

2023 Winter Traveling Dairy Course

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Each winter, students from New England universities spend a week immersed in the dairy industry touring farm operations. For this 25th annual Winter Traveling Dairy Tour, all six New England land grant institutions were able to participate for the first time since its inception. Almost fifty undergraduate and graduate students from the University of Connecticut, Maine, Massachusetts-Amherst, New Hampshire, Rhode Island, and Vermont gathered at UNH on January ninth. Over the next five days we toured ten farms throughout the state of Maine and several dairy adjacent operations, including a cheese processing facility, an agricultural trade show, and IDEXX laboratories.

The last remaining land grant collaboration class was brought to life by the planning of Dr. David Marcinkowski of UMaine, the support of Dr. Pete Erickson of UNH, Dr. Mark Huyler of UMass, Dr. Steve Wadsworth of UVM, Dr. Amy Safran of UConn, and Drs. David Townson and Justine Deming of URI. This valuable educational program was made possible by generous funding from the Northeast Farm Credit Ag Enhancement Program and the hospitality of the farmers who hosted us.

Our tour began on January 9th at the UNH Fairchild Dairy Teaching and Research Center in Durham. Here we were given a tour of the facilities by the very knowledgeable UNH students. This university run farmhouse has 90 milking Holsteins and 70 replacement heifers. Open to the public, the facility frequently participates in public education and community involvement events. Student labor is a large part of keeping the farm functional, with several dozen students working each semester. An impressive highlight of the UNH dairy program is the Cooperative for Real Education in Agricultural Management (CREAM) class, a student run course where students take over full responsibility for a small herd of tie stall cows. The students manage all feeding, milking, calving, calf and heifer care, and health of their herd. Besides valuable hands-on animal experience, students learn the business side of dairying by tracking costs and making financial decisions for the CREAM herd. Non-CREAM cows function as research participants for various university projects currently focusing on nutrition and reproduction.

Production here is above the national average with 26,000 lbs. per cow a year. Fairchild's milk has been recognized for its quality by the New Hampshire Department of Health and Human Services as a New Hampshire Quality Milk Producer and the Dairy Farmers of America with Gold Quality awards.

After all the universities assembled at Fairchild and boarded our bus we headed over to another UNH owned farm in Lee, New Hampshire. As an organic dairy the UNH Organic Dairy Research Farm was different from the Fairchild farm in many respects. This 100 head jersey operation is only one of two organic research farms nationally and the only one maintained at a land grant university. Calves are housed individually until weaning and fed four quarts of whole milk from the farm's bulk tank daily. Milking cows are housed in a barn with 24/7 access to outside where

feed bunks are located. Stalls are lined with compost bedding which is rotated twice a day to stimulate denaturation of pathogens that cause mastitis. As an organic dairy, we learned that the cows must have access to pasture for grazing except in instances of extreme weather.

Pastures are rotated every 12 hours and accessible by cows after milking. The milking parlor was a unique setup different from any other we saw. A four cow step up parlor, which necessitates much closer proximity to the cows while milking, was fascinating to see in person for those of who had only seen larger scale herringbone or parallel parlors. Researchers are currently studying the addition of seaweed to the cows' ration as it relates to mitigating methane output.

Our trip then continued to the first Maine dairy farm we would visit, and the last one for the day. In the shadow of Mount Washington set on top of a scenic hilltop, was the aptly named Highland Farms Inc. This impressive operation in Cornish is the oldest pureblood Jersey dairy farm in the nation. In 1886, cows Perty and Guilet were the first in a herd that would become the 220 head Jersey operation of today with several cows in the top 1.5% of the Genomic Jersey Performance Index (GJPI).

Farm owner Libby Bleakney provided a comprehensive and enthusiastic tour of the facilities, graciously answering the many questions we had. The herd averages 20,207 lbs. a year with components of 5.53% fat and 3.76% protein. Lactating cows are split into mature and heifer groups unlike many other farms we visited which split milking groups by production level. The absence of "high/low" groups allows the heifers to avoid competition with multiparous cows. All cows have year-round access to an outside barn that has a uniquely shaped roof with an angle that promotes shade in the summer and keeps heat in the winter. Supplemental niacin is added to cow rations to combat the Jersey tendency to produce lower quality colostrum in smaller volumes in winter months.

