

National FFA Convention - Dairy Cattle Housing and Facilities Scenario

October 2024

Scenario

Your team received a call from Finlee and Fletcher Ames, owners of FFA Dairies, LLC, located in the western US. The farm has been in their family for 4 generations. The Ames have called your team to get your advice on how to improve their operation as it relates to the management of the current facilities and housing for their herd. At the current time, finances are such that no additional housing facilities can be added.

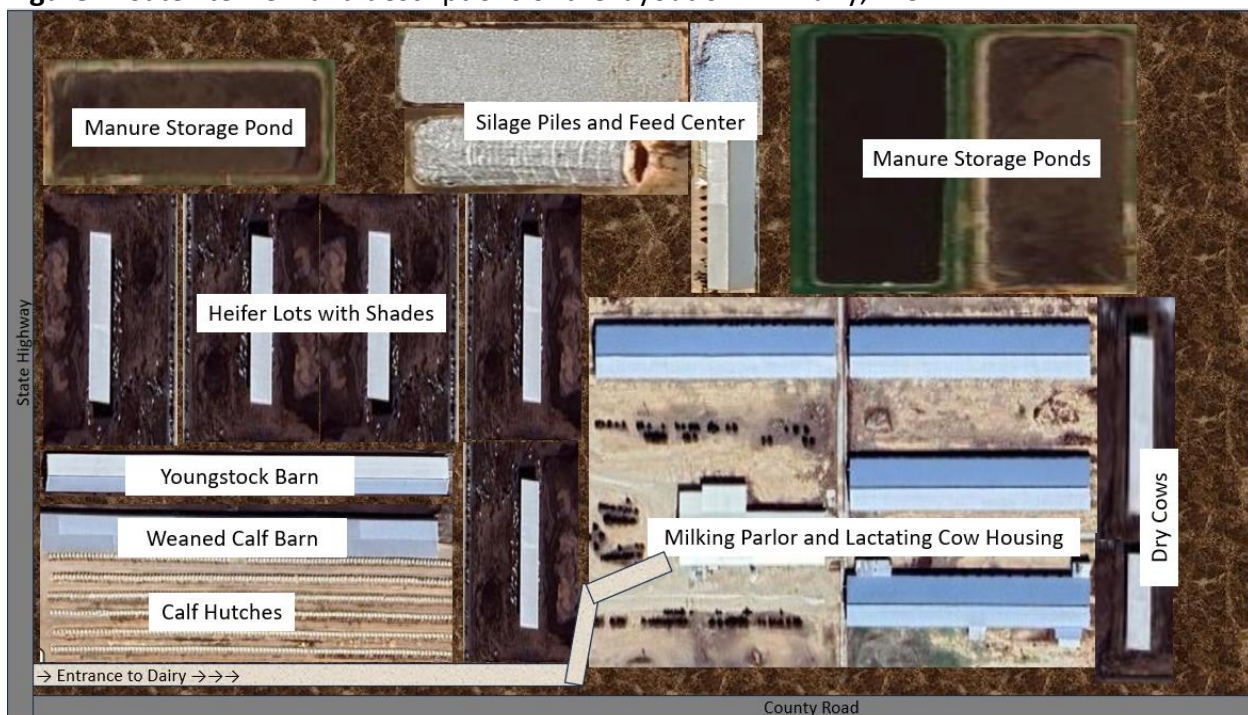
Herd Overview

FFA Dairies, LLC are milking around 3400 Holstein dairy cows. The farm currently has a rolling herd average of 29,100 lbs of milk, and are averaging 4.0% milk fat and 3.25% protein with a SCC of 280,000 cells/ml. The calving interval of the herd averages 13.8 months. They try to breed their cows and heifers such that the calving is evenly spread out through the year. However, this fall more cows will be calving than expected.

