

# ASSESSMENT OF DAIRY PROGRAM OPERATION AND CAPABILITY

FOR

**University of Missouri**

**College of Agriculture, Food and Natural Resources**



Final Report, February 1, 2021

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## **Introduction**

The discipline of Dairy has experienced an unfettered metamorphosis over the past four+ decades within the producer and processing industries. Driven by improved sanitation and shelf life, individual dairy processing facilities have extended their marketing and distribution reach enabling consolidation and concentration of manufacture. Larger capacity facilities enable operational capabilities and fractionation of milk - previously cost prohibitive - into its value-added components creating new markets. These consolidation forces and accompanying pricing pressures worked backwards through the supply stream driving farm operations to expand capacity and, through attrition, migrate closer to the processing epicenters. What had been a relatively ubiquitous system throughout the US has transformed into a mottled, regionally weighted industry with massive cheese and ingredient specialty plants serving as centers of gravity driving the flow of milk. Fluid bottling facilities either expanded and diversified, specialized, or closed. A continuously suspicious public became drivers of organic, local, non-GMO, humane, etc. as an attempt to counter their media-driven perception of mass-produced sustenance. The sporadic but continuously increasing farmstead dairy operations are a result of the public pushback against big dairy.

These same forces along with shifts in funding methods and budget cuts have resulted in massive changes at our land-grant universities in how dairy education programs and dairy operations are perceived. These changes have come in decade-spaced waves riding on the crests of peaking feed costs and bottoming milk prices slowly eroding the commodity's foundations on campuses across the country. Several universities, fortunately located in the dairy growth regions, have capitalized by bolstering their programs with new infrastructure and personnel further distancing the haves from the have nots. Others within the middle ground regions are now faced with the task of self-assessment. New, emerging technologies and areas of science command new university spending to be a player in those fields. To remain effective in dairy, these institutions must carve a niche, either unique within the commodity or valuable within their state, while approaching self-sufficiency where the system value far exceeds the cost of existence. A valid and respected university-based dairy education program must exhibit the characteristics of efficiency, relevance, and recognized impact to its audience within the academic institution, the industrial world and the budget writers.

## **Charge**

The purpose of this report is to provide an initial assessment of the existing conditions and capabilities possessed within the University of Missouri of the full dairy commodity

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system from farm productions through marketable products. The information, discussion and suggested pathways contained in this report are not the product of an in-depth study and analysis but are derived from written surveys, brief interviews, provided data and research of public records.

### **Current Farm Operational Strengths and Challenges**

The Foremost Dairy Research Center within ten miles of the university center is a phenomenal asset. Encompassing 825 acres (excluding the Kirby tract), the property seems poised in anticipation to meet its grand potential. The current utilization comprised of 160-200 milking Holsteins under total confinement and 20-40 pasture-based crosses plus dry and replacements seems to strike a balance of not satisfying anyone. Through open discussions and interviews, the existing status quo operational model is lacking in the eyes of the farm operators, dairy specialists, various disciplines and CAFNR program managers. Exacerbated by the rolling budget deficit, there exists a unison of opinion that changes must be implemented. Although functional (but degrading) facilities contribute to the increasing shortfall, the collective desires for redirection lean more toward programmatic changes in the operational model to bring about improved efficiencies through focused direction.

#### Strengths

- Excellent acreage to base any future operational design.
- Sufficient proximity to main campus so not too burdensome for faculty/student travel.
- Cooperative and accommodating staff praised by faculty as easy to work and interface with the farm.
- Farm KPI's are respectable in most categories, neither bottom nor top of the industrial pack.
- Facilities are functional.
- Milk is marketed through DFA which provides great latitude and flexibility for future endeavors.
- Farm is located two and three miles between I-70 exits – easy access.

#### Challenges

- Farm is operating as two separate entities, total confinement and pasture-based. Majority of programmatic drivers lean heavily toward pasture-based system. Some advocate for an equivalent split system for comparative research.
- Forage production and quality output performance is removed from accountability to the farm operation. This is a recipe for disaster. Poor

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quality will doom the farm performance for years through no fault of the farm's operational staff.