Highland's calves are individually housed for the first week of life until they prove to be proficient with a bottle. Interestingly, each calf is fed its own mothers transition milk for 3 to 5 days after birth. After their first week or so they are moved into an open pack group where milk is dispensed by automatic feeder programmed to dispense the correct amount to each calf by recognizing ID tags on the calves' collars. Hanging balls provided enrichment for each group and this novelty seemed quite popular with the calves. Farm owners agreed that group housing had promoted much more social behavior than occurs in hutches.

The high altitude provides wonderful views but presents challenges for the farm as runoff has to be carefully mitigated with diversion ditches. Besides dairying the farm produces maple syrup, logs and trucks trees, and raises bulls kept for use as cleanup bulls. Historically, Highland's bulls, including famous Magic Duncan and Duncan Lester, have been prodigious with thousands of registered progenies through AI.

On Tuesday January 10th, our first stop for the day was Conant Acres Inc, located in Canton, Maine. This is a fifth-generation family farm, with senior members being Duane Conant. We

were greeted by the Farm Manager, Matt Sneller who was kind enough to give us a tour of the facilities. Conant Acres is a tie-stall barn, holding 75 milking cows, along with a separate room to hold a few extra. With their prized Holstein cows milking 2 times a day, they average 88 lbs. of milk per day per cow, with a butterfat and protein of 3.6% and 3.15% respectively. What stands out at this farm is their BAA score of 115.5, ranking them 4th nationally and 2nd in New England by the Holstein Association. Priding themselves on their genetics, their Breed Age Average is something that shows just how much work they have put into their cows for generations, and they are constantly looking to improve their herd. Current goals for genetic improvements focus on appropriate size and stature, excellent udder conformation, and improving milk components.

Lactating cows were kept clean and healthy within the tie-stall barn, and the calves are housed in hutches on the side of the milking barn. The hutches were spaced out each having a black mat put down for cleanliness and warmth, eventually moving older calves to super hutches. Housing three or four calves at a time, they are kept together here until being weaned at approximately 8 weeks. Some of their calves are also used by local kids for showing, which gives them a nice way to connect with the public. We said hello to their springing heifers next to the milking barn and then moved to the upper level. Up the hill behind the main barn, was housing for heifers, dry cows, and some Hereford beef cattle. Here these open front barns had many open pack style pens. This is also where they store their hay and silages, most notably their round bales and corn silage. Another interesting thing about this farm is their farm store that they have on the property, where they can sell local beef, dairy products, and also locally sourced products like fresh produce. The farm was also awarded the Cleanliness and Quality Award, meaning they can sell raw milk. This fairly new farm store has quickly become an integral part of the farm's earnings and is a great example of diversification!

Following the first stop of the day at Conant Acres, we made our way to Hardy Farm in Farmington, Maine. Hardy Farm is a small organic dairy with primarily Ayrshires and a few Holsteins. We were greeted by Henry and Teresa Hardy as well as Abby Weisberg, their Dairy Grazing Program apprentice. The Hardy family has been farming for 36 years, but they've had registered Ayrshires since 1940. They switched to organic production in October of 2003 as they were practically operating organic anyway and to secure a niche in the market.

Hardy Farm milks an average of 54 cows twice a day in a double five, swing, herringbone parlor. The Ayrshires in the herd average 15,152 pounds whereas their Holsteins average 17,703 pounds with a combined fat of 4.1% and protein of 3.1%. Their milk is shipped to Organic Valley and has been since October of 2015. For seven months out of the year the herd is rotationally grazed, changing pastures daily. Ayrshires, described as "aggressive to graze", do quite well on pasture due to their independence and longevity. When not on pasture, the cows are housed in a beautiful 60 cow free-stall barn. The barn contains an open ridge roof which provides good ventilation by easily allowing hot air to rise and be released. Stocking density, a problem which can disrupt lying time and quality rumination, is kept below 100% in acknowledgement of the importance of a dairy cow's time budget. Heifers and dry-cows are housed in a group housing compost-pack barn where they are fed a full diet of baleage.

