



High-Tech Herd: How Dairy Farms Are Using Technology to Improve Cow Health and Comfort


From biosensors to data analytics and AI, modern dairy farms are embracing technology to ensure cow health and well-being.

Wearable devices that track activity levels, sleep patterns, and vital signs. Climate-controlled living spaces that automatically adjust temperature and humidity. Round-the-clock biosensor data that detects potential health issues long before symptoms appear.

These aren't scenes from a state-of-the-art smart home—they're innovations happening right now on modern dairy farms. This technological revolution is a part of dairy farming that most consumers never see, but it plays a crucial role not only in optimizing operations, but also in maintaining cows' health, comfort, and well-being.

"One of the biggest misconceptions about this industry is that farmers don't care for our animals, and that there isn't individualized cow care," says Justin Leyendekker, a third-generation dairy farmer and partner at Hoppy Cows Dairy in Kingsburg, California. "That really couldn't be further from the truth. Farmers love animals—it's the whole reason we're in the business. We understand the animals and we care for them first and foremost."

Dairy farmers are committed to taking excellent care of their animals and producing safe, wholesome milk. Today, 99 percent of the domestic milk supply comes from farms that participate in the National

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As part of that commitment, dairy farmers are increasingly turning to cutting-edge technology to monitor and improve herd health and cow comfort.



Today's dairy farmers use advanced monitoring systems to track their cows 24/7. These sensors, which are usually worn as an earring or collar, provide real-time data about each animal's behavior, and they monitor many of the same metrics as, say, a human fitness tracker: eating habits, temperature, and activity levels. In addition, they track cow-specific activities like rumination (time spent digesting their food) and lying time.

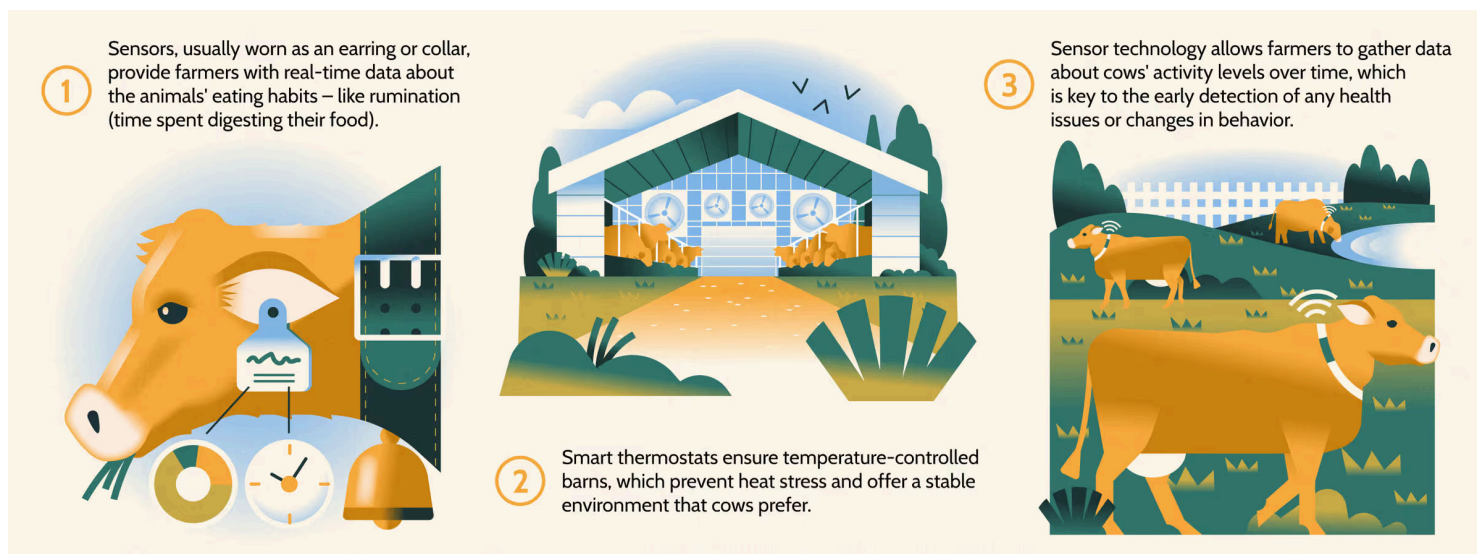
At Hoppy Cows Dairy, Leyendekker notes that the power of data is compounded by having historical information over time. "When you have these collars on your herd for a while, the algorithm learns what the natural habits of the cows are individually and also within their pens," he explains. "So we can get a baseline idea of when they start to eat less, or when they're not ruminating as much." If something is amiss, Leyendekker can get an immediate alert, investigate and intervene to optimize each cow's health.

