

HEALTHY HEARTS

start with knowing more

Bovine congestive heart failure research reveals new information.

by Miranda Reiman, senior associate editor

What is six or seven in 10,000? It's a small chance — only 0.07%. What if that moves to nine or even 15 in 10,000? Still a low probability.

The odds aren't impossible, but they don't feel likely. If you're trying to win a lottery, that's a bummer; but if you're trying to avoid cattle deaths related to bovine congestive heart failure (BCHF), the numbers feel like a win.

Those statistics are from a recent Kansas State University (K-State) retrospective analysis of health data on 4.5 million head of cattle fed across the United States. The research, which was supported in part by the Angus Foundation, quantified the incidence of BCHF across the industry and sought to identify patterns in the data.

“We were just trying to find answers,” says Kelli Retallick-Riley, president of Angus Genetics Inc. (AGI). “At the beginning of this conversation, when we have these cattle popping up and dying of congestive heart failure at very low elevations, it raised a lot of questions. There were a lot of anecdotal thoughts out there about what types of cattle were succumbing to this disease, what age they were, how far along they were on their days on feed, what types of cattle. We had a lot of assumptions, but we didn't have a lot of data.”



Now they do

In a multistage project, researchers at K-State's Beef Cattle Institute (BCI) looked at incidence among the whole population and trends in everything from days on feed to in-weight to seasonality.

The first report showed around six head out of every 10,000 died from BCHF. An additional analysis looked at railers, or cattle sold outside the group marketing due to low performance, and around nine in 10,000 head were flagged for BCHF.

"We found that we're actually railing cattle at a higher rate than we are seeing cattle die of heart disease in the feedlot," says Blaine Johnson, the K-State veterinarian leading this project.

Adding the railers and deaths together led to an estimated 15 BCHF incidences in 10,000.

"That is slightly higher than what previous literature is reporting, but you have to be careful when interpreting all of that," he says. "Is this real, or is this something that we're looking harder for?"

But first, what is BCHF?

At its simplest, BCHF is just as it sounds, Johnson says — a noninfectious form of heart disease, that causes the heart to stop as it progresses. Chronic high blood pressure damages tissues.

"When an animal experiences pulmonary hypertension for a long time, both within the lung and particularly the pulmonary artery that goes from the right side of the heart to the lung, then those tissues become inflamed and they lose their elasticity," says Milt Thomas, Colorado State University (CSU) animal scientist, who is also studying the disease.

That makes the heart work harder and under higher pressure because the organ is no longer as flexible.

"It becomes like a garden hose," Thomas says.

CSU developed a heart scoring system (see sidebar) to rank severity from animal to animal and assign some objective measures to ongoing research.

"Heart disease is not a new disease," Johnson says.

High-altitude disease (HAD), a form of congestive heart failure experienced when animals are stressed by lower oxygen levels, was first noted by CSU veterinarians in 1914.

"So, for high altitude it's been documented and researched for over 100 years," Johnson explains. "Then we started seeing it in lower-level elevations."

Today, high-altitude disease is generally classified as being at elevations of 5,500 feet or above. Lower than that, and the cause is still somewhat unknown.

However, scientists suspect it has to do with some form of hypoxia.

Overall BCHF numbers are still relatively small, but there is increasing awareness in the cattle-feeding community.

"These heart disease cases are memorable and they're often fatal, so it becomes a bigger deal. We start talking about it, and we start looking for it. We do see that it is being found and identified more frequently," says Brad White, BCI director and fellow researcher.

Part of the challenge with health records is lack of a universal definition.

"The first thing we noticed is that there's a large variation in what yards are actually calling heart disease," Johnson says.

He pooled data from more than a dozen different labels, including congestive heart failure, brisket disease and high-altitude disease.

Once the definition is consistent, the next hurdle is correct diagnosis, because it's not that common, it mimics other diseases and a cattleman never knows for sure unless there's a necropsy. Common BCHF symptoms, such as labored breathing and general failure to thrive, could also indicate bovine respiratory disease (BRD) or Acute Interstitial Pneumonia (AIP).

Across all the yards, occurrences varied a great deal, with some locations declaring zero cases and others 15 in 10,000. That suggests a difference in reporting, Johnson says.

What we do know

Digging into the data, they looked for clues that would point to a specific type of cattle most commonly affected. They analyzed the information for arrival weight, gender, time of year and other factors.

"Some of the things that we've heard early on — and those would make sense that they could play a factor in when we see heart disease — when we go back and we look at the data across multiple yards and multiple years, we don't see that those are having a big impact on their risk of heart disease," White says.

The idea that it's only a challenge late in the feeding period is not congruent with their timing analysis, Johnson adds.

"It wasn't just localized to one period. It was throughout the whole feeding period," he says. "So it kind of went against some of the anecdotal things we would hear out in the industry buzz."

Johnson is currently working on a second paper for publication, which includes a few more years of data

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and also notes that BCHF is found in native beef animals and dairy animals in similar fashions. It points out that it is not specifically an Angus problem.

“Angus is 75% to 80% of the cattle on feed, so that’s not a fair statement in my books. They’re just the biggest part of the animals we see on feed,” Johnson says.

Why we want to know

Of all feedyard mortalities, BCHF accounts for 4%. That’s compared to 43% for BRD or 19% for gastrointestinal issues. That’s fairly small in comparison, but when a producer suffers a loss, they want to know why and how to prevent it, Johnson says.