Farm Layout Overview

The dairy raises all of their youngstock. The youngstock, dry cows, and lactating cows are all housed at the same location (Figure 1). The lactating and close-up dry cows are housed in free stall barns. The heifers and far-off dry cows are housed in outside lots with shade structures and feed lanes due to the arid climate. The outside lots are sloped away from the feed lanes and shades to reduce mud during rainy periods. Calves are housed in hutches and there are two post-weaned calf barns.

Figure 1. Satellite view and descriptions of the layout of FFA Dairy, LLC.



Milking Parlor

Cows are milked 3 times a day on an 80-stall rotary milking parlor (Figure 2). It takes cows 10 minutes to enter the carousel, complete the milking process, and exit the rotary parlor. All the cows from a pen are brought into the holding pen. Cows step onto the slowly-moving parlor platform into an individual stall, the cows are milked while the parlor rotates, and they back off the parlor just prior to where cows enter the parlor. Cows are returned to their pens after all cows in the pen are milked. The milking equipment is checked and maintained by technicians on a regular basis to ensure that the equipment is all working correctly. After entering the rotary parlor, the cow's teats are fore-stripped, pre-dipped, milked, and post-dipped using proper timing and university recommended procedures by properly-trained milkers. The bulk tank is sampled monthly to determine the bacteria species present and no species associated with contagious mastitis have been detected.

Figure 2. Picture of the 80-cow rotary parlor. (Photo credit: <https://dairystar.com/stories/a-generational-expansion,25174>)



Free Stall Barns, Stalls, Pens

The milking herd is housed in four, 4-row free stall barns (Figure 3). Each barn is divided into 2 pens with a feed lane down the middle of the barn and a pen on each side. There are 2 head-to-head rows of stalls in the middle of each pen. Each pen in the 3 main lactation barns (Pens 1-6) have 432 stalls each (864 per barn). Pens 7 & 8 each have 216 stalls per pen (Figure 4). After calving, cows will go into the fresh cow pen for about 28 days. After the fresh period, cows will be placed in one of the pens of high cows, depending on which pens have available space. Cows are moved once weekly on Tuesday mornings. The Ames have noticed that milk production of the fresh cows is lower this fall compared to previous months.

The cows are brought into the close-up dry cow pen when they are approximately 21 days from calving. Cows will be moved into one of the calving pens when calving is imminent by a trained technician. At least one employee is assigned to the calving pens 24 hours a day.

Figure 3. Diagram of the layout of the barns, holding pen, and milking parlor and the group of cows housed in each barn.