- Farm facilities are inadequate, outdated and in need of upgrades. However, efforts in this area cannot be moved on until the farm's operational model and vision are determined since these functional decisions will drive form.
- Financial expenditures, budgets and forecasting/tracking are removed from the operationally responsible parties. Those held accountable at the farm level possess no authority to manage spending nor hold any decision-making capacity based on budgets and balances. The incentives to conserve funds in one area and redirect to higher priorities with greater ROI's does not exist. This lack of motivational pathways results in a system that will never experience internally driven continuous improvements.
- The cumulative budget deficit continues to build due to annual shortfalls. Through discussions and interviews, there appears to be no magic bullet for resolution and more closely resembles death by a thousand cuts. Clear direction and goals are essential. Monthly tracking and monitoring of line-item expenditures by farm management must be enabled by supplying accounting data, accompanied by empowerment to manage "at the moment" while minimizing waste and inefficiencies.

### **Current Dairy Processing Strengths and Challenges**

Buck's Ice Cream, residing within the Food Science component of the Division of Food Systems and Bioengineering is already a success story waiting to be built upon. During the 2020 year of disruption, 3,800 gallons of ice cream has been marketed which represents over 300 gallons per month. This accomplishment has been achieved with minimal promotional activities and facilities. There is consensus that a dynamic and expanded dairy processing facility will greatly enhance the student learning experience and add value to the graduate of the Food Science program. Unfortunately, those conditions do not exist in the current facilities.

#### **Strengths**

- Buck's Ice Cream has significant name recognition and reputation.
- Food Science currently offers three undergraduate dairy courses.
- Food Science possesses expertise in dairy protein, ingredient, and flavor chemistry.
- Food Science has a champion in Richard Linhardt that currently holds the Buck's Ice Cream program together.

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### Challenges

- Linhardt has 30+ years of service with no assistant in the wings. All needs fall on his shoulders and all knowledge of continuity resides in his mind.
- Facilities for ice cream production are woefully inadequate.
  - Increasing regulatory pressures on environmental monitoring standards will not be able to be met in the existing conditions.
  - Capacities of freezer and cooler space are maximized at current levels. No room for expanded production and ingredient control.
  - Inadequate space and conditions for educating students to be immediate contributors within the processing industry.
- Operation not designed for raw milk conversion to pasteurized ice cream mix. Required purchase of prepared pasteurized mix increases ingredient costs by a factor of 3, greatly reducing the value-added realization.
- Student experience is limited to ice cream flavoring and packaging, store-front marketing, and facility cleaning. True food manufacturing experience is virtually absent from the experiential learning process.
- There is no connection between Buck's Ice Cream and milk produced at the Foremost Farm operation.
- Budgetary knowledge is totally absent from the operational decision makers. The ability to make decisions on a cost vs. benefit basis and to act proactively is removed from the front-line decision makers.

### Industry Perspective

Through conversations with a prominent alum of Mizzou and a premier dairy industry player, an industry perspective began to take shape. It should be emphasized that this represents only one industry voice and more outreach is needed to fully comprehend the industry mindset and potential reaction to a modified and expanded dairy program at MU. Ted Jacoby, Jr., CEO of T.C. Jacoby & Co. holds a BS in Ag from 1963. He supports Mizzou through significant dairy scholarships and possesses much pride in his relationship with MU and dairy. Mr. Jacoby spoke fondly of his past relationships with Bob Marshall and WHE Reid and his MU degree in Dairy Manufacturing. Operationally, Mr. Jacoby believes any facility must go beyond basic blending and pasteurization and include advanced capabilities of filtration and concentration technologies. Product outputs of choice are cheeses and ice cream, but he supports Mizzou fluid milk as well. As the discussions progressed into what was needed, he stressed the hands-on experiential knowledge that comes when students participate within an operational plant. And the value is not within the cheese or ice cream produced, but the knowledge and confidence possessed in that student as they walk into a facility without intimidation

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but as a contributor on day one. He believes Mizzou can garner the support of Aurora, DFA, Prairie Farms and Kraft as well if the goal is to produce knowledgeable students as the prime directive with the production of dairy products as secondary.

### **Opportunities**

Eric Cartwright is the Executive Chef of Mizzou's Campus Dining Services. The potential Dairy System is extremely fortunate that Campus Dining is wholly controlled within the university system and exists for the betterment of the student experience. As many are aware, that is not the norm on many campuses today. Mr. Cartwright is well schooled in what improves the dining experience on Mizzou campus and he also values relationships, product origins and the story behind his food items. The cost of goods used is a complex formula and not based solely on price. There is a true partner in Eric. He is very accepting of the concept of Mizzou milk and dairy being utilized in Dining Services on campus – and he possesses the decision-making authority to determine his sources. It is critical to understand that the partnership mentioned will not work if only one way. Campus Dining Services brings to the table the ability for a dairy system to succeed. Dining Services would likely be the major promotional arm of any dairy system put into place. The successful integration of two entities such as Dining Services (customer) and Dairy Systems (supplier) requires that the new system be designed and built with both groups at the table from its inception. The initial end user will drive the design, capacity, and product line while additional product capabilities can be integrated within those original requirements.

