

Fad or future: Monitoring boluses make a comeback



Dairy basics - Herd Health

Written by PD Editor Walt Cooley

Monday, 19 September 2011 09:02



Trending topic article: Herd Health

Originally published: September 22, 2011

This popular article was our cover story in September 2011. [Click here](#) to jump to the article.

Progressive Dairyman Editor Walt Cooley interviewed several industry contacts about rumen monitoring boluses, including Dr. Ed Harness (pictured to the right), a veterinarian who cares for more than 40,000 animals.

"My focus for this technology is on fresh cow health because I think that is where we have lagged behind in the last 15 years," Harness said. "Every little bit of help we can get in the fresh cow stage is crucial. Peak milk is all of a dairy's money now."

Because this article has been so popular, we asked a followup question to Bella Ag's Nick Rettedal and DVM System LLC's Kevin Wild:

Q. Last year's article showed that low milk prices impede the adoption of rumen bolus temperature monitoring installations due to the costs of the system. Have this year's milk prices proven that theory correct? Why or why not?

RETTEDAL: I would say that theory was correct to a certain extent. 2011 and 2012 are not great years to compare, and a lot of producers in the U.S. are still below break even. Milk prices in 2012 were higher than 2011, however many producers were still in the phase of recovering from a sometimes devastating loss of equity coupled with high feed and fuel costs, which for the most part kept purse strings tight here in the U.S.

If we judge adoption of the technology based on sales volume, then the adoption rate is growing. The caveat to that statement is that the adoption rate in the U.S. is steady but low, versus foreign markets where new sales have grown exponentially in the last year.

What was interest in our technology from outside U.S. borders in 2011 has turned into sales in foreign markets in 2012. That being said, I feel there are a large number of producers at home that are on the fence or waiting in the wings, and as user feedback from product support all over the world continues to help shape things to come, we'll see a shift in 2013.

The hardware available to do this job a few years ago proved the concept but wasn't market ready performance wise. Last year the performance was better but scalability and marketability were challenging.

When your customer base ranges from 15 animals to 10,000+ the "one size fits all" approach is clunky, and our focus this year has been to turn a box of hardware into a scalable, robust, easy product. It's been a lot of work but 2013 will see some really cool stuff. In short, temperature monitoring isn't a fad, it's the future of large animal health management.

WILD: The devastating drop in milk prices and unprecedented increase in feed cost have forced dairies to cut every expense they can. Like any industry, such disasters do not encourage adoption of new technologies. Assessing the cost effectiveness of new technology is difficult due to highly volatile feed, milk and meat prices. The burden of maintaining milk production and reproduction will fall on individual health management. Treatments are most effective when administered early. Late treatments are less effective and are costly.

Countries with scarce resources have adopted precision dairy farming as a business necessity. To this point, the most productive milk cows in the world are in Israel. It is a fact that commodity feed prices will continue to rise and the dairy industry will be forced into new efficiencies to remain profitable.

DVM Systems' next product evolution, ovulation detection, will directly improve reproduction. Temperature based ovulation detection will change the game for breeding programs and go beyond heat detection to get the right cow pregnant quickly and also provide early illness detection. DVM Systems' temperature monitoring will become an essential part of precision dairy farming, not because of its advanced technology, but because it helps dairies achieve profitability.

ARTICLE

The Great Recession smoldered the early adoption of rumen boluses that monitor a dairy cow's core body temperature.

Now as the dairy industry recovers a bit of its equity, two companies that sell the technology believe their boluses are poised for a comeback and will improve how dairies manage herd health and reproduction.

2009: A bad year for boluses

Since 2001, Bill Ardrey, an engineer and owner of Techrol USA, has been adapting radio frequency (RF) technology previously used by the military for animal health monitoring. He first started putting RF-enabled boluses with active transmission in beef cattle in 2001.

He found that the technology was identifying signs of illness in feedlot and range cattle three to five days before pen managers were catching sick cattle.

"Cattle are herd animals," Ardrey recalls hearing a pen manager tell him once. "In the wild, herd animals are subject to predators, and predators look for the sick and old ones.

For self-preservation, a cow will keep her head up, even if she's sick. When she's too sick to keep her head up, it's going to be very expensive to treat her or too late altogether."

Ardrey installed his first commercial dairy bolus monitoring system on a 1,200-cow dairy in Texas in 2008.

"The system performed well beyond our expectations," Ardrey says. "Our intent at the time was to help reduce their death loss by 50 percent. After about 18 months, that dairy only lost two cows. We had, ultimately, nearly eliminated their unexpected death loss due to early detection."

Ardrey says the producer estimated his savings while using the system at about \$800,000, including decreased costs for death loss, replacement cattle and pharmaceuticals as well as increased milk production.

Midway through 2009, the Texas dairy got a buy-out offer it couldn't pass up and exited the industry, leaving Ardrey without any commercial dairy clients. Ardrey's system continues to be used in many research applications, and he's optimistic for his first post-2009 commercial dairy install soon.

