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The Tech Forefront

The beef industry is taking technological innovation to a new level to drive improvement.



Weyman Hunt, Innisfail Farms, Madison, Ga., passes along the value in collecting accurate data to his sons.

by *Austin Black*

Efficiency equals profitability in the beef industry. And as technology advances, efficiency increases. Reducing inputs, adding value and improving marketing help strengthen the bottom line.

Managing cattle to perform their best with minimal input is crucial. And it all starts with genetics. For years seedstock producers have benefited from artificial insemination (AI) and embryo transfer (ET) programs to improve the quality of their herd. New technologies are available to take herd improvement to the next level.

Make data work for you

Weyman Hunt, Innisfail Farms, Madison, Ga., knows an animal's phenotype does not tell the full story. "We've been doing ultrasounds forever," he says. This helps him determine which genetics produce bigger ribeyes and more marbling. His customers are commercial cattlemen who rely on pounds of beef to make money. "We're in the beef business, and at the end of the day we make steaks and hamburgers that are hopefully high quality. We need to select for animals that are going to do that."

But high carcass potential does not always mean a bull is efficient. To gather more information, Hunt began testing his bulls to get residual feed intake (RFI) data. Collecting the RFI helps create a dry matter intake expected progeny difference (EPD). "We're trying to make cattle more feed efficient. At the end of the day that's what it's all about – trying to grow beef as efficiently as possible," he says. "We're trying to collect more of that data because that's profit at the end of the day when you're feeding cattle."

Hunt also retains ownership through the feedyard. Witnessing firsthand how genetics influence feedlot efficiency helps him make breeding decisions. Some of the differences are surprising. "We're seeing major differences in different genetics feeding out," he notes. "Some of these cattle you would think would be great just jam up."

Feed conversions have to match the phenotype to be profitable. "It's changed the direction of some of the breeding," he says.

Another criteria Hunt uses for breeding decisions is DNA data. Every bull Hunt sells is DNA tested, as are his donor cows and ET calves. This testing increases the animal's EPD accuracy and helps determine its potential before it produces.

Hunt has used ET in his operation for many years but always waited to see which cows actually performed. "Previously we wanted them to have six or seven calves before going to the donor pen," he says. Now, with several generations in his herd, Hunt can collect DNA on young cows to determine their genetic potential early. "DNA is allowing us to accelerate our selection process of those cows," he adds.

But the most beneficial technologies Hunt uses are on his phone. He began using Facebook about five years ago to market his cattle. Admittedly, he was "adamantly opposed to it," but it has become one of his best marketing tools. It is worldwide exposure for little to no cost. This combination makes it an efficient way to market cattle and to stay connected with customers.

"Facebook is a phenomenal resource to sell cattle," Hunt says. "When you think about it, there's no commission. Even if you sponsor a post for \$100, it goes a long way.

"Everyone has to have a website but I can update a Facebook page in seconds. I have to get someone to update a website," he adds.

Hunt posts pictures of his kids showing cattle and uses his own hashtags to spark interest — #herefordthatmarble, #genotypewithphenotype and #carcasswithstyle are catchy phrases that communicate Hunt's mission to produce cattle that perform in the ring and on the rail.

His other mobile app of choice is "Calf Book." A concept he created, Hunt worked with a programmer to develop the digital herd book app, which allows users to access performance, health, breeding and calving records on an entire calf crop in one program. "Calf Book is an app that tracks everything in your record book but it's sortable and linked," he explains.

The app also ensures every employee has herd records at all times. "Everyone uses their calf book, but inevitably you don't have the right one when you need it. And you can't compare the previous year's calves," Hunt says.

The app is cloud based but stores information on the phone. "I want to be able to look at cattle in the field and have all my information right there," he says. "When I'm in the field and have zero service, I can still access and input information. When you get back to the internet, you can sync it."