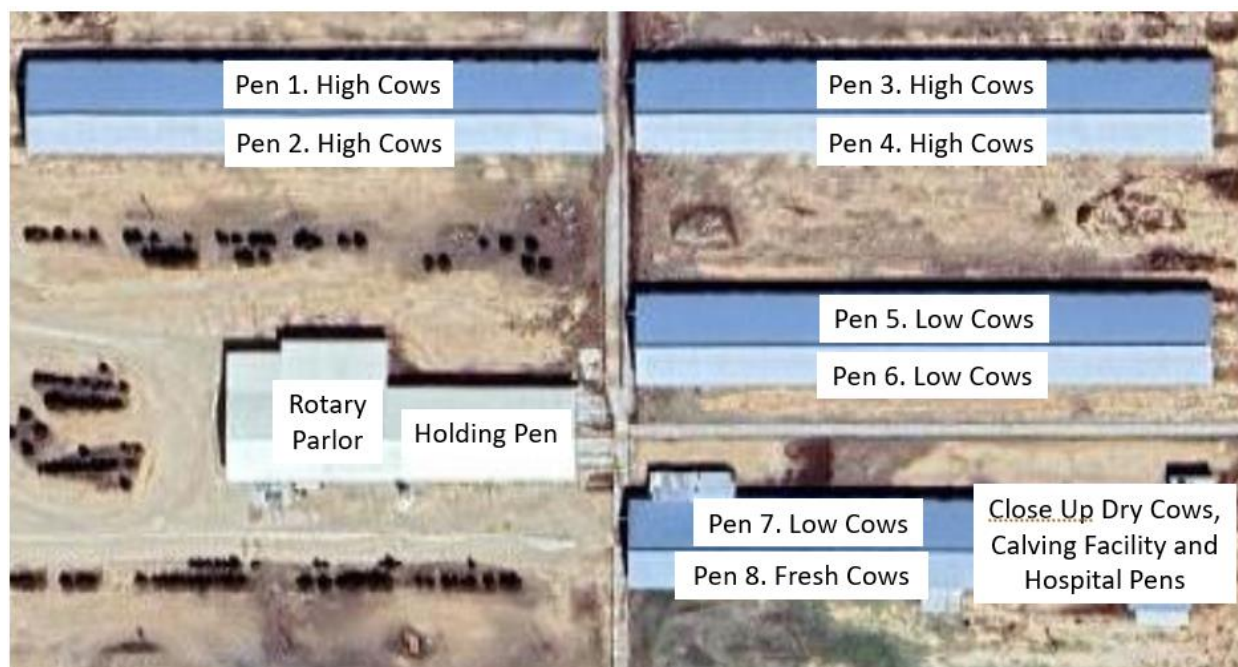
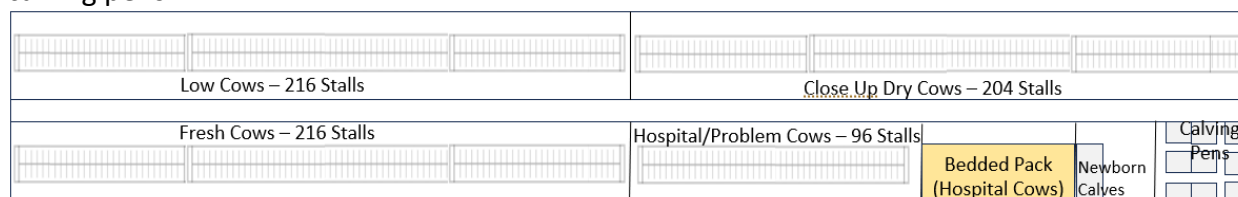


Figure 4. Diagram of the barn containing the fresh cows, close-up dry cows, hospital cows, and calving pens.



FFA Dairies, LLC is feeding one TMR ration to the high cows, a different TMR ration to the lower producing cows, a specific TMR ration to the fresh cows, and another ration to the close-up dry cows. The rations were properly balanced by a nutritionist to meet the nutrient needs of the close-up dry cows, fresh cows, and lactating cows. The recommended rations are accurately mixed and fed twice a day at 6:00 am and 6:00 pm. Feed is pushed up every hour by an employee with a tractor and feed pusher. Nutrition is not a concern for the dairy at this time.