### **Organizational Status**

A vertically integrated dairy enterprise program would follow a path from feed crops, through the dairy farm and into a dairy processing operation. These basic steps already incorporate Plant Sciences, Animal Sciences and Food Science & Nutrition disciplines; however, there are many additional disciplines that can “plug in” to an operational substrate based on dairy. Agribusiness Management, Ag Education, Ag Systems Technology, Environmental Sciences and Hospitality Management each can find an area specific to their field within a healthy, multifaceted business model. All must be aware that an operational Dairy System is only “Dairy” due to the value-added return and the existing infrastructure that leads to its establishment. Therefore, the system should be regarded as a resource for all members of the university, not simply dairy connected programs. However, utilization by others of critical resources required to operate the Dairy System, having lofty goals of self-sufficiency, cannot be by happenstance or unfettered. A process of review must be developed much like animal research reviews to evaluate and project possible disruptions and resource usage.

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Compensation should be factored in for significant consumables, loss of milk, labor, etc. where necessary to prevent operational setbacks from occurring. A healthy relationship between operations and researchers or other parties should leave the farm or processing facility “better than they found it” through residual equipment and supplies, or improved facilities by factoring those items into grant proposals.

## **Goals**

The recommendations within this report are based on several basic goals.

- Establish a valid, vertically integrated operational system based on the commodity of dairy encompassing aspects of production, processing, marketing and regulatory.
- Achieve fiscal stability within the total dairy system approaching self-sufficiency as much as practical.
- Create an organizational structure which, by design, promotes and rewards efficient and continuously improving operations and output.
- Establish the dairy system as an educational operation with the primary mission of student, research, and extension output. Revenue generation must be considered as simply a life support mechanism to exist - a necessary evil - not the primary objective.
- Create a valued university resource serving as a vibrant operational business system representing a true industrial model. The system’s presence on campus will provide a real-world plug-in for multiple disciplines of agricultural and non-agricultural origins.
- Provide an agricultural focal point for student and university pride while serving as an enticement for new university relationships.

## **Recommendations**

The following recommendations are based on a relatively superficial review. However, the assumptions and conclusions reached are representative of and formed from consistency of invested stakeholders, prior knowledge and experience with university-based dairy operations, and conclusive observations.

- Although minor differences in opinion exist within the MU dairy faculty, the majority support an increase in pasture-based operations. Due to the increasing prevalence of pasture-based farms in Missouri and the ever-present support system for total confinement at other major regional universities, the recommendation is to focus on conversion to pasture-based systems. This is consistent with the internal direction mapped by the Foremost Dairy Farm Plan

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committee. From a fiscally responsible stance, the wide discrepancy of income over feed costs between the two operational methods reinforces this pathway. The Foremost Dairy Farm Plan outlines this transition; however, the timeline should be shortened as much as practical. Milk sales output must be carefully considered and monitored through the transition. Much of the farm operational costs are not variable and a dramatic fall in revenue may exacerbate the shortfalls. Determining the final mission and direction of Foremost Dairy will empower definitive planning for infrastructure layout and upgrades.

- The vision and desires throughout MU campus are unified and consistent: Mizzou needs to invest in a modern, relevant dairy processing facility. The drivers of sales and utilization will determine form and function of the facility. Initially, sales will be derived from Campus Dining Services, various outlets on campus and public walk-in demand. To maximize the value-added nature of the public aspect, the location of the facility is crucial. Location of the manufacturing facility on main campus will minimally increase product sales since additional outlets will exist. Additionally, the dairy processing facilities utilized to currently produce Buck's ice cream are woefully inadequate to meet the needs of a viable operation. It is highly recommended that a new processing facility be located at the entrance to Foremost Dairy Research Center.

Major advantages exist for this approach:

- Maximum flexibility in design due to land availability.
- Unfettered access to the public.
- Maximize the opportunity for dairy and ag education of the public.
- Minimal cost associated with construction and design.
- Minimal operational cost for milk hauling and farm interaction.
- Central location to showcase the full dairy integrated system.
- Easily expandable in future.
- Process system utilities may enhance farm capabilities.