Hardy Farm is not just a dairy operation. They have diversified far beyond that ensuring to use all of their resources to their fullest potential. These diversifications include; hay and baleage production, wood cutting, logging, making homemade milk soap, tapping trees to make maple syrup, raising broilers and chickens for meat, selling bull calves, various 4-H projects, and showing cattle. Following the tour through the farm the Hardy Family welcomed the entire group into their home for an amazing homemade lunch. Here we got to talk to multiple generations of the Hardy Family and learn even more about their operation. We are incredibly grateful for their generosity and hospitality.

The last farm we visited on this second day was the Flood Robotic Dairy. Just one of multiple family farms owned by the Flood's, this operation was a 170 Holstein herd. With a Delaval equipment dealer in the family the switch to robotic milking was natural. Two robotic milking systems are in operation for the whole milking herd. Cows are trained to lead themselves to the parlor where they are fed a ration of grain. The cows average about 3.1 visits to the robots per day and give an average of 93 lbs. per cow per day. The barn itself is a large free stall but was set up differently than others we saw this trip. Four rows of free stalls lined the middle of the barn and on the outside were two alleys with feed tiles for PMR. Sand bedding, a good deep bedding choice for cow comfort, lines the free stalls. A bird's eye view of the barn was possible thanks to the handy viewing platform above the parlor.

On our third day we woke up bright eyed and bushy tailed excited to see the Stonyvale Inc. farm and their Exeter Agri-Energy anaerobic digesters. This 5th generation family farm has been around since the 1800s and was named the "Maine Dairy Farm Family of the Year" in 2008. Upon arrival Kate Fogler showed us their calf facility which houses calves together in groups of up to 20 from birth to weaning. The open packs were sawdust and straw bedded with a grate underneath to facilitate liquid waste removal. Radiant heat under a slab on concrete keeps water from freezing, an important feature for the Maine cold. The barn had excellent ventilation with curtain sides that roll up and down for airflow. Colostrum protocol dictates feeding one high quality (25 brix units or more) gallon and a second lower colostrum feeding before moving to milk replacer. At the third feeding calves are moved over to an automatic feeder which provides more consistency in feed dispersion than with manual feeding. Calves are weaned at 50 days, younger than other farms we saw but consistent with current trends in the industry towards earlier weaning.

Next we visited their parlor, a double 20 parallel rapid exit, which was one of the largest of the whole tour. Here their 1,025 head milking herd, the second largest in the state of Maine, produces an average of 93 lbs. a day per cow. The herd consists primarily of Holsteins with a few Jerseys mixed in. A double sided 3 row free stall barn with a stocking density of about 137% houses these cows. Ventilation is elevated by the curtain sides and open ridge roof design. Fogler stressed the importance of breeding for high components producing cows that are solid and sturdy enough for free stalls. In addition, their calving interval was reported to be 12.7 months which is difficult to achieve with the inverse relationship between high levels of production and fertility.

Interestingly, the farm incorporates natural remedies into their treatment protocols in a commendable effort to reduce antibiotic use. Garlic, turmeric, and peppermint are just some of the components used to treat common ailments like mastitis, foot rot, retained placentas, and other inflammation. Additionally, the farm has adequate equipment to run their own PCR tests to identify specific infections in their herd.

Finally, we visited the farm's very own methane cogeneration facility. Exeter Agri-Energy manager, John Wintle, explained the origin and day to day operations of the facilities. The anaerobic digesters have been in operation since 2011 converting manure from the farm into biofuel. Since then they have expanded to also take in food waste from sources like grocery stores, restaurants and cafeterias. Food waste produces more energy in the digester per pound than manure since manure has been already digested by the cattle. Packaging is removed by a pulverizing separator and food waste is added alongside manure to three digestion vessels.