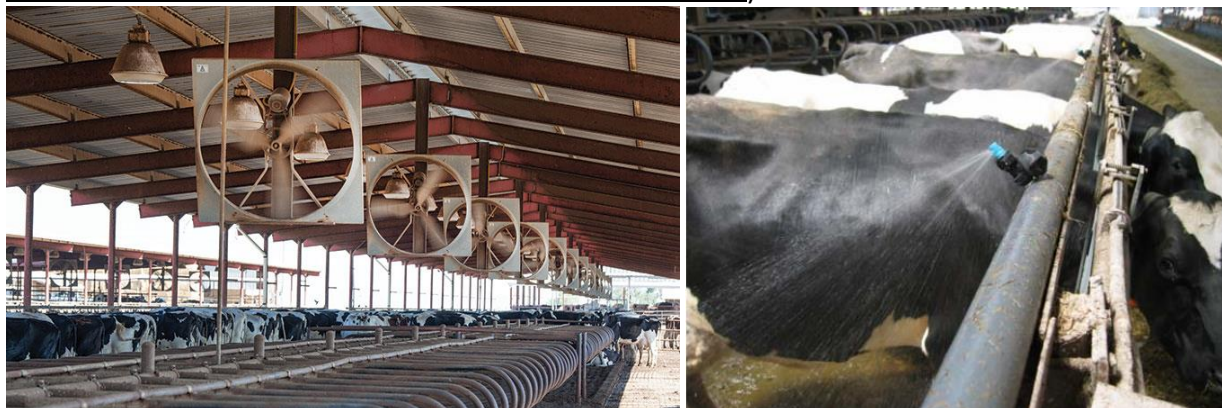
The free stalls in the barns are correctly sized for the body weight and size of the cows according to University recommendations (Figure 5). Cows have good lying rates and there is little perching in the stalls. Stalls are bedded with sand 1 time per week. Manure is removed from the back of the stalls at the morning milking when cows are moved to the milking parlor. The barns are set up with a flush system that runs recycled water down the lanes to remove any feces and urine. The flush system is run 2 times a day when the cows are out of their pens for milking.

Figure 5. Cows lying in their free stalls during an early morning visit to the dairy. (Photo credit: <https://www.dairydesign.com/projects/leatherbrook-holsteins/?portfolioCats=64#>)



The barns have fans over the stalls in each of the barns (Figure 6a). Each barn is also equipped with soakers at the feed bunk that soak the backs of the cows with water when they are eating (Figure 6b). Both the fans and soakers are on automatic thermostats and are programmed to operate at the appropriate temperature-humidity index (THI) and timing according to the most current university recommendations. No cooling occurs in the holding pen before cows enter the parlor.

Figures 6a & 6b. Fans over the free stalls. (Photo Credit : <https://hoards.com/article-20990-four-seasons-of-fresh-air.html>) and soakers on the cows over the feed lanes (Photo Credit: <https://www.ag.k-state.edu/ag-experiences/ffa/Heat%20Stress%20Abatement%20-%20Cargill%20-%20April2010.pdf>)



The herd is doing fairly well from a reproduction standpoint. They are running a 21-day pregnancy rate of 27%. The lowest pregnancy rates occur at the end of July, August, and the beginning of September. Overall, they are not concerned with the reproduction on the dairy, but would always be happy if it increased. They did start breeding the lowest 30% of the mature lactating herd, based on genetics and milk production performance, to beef bulls as

they have enough replacement heifers, and they would like to capture the premium of selling black feeder calves into the beef market. Previously, they had sold all their newborn bull calves within 2 to 3 days of birth, but they are now raising them until 600 lbs.

FFA Dairies, LLC is raising all their youngstock to 600 lbs and continue to raise the replacement heifers until they calve and enter the lactating herd. The youngstock and heifers are housed at the same location as the dairy. Milk-fed calves are housed in individual hutches until 1 week after weaning when they are moved into the weaned calf barn and housed in small groups. After approximately 2 months, they will be moved to the youngstock barn. They will stay in the youngstock barn until they are about 600 lbs. At that time, the heifers will be moved to outside lots with shade structures, and the steers and crossbred heifers will be sold to a feedlot facility where they are fed until they are finished and sold for beef. For the past 2 years, the dairy has been raising all of the calves born on the facility, including any crossbred bull and heifer calves. Although they used to have a death loss of 3% and a treatment rate of 24%, these numbers have increased the past 2 years and they are now running a death loss of 6% and a treatment rate of 42%. In addition, the age at first calving has increased from 23.5 months to 24.5 months. To accommodate the extra calves, they have purchased additional new calf hutches, but they have continued to use the same weaned barn and youngstock facilities.