At CSU, their work shows it’s not just about the deaths, either.

“I think we’re very responsible in the beef industry. We do whatever we can every day to keep our animals healthy, and so we’re learning about the health of these animals,” says Thomas, noting it’s not all about profit.

However, for those animals with BCHF, their work indicates it reduces efficiency even if they do live. In a recent study, the CSU team found groups with lower heart scores also had better performance. The group with an average heart score of 1.36 (normal), had an average daily gain (ADG) of 3.3 pounds (lb.) per day and a feed-to-gain (F:G) ratio of 6.26 lb. per pound of gain.

That’s compared to a 2.7 ADG and 8.5 F:G for the group with a more moderate heart score around 2.8.

“If a health issue is making them less efficient, we want to do what we can to improve that,” Thomas says. “And so it’s very exciting right now to see people in the beef industry start to step up and say, ‘Hey, I think we’ve got some issues, and let’s do what we can to make it better.’”

The whole point is to get at tools to act against BCHF in the future.

What we hope to know

“This is kind of the foundational groundwork we need for us to try to go out and say, okay, what do we do next?” Retallick-Riley says.

The K-State team designed their project to find a target population likely to have a high risk for BCHF, with hopes to find likely candidates for DNA sampling.

“The downside of everything we’ve seen is that there is no clustering of data that we can strictly make management decisions on,” Johnson says.

It’s a disappointment because it doesn’t give them a specific group to key in on, but he’d rather have the industry take the next steps based on fact and not assumptions.

“We can’t go out and do a screening or a test of all cattle until we figure out which groups of cattle are most likely,” White says. “That’s really where we want to continue to hone in and find out what else can we learn about those cases. What are some of the potential contributing or risk factors?”

There are also a few steps in between identifying groups and causes and developing a tool cattlemen can use.

Early work on small test groups at CSU shows a wide difference in heart score between sires — some progeny had an average heart score of 1, compared to a heart score of 3.4 for another.

“That’s a pretty good indication that there is a genetic component,” says Scott Speidel, CSU geneticist.

Speidel, Thomas and the team are currently working on a multi-agency project to help determine relationship between PAP, heart score and BCHF and work on tools for prediction.

Right now researchers say they’re in the discovery stage. Learning more about the disease, both how it works biologically and its epidemiology will allow for future work to help producers do something more about it. In the meantime, White says cattlemen should watch for it and have a plan.

“We have to be aware it’s out there,” he says. “While it’s a relatively rare occurrence, we need to be cognizant of what are those clinical signs that I should be looking for? How might I distinguish that from some of our more common diseases like respiratory disease?”

BCHF occurs throughout the feeding period and in a variety of elevations.

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— Milt Thomas

“We can’t have blinders on,” White says, noting it’s ideal to talk with a veterinarian ahead of time to know what you’ll do if you get a BCHF diagnosis.

As more data is available and these new research projects advance, the collective knowledge will grow.


Retallick-Riley says as they talk with cattle feeders, generally BCHF only comes up when they’ve had specific personal experiences with it. Most do not consider it a top issue on their list, but she says that doesn’t mean the breed should completely ignore it.

“When there is an issue in the industry, Angus needs to take a leadership role because if you want to make change in the U.S. beef industry from a genetic level, you make it with Angus,” Retallick-Riley says.

That’s why the Angus Foundation is actively funding projects on this topic.

Cattle that are more resilient to stress events are beneficial for everybody.

“If there is genetic component to healthier hearts, I’m not saying you’re going to eliminate all the death loss due to heart disease in the feedyard, or even at elevation, but maybe we can make them healthier across the board,” Retallick-Riley says.

That seems like winning odds all the way around. 

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Indications of HEART HEALTH

“We can’t do blood pressure and those kind of measures like we do in people. We just don’t have the equipment or the tools to do that,” says Milt Thomas, Colorado State University (CSU) animal scientist.

But that doesn’t mean the cattle industry is completely without measurements.

Since the late 1980s, trained veterinarians have measured pulmonary arterial pressure (PAP) by running a catheter through the jugular vein to the pulmonary artery. The lower the pressure, the better response that animal is having to a hypoxic environment like high altitude, Thomas says.

It’s not a perfect relationship, but recent studies show PAP can be used as an indicator trait for BCHF. However, that’s labor intensive and requires a high level of training. Typically it’s reserved for animals that will stay in the herd rather than cattle on feed.

CSU recently developed a scale for evaluating heart health at the harvest level. On a 1-to-5 rating, hearts are measured as 1 being normal and 5 as the worst, or the most remodeling of the organ.

“If an animal’s experiencing pulmonary hypertension for a long time, the right side of the heart’s going to malform, and it’ll lose its heart shape and start to look more round,” Thomas says. “The right side’s bulging out, and it’ll look more like a volleyball.”

A recent analysis of both high- and low-elevation research groups indicated 33% of the cattle were 3 and above for heart scores; 9% hit 4 and above. Fives are rare in the plant, because typically animals that reach 5 have already perished, Thomas notes.

Correlating the heart scoring system to actual cases of BCHF is promising for the research community.

“It’s a very plausible methodology to collect big data that could be applied to genetic evaluation,” he says.

