Sheep Ailment May Hold Clues to Mad Cow Disease

By DENISE GRADY

No one knows for sure when or where the first cow went mad, but the first recorded case occurred in December 1984 when a dairy cow on a farm in West Sussex began to stumble around and act strange. That cow, identified only as No. 133 in a British government report, died two months later, as others on the same farm fell ill. An autopsy on one in 1985 found its brain full of holes, like a sponge. Sick animals turned up on other farms, and by 1989 the British knew they were facing an epidemic of a terrible new cattle disease.

By 1994, the illness had spread to people, probably from eating beef. So far, the number of human cases has remained relatively small, 137, mostly in England, out of millions there who may have eaten contaminated meat. But the disease inspires fear because it is fatal, the incubation period is uncertain, people have no way of knowing they have been infected until they get sick and the symptoms are horrific. The disease attacks the brain, leaving a person mentally and physically helpless. Many victims were young, including some in their teens and 20's.

The discovery last week that the disease had turned up for the first time in the United States, in a cow in Washington State, led to a recall of meat from at least eight states and Guam, even though the risk to consumers is low because highly infectious tissues — brain, spine and part of the intestine — had been removed from the sick cow in Washington before its meat was butchered and shipped. The discovery also highlighted questions that scientists still cannot answer with certainty. Where does this disease come from? Can there be

Many theories but few certainties about the infection.

just one mad cow?

If the Washington cow was infected by feed — as is thought to have occurred in the British epidemic — it seems unlikely that only one could have been infected, since feed is shared. But if the cow developed the disease spontaneously, which is theoretically possible though not proved to occur in cows, then it may be possible to have one mad cow at a time.

The new case and the unanswered questions have heightened interest in efforts in

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Creutzfeldt-Jakob disease, a fatal brain illness, has a form that is similar to mad cow disease. The agent behind it is widely believed to be a protein, called a prion, whose normal function has been altered.

**NORMAL**

- The healthy prion protein folds itself into a series of corkscrew-like helices.

**DISEASED**

- The diseased prion rearranges a portion of itself into strands and sheets.

Diseased prions induce healthy prion proteins to change their shape.

Clusters of disease build, leaving holes in the brain.

Source: Dr. Fred E. Cohen, University of California at San Francisco

When proteins go haywire and unleash a deadly force.

Now, researchers say that efforts to eliminate scapie may shed light on mad cow disease. Scapie has been killing sheep for more than 200 years despite efforts by farmers in many countries to wipe it out by getting rid of diseased animals.

Dr. Stanely B. Prusiner, a Nobel Prize-winning neurologist who developed the theory of prions, says he is finding a way.

Dr. Prusiner said that scientists say many of the prions’ first targets are healthy cells called prions.

In the United States, the prion was first found in 1947 and is now confirmed cases reported to the government for 2003. But the prion affects American farm animals, including cattle and sheep, by infecting the brain.

A government program seeks to end the prion in animals by 2010 and having the United States declared scrape-free by that time.

The program is underway.

Genetic tests are used to identify prion-infected animals.

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This country is sequencable the cow genome, as a potential source of information about what makes animals susceptible and whether resistance to disease can be bred or genetically engineered.

A widely (though not universally) accepted theory holds that mad cow disease is caused by bacteria, viruses, or by prions, abnormal proteins that build up and damage the brain. Collectively, the diseases are called spongiform encephalopathies, for the spongelike holes they leave in the brain.

Prions are thought to be misfolded versions of a normal protein that is abundant in the brain and spinal cord. Somehow, the theory goes, prions form normal proteins to misfold, setting off a destructive chain reaction in the brain. Prions may transmit disease between people or animals, or some people or animals may have an inherited genetic tendency to form prions. In other cases, the tendency to form prions may develop sporadically, for unknown reasons, in an individual with no family history.

The term prion and the theory were developed by Dr. Stanley B. Prusiner, a neurologist at the University of California at San Francisco who won a Nobel Prize in 1997.

Dr. Prusiner built on the work of another researcher who won a Nobel Prize in 1976, Dr. Carleton Gajdusek, a scientist at the National Institute of Health. Dr. Gajdusek proved that members of the Fore tribe in New Guinea contracted a brain disease called kuru from eating the brains of relatives who had died of the disease. At the time, he thought the disease agent was a “slow virus,” meaning one with an incubation period lasting years or decades.

But no virus was ever found for any of the spongiform diseases, and Dr. Prusiner eventually concluded that a prion was responsible.

Many scientists think Britain’s mad cow epidemic had its origins in scrapie, a spongiform brain disease that occurs in sheep and goats. The name comes from the sick animals’ tendency to rub against things and scrape off patches of wool.

Scrapie has never been known to spread naturally from sheep to cows or to people who eat lamb, but it is believed to have infected cows in England in the 1980s because they were given feed made in part from rendered sheep carcasses that were heavily laden with scrapie prions.

Flesh and bones from dead cows were also rendered and added to cattle feed, which may have spread the prions even more efficiently. Both types of rendered additive are now banned from cattle feed.

The epidemic in Britain eventually infected nearly 200,000 cows, but many cows were discovered and destroyed. The number of new cases turned up in about a dozen other countries as well. Britain alone destroyed about 4.5 million cows in hopes of stamping out the disease.

Although British health officials initially thought the sickness would not spread to people, they grew increasingly worried as house cats and some zoo animals fell ill, indicating that the disease could jump readily from species to species.

When it did jump to humans, it resembled a spongiform disease already known in people, Creutzfeldt-Jakob disease, C.J.D., which can be inherited, sporadic, or, in rare cases, transmitted by surgery. But the mad cow form, known as variant C.J.D., created a unique pattern of damage in brain cells and struck younger victims than the original disease did. Genetic tests led researchers to conclude it must have been caused by contaminated beef. That finding, and the unknown incubation period of the disease, led the United States to ban blood donations from anyone who had lived in Britain for more than three months in the time contaminated beef was on the market.

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The New York Times

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Experts Seek New Efforts To Control Hepatitis A

By ANAHAD O'CONNOR

In the wake of recent food-borne hepatitis A outbreaks, scientists and medical experts are urging the federal government to refocus some of its efforts to quash the disease.

Now more than ever, some argue, there is a need for widespread vaccination against hepatitis A.

Since 1999, the Centers for Disease Control and Prevention and the American Academy of Pediatrians have recommended childhood vaccination in 11 Western states where incidence rates are twice the national average. But much of the responsibility for enforcing immunization falls on parents and schools, and vaccination recommendation can often go unheeded.

Some experts also say that focusing efforts in only a small number of states may leave millions of people vulnerable to the threat of contaminated produce shipped from regions where hepatitis A is endemic. Contaminated green onions from Mexico set off the outbreak in western Pennsylvania in 2003.

In October, as health officials scrambled to screen thousands of people for hepatitis A, the Pennsylvania outbreak, which spread to people in 11 states, the agency had moved to universal vaccination against hepatitis A to prevent outbreaks.

In 1996, the Centers for Disease Control and Prevention recommended widespread vaccination against hepatitis A in the United States, but the program was never fully implemented.

In October, a hearing on the Hepatitis A outbreak was held in Washington, D.C., by the House Committee on Oversight and Reform.

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Australia and New Zealand are the only countries internationally recognized as scrapie-free and allowed to sell breeding stock to other nations.