Based on this farm information, Finlee and Fletcher would like your evaluation of the overall farm and your recommendations to the following specific questions:

- FFA Dairy, LLC has been very concerned with biosecurity after the outbreaks of Avian Flu occurred this past year throughout the U.S. Outline a biosecurity plan to help prevent Avian Flu and other diseases from entering the dairy.
- Even though the free stall barns have fans and soakers that are working correctly, the cows are still experiencing reduced milk production and lower conception rates during the hot periods of the summer. What would you recommend to further reduce the amount of heat stress the cows are experiencing?
- Do you have any recommendations regarding how cattle are grouped within the barns?
- Do you have any recommendations as to changes that should be made regarding the management of the barns themselves to help improve milk production and/or milk quality?
- The calves and youngstock are experiencing higher rates of morbidity and mortality than they typically experienced in the past. What do you think is the cause of these health issues? What would you recommend to decrease the amount of illnesses and death they are experiencing in the youngstock?
- Outline other challenges you found on the dairy and what you would recommend for solutions.

ANSWERS

This FFA Dairy is well managed, i.e. high milk production, good milk components, and good reproductive performance. They also actually use the data generated to help manage the operation. This is illustrated by the calculated data looking at heifer calving age, youngstock morbidity and mortality rates, and other data outlined overtime.

Question #1: Biosecurity Plan

Concept Illustrated: Dairies, like all livestock and crop operations, need a biosecurity plan to minimize disease challenges both from outside and within the operation. Plans should be developed with the input of the farm's local veterinarian.

Answer:

- Biosecurity plan to minimize disease introductions into the herd: Key concepts to include:
 - Limit access from visitors to all facilities. Those visitors allowed access use disposable boots or disinfected boots and clean clothes.
 - Have designated parking areas and limit access of delivery vehicles to non-cattle areas.
 - Change the main driveway/entrance to the facility (Figure 1) to come off of the county road closer to the parlor. This would reduce the amount of traffic driving past the calves and youngstock.
 - Require that all cattle trailers used to transport steers are cleaned and disinfected prior to entering this facility.
 - Employees: have and wear dedicated clean clothing and shoes/boots for this dairy
 - Recommendations specific to preventing Avian Flu also include milkers wearing gloves, masks, and protective eye wear.
 - Minimize rodent, varmits (i.e. raccoons), and birds especially in feed storage and housing facilities.
 - All cattle, if added, are isolated for 30 days upon arriving and are tested negative for diseases identified by the farm's veterinarian just prior to purchase and transport (such as mastitis organisms, avian influenza)
- Biosecurity program within dairy:
 - Sick animals are not housed in close contact with immune compromised cattle—fresh cows and newborn calves
 - Sick animals are cared for after caring for others, i.e. sick baby calves are fed and treated after caring for other baby calves
 - Boots are washed and disinfected when moving between groups of livestock
 - Hands are washed after caring for sick animals and before eating or drinking

Question #2: Improving Heat Stress Abatement

Concept Illustrated: Heat stress results in a decrease in reproductive performance and milk production not only for cows within the current lactation, but also future generations born to heat-stressed dry cows.

For the milking herd, heat stress abatement should be provided through the use of fans properly located and maintained (i.e. belts replaced, angled correctly, dirt removed) over freestalls and fans and soakers provided at the feed bunk and in the holding pen. These fans and timing of the soakers should be programmed to come on when the temperature-humidity index is 68.

Dry cows also need heat abatement. Studies have shown that not only are dry cows (far-off and close-up) negatively impacted by heat stress but also their unborn fetus and that fetus' future performance.

Answer:

- This dairy has no heat abatement (fans and soakers) in the holding pen. This is an area that should be addressed sooner than later. These animals are in close contact in this area and heat abatement is critical. The lower pregnancy rates during the summer months further indicate that the cows are experiencing heat stress.
- Bonus points: The pictures do not show if there are fans over the feed lanes as well as over the free stalls. Placing fans above the feed lanes as well would further improve the evaporative cooling in the barns.
- Bonus points: Current management practices for bred heifers and far-off dry cows provide shade but no air movement to allow for evaporative cooling. Also, depending on the time of year, the sun may enter the shade structures, increasing bunching and thus heat stress.

