

Scientist creates test, treatment for malaria-like sickness in horses

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A cayenne tick is removed from a horse. (Photo courtesy of the USDA)

When Washington State University and U.S. Department of Agriculture veterinary scientist Don Knowles got word two years ago that a rare but deadly infection was discovered among a group of horses in south Texas, he felt a jolt of adrenaline. Not only were the horses infected with a parasitic disease similar to malaria in humans, but the epicenter of the outbreak was at no ordinary ranch.

It was the King Ranch, legendary for its world-class quarter [horses](#),

including former winners of the Triple Crown and Kentucky Derby. The 825,000 acre family-owned estate that stretches across four counties is one of the largest and most famous ranches in the world.

"Anyone who knows anything about quarter horses knows about this ranch," said Knowles. "Universally, it's on the map for the best horses and cattle."

One King Ranch horse had tested positive for the disease when the federal government first alerted Knowles. A few days later, it was a dozen; then four dozen.

"The number just kept going up," recalled Knowles at his WSU office, where a large photograph of Appaloosa horses in a field punctuates one wall and a road bike leans against another.

Knowles, in his silver-rimmed spectacles, hiking shorts and [athletic shoes](#), resembles someone more at home on a bike trail than a scientist at the beck and call of deadly, infectious animal diseases that pull him to regions near and far.

"This kind of outbreak had never been seen in this country before," he said. "People were asking 'What's going on down there?'"

And so, at the request of federal agriculture officials, Knowles boarded a plane and headed south to investigate. As leader of the USDA's Animal Disease Research Unit at WSU, he had a Texas-sized riddle to solve.

Parasitic storm

Equine piroplasmiasis is so feared in the U.S. that the government bans horses that test positive from entering the country. Until the outbreak in Texas, only a few sporadic cases had ever been reported.

"We had regarded piroplasmosis as a foreign [animal disease](#) and suddenly here it was on U.S. soil, with not one or two cases but nearly 300 – all concentrated at a ranch recognized for exemplary management practices," said Dudley Hoskins, an attorney with the American Horse Council in Washington, D.C., at that time. "To say we were concerned would be an understatement."

Piroplasmosis, also called equine tick fever, is transmitted to horses through the bite of a tick that carries either the *Babesia caballi* or *Theileria equi* parasites in its saliva. Similar to malarial parasites that infect humans, these pear-shaped creatures travel through the horse's circulatory system, multiplying, drilling through red blood cells and multiplying some more.

Knowles, also a professor of microbiology and pathology at WSU's veterinary college, teaches his students about it.

"I tell them that one of their responsibilities as a veterinarian will be to prevent piroplasmosis and how an outbreak could result in a great loss of horses and deal a severe blow to the horse industry," he said. "Once the parasite becomes established in the tick and equine population, it could spread quickly as horses are transported to equestrian shows and races around the country."

No treatment, painful options

Many infected horses exhibit little more than cold-like symptoms, but in regions where piroplasmosis is uncommon - such as the U.S. - horses have no natural resistance to the disease. Unimpeded, the parasites proliferate and destroy blood cells, triggering fever, anorexia and anemia.

"If a horse dies of piroplasmosis, anemia is often the cause," said

Knowles. "It's a progressive process and a miserable way for an animal to die."

Before the outbreak in 2009, no standard treatment existed. If a horse tested positive for piroplasmiasis, the owner had three government-mandated options to keep the disease from spreading: euthanize, quarantine or ship the horse out of country.

"Our horses are vitally important to us," said King Ranch manager Dave Delaney by cell phone from the ranch, 45 miles southwest of Corpus Christie. "The idea of euthanizing them was out of the question.

"Many of us had heard of piroplasmiasis but had never dealt with it," he said. "So when Don got here, whenever he spoke, believe me, people paid attention."

On the trail

Long before Knowles boarded that Texas-bound plane in autumn 2009, he knew a lot about piroplasmiasis. The periodic clusters that surfaced in temperate-climate states such as Florida proved the parasites sometimes slipped across the U.S. border in horses that had tested negative for the disease when, in fact, they were positive.

Because the test sometimes gave false negatives, Knowles was charged with developing a more reliable diagnostic test. He also was instructed to create a standardized treatment to kill the parasites.

"Until Texas, much of the work had been done in the lab," he said.

This means that, after Knowles and his team arrived at King Ranch, "you might say we provided him with a real-world case to test the effectiveness of his preliminary work," said Delaney.

Hungry vectors, vulnerable hosts

Armed with two decades of piroplasmosis research and a team of scientists from his USDA unit and WSU, Knowles not only contained the outbreak but he and colleague Glen Scoles also identified a new blood-sucking culprit that had spread it.

"Prior to that outbreak, we knew of two tick species capable of transmitting the disease. There, we discovered a third," said Knowles.

He and his team identified the cayenne tick as the predominant carrier, a finding so important that the group later published a paper about it in the journal *Emerging Infectious Diseases*.

It's likely a cayenne tick snagged a ride on an infected horse years before the outbreak, drawing parasites in through its blood meal then moving on, injecting and infecting other horses, said entomologist Scoles who, after the outbreak, proved that the cayenne species was involved.

The outbreak at King Ranch "could have coincided with climate factors which, in turn, caused an increase in tick numbers," said Scoles.

"They saved our horses"

All said and done, Knowles and his team did more than identify a new eight-legged transmitter of piroplasmosis and develop an internationally accepted test to diagnosis it.

"How about, 'They saved our horses?'" said Delaney of King Ranch.

With high doses of imidocarb dipropionate, a drug used to treat certain diseases in cattle, "The parasites appear to be eradicated. All of our

horses are healthy," he said.

The outcome of administering the drug was so successful that, after subsequent trials, it is now being evaluated as a standard treatment protocol in the U.S.

"If approved for use, the treatment would offer a way to clear horses of infection," said Hoskins, who has followed Knowles' research. "This would be huge."

Which means that, largely because of Knowles' work, the owner of a piroplasmosis-infected horse may have the option of curing the animal – and then one day watching it flash across a meadow or even a finish line.

Provided by Washington State University

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