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Mountain Masters



PHOTO BY CATHY WRIGHT

Herefords' reliability in high altitude makes them a smart choice for cattlemen in high elevation.

by Sara Gugelmeyer

Ranching in the mountains isn't all pretty views and deep meadow grass. It might be those things too, but high altitude definitely presents challenges. This important management factor is the reason why many high elevation cattlemen are using Hereford genetics.

Dr. Tim Holt, consultant, veterinarian and associate professor in the College of Veterinary Medicine at Colorado State University, is the widely acclaimed expert on grazing cattle in high altitudes, after decades of research and testing. He says while there is some variation within the Hereford breed, "...the American horned Hereford tends to be naturally

more resistant to altitude problems. Through the years, ranchers in high altitude that were having brisket disease issues have found some relief in the death loss by adding Hereford into their breeding program."

What's brisket?

To flatlanders, brisket is mostly just a really good cut of meat. But to producers at about 5,000 ft. or higher, it's a commonly used term for a serious problem. Brisket disease, also called high mountain disease or dropsy or, more accurately, pulmonary hypertension occurs when the oxygen shortage at higher elevation causes increased resistance to blood flow in

the small arteries of the lungs. The heart must compensate by building up a higher pressure.

Depending on the severity, the increased pressure results in right heart failure, which is seen as fluid buildup in the brisket, chest cavity and elsewhere. Ultimately, the heart fails and stops beating. Cattle differ in how they respond to the oxygen shortage. Some can tolerate high elevation for long periods of time with no effects at all. That type of cattle is absolutely necessary to graze high-mountain pastures.

Tyler Knott of Knott Land & Livestock, along with his dad, runs

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200 pairs near Oak Creek, Colo. Knott's family has been in business in that area since 1936. Brisket has been at the forefront of nearly every management decision.

"The No. 1 problem is death when you are dealing with brisket disease," Knott explains in layman's terms. "The cow cannot adjust her respiratory rate to compensate for the lack of oxygen at higher altitude. So her heart has to work harder to get the same amount of oxygen to the body. As the heart works harder, it increases blood pressure, then it becomes chronic disease, they start retaining fluids, and their performance is reduced. A lot of times on cows, you'll start having open cows because they can't meet their reproductive nutrition demand because they are utilizing so much energy just to stay alive. The acute side is their arteries will rupture or the heart will blow out. Ultimately, death is the end result of all brisket-related issues."

Dead cows and calves don't help anybody. That's the reason why cattlemen in high altitudes have kept Hereford part of their herds.

Knott says, "Our cow herd has been historically Hereford-Angus based. For a while we went predominately black, and now our cow herd is about 70% Angus, and mostly black-hided. That's why we've been going back with Hereford bulls. We like the phenotype and performance of the Herefords. We can buy better Hereford bulls with less risk of altitude problems than we can Angus bulls."

For high altitude producers, PAP testing is a must. PAP stands for pulmonary arterial pressure, and, at this time, it's the only way to determine a bovine's susceptibility to brisket disease. (See "PAP test" sidebar for more information.)

Since 1980 Holt has been traveling to high altitude operations and testing



DNA testing for brisket disease susceptibility

Since 2009 Manuel Encinias, New Mexico State University Extension beef specialist, and Jon Beever, University of Illinois animal science professor, have been studying the genetic aspect of brisket disease. Encinias and Beever hope to find a genetic marker for susceptibility to brisket disease.

Beever says he believes it's possible. "Since it's heritable, this means that we can find — somewhere in the DNA — the set of genes and changes in those genes that control that susceptibility," he explains.

Beever adds that there is a belief that, in general, the Hereford breed is better suited to high altitude, and there is some data to support that belief, but it would be advantageous to those selecting for that trait to have a DNA marker.

"We believe that we can develop a fairly accurate DNA-based test that might be applicable to any cow in the world. We would then know whether this animal can survive at 8500 ft., or realize that this animal wouldn't make it, and there's no point in taking it up there—or no point in using semen from that animal in a herd that lives at high elevation," Beever says.