"We are in our infancy on this product launch," Ardrey says. "Amazingly, many dairies have not heard of this technology. We are not further along as an industry because of the downturn we saw a few years ago."

2009's economic downturn also victimized another award-winning company that was marketing monitoring boluses.

April 13, although not a Friday, was an unlucky Monday for New Frontier Bank of Greeley, Colorado, and its dairy clients, including Bella Health Systems. The company that had just a few months earlier been named a top new product by World Ag Expo for its temperature monitoring bolus ran out of funding and folded.

"2009 was a bad year," says Bella Ag's technology officer, Steve Weilnau. "After the company went under, we got together and said, 'We still believe in this idea. We want to do it differently this time.' So we went back to the drawing board and developed a brand-new product."

Weilnau and his partner, Nick Rettedal, Bella Ag's chief operating officer, say the principal engineers and designers huddled together throughout the economic downturn and redesigned their original passive bolus, which only transmitted a temperature reading inside the rumen when activated in the parlor.

At the end of 2010, the company reincorporated as Bella Ag and began marketing a new active bolus, which transmits a core body temperature reading out of the rumen to RF readers as frequently as every eight seconds.

"The downturn was actually good for us. Since then everything has gotten smaller, faster, more efficient and more cost-effective," Rettedal says. "Now we can do 30 times what we could have before for the same price."

With technology, just give it time

Current monitoring boluses read the core body temperature of a cow from inside the rumen multiple times per day via wireless or hardwired RF readers positioned inside a cattle pen.

Producers can set a customized threshold for alerting them of high or low temperature readings. Both systems can send a text message to a producer when receiving a reading that is out of a pre-determined tolerance.

Dave Luzader, director of operations for Dairy Cheq, which distributes and installs monitoring bolus readers for Bella Ag, says the most costly part of the monitoring system is often a directional antenna or the hardwiring to move the bolus system's data to a dairy's home office rather than the cost of the boluses or readers by themselves.

"There have been electronic boluses around for a long time," Luzader says. "It's to the point now where the sophistication of the system is at a new level. We're at the early adoption stage."

Bella Ag claims its readers will pick up a signal emitted from a rumen monitoring bolus if the cow is within 150 feet of the device. SmartStock claims its technology can be read from as far away as 400 feet.

Both companies say that the battery-powered monitoring boluses they use today run on nano-amperes of power and can last in the rumen for up to five to six years.

"In most systems, the bolus outlasts the cow," Luzader says.

Both companies market their boluses for about \$50 apiece. Bella Ag customizes boluses with dairy names or logos to enable its clients to recover boluses after a cow is sent to slaughter and then reuse them until the battery dies.

10,000-cow dairy's experience

Earlier this year Dr. Ed Harness (*pictured above*), a veterinarian who cares for more than 40,000 animals in Idaho, began using Bella Ag's monitoring boluses on one of his clients' dairies. The cows are being compared to a group of 200 control cows on the dairy to compare how effectively the monitoring boluses are detecting core body temperature changes – the signal of early illness.

Three weeks after the boluses went active the 200 cows with boluses received the dairy's traditional set of vaccination boosters. The next morning, Harness says, the software alerted him that 87 percent of the cows had a temperature more than two degrees higher than the threshold for normal core body temperature – 102.7°F.

"I called Bella Ag's tech service guys and asked them what was going on," Harness recalls. "They said, 'Everything's going to spike a fever after vaccination. That's just a testament to how well this system works.'"

Harness and the hospital pen manager later determined that the reason most of the 200 cows with boluses showed a brief increased temperature, and not all of them, was not because of mechanical malfunction but rather a pen move. A few of the cows with boluses were in the hospital pen and had missed receiving their vaccination boosters.

"My focus for this technology is on fresh cow health because I think that is where we have lagged behind in the last 15 years," Harness says. "Every little bit of help we can get in the fresh cow stage is crucial. Peak milk is all of a dairy's money now.

Anything that happens to that cow in the first 30 days when she is on her way to peak milk will make her lactation curve plateau or at least peak 10 to 15 percent lower than where it could have. That means no peak milk for her. And that's all your profit."

Harness says high feed and fuel costs and increased scrutiny from lenders have made recent margins thin, leaving little room for costly health setbacks in a lactation.

"Assuring peak milk is my top priority," Harness says.

Harness says readers on his client's dairy are currently recording about 40 transmissions of core temperatures from each cow's bolus per day. He'd like to see that increase to about 48 per day or about twice per hour. An additional RF reader in the pen might help get there.

However, even with the current core temperature data he receives, using the boluses has led to earlier diagnosis of metritis, mastitis and pneumonia in fresh cows. Harness reports the dairy's antibiotic use has decreased by a third and is evaluating how much it will impact the dairy's 60-day removal rate from the fresh cow pen, which, before boluses, was already at just 13 percent.

"My goal is to eventually not have to withhold milk for antibiotic withdrawal or to not have to use antibiotics at all," Harness says.