Beneath the rubber membrane domes, microorganisms feed on the organic matter and produce methane and carbon dioxide. These biogases are combusted which creates electricity and heat that power the Stonyvale farm with excess power exported to the grid. Everyday 70,000 kWh of energy is produced which is enough to power 2,500 homes! Byproducts of this process can also be used which makes this process a closed loop with zero waste. After going through a bio separator, the odorless liquid product retains nutrients and can be used as fertilizer. Solid product is used on Stonyvale farm as composted bedding called dried manure solids (DMS).

After being wowed by the methane cogeneration facility in Exeter we loaded up the bus to head to Orono to visit University of Maine's J.F. Witter Teaching and Research Center. This historic facility has operated as a dairy research facility since the 1970s. Both the Progressive Breeders Registry Award and the Progressive Genetics Herd Award were awarded to this farm in 2019 and in 2021. This dual honor makes it the only farm in Maine to have received both distinctions. The smallest herd size of this trip, UMaine has 20 cows housed in a single row of tie stalls. Students proudly run this operation under the cleverly named program UMaine Applied Dairy Cooperative of Organized Working Students (UMAD COWS). This course is most students' first experience with the world of dairy, which makes the herd's success even more impressive. Even with first time milkers somatic cell count is an outstanding 50,000 cells per mL! Cows are turned outside twice daily after milkings which reduces lameness and promotes muscle maintenance. These girls were all happily eating their on-farm-grown forages and ruminating as we walked by, a testament to the stellar welfare and individual attention provided by students and staff.

Heading just down the road we stopped in Bangor at the Pineland Farms Dairy Company production plant. This facility is part of the largest cheese making operation in Maine. We met with President Mark Whitney and production manager Larry Wintle who gave us the history of how Pineland Farms Dairy Company came to be. We were guided through the expansive buildings as our cheese expert tour guides detailed the cheese making process. Cheese here comes in many forms: bars, blocks, and curds, oh my! Flavors are plentiful with many variations of cheddar, baby Swiss, Monterey jack, pepper jack, and Colby jack. Besides hard cheese

Pineland Farms also sells feta, different flavors of curds, cream cheese, sour cream, yogurt, ice cream base, and bulk 300-gallon totes of milk. An interesting fact about their factory is that the whey they produce as a by-product in their cheese making is sent back to the local farms that they source their milk from as a food staple for their animals. No waste! Even with all of the products Pineland Farms Dairy Company is still looking to expand and diversify their business and product line. Yay for more dairy products!

On our final stop of the day, we visited Seal Cove Farm in Lamoine, Maine. This dairy was quite different from all the others we had visited previously being that there were no cows. Instead, we were met with a herd of dairy goats! Seal Cove started with ten goats but has grown into a 100-goat operation. These include breeds such as La Mancha, Nubian, Toggenberg, and Alpine. Alpines produce the most milk and La Manchas produce the highest milk fat at around 4.5%. Seal Cove milks for 305 days out of the year. Milking is done on site as well as the cheese making with flavors including classic goat cheese, blueberry, and garlic pepper. They have been making small batches of Maine goat cheese ever since 1976 and produce over 700 lbs of cheese each week!

The does in the herd are at their prime milking age at five to six years old and are kept until they're around seven years old. Another interesting note about Seal Cove is their wood-fired pizza. The pizza toppings include goat cheese, goat meat, as well as vegetables harvested from their own farm. In addition to cheesemaking and pizza Seal Cove has compost available for sale. They call their compost "Nannyberries Compost" describing it as gourmet, perfect for gardening and a great way to add organic matter into pre-existing soil. And if cheese, pizza, and compost wasn't enough, Seal Cove also runs a farmstand where they of course sell their cheeses as well as goat meat products such as "Goataroni" and "Goatarizo", fresh vegetables, and other local foods.