American Hereford Association Chief Operating Officer and Director of Breed Improvement Jack Ward says, "Brisket disease is a trait of interest that has huge economic impact in some regions of the U.S, and it would be very useful to have a simple marker test to find genetics that are favorable for this trait. This test could reduce the risk for breeders supplying genetics to these regions."

The major obstacle to the project is getting DNA on animals that have been PAP tested. It takes hundreds of DNA samples for Beever to be able to find the genetic marker reliably.

If you are interested in supporting this project, contact Beever at jbeever@illinois.edu or 217-333-4194. **HW**

beef cattle. He estimates he's tested more than 350,000 head to date.

The lower the score the better, but there are many factors to consider.

The test must be performed in high elevation. Holt says, "Testing below 5,500 feet should always be viewed as a screening test meaning that a high PAP score is accurate but a low score only means that at this elevation the

animal may be a worthy candidate for altitude use but should be retested after arrival in higher elevations. A high PAP score, regardless of elevation, is accurate but a low score at a low elevation should always be repeated once a higher elevation is reached."

Other criteria involved include the age and sex of the animal. One of only about 12 people in the country that perform the test, Holt gives the cattlemen the PAP score as well as the systolic over diastolic blood pressure.

"Using those three numbers, I will help them decide about each animal," Holt says. "It's an instantaneous evaluation but we talk about each animal when it comes through and make a decision. We are making some big decisions right at the chute."

Typically a score in the 30s or the low 40s will be fine at high elevations.

Holt cautions though, "While the test is about 95% accurate when done at higher elevation (greater than 6,000 feet), it is not the whole answer. A low PAP test does not mean the animal will never get brisket since there are other factors that can initiate the onset of the disease. The PAP test can only tell if an animal has pulmonary hypertension; it cannot determine why. In most cases we think that the elevated pressure may be genetic in origin but we cannot forget all the environmental conditions that can result in brisket disease. The other influences that can be an issue are pneumonia, feed, parasites, among others. There can also be congenital heart and lung defects."

Though there are no guarantees, Holt estimates that about 90% of high altitude breeders utilize PAP score in some way.