Harness has trained the dairy's fresh pen manager to analyze the boluses' temperature readings, diagnose the situation and choose the appropriate treatment protocol. He says the dairy has tweaked many of its protocols for treatment because it is now catching illness much earlier.

For example, a typical treatment protocol for a metritis fever is now to give a drench (electrolytes, probiotics, calcium and propylene glycol), followed by another drench again and then, if necessary, treat with an antibiotic that does not have a withholding period. Harness says the dairy catches symptoms early enough that drenches intervene and the antibiotic treatment often isn't even necessary.

"I tell people that this technology helps catch symptoms you might feel when you have fever," Harness says. "You might come home from work and ache and your skin is a bit chilly, but then you eat dinner and feel a bit better."

However, by morning you have a fever and are sick in bed. We're now catching cows when they are achy, not visibly sick."

Harness says the dairy is still trying to pinpoint exactly how many days early they are catching symptoms compared to the control cows, but so far he says it's anywhere from three to five days sooner.

From early adoption to mainstream?

All the vendors of rumen monitoring boluses agree that for the technology to become more mainstream, a few things will need to happen.

First, dairies must improve their ability to get financing for the hardware costs to install the system, which is about \$60,000 for a 1,000-cow dairy.

"The worldwide interest in this product has been overwhelming, especially in the Middle East and Europe," Rettedal says. "They have a more consistent income from their quotas, so it is much easier for them to budget, plan and implement this system."

While over time the cost of the monitoring bolus equipment may decline, which could speed adoption, capital to invest in the system is only the first hurdle. Luzader says using the system requires dairy producers trust the accuracy and reliability of the core temperature results that the boluses return.

"Guys that are a bit more technology savvy, who trust computers and electronic ID, and who can do data analysis when looking at software, they are the early adopters," Luzader says.

Luzader says even though the system is delivering reliable, consistent body temperatures, it still requires a producer to interpret the data.

"Even though the data is spectacular, it's not coming up and saying, 'This cow has metritis,' or 'Breed this cow,'" Luzader says.

Luzader is also a distributor for activity monitoring systems used for heat detection. He says although monitoring boluses are picking up body temperature spikes related to estrus, producers who buy into the bolus system will be more likely interested in their application to improve health.

"Are you going to go up and down the road selling this system? ... No!" Luzader says.

Harness says additional training will be required to incorporate the temperature data. In some cases, that may require employees to alter how they diagnose cows and the treatments they have been used to giving.

"On large dairies, we tend to have people who have specific jobs with specific protocols," Harness says.

“If we give them more tools, we have to give them more training. That's because the people who are putting the money out for the boluses likely aren't going to be the same ones doing the work from the information they receive. So there has to be employee buy-in.”

Next steps

Proponents of monitoring boluses say it's only a matter of time before word-of-mouth success stories and more validation from the research community take usage of their products to the next level.

“The biggest challenge that we've got is to get individual users to trust the system because they are used to trusting their gut and watching the animals or seeing heads down when they are sick,” Ardrey says. “I've launched new technology into a couple of different fields. It's always a challenge to get people to change, even when it's for the better.”

Ardrey and others are confident more widespread use of the technology is forthcoming.

“The constant adoption of other technology in the dairy industry, such as smart phones or tablets, will be a huge boon for producers to gain the information they need to make better decisions,” Weilnau says. “As producers figure out how to implement these technologies on their operations, it's going to create an opportunity for these systems.”

Rettedal says boluses automate and accelerate a proven cow health practice – temping cows – which would otherwise require human intervention and several minutes of time.

“If a producer understands that core body temperature is a key indicator of health, then we can simply give him or her a tool that will automate the process of getting that information,” Rettedal says.

Early adopters say there are many underexplored applications of the technology. In addition to health and estrus monitoring, the technology may be useful to improve milk quality and even predict a calving event.

“Every time I have a conference call with Bella Ag, we think of three more things we can do with it,” says Harness, who in addition to doing research for the company will be the company's western states distributor.

Rettedal says younger farm managers coming back to their parents' dairy and transfer of dairy management to the next generation will favor faster adoption of the monitoring boluses.

“We still run into dairymen who are intimidated by using a computer,” Rettedal says. “The next generation of producers are proficient and comfortable with technology. They want to use it, so boluses are the future.”

These companies all see a future where technology helps decrease production costs and improve producer margins – perhaps helping the U.S. keep up with other lower-cost milk-producing nations.

“Regardless of whether you have a 15,000-cow dairy or a 15-cow dairy, the ability to get temperature monitoring data into the hands of technicians, and do so in a timely manner, will create the efficiency the U.S. dairy industry will need to stay competitive on a global scale,” Weilnau says. **PD**

PHOTO:

TOP RIGHT: Veterinarian Ed Harness says monitoring boluses are helping one of his clients' dairies to detect illnesses in cattle, especially fresh cows, several days sooner than cows without the boluses. *Photo by Fredric Ridenour.*