Karen Jordan, a veterinarian and dairy farmer in North Carolina, also relies heavily on this type of sensor technology. As a veterinarian, she knows the importance of preventive care—and early detection of health issues. "If I get an alert on my phone that tells me we've got a problem, I can pull up that cow's information and determine whether she needs to be pulled in immediately for some help, or if other diagnostic tests are needed," she says.

Though this type of sensor technology isn't new, it has evolved significantly in recent years. "It's gaining speed with more data and studies and better algorithmic technology," says Leyendekker.

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cases that may revolutionize health assessments: condition scoring, where cameras and AI can evaluate a cow's weight and overall condition, and lameness detection, where AI can analyze a cow's gait to identify potential foot or leg issues. "Of course, those are things we can see with our own eyes, but it may be that the AI will capture that animal just a little bit quicker than what the human eye would catch," says Jordan. "To me, that's an exciting thing on the horizon."



While health monitoring is a major focus, technology also plays a critical role in cow comfort. One simple but effective solution is the use of temperature-controlled barns. These systems not only prevent heat stress, but also create a stable environment in which cows thrive.

This is particularly important technology given cows' unique physiology. When humans get hot, we sweat—it's our body's natural cooling mechanism. But cows don't have the same kind of temperature-regulation capabilities, so keeping them cool manually is critical for their health and well-being.

To address this, Leyendekker's farm is equipped with automated soaker systems in key areas like the feeding alley and near the milking parlor. "These essentially release water at timed intervals, and then blow it on the cows with fans for an evaporative cooling effect," he explains. "This may sound simple, but it makes a huge difference for cow comfort." This setup is particularly important in California's Central Valley, where temperatures can soar during the summer months.

Similar systems are in place at Jordan's North Carolina farm. "Our fans kick on automatically when the temperature hits 68 degrees, and some barns also have sensors that help control ventilation, like curtains that go up and down," she says.

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can sense the barometric pressure and decide when the cows should be coming in, so the cooling goes

up and the cows don't get soaked as the wind blows in," Jordan explains.

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Milking, too, has become less stressful for cows thanks to modern technology. Today's dairy farms employ sophisticated milking systems that prioritize both efficiency and cow comfort.

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Leyendekker describes one such innovation: the carousel barn, a system he hopes to add to his own farm in the next couple of years. These milking facilities allow the cows to walk onto a rotating circular platform, where they're milked as the carousel turns. Human employees oversee the process to ensure everything runs smoothly and safely. "By the time a cow completes the circle, she's fully milked," says Leyendekker. "This provides more individualized care, more streamlined operation, and it reduces the amount of milking time."



Some farms even use robotic milking facilities, where cows can decide when they want to be milked. "The cows can voluntarily walk in, and you get individualized milking on the cow's preferred schedule," Leyendekker says.

These robotic systems often come with additional features that further enhance the milking process. For instance, they can perform quarter milking, where each of a cow's quarters of her udder is milked individually. "Once a specific quarter is completely milked, the milking unit assigned to that quarter will remove itself while the others remain milking until each quarter milking is complete," Leyendekker explains. This along with other unique technology in these systems all help in being proactive in management and prevention of disease.



Data is also used to optimize nearly every aspect of dairy farming, from a cow's nutrition to genetics.

For nutrition management, data analytics play a crucial role. "Diet formulations and analysis of our feedstuffs allow us to create diets that are very tuned into the age and stage of each animal," says

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Levendekker, explaining that on Hoppy Cows Dairy, they also use a calculated feeding ratio for each animal to ensure it gets the proper balance of nutrition. Their software feeding program even communicates directly with the farm's tractors, which helps ensure precise feed distribution and reduces waste.



When it comes to genetics, too, data from biosensors has far-reaching implications. "Whenever we're talking about genetics, down the road, that does affect health and well-being," Karen Jordan says, explaining that selectively breeding animals with better feet and leg conformation or udder structure helps ensure healthier animals in future generations. She notes that some breeds of cows now have such extensive genetic databases that farmers can select for certain health traits—like being less prone to disease.

These technological advancements are not just improving the lives of cows; they're also changing the nature of dairy farming itself. "I don't think we've begun to tap into how beneficial modern dairy cows can be," says Jordan, adding that ultimately, the goal is to create an environment where cows—and farmers' businesses—can thrive.



The U.S. dairy industry leverages the latest advancements in technology to improve holistic cow care. To learn more about the impact of technology on cow welfare, visit usdairy.com.

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