The next day, the 12th, started with a unique stop to the Maine Agricultural Trade Show. Here we got the opportunity to attend a conference with a group of incredible leaders, and meet with local vendors. Amanda Beal, Commissioner of Agriculture, Conservation and Forestry and Nancy McBrady, Deputy Commissioner, welcomed us by giving the group their personal backgrounds, mission statement, and goals for the betterment of agriculture in Maine.

Continuing with their strong team, we were introduced to a State Veterinarian of Maine, Carolyn Hurwitz and Linda Stahlnecker, the Director of the Milk Quality Lab. Both gave interesting talks on the day to day operations of their work, how rewarding their careers are, and what it took to get where they are. Last and definitely not least, we were introduced to Julie-Marie Bickford, the Maine Milk Commission Executive Director, and Sarah Littlefield, the Maine Dairy and Nutrition Council Executive Director. They both described their roles as on the ground working directly with farmers and gave insight on the daily issues farmers face and what they can do to bring these issues to light and supply real and fast solutions. The group as a whole was passionate about helping farmers and placed a heavy emphasis on education in dairy and agriculture and the collaboration this requires. Their words were inspiring and heard! Hearing a full panel of

successful women leaders in agriculture was uplifting for us as the next generation of agri-workers.

After the conference we were able to mill about the trade show that was happening on the ground floor. Vendors had topics ranging through every agricultural theme you could think of. It was interesting to talk to the vendors, learn about their passion, and see how this has shaped Maine agriculture for them and their families personally. Notable vendors include New England Dairy where we got to say hi to Sarah Littlefield again, and Farm Credit East, who made this trip possible!

Following a quick lunch at Big G's Deli we made our way to Taylor Dairy Farm in St. Albans, Maine. Taylor is the largest Jersey dairy in the state of Maine with around 1,800 head. They milk almost 800 cows each day in a double sixteen parallel parlor. Their cows average around 64 lbs. of milk a day with 5.5% milk fat and 3.8% protein. Taylor farm highlights their genetics and cows here were all genetically tested and registered. Breeding is done with 3 AI services and then using a cleanup bull, a more traditional method not seen as often on our tour with the trend towards fully AI breeding. As many farms are opting for these days, the cows have SDR collars that track their activity and rumination. SCR activity data is used for heat detection as well.

Cows are housed in a two-row free stall barn with curtain sides and large ceiling fans for ventilation. Bedding is a unique organic wood ash and algae mixture. However, the farm is hoping to switch to compost bedding from a local anaerobic digestion facility. Silage is kept in a combination of horizontal silo bunkers and AgBags for storage. Their calf operation was impressive in scale and organization. Calves are group housed and fed using an automatic milk replacer feeder. The machine mixes up milk replacer as needed for calves and calves average 10.3 L per day up to 2 L per visit. Three of these machines are in use, each of which feeds 40 calves. Fencing between pens has large openings which allows these groups to interact with one another and socialize. Ventilation in this barn was a bit of a challenge, a problem many New England producers face with repurposed buildings, but is something the farm is working towards improving.

An interesting aspect of this farm was their work with embryos and IVF. One of their goals in terms of genetics was to create a market to be able to sell the embryos that they collect. Taylor Farm ranks twelfth on the REAP Herds Ranked by Average JPI. Additionally, they have between 8 and 10 bulls on the Jersey bull stud list.

We then made our way to Flood Brothers Rotary in Clinton Maine, the largest dairy in the state of Maine with around 3,400 head, primarily Holsteins. On a daily basis they milk almost 2,000 cows three times a day in their 100-stall rotary parlor. We had the opportunity to step inside this amazing parlor to better understand this specific system which was impressive to say the least. Average daily production is 17,000 gallons with around 83 pounds from each cow, but their highest producing cow puts out an impressive 120 pounds. Their fat content is 4.3% and their protein 3.4%. Flood Rotary ships their milk to HP Hood which needs to be picked up in multiple loads otherwise they could fill a whole truck themselves. Calves are housed in hutches as the

farm did not see positive results from group housing like other operations we saw this week. A gallon of their mother's own colostrum is fed at birth and then unpasteurized waste milk is fed until weaning. Flood Brothers has been running for 200 years and has many generations on top of their many employees which they consider to also be part of the Flood family. Flood rotary has a goal to create renewable natural gas via a natural gas digester which will be fueled by cow manure. The hope of this project is to reduce methane emissions, increase sustainability, and power the farm independently. This farm alone produces 5% of Maine's milk with the total of all the Flood family farms producing 15% of the state's milk.