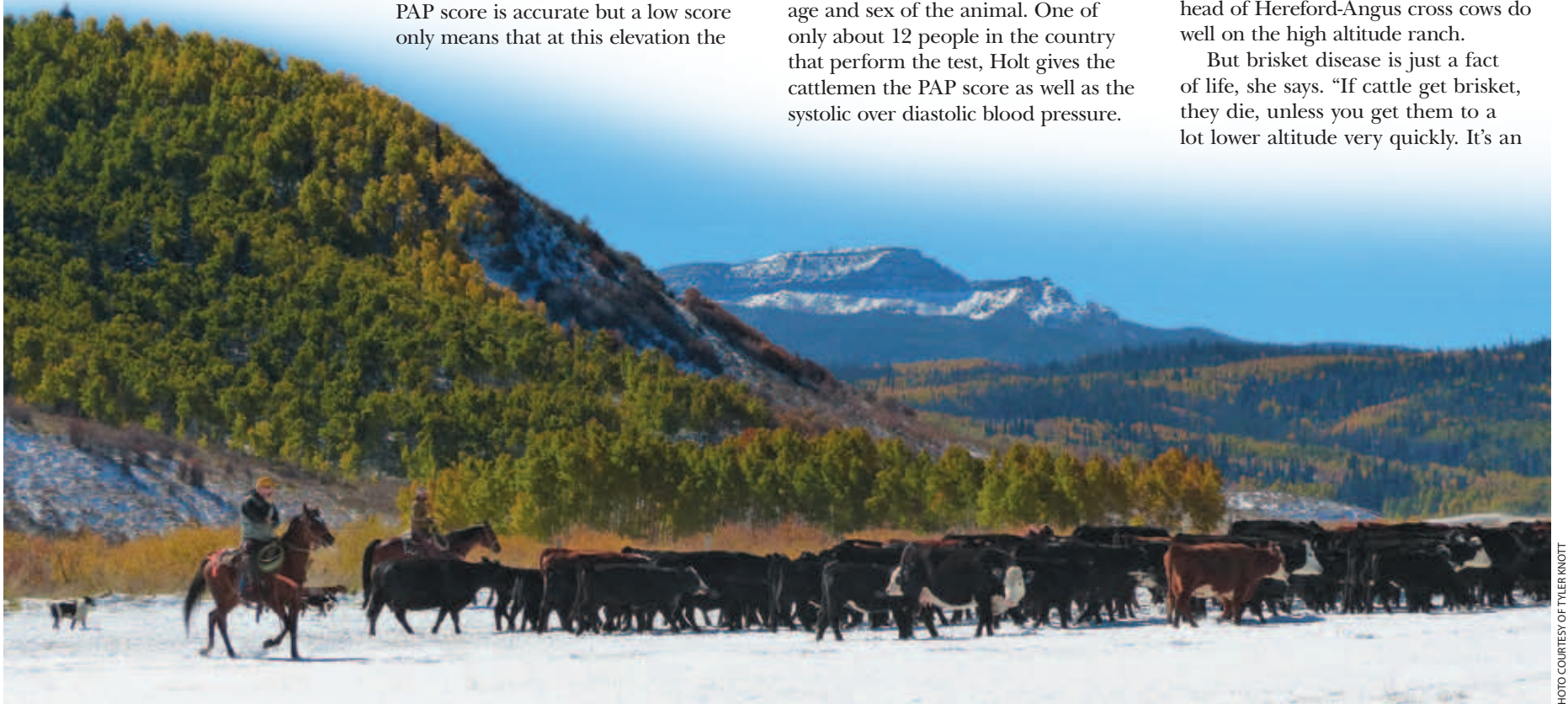
It certainly isn't cheap. Holt's costs are about \$22 to \$25 per animal, plus each test takes about three minutes, so there is considerable labor involved.

Without it though, the effects of brisket disease can be devastating. "For a completely non-tested herd at 8,000 feet, the death losses that I see range anywhere from 5 to 10% of the calf crop with losses sometimes reaching 20% or more," Holt says. "Cattle may exhibit other effects of altitude besides death including poor weight gain efficiency and compromised reproductive status."

Bull buying

Susan Nottingham is the fifth generation in her family to manage Nottingham Ranch Co. near Steamboat Springs, Colo. Her 1,100 head of Hereford-Angus cross cows do well on the high altitude ranch.

But brisket disease is just a fact of life, she says. "If cattle get brisket, they die, unless you get them to a lot lower altitude very quickly. It's an



Knott Land & Livestock is adding more Hereford to its herd.

economic challenge for sure," she says. "If you're at altitude, you know you have to try to minimize your losses in any way you can."

While some producers PAP test all replacement females, Nottingham says because of her large herd, she just can't justify the expense. Instead, she is careful when purchasing bulls. Bulls must have a good PAP score, and because of the heritability of the trait, her calves (which she doesn't sell until they reach about 900 lb.) and retained replacements will, for the most part, do fine.

"When a cow has a calf that gets brisket, we get rid of her," Nottingham says. "It's a genetic thing, more than anything. There are a lot of contributing factors to brisket, although genetics are certainly the primary reason."

Nottingham says she would prefer to buy bulls raised at high altitude, but that's not always possible. That's why it's important to get a PAP score guarantee when purchasing. Most bull sellers offer that although it's certainly something worth checking. Testing is a hassle as cattle cannot be tested below 4,500 feet, and cattle must be at altitude for three to four weeks before they can accurately be tested.

"For instance," Nottingham explains, "two years ago I bought 17 Hereford bulls from Van Newkirks (Nebraska)."

Two months later when Holt PAP tested them, three didn't pass. Van Newkirks gladly took the bulls back because their passing the test was a condition of the sale.