Hunt also designed the app to allow seamless workflow for registering calves. "I can export all the data directly into the spreadsheet where we register Hereford calves. I proof all my data and make corrections, then save it and re-export it into the format the American Hereford Association needs."

Lend me your ear

The more data producers have, the better they can manage their herd. And with new technology offered by companies like Allflex®, data is more accessible than ever. A new product called SenseHub is revolutionizing how producers can monitor cattle for estrous and animal health.

In 2013, Allflex purchased SCR Dairy, the world's largest supplier of milk meters and cow monitoring devices. One of the top selling products was a collar that monitored the estrous cycle and animal health. Andy Dorn, Allflex regional manager, received the task of making the product work for beef cattle. Dorn researched the collar and learned it was insufficient for beef cattle. "It was bulky and they tried tearing it off," he notes. The algorithm was not the same either. "The algorithm didn't take for granted that a beef cow moves about seven times as much as a dairy cow and doesn't eat the same thing every day," he notes.

For five years, Dorn oversaw research and development for an ear tag. "The engineers got us an ear tag in 18 months. We went from a two-by-three inch device that weighed two pounds to a 26-gram device that's as big as a half dollar — with all the same things in it."

New algorithms were designed to accompany the battery-operated tag. And after thousands of hours of evaluation on beef cattle, it was ready for market.

It is a simple concept wrapped in an amazing application. The tag monitors animal activity, rumination, respiration and eating. Using an animal specific baseline, the tag highlights abnormal activity that can indicate oncoming estrus or potential health problems. "The ear tag has a multitude of sensors that detect mobility and movement and the different ways an animal moves



The use of TSUs by AHA members has become increasingly popular since their implementation in late 2017. TSUs currently account for 25-50 percent of all DNA samples tested through the AHA.

it ears," Dorn says. "We're detecting estrus through rumination decrease and activity increase. And we're using algorithms to establish tighter times of ovulation."

Instead of following traditional AI timing, producers can catch cows in peak estrus. "That animal might have peaked at 3 p.m. and we need to breed her — or at least we know she peaked and we probably shouldn't put expensive semen in her because we might have missed her ovulation," he explains.

Activity levels can indicate disease onset as well. Dorn points to a study by Cornell University in 2016 which showed rumination would decrease several hours before the onset of a fever.

The tag records data every minute and downloads the information to a remote reader every 20 minutes. If the reader is not within a quarter mile of the tag, the tag will store 24 hours worth of data. Producers can access the SenseHub server through their phone or computer to get estrous and health reports.

SenseHub tags are available in two models — starter and premium. Starter tags only detect estrous activity and are \$56 each. But the tag battery will last three years, which makes the investment about \$16 per year.

Premium tags monitor estrous cycles and animal health and cost \$72 each, or \$20 per year. The SenseHub server, reader and installation is \$2,750.

Tags hit the market in June 2018 and gained fast attention. Seedstock breeders with anywhere from five to 1,500 cows have invested in the technology. Future enhancements will include longer lasting batteries and more monitoring applications. Dorn says there is opportunity to focus on calf health issues in the feedlot, as monitoring respiratory disease and scours can help reduce mortality.

If SenseHub tags are cost prohibitive, producers can use another Allflex product to collect data. Tissue Sampling Units (TSUs) are widely used by seedstock operators to collect DNA samples. This product was introduced in Europe to eradicate bovine viral diarrhea (BVD). European laws dictate animals must carry two forms of identification and have a tissue sample on file for disease. But the animal cannot have more than two incisions in its ear. So, Allflex designed a tag with a tissue sampler.

"It was all good but when we brought it to the U.S., the obvious use wasn't BVD eradication — it was genomics," Dorn says. BVD testing requires a dry sample so the disease is not altered. "With genomics, you want to preserve the DNA so letting it dry out is not an option," he explains.

The previous product resulted in poor tag retention and lower call rates at the lab. To solve the problem, Allflex designed a TSU specifically for collecting data. "In 2008 it started and by 2012 or 2013, this was firing on all cylinders in the dairy industry," Dorn says. "The growth trajectory of TSUs has been exponential in the last three years. But it really launched in the beef industry in the last 18 months."

With a new design and automated testing in the lab, producers can collect a sample in seconds and get results within 10 days. "It's a way better system than to sit there and punch out hair follicles. They are a very large efficiency booster."

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“Using technology to make management decisions will help producers focus on raising the highest quality cattle possible.”



Sexed semen has been popular in the dairy industry for a number of years, and experts predict it will soon take the beef industry by storm.

Pick your sperm

Using DNA to select top animals and to monitor performance helps producers improve management. But what if producers could plan their entire calf crop? Turns out they can — with sexed semen.

In the early 2000s, the founders of Sexing Technologies acquired the initial technology that sorted male and female cells. “It’s based on the premise that there’s a difference in the amount of DNA in male versus female sperm cells,” says Aaron Arnett, director of beef genetics at ST Genetics®. “Female sperm in cattle have 3.5 percent more DNA content than male sperm.”

The technology is a simple process, in theory. “We put the ejaculate in a dye for several hours. The DNA in semen will absorb the dye,” he says. “Because there’s more DNA in a female cell, it will absorb more dye.”

Next, the ejaculate runs through a laser that detects the fluorescence, or brightness, of the sperm cell. Since the female cells have more dye, they shine brighter than the male cells.

“Once it’s determined if it’s a male or female cell, the droplets of media containing the individual sperm are assigned an electric charge and passed through a magnet,” Arnett says. Male and female sperm each receive a different charge. Cells are then sorted into three cups based on electric charge — the third cup collects dead or abnormal cells that didn’t receive a charge. The result is sexed semen that is guaranteed to contain a minimum of 90 percent of the desired sex of sperm cells. “Anytime there’s a big value differential between male and female animals, there’s a value in sexed semen,” he says.

The technology took off in the dairy industry, and Sexing Technologies began servicing AI studs across the country. “Bull studs pay a royalty for each straw of sexed semen,” Arnett notes.

In 2015, Sexing Technologies introduced its own lineup of beef AI bulls and rebranded itself as ST Genetics. Arnett was hired to lead the beef genetic program, and the rest is history.

ST Genetics continues to adapt technology to improve accuracy. “The goal is to have fertility be the same as conventional [semen]. They are close. They’ve made a lot of refinements,” he says. Producers will experience 5 to 10 percent lower conception rates on most bulls with sexed semen. High fertility bulls will be close to conventional semen.

Sexed-semen technology has a lot of potential in the beef industry. “People use AI sires because they want the daughters. They are high genetic merit bulls out of special cows that breeders sometimes couldn’t afford to purchase themselves. They want those genetics in their cow herd and the fastest way to improve a cow herd is to get the heifer calves from a desirable sire,” Arnett says.

Hereford breeders have noticed the difference. “I think Hereford breeders have shown more interest in sexed semen than other breeds of beef cattle,” he says. “We have several really good Hereford bulls that would be features in the breed and the demand for those bulls is incredible.”

Arnett says sexed-semen is often twice as expensive as conventional semen. But mating cows to produce bull or heifer calves can boost an operation’s profitability. Producers can choose a strong carcass bull and breed terminal-oriented cows with male sperm, or they can choose a maternal-focused bull and breed replacement heifers with female sperm. “All the cattle will end up in the feedlot where value is determined on carcass merit,” he says. “Those gender differences do transition into dollar differences in commercial beef production.”

As cattlemen are tasked with producing more beef using fewer resources, efficiency is key to staying in business. Using technology to make management decisions will help producers focus on raising the highest quality cattle possible. **HW**

Editor’s Note: Austin Black is a freelance writer from Butler, Mo. He operates Backroad Productions, a photography and video marketing agency.