

### Prioritizing \$10 M State resources at Knott Dairy Center (KDC)

The intent of the Major Capital Request was to mitigate the extensive deferred maintenance and safety issues that compromise the sustainability of this valuable research, teaching, and Extension facility. The State investment can facilitate the KDC improvements such that it remains sustainable into the future.

Since 2020, we have increased the herd and the number of lactating cows in order to increase the revenue generated and better supply the creamery with the desired milk to increase their production. This has resulted in over-crowding and pinch points with respect to herd management. The IACUC have expressed concerns with the stocking density in our heifer barn and Iso-barn (dry cows). Neither of these current structures permit access for teaching or research.

The Knott Dairy Center was originally built in 1959 to accommodate 80 lactating cows. The resting area was modified in 1997 to increase the capacity of the milking pens up to 180. Thus, the only remaining space for replacement heifers was supplied by the bull barn. The lack of space became especially problematic since 2020 when the herd started increasing to reach capacity.

Major Areas for investment consideration:

- 1) New Heifer/Dry cow facility
- 2) Nutrient and Manure Management facilities
- 3) Improved research/teaching capacity
- 4) Safety and improved handling
- 5) Robotics/modified parlor

#### 1. New Heifer/Dry cow facility:

This new facility should provide more suitable space for our livestock, better air quality, and easier manure management resulting in improved health of our livestock. It will incorporate new capacity to utilize different rations and perform research on heifer development, reproduction with better AI protocols and pregnancy checking, and behavioral research. Larger group pens with capacity to add future robotic ad libitum feeding should be included, as well as cameras for behavioral research and improved training of reproduction to our Animal Sciences (AS) undergraduate students and Cooperative University Dairy Students (CUDS) and. The research activities of Dr. Marcondes, a specialist in heifer development, and Dr. Adams-Progar, a dairy behavior expert, in particular will benefit from this new facility. The associated laboratory and educational spaces included in this new barn will support all three of our land-grant missions with enhanced livestock handling, observation, and safe interaction between staff, students and livestock. This will address concerns regarding stocking density, manure and bedding management and nutrient provision to our livestock raised by IACUC and AAALAC. It will also allow our herd size to match our desire to have between 200 and 240 lactating cows producing the necessary milk to our WSU Creamery and their aspirational production increases. Both the current heifer and dry cow barns have structural concerns that would be costly to repair and modify.

#### 2. Nutrient/manure management:

Our current facilities were neither designed for the current herd size nor the rising costs of labor. Clean out and re-bedding are below standards of the industry and best practices. Nutrient and manure

handling are time-consuming and costly, creating daily challenges to our management. We currently aggregate our manure, separate our solids from liquids and are then burdened with the transport of our solids to the compost facility. Fuel, labor, and equipment maintenance costs directly associated with manure hauling is upwards of \$125,000 per year. Our trucks and equipment are dated and there is not a budget model for replacement of our dump trucks, loader, nor skid-steer. There is a maximum ceiling on the amount of manure that we can deliver to the compost yard, which we exceeded in 2023. This resulted in an additional \$11,000 charge to the KDC. We are forced to purchase higher cost bedding straw and hay as they need to be pesticide/herbicide free otherwise the compost facility will not receive our manure/soiled bedding. We buy back compost bedding from the compost facility at a fairly high cost and they are unable to provide all of our needs as they typically run out of dry compost by February. On site management of manure using a digester should be considered.

### 3. Improved research/teaching capacity

Our current teaching and research areas are insufficient for the number of students we serve and for the minimum number of animals required for research. There is a need to have specific areas for teaching and research at different stages of growth and milk production. We need to improve capacity for well controlled nutritional studies including those trials designed to test strategies to reduce enteric methane production, improve feed-production efficiency, and nutrient composition for longevity and production traits. This is critical for both our ruminant nutrition and our genetics research. Dr. Neibergs has a well-established research program but currently does not utilize our KDC herd to a great extent due to lack of parity with larger industry dairies and practices. Dr. Marcondes is growing his research program but has been limited by our infrastructure. Dr. Kim Davenport will be joining our department and will be utilizing our KDC should we build capacity to obtain high-quality phenotypic data that she can include in her trait analyses. Dr. Adams-Progar needs improved capacity to adjust and study the human-cattle interface for safety and best management practices. We hope that reproductive research can be added to our capacity as an important component of the future sustainable dairy practices.

### 4. Safety and improved handling

Our current KDC is not well-designed nor suited for ease of livestock handling, livestock sampling, monitoring, grouping, nor individual/group treatments. The capacity to have safe and effective locations for our undergraduate students, graduate students, staff and faculty to handle, sample and interact with our livestock is a critical component of our teaching, recruitment, Extension, and research aspirations and as such should be considered a strong need for strategic investment. In addition, the current fencing system is obsolete and worn and there are areas of slippery concrete that need to be resurfaced or renewed. The handling and interaction of cattle needs to move away from the use of ineffective and restrictive hot-wires in all of our cattle housing areas but especially in our lactating cow, holding pens and parlor area.

### 5. Robotics/modified parlor

To reach our educational aspirations, we need to modify our curriculum and expose our students to advancing technology and precision agriculture. This requires that we prepare our facilities for robotic milkers, automatic feeders, robotic feed pushers, and robotic pen scrapers/manure management. This equipment may not be affordable in our current budget but do need to be prioritized, included in our planning, and have our sites modified to receive and implement this technology in the future. These

## **Knott Dairy Center Investment Prioritization**

improvements will further reduce our labor costs while allowing our data to serve our teaching, Extension, and research needs and better reflect the Washington State, regional and national dairy industry. We have a tremendous opportunity to have an exceptional dairy only five miles from main campus in Pullman that will allow us to be a leader in the western US. This investment will help us move forward and plan for the future. The intention is to initiate discussions with precision ag/robotic companies to have them place their respective equipment on our dairy at potentially a zero-dollar lease where we can train the next generation and perform the critical and sustainability relevant research that the industry needs.