

Mad Cow Disease and It's Effect on U.S. Beef Consumption

This is a good paper. well written, good use of sources. The paper is well organized. The sources are credible. The web addresses are sufficient for the reader to find the source on-line.

News of Mad Cow Disease has seemingly spanned the United States from the smallest rural town to major cities through all types of media, including television and the newspaper. However, it seems that very little is ever reported on the actual effects of Mad Cow Disease on American consumption of beef, current risk to the American food supply, and safeguards in effect to protect the American consumer. With the continuing media frenzy concerning Mad Cow Disease, even the most media-skeptical Americans are sure to have their doubts about the safety of United States beef and have been forced to consider whether or not beef should be "what's for dinner".

Mad Cow Disease, scientifically known as Bovine Spongiform Encephalopathy, is a neurological disorder in cattle caused by infectious prions (3). These prions are comprised of proteins that do not contain nucleic acids and seem to be a mutation of a normal protein used to build cells (3). The prions multiply within the host by changing the shape of other normal proteins that are present (3). Since BSE is caused by the disease-causing agents, known as prions, it is classified as a Transmissible Spongiform Encephalopathy, or TSE (4). Other TSE's in this group include Scrapie in sheep and Chronic Wasting Disease in deer and elk (4).

The symptoms of BSE in cattle are caused by a progressive deterioration of the central nervous system (7). Clinical signs of BSE may first be expressed as unusual nervous or aggressive behavior (7). BSE cattle may also exhibit unusual stance and posture, lack of coordination, and difficulty standing (7). Milk production in BSE cattle will decrease and a loss of body weight will occur

regardless of adequate appetite (7). The symptoms of BSE will progressively grow worse until the cow is no longer able to stand and death will occur (7). BSE in cattle has a long incubation period, from three to eight years, and no signs or symptoms of the disease will occur in the BSE infected cattle during this time (5). The disease is given the trademark name of Bovine Spongiform Encephalopathy, or BSE, due to the "spongy" appearance of brain matter, ^{to} due microscopic holes in brain tissue caused by the disease, when examined under a microscope (7).

BSE can be transmitted through feeding BSE-contaminated feed and the maternal pathway (6). There is no current evidence to suggest that BSE can be transmitted to cattle by direct contact with BSE-positive cattle or to other species by direct contact (6). There also is no current evidence to suggest that insects, or vectors, are pathways of BSE transmission (7). However, BSE-causing prions are very resilient to heat, making food or feed disinfection by heat ineffective (4).

There is no procedure currently available to test live cattle for BSE; therefore only post-mortem tests can be conducted to verify the existence of BSE-causing prions (6). Currently, there are no vaccines to prevent cattle from being infected with BSE (6). No treatments or cures currently exist for BSE positive cattle, and therefore all BSE positive cattle must be humanely euthanized or will die from the disease (4).

The first cases of BSE are thought to have occurred in the United Kingdom in the 1970's, however the first two confirmed cases of BSE occurred in 1986 (2). These United Kingdom BSE cases may have been the result of feeding meat and bone meal from sheep with Scrapie, another transmissible spongiform

encephalopathy, to young cattle (2). At the climax of the BSE outbreak in 1993, nearly 1,000 new cases of BSE were reported weekly in the United Kingdom (2). With 2005 waning to a close, greater than 184,000 BSE cases, effecting 35,000 herds, had been reported within the borders of the United Kingdom causing havoc in the British beef industry (2).

In June 1997, the Food and Drug Administration introduced a feed ban that no longer allows using most animal byproducts to make ruminant animal feeds(5). The 1997 ban also includes safeguards to insure that no mammalian tissue is being fed to ruminant animals (5). This feed ban and similar feed bans in other countries have been put into place to insure that no transmissible spongiform encephalopathy, such as BSE, is passed to ruminants or humans through animal feed (5). This protective feed ban was effective on August 4, 1997 in the United States (5). In the United Kingdom a similar feed ban proved successful, reducing the number of confirmed BSE cases infections from 36,680 in 1992 to less than 1,500 in 2000 (5).

While numerous other countries began to experience the "Mad Cow Disease Blues", the United States managed to remain BSE free until the first documented case of BSE occurred in December 2003 in a Holstein cow in Washington State (2). The positive BSE results were verified by an international lab in Weybridge, England (2). The USDA then determined that this BSE cow was imported from Canada in August 2001(2). Immediately after the Washington State cow tested positive for BSE, the FDA and USDA recalled all meat from the BSE positive cow and all prion-carrying organs were removed at slaughter, therefore no BSE

positