

## 'Wildcat Power Cord' repairs cruciate ligament in dairy cow's knee

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Wilhelmina is led across K-State's video synchronization pressure mat to determine her level of lameness before surgery. The day after surgery, her stride length had increased 30 percent and she was bearing 25 percent more weight on her operated leg. The red, orange and yellow tones indicated Wilhelmina's steps. The blue and green tones at the top of the screen indicate the students' footsteps who are leading and following her. Credit: Kansas State University

An 8-year-old Jersey dairy cow is back at her Kansas farm thanks to a decade of research and an experimental surgery performed at Kansas State University's Veterinary Medical Teaching Hospital.

The cow, named Wilhelmina Jolene by the veterinary students assigned to her case, sustained a breeding injury in December 2007 when the cruciate ligament in her right knee ruptured. Dr. David Anderson, professor and head of agricultural practices at K-State's College of

Veterinary Medicine, replaced the ligament using synthetic material called monofilament nylon. The procedure's success could have enormous implications for breeding quality cows and bulls with the same injury.

Fortunately, Wilhelmina's owner recognized the value of saving her. Mike Frey is the son of Dr. Russ Frey, a prominent professor at K-State's College of Veterinary Medicine. "She's owned by the son of an important faculty member in our college's history," Anderson said. "It's wonderful that there is a connection to Dr. Frey with this case and that Mike understands the teaching value."

Mike Frey said he was happy to be part of an effort that could help animals, producers and students.

"I was always under the assumption that an animal with this problem was going to be heading down the road," he said. "If they could perfect this so that a cow could be kept in production, that would be worth quite a bit."

The cruciate ligament is a dense tissue that connects the bones in the knee joint. Injuring it can be career-ending and often life-ending - until now, Anderson said.

The three surgical techniques for cruciate ligaments in large animals have a failure rate of approximately 50 percent, Anderson said. This fact caused him and surgery colleagues Drs. Guy St-Jean and Andre Desrochers to investigate alternatives in the 1990s. That's when the team designed a cruciate ligament using braided polyester; however, the material was not strong enough for heavy cattle.

Anderson continued to experiment with a variety of materials until he discovered an unusual form of nylon monofilament, a solid material

about the diameter of a coffee straw. But the question remained: Could this man-made material replace the natural ligament of a 1,500 pound animal?

On Jan. 17, Anderson replaced Wilhelmina's torn ligament with the artificial one, dubbed the "Wildcat Power Cord." Anderson's surgery team included surgery residents Drs. Kara Schulz and Jose Bras, intern Dr. Manuel Chamorro, along with anesthesiologists, veterinary students and technicians.

The next day, the Jersey cow was led across the hospital's video synchronization pressure mat to determine her level of lameness. "Her stride length had increased 30 percent, and she bore 25 percent more weight on her operated leg," Anderson said. "To have that much improvement is spectacular."

His long-term goal is to develop a replacement ligament strong enough for bulls. Lab tests reveal that the Wildcat Power Cord can withstand up to 12,000 newtons of pressure - roughly 50 percent more than an adult bull requires.

Wilhelmina returned home and was kept in a box stall for a week or so, Mike Frey said. After that, she had the run of the free stall. "It's been a tough winter with all of the snow and ice," he said. "I didn't think she'd get around as good as she did."

Shelby Reinstein, a senior veterinary student from Tulsa, Okla., was one of the K-State students who worked with -- and named -- Wilhelmina the cow.

Reinstein said she appreciated the learning opportunities this case presented, especially those relative to anatomy of the stifle and monitoring Wilhelmina for specific conditions dairy cows are at risk for

developing. These include inflammation of the udder (mastitis) or of the uterus (metritis), a metabolic imbalance (ketosis), ulcers and displacement of the abomasum, the fourth compartment of a ruminant's stomach.

"We worked really hard for her and spent long hours at the hospital, but it was definitely worth it after seeing how well she did post-op," Reinstein said. "I love being part of the discovery aspect of veterinary medicine, and it is always really rewarding to try something you're not sure about and have it work. And, my parents were quite impressed that I could milk a cow!"

Source: Kansas State University

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