A five-member faculty research team has developed a rapid and highly sensitive test to prevent BSE transmission through animal feed.

The test will assist feed processors, producers, veterinarians and regulatory agencies in screening feed products for contamination by prions, the abnormal cell proteins that trigger the disease.

The test uses DNA analysis to identify protein from ruminants—cows, sheep, goats and deer—in feed products intended to be eaten by other ruminants.

The use of ruminant protein in livestock feed has been banned in the United States since 1997 because evidence suggests that livestock feed containing material from the carcasses of animals infected with mad cow disease can transmit the disease to healthy animals and, in turn, to humans.

A paper reporting development of the test is now under review by a peer-reviewed scientific journal. The University of California also has filed a patent application on the new procedure, which might be available for commercial use late this year.

Led by Veterinary Medicine Teaching and Research Center director James Cullor, the research team included Dairy Food Safety Laboratory staff researchers Mary Sawyer, Wayne Smith, graduate student Gabriel Rensen, and school dean Bennie Osburn.

Up until now, federal regulators have used either microscopic analysis or more rapid antibody-based tests to monitor feeds for contamination, but both types of tests have drawbacks.

The microscopic analysis, which looks for bone, hair and muscle tissue, is a tedious process that can take days to perform. The antibody tests are much quicker, but may fail to detect contamination if it occurs at levels lower than one percent.

The UC Davis researchers used a technique called polymerase chain reaction (PCR)—a technique commonly used for more than a decade in a broad spectrum of studies—to replicate selected stretches of DNA and accurately identify them.

They spiked seven different cattle feeds with predetermined amounts of meat and bone meal from cows; meal rendered from fish, sheep, and poultry; and dried blood from pigs and cattle.

DNA was then extracted from each of the spiked feed samples and replicated via PCR. The test detected ruminant DNA contamination well below 0.5 percent by weight.

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DNA Test Aims to Detect Protein Contaminants in Ruminant Feed

**MAD COW: A PRION DISEASE**

Bovine spongiform encephalopathy (BSE), commonly known as mad cow disease, was first recognized in Great Britain in 1986. The epidemic of BSE that followed involved more than 178,000 cattle there and spread to other European nations.

BSE is caused by abnormal cell proteins (prions) which are found in brain and lymphoid tissues. Abnormal prions cause transmissible spongiform encephalopathies (TSEs) in a variety of animals in addition to cattle—sheep (scrapie), mink (mink encephalopathy), people (kuru, Creutzfeld-Jakob disease and variant CJD), cats (feline encephalopathy), deer and elk (chronic wasting disease or CWD).

The primary means of transmission of BSE is through ingestion of affected brain or spinal cord material—neurological disease in cattle, cats and people has been associated with eating meat and bone meal contaminated with prions. The prions cause disease by triggering a slowly developing chain reaction of similar protein mutations. After infection, the disease usually takes years to develop.

The prions eventually accumulate in the brain and cause debilitating symptoms of neurological degeneration (loss of balance, tremors, wasting) and eventually death.

Slightly more than 150 humans, worldwide, have contracted the fatal prion disease called new variant Creutzfeldt-Jakob disease, most of these cases occurring in Great Britain. It is believed these people became infected with prions due to eating meat from cows that had BSE.