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Chitale Dairy Uses RFID to Improve Milk Yields

Topics/Verticals: Supply Chain, Environment, Asset Tracking, Health Care

The system, developed at Bombay Veterinary College, combines RFID and cell-phone technologies to track data related to cow and water buffalo health in small farms.

By Claire Swedberg

May 21, 2010—After several years of testing a system that combines radio frequency identification and cell phones to record and track the health and nutrition of cows and water buffaloes on Indian farms, Chitale Dairy, in Bhilawadi, has significantly increased its animals' health and productivity. In fact, Chitale reports, since the dairy began utilizing the system, the animals' milk yields have increased and are now three to four times higher than the national average.

The reason for this increased yield, the systems' developers say, is that Chitale can now better manage the visits of the service providers it sends to those farms, as well as store a greater amount of resulting information about the visits and the services administered, or the observations made during those visits, such as vaccinations, calf delivery, medications or simply the volume of milk produced by a particular cow. The system was developed by researchers at Bombay Veterinary College. Because of that success, a company known as Infovet is now marketing the system's software to dairies throughout India and other parts of the world. The firm can also provide the RFID readers and tags, if needed.

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A Chitale service provider uses an Allfflex handheld interrogator to read a water buffalo's ear tag.

The software, known as Herdman, was designed to be used in conjunction with the animal RFID tags and cell phones' text messaging capability, in order to access information regarding the cows and buffaloes. Herdman was developed by Abdul Samad, Bombay Veterinary College's dean, and his colleagues. The goal was to make the collection of data regarding the animals' health more efficient and reliable.

According to Samad, the Indian dairy industry is complex, to say the least. Many small farmers contribute to the nation's milk production, which is one of the largest in the world. On average, he says, small farms have only three to five cows. To market their milk, farms can either join cooperatives—a collective group of farmers—or sell milk to private dairies. In either case, these dairy companies, or cooperatives, send service providers and veterinarians to each farm, to examine the cows, tend to their

health, monitor milk yields and administer to newborn calves. These service providers and veterinarians write down details related to what they find (such as a particular animal's health status, vaccinations, medications, calving, drying-off, births, disease testing and calf weight) and take that information back to a central office, where the data is then input in to a computer.

That process, however, is slow and cumbersome, as errors can be made and the inputting of data can not take place until an individual returns to his office. Visits are often not made regularly, due to time constraints and a shortage of oversight of the service providers. As such, even when a service provider does make a visit, that visit and information recorded about it are difficult to verify. Some of the information, for instance, might be based solely on a farmer's recollections (such as when the cow last delivered a calf, or the amount of milk it produced)—and in some cases, the service provider might not have physically visited the site, but simply recorded information as if he had done so.

In addition, despite the fact that India produces a large percentage of the world's milk supply, its yield per animal is low compared with that of other nations. When investigating an automated solution, Samad says he had hoped to develop a system that would "improve buffalo herd health and productivity-enhancement protocols." To carry out this mission, researchers felt an automated system was needed to provide data not currently available about animal health and nutrition on small farms.

Chitale, which sells approximately 60 million liters (15.9 million gallons) of milk from cows and buffaloes annually, has a computerized dairy farm with an auto-feeder and a milking parlor. However, it is also supplied with milk from small dairy farms scattered within 25 kilometers (15.5 miles) of Chitale's facility. It is these farms, and their animals, that the system targets, since information regarding each animal, such as its health, breeding and milk yields, has been sketchy.

By tagging every animal on each farm with an RFID inlay, Samad says, the service providers could capture the unique ID number of each cow or buffalo, and thereby prove they visited that animal and did not simply fill out a report without actually doing so. However, to input other information about the animal, such as regular updates related to its health or milk production, Samad and his colleagues opted for cell phones with text messaging functionality. When visiting an animal, a service provider would use his cell phone to enter the last four digits of the ID number encoded to an animal's RFID chip, and then describe whatever services he performed, or the observations he made. Farmers could later use their own cell phones to access data about their animals from Chitale Dairy's database, input by service providers (such as milk production, or the date when they should become pregnant).

Chitale began utilizing the RFID-based system two years ago. At farms that sell milk to the dairy, a low-frequency (LF) 134.2 kHz RFID tag from Bartronics was punched into an ear of each of 6,000 cows or buffalos.

Researchers at the college began by developing a software system to allow the collecting and translation of data related to each animal's health.

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Upon arriving at a farm, service providers carry a ruggedized Allflex USA handheld interrogator in a wand format, and read the ID number encoded to each animal's RFID tag, which complies with the ISO 11784 and 11785 standards. That ID number is stored in the handheld reader, and then plugged into the back-end system via a USB port at the end of the day, thus providing proof that the visit took place. Moreover, to record details about services provided or health observations made when a service provider visits, they input the last four digits of the same ID number printed on the cow's tag, which links the visit-related details with the animal's RFID number in the Herdman software, running on a back-end server.