On our final day we visited our last farm of the week, Pinelands Inc in New Gloucester. This facility functions mostly as an education department that gives tours for the community and sightseers. We were first brought into their tie stall that held their small lactating group of cows when it is too cold for pasture. These cows were kept in a two-row tie stall barn where each cow produces around 90 lbs a day. Milk is shipped to Hood, not Pineland cheese company as one might expect. Their cows and stalls were spotless as expected from a very public facility. Training bars were kept above the cows backs to ensure that manure falls into the manure conveyor. The cows themselves are given the show cow treatment with weekly baths. Somatic cell count was reported at around 40,000 cells per mL.

Our next stop was in their calf barn. Young calves were kept in individual pens inside the building and grouped into threes post weaning. Dehorning protocol was unique with cauterizing preceded by lidocaine and xylazine and followed by vitamin B12. Holsteins found at this farm are a part of the oldest registered family in the United States. Their line traces back to cows in the 1800's and are able to register almost all of the current Holsteins they breed. This farm has a large focus on genetics and they strive to produce the best quality of cows in both show standard appearance and production quality.

On our way back home, we got a chance to see the IDEXX headquarters in Westbrook, Maine. IDEXX is a manufacturing company for many different hematology tests and the machinery to run them. A competitive company in the companion animal diagnostic industry, they are one of two major brands that manufacture these products. When first brought into the facility, everyone was given individual name tags with scanning QR codes incorporated within them. This facility is highly secure and no photography was allowed. Senior research and development scientist Rick Linscott presented a summary of the diagnostic tests IDEXX provides specific to livestock, where they distribute them, and internship opportunities to join their team.

After learning about what their diagnostics test for, we toured the factory to see how each type of test or even the machines are made. Lasercyte and catalyst machines are used to run hematology diagnostics in small animal medicine. The lasercyte tests the CBC within blood samples that have received an anticoagulant factor. The Catalyst performs chemistry diagnostics that informs veterinarians about levels of blood urea nitrogen (BUN), creatinine, and other values that provide information on the state of a patient's liver and kidneys. Another section of the facility they introduced us to would be the location where they make all of their snap tests. Tests such as the Alertys Bovine pregnancy snap test and the 4-DX snap test, which

tests for 3 strains of tick-borne diseases and heartworm, could be seen in production. These tests consist of a thin membrane that is able to be stained with blood. Once patient blood is added, the dyes react with the blood and will appear on the membrane when the patient appears positive for the test. An outer shell is then placed onto the membranes after each dye is added and they are cut to their sizes. We were even lucky enough to be sent home with our own Alertys cow-side pregnancy tests that assess pregnancy-associated glycoproteins (PAGs) in blood!

Across the nation small farming is becoming more difficult to sustain financially. Maine's dairy industry, however, consists of 99% family owned and operated farms. Maine dairy contributes not only high-quality products, but economic value to the state as well as thousands of jobs. The importance of keeping dairying sustainable for small farms was a valuable lesson reinforced by this trip.

The Winter Traveling Dairy Tour was an illuminating and invaluable experience for us animal and agricultural students. The opportunity to take what we have learned in our coursework and apply it by analyzing a real-life production operation propels our knowledge and understanding exponentially. As many students' in-person education was interrupted by the pandemic we are grateful to have had this hands-on learning experience. We thank Farm Credit East for funding this betterment of our education through the AgEnhancement program. We also thank the farmers and professionals who took time out of their busy days to speak to us and answer our many questions. We truly appreciate being allowed into the heart of their livelihoods and will take the lessons learned with us as we work towards our future careers in agriculture!