"That happens fairly often, because I buy in volume," Nottingham says.

That's the reason why it's critical for producers to use reputable breeders like Van Newkirks, who will stand behind their bulls.

"It's important to have a producer that will work with you," Nottingham says. "You have to make known before you buy that it's a condition of the purchase."

Tyler Knott agrees and only buys bulls that pass the PAP test. Knott says even though his family has been selecting based on susceptibility to brisket disease for 40 years, problems still arise. That's one reason why they are trying to increase the Hereford blood in their cow herd.

"I wouldn't say we've had an increase of issues," he says, "but the problem we are having with Angus is the genetic pool that we have to choose from is so much smaller that we are starting to have concerns of linebreeding issues. As commercial producers, we are trying to capitalize on heterosis and the resulting hybrid vigor and growth. Breeding Herefords to Angus provides this benefit."

Hereford advantage

Because there are fewer Angus bulls that will PAP test reliably, Knott says they were forced to sacrifice quality or spend more time and money by being more selective in order to buy Angus bulls.

"The outcross of a Hereford bull is gaining us 30 to 40 lb. on weaning



The rough mountain terrain is where Hereford bulls' soundness and longevity can make a difference, Tyler Knott says.

weights and we can buy better quality bulls because the gene pool is broader," Knott explains. "In the last three years, I haven't bought any new Angus bulls."

Knott says he's seen other advantages in his Hereford bull purchases as well. Most of his pastures change 200 to 300 feet in elevation in one pasture. A bull's ability to travel and stay sound is critical.

"Another contributing factor to me switching to Hereford bulls is that Herefords have more structural soundness overall than Angus," he says. "Angus has selected more toward carcass merit and as a result they've reduced the amount of bone structure in them. In the last Angus bulls I bought we have lost several to structural issues including pulled stifles, broken hocks, soft feet, etc. The longevity of bulls in this program is important. With the cost of these bulls now, if you're only getting two to three years out of an Angus bull and with a Hereford bull you can get four to six years, that's a much better return on investment."

The bottom line is if you're in high altitude, Herefords are a good bet.

"The Herefords tend to do better than other breeds," Holt explains. "If we wanted to sum up the Hereford breed as a whole, they tend to have a lower percentage of those tested that have failed. Does that mean they are naturally resistant to the disease? Not necessarily, but they tend to be more reliable at all elevations." **HW**

PAP test

PAP or pulmonary arterial pressure is measured by a procedure called "right heart catheterization." Tim Holt, DVM and associate professor in the College of Veterinary Medicine at Colorado State University, has been performing this test since 1980. In order to test the pressure, a small plastic tube is passed through a needle into the jugular vein with blood flow to the upper right side of the heart or atrium through a valve, then into the lower right side or ventricle, through another valve and into the pulmonary artery just before it branches into the lungs. Pressure waves are observed on a heart monitor and the monitor provides a readout of the average pressure.

The PAP score, combined with diastolic over systolic blood pressure, is used to determine if the animal is likely to be susceptible to brisket disease. The test is about 95% effective when done when the animal is acclimated (spent at least four weeks at 6,000 ft. elevation or higher). If the animal scores 45 or above, it is considered a moderate risk for high elevation use. An animal measuring above 48 is considered to be a high risk for elevation use. A "good" score, or lower risk measurement, would be 44 or below.

If the test is done below 5,500 ft., it can be used as a screening test only. In other words, Holt explains, if a bull is tested at 5,000 ft. of elevation and he scores a 55, he will not do well in a high altitude. However, if a bull scores a 36 that score doesn't necessarily mean the score will remain 36 once he moves higher and is acclimated.

"When the test is done at lower elevations, it can be used as a screening test only," Holt explains. "It can help bull buyers eliminate bulls, and rule out some bulls definitively, but does not necessarily say which bulls will do well."

In that situation, the bull buyer should re-test once the bull is acclimated to the high elevation and then decide if the bull should remain in the new herd. **HW**



PHOTO BY JANE MOORMAN