, and improve the efficiency and utilization of energy inputs.
2. Improve establishment, harvest management, and storage methods to reduce nitrogen inputs, increase the profitability of crop rotations, increase the recovery of dry matter and nonstructural carbohydrates, improve the energy density of baled hays, and mitigate the negative effects of rainfall on ensiling, storage, and feeding characteristics of rain-damaged silages.
3. Improve pasture grass and legume production systems through increases in establishment capacity, persistence, productivity, resilience to climate extremes, and quality.
4. Improve profitability, conversion efficiency, and adaptability to climatic variation in forage and bioenergy crops.

Improvement of Dairy Forage and Manure Management to Reduce Environmental Risk

Scientists:

Peter Vadas
Wayne Coblentz
Bill Jokela
Mark Borchardt
Tucker Burch

Start Date: October 1, 2015
End Date: August 13, 2016

Objectives:

The over arching objective of our research project is to address current knowledge gaps in understanding and managing the nutrient cycles and pathogen transmission on modern dairy farms. Our specific research objectives are as follows:

1. Determine the effects of dairy cattle diet and dairy herd management (e.g. pasture, confinement, hybrid sys-

tems) on manure nutrient excretion, capture, recycling, and loss via gaseous emissions, leaching, and runoff.

2. Determine the effects of dairy manure management practices and cropping systems on crop production, soil properties, and loss of nutrients, sediment, and pathogens (e.g. *Cryptosporidium parvum, Salmonella spp*., and bovine diarrhea virus) in surface runoff or atmospheric emissions.
3. Determine the effects of timing and rate of dairy manure application on nutrient uptake and nutritional characteristics of fresh and harvested annual and perennial forages.
4. Develop crop management strategies to optimize the exchange of nitrogen, phosphorus, and potassium as manure and feed between neighboring dairy and cash grain farms.
5. Develop improved methods for detection and quantification of pathogens in manure, forages, and surface runoff and evaluate effects of management practices on pathogen transport and survival.
6. Improve the environmental sustainability and production capacity of integrated dairy production systems through novel manure application methods; manure handling/processing equipment/technology development; and/or alternative manure-use or processing strategies; to maximize the efficiency of manure nutrient use and retention, promote soil health and fertility, and improve forage crop productivity in integrated forage cropping systems.
7. Improve dairy industry production capacity and sustainability to meet the demands of existing and emerging markets, and improve dairy industry resilience to abiotic and biotic stressors while maintaining producer economic viability. Use a comprehensive systems approach along with existing/new databases and models to identify opportunities and support Livestock GRACEnet, LTAR and Climate Hub efforts to improve the environmental performance of dairy systems across the Northeast, Midwest, and West.