Question #3: Grouping of cows

Concept Illustrated: By grouping cows with similar behavior and nutritional needs together, farm managers can better meet the nutritional and management needs of these animals. Financial and labor savings may also occur.

First lactation cows (heifers) eat slower than mature cows and do better when housed separately from the mature cows.

Overcrowding of fresh cows should be avoided. Fresh cows should be provided with 30 inches (headlocks) and 36 inches (post and rail) per cow and access to at least 1 stall per cow in the group. By housing these cows separately, more expensive feed additives can

be targeted for use by this group. Additional time can be dedicated to observe this group for post-calving, health-related disorders.

Answer:

Grouping of cows – At this time, very little grouping of cows is occurring. One option would be to separate out the first lactation heifers into one pen separate from the older cows. The high producing cows could also be grouped by stage of lactation so that breeding was limited to a lesser number of pens.

Fresh cows- The number of stalls and feed bunk space is too low for keeping the fresh cows in the pen for 28 days. Assuming an equal monthly calving pattern, 283 cows and heifers are calving monthly (3400 milking cows + 500 dry cows (average 15% of milking herd) = 3900 cows, 13.8 month calving interval). Decreasing the days in the fresh pen to only 21 days would decrease the overcrowding issues and would be more ideal from a nutritional standpoint as well. Also, with more cows calving this fall this group will be even more overcrowded. Might want to consider moving this group to another pen or using part of the low group pen.

Question #4: Management of facilities

Concept Illustrated: Housing and animal movement to and from the milking facilities should be managed to maximize cow comfort, health, and performance. In this scenario, the SCC is higher than ideal and management within the facilities can be tweaked to lower the SCC.

Answer:

- The SCC on the dairy is running higher than is ideal. The bulk tank samples indicate contagious mastitis is not an issue, suggesting that environmental organisms are challenging udder health. This may be due to the cleaning schedule of the stalls and the flush system. Figure 5 shows that the stalls and alleyways could use some additional cleaning.
 - Clean the manure from the stalls at each milking instead of just 1 time per day
 - Increase the flush system to clean the alleyways 3 times a day instead of the current 2 times.
 - Add fresh sand to the stalls at least 3 times per week
- The calving facility and sick pens are together in the back of the same barn. This provides an opportunity for immune compromised fresh cows and calves to be exposed to diseases. Ideally, the hospital and sick cows should be in a different barn away from the fresh cows and newborn calves.

Question #5: *Mobidity and Mortality Issues in the Heifers:*

Concept Illustrated: As more animals are added, addition of facilities or areas to house animals needs to keep pace with the addition of animals to ensure that they have enough feed access and lying space.

Answer:

- The dairy is raising more animals to 600 lbs as they used to not keep any of the steer calves. This is increasing the amount of young animals in the system and causing a lot of over-crowding as they enter the weaning and youngstock barns. The overcrowding appears to be increasing illnesses and decreasing growth rates of all the animals as heifers are now calving in later.
- As the farm does not have the financial means to construct more buildings at this time, they need to consider selling the steers and crossbred heifers at a younger age or looking into having some of the youngstock custom raised.
- Also, steers and crossbred females should be managed and housed separately from the replacement heifers. This would also allow for different nutrition programs to better meet the different nutritional needs of the heifers and steers.

Question #6: *Other challenges on the dairy (Bonus question)*

Answer:

- With the health challenges and later age at calving for the heifers, the dairy should reassess how many cows are being bred to beef sires as they may not have enough replacement heifers.
- Figure 1 shows that there are two shade structures in the far-off dry cow lot. This would present an opportunity to separate the far-off dry cows and springing heifers as it is not clarified how this is being done in the scenario. Also, there may be an opportunity to separate close-up dry cows and heifers with gates in the pen.