The service provider then uses the phone to input details outlining what the visit consisted of, such as which vaccine was administered, or whether a cow was found to be pregnant. The Herdman software then updates Chitale's database regarding each farmer's animals. If service providers enter information about a visit to an animal and yet no RFID read is received at the end of the day—which could indicate the service provider did not physically visit the farm—the software displays an alert, informing Chitale's managers that the data does not correspond with an RFID read.

For farmers, Samad says, those details entered into the system by service providers about the health of their cows or buffaloes is made available via cell phone, since 90 percent of farmers have cell phones, whereas they are less likely to have a laptop computer to access Chitale's database via the Internet. Farmers send a text message consisting of the last four-digit numbers printed on an animal's RFID tag. To access breeding records for that particular animal, they would then type the letter B (for milk records, they would type the letter M) and send this message to the dedicated server maintained in Chitale's message center. The farmers then receive an auto-generated report in the form of a text message. What's more, the system enables any other farmer interested in purchasing a particular animal to access information regarding that animal, via his or her cell phone.

The Herdman software not only stores and shares data regarding each cow's or buffalo's health and services, it can also send alerts. For example, if an animal has given birth, an alert can be sent after a specific amount of time (120 days, for instance) has passed, to remind farmers and service providers that the cow or buffalo should be inseminated.

Farmers pay an annual service charge for the service and veterinary activities—typically about 700 rupees ($16) per animal, deducted from their earnings for milk sold to Chitale—which helps offset the expense of the RFID and cell phone system, as well as the cost of tags and readers.

According to Chitale, since the system was installed, the improved tracking of the animals' health—accomplished by keeping more accurate information regarding each animal—has resulted in the cows and buffaloes becoming more productive than the national average. National milk yield for buffaloes is about 800 liters (211 gallons) per lactation cycle, while buffalos whose milk is sold to Chitale produce approximately 2,500 liters (660 gallons) in the same amount of time. This is accomplished by more regular service visits, as well as by changes in the farming practices as a result of improved information from repeated visits. "From the data," Samad adds, "it is now evident that in the first two

years of the project, dairy animal fertility [the number of calves being born] has increased as we are tackling the fertility-related problems based on data analysis, and not merely relying on farmers' observations."

Farmers have been enthusiastic about the system, Samad reports. "On the first day when they received an SMS message [to alert them that the system was available], they were very excited," he says, "and more than 50 percent phoned to find out how to read the message, and what they were expected to do."

Initially, Samad notes, researchers did not share the information input by service providers, or the subsequent milk analysis reports they generated from that data, with farmers, "thinking that it may not be of much use to them." However, he says, "Their immediate demand was that they should also get this report as a text message. They then started comparing the analysis report they get when they hand over milk at the collection center, and they started protesting in case of discrepancy in milk fat value."

Based on analyses of the data provided by the RFID-based system, the school has begun working with the farmers regarding such details as convincing farmers not to restrain their animals in a small space, and not bathe the animals or regularly wash the concrete or brick floor twice daily, as researchers discovered that the trapped animal waste, combined with excess, pooling water, was a key factor leading to diseases, bad sanitation and reduced fertility. Instead of being bathed, the animals remain clean because they have more freedom of movement and no longer lie on wet, contaminated floors. "This idea is catching on fast," Samad says, explaining that the farmers "realize the benefits of the new system in two weeks, in terms of less labor, less water to fetch, [fewer] disease problems and better feed digestions due to improved rumination."

For service providers, the recording of information about the services they provide and their observations about an animal's health is easier than the previous method or manually handwriting reports following conversations with farmers. "They have data to convince management of their work contribution," Samad states, "and their performance, in terms of enhancement of productivity, can be calculated." Prior to using the system, service providers typically visited animals based on reported sicknesses, and often provided inappropriate administration of drugs and hormones, since information was based only on farmers' verbal reports. The focus of service providers has shifted from simply responding to calls from farmers when an animal seems to be sick, for example, to productivity enhancement and health management based on data from routine visits.

According to Samad, Chitale hopes to increase the number of tagged cows and buffaloes from 6,000 animals to 10,000 during the next three months. Its target is to have 20,000 of the farmers' animals tagged by 2011.

Another dairy company that has used the Herdman software is Sangamner Milk Union, a dairy cooperative located in Maharashtra. Last year, Sangamner began attaching a plastic ear tag to each of 5,000 animals, with a printed ID number stored and managed in the Herdman server software. Based

on the content of the text-message data provided by the service providers over the past year regarding each animal's condition, health and services received, the group has decided to attach RFID tags to the animals, in order to ensure the accuracy of the data related to each animal. This would enable service providers to use an RFID interrogator to read a tag's ID automatically, rather than having to visually read and input a printed number, which could lead to errors related to entering an incorrect ID number. The cooperative's target, Samad says, is to convert 5,000 animals' current plastic ear tags to RFID in one year. The group provides services to approximately 100,000 animals, which it hopes to tag and begin tracking over the next three years.