Potential disadvantages:

- Utility availability.
  - Student/faculty travel.
  - Product requires delivery to campus.
- Construct a classroom in conjunction with the processing center at Foremost Dairy. These facilities will serve multiple clients including Animal Sciences, Food Sciences, Extension and Outreach, industry groups, civic organizations, school



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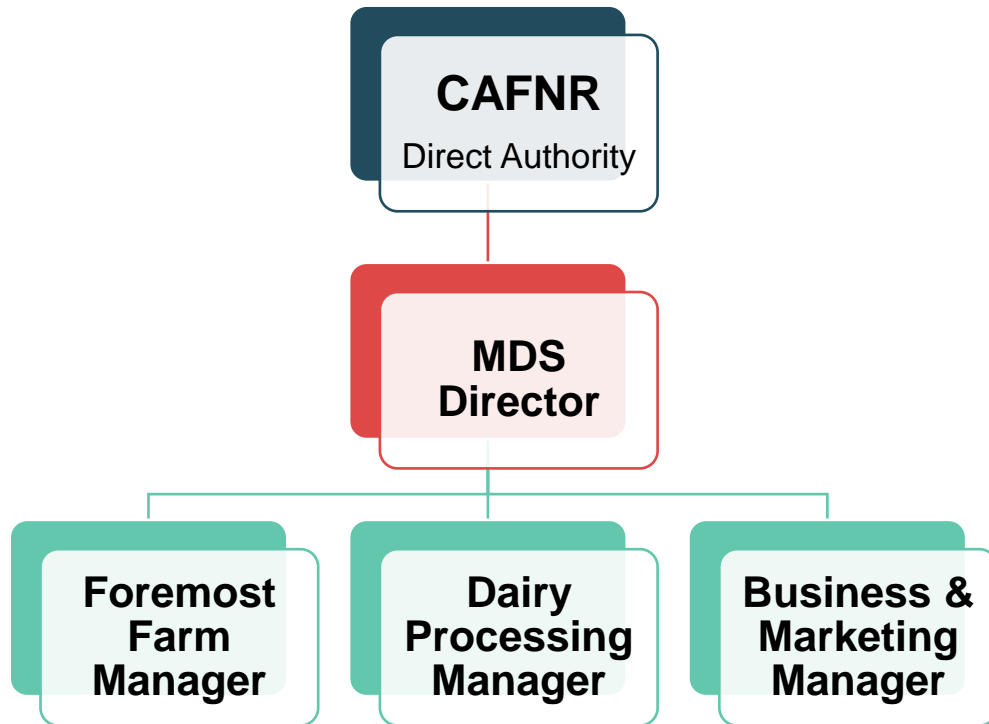
tours and more. The classroom will elevate awareness of the farm center's existence and enhance public awareness.

- Create a new, operational entity within CAFNR suggested to be the MIZZOU DAIRY SYSTEM. The organizational structure is represented in the diagram below. This organization will be completely new to the University of Missouri system with new positions, job descriptions and reporting pathways. The key position is the MDS Director. This position will be empowered to administer and operate the total dairy system from feed and crop production through consumer products and marketing, both long term and day-to-day duties. The responsibilities and authority would include financial, infrastructure, maintenance, and manpower within the university system guidelines. Critical components that currently do not reside within the farm or processing control yet are critical to its success (such as silage/forage production) must be moved under the control of the MDS. This top administrator shall report directly to the CAFNR Dean or his designee and will be empowered to make operational decisions for the full dairy entity. The managerial and personal characteristics held by this person are critical to the success of this fledgling undertaking and includes:
  - Vertically integrated knowledge and savvy.
  - Financial knowledge and capability.
  - Risk evaluation and decision-making skills.
  - An educational heart and passion to meet the university mission.

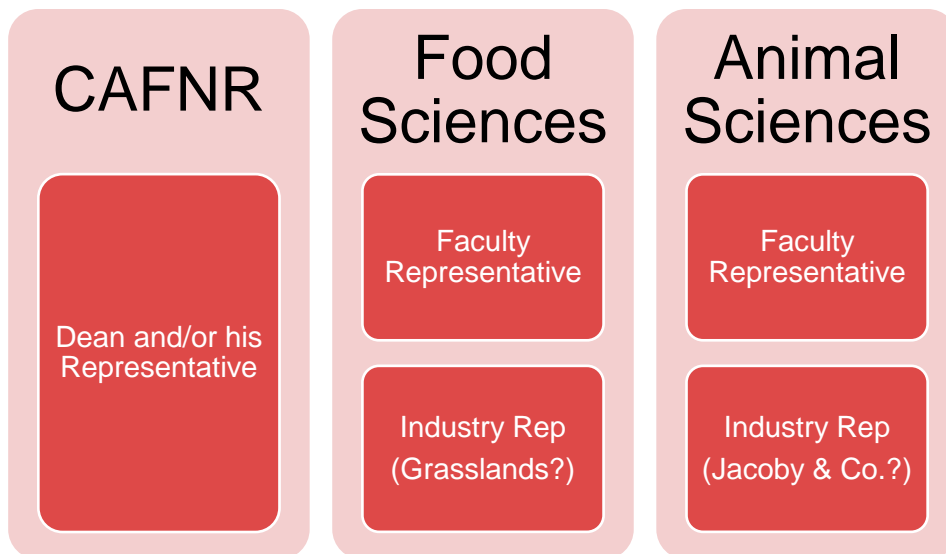
As the leader of the MDS, the difficult task is to operate a viable, solvent business operation within a university environment yet maintain the adherence to its mission of education and academic support. This mission oversight shall be maintained by trilateral group of Animal Science, Food Science and CAFNR representation including industry representation from the animal and food sectors as shown in the illustration below.

Adherence to this system or similar design is a mainstay ingredient for success of such an undertaking. The proper personnel are essential for success. Fortunately, the dairy industry is healthy in Missouri and with that, extremely capable individuals, many with ties to Mizzou, are likely waiting for this extraordinary opportunity.

# MIZZOU DAIRY SYSTEM



## MDS OVERSIGHT ADVISORS



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**Pitfalls and Afterthoughts**

The administrative structure established around and supervising over the proposed Dairy System will determine its success or failure. Initially, financial support will be required for several years to reach a sustainable level. There may never be a period where appropriated support can be fully retracted and there exists logic for continued support. The proposed Dairy System exists, not to produce milk or ice cream, but to develop experienced students, empower research, and disseminate knowledge. Dairy products are simply a byproduct of the system that must exist to meet the university's land grant mission. There is a cost to that educational production just as there is a cost to produce a pint of ice cream, so to require the Dairy System to bear the full burden of education is unrealistic. That said, there is an expectation that a healthy, vibrant Dairy System will give back to the university in substantial ways, allowing faculty and students to interface with no cost (or minimal compensation for true costs) creating an advantage in real terms for faculty to be more competitive with other university dairy programs.

One topic that needs to be raised is the surprising lack of processing industry contacts and legislative bridges. This condition is not unusual at many universities but needs to be addressed over time where Mizzou faculty and staff begin recognizing opportunities to reach out to alumni and friends of dairy and legislative entities where appropriate. Proactively attend commodity meetings, volunteer to serve on boards and make opportunities to tell local legislators how Mizzou and dairy are enhancing the State of Missouri. These bridges should be strongly built and available long before they are needed to forge the river toward your goal.

**Thank You**

As the Service Provider for this report, I would like to extend my gratitude and thanks to the leadership of the University of Missouri and the various faculty and staff members for their professionalism and clear guidance provided throughout this process.

Respectfully submitted by Gary Cartwright Consulting LLC

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**Biography**

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*Gary Cartwright*

Gary Cartwright is the owner of Gary Cartwright Consulting LLC of Apex, North Carolina. Recently retired from NC State University, he served as the creator and inaugural Director of the Dairy Enterprise System which encompasses the Lake Wheeler Research & Teaching Dairy Farm, the Feldmeier Dairy Processing Lab located in Schaub Hall and is credited as the co-creator of the highly successful *Howling Cow*<sup>®</sup> brand of milk, ice cream and other dairy products. He also provided research, teaching and extension support to the Dairy Industry through the Department of Food, Bioprocessing and Nutrition Sciences. Gary continues to work closely with North Carolina, national and international dairy and food entities providing support to existing industry and emerging entrepreneurs in process technology, business development and quality improvements. He holds multiple patents in the development of food process innovations including the advanced thermal processing of high viscosity and particulate food products leading to the formation of several food processing companies in North Carolina.



Gary Cartwright earned his B.S. degree in Food Science at North Carolina State University in 1979. He has worked in the food processing and packaging industry for over forty years including dairy, brewing, thermal processing and aseptic processing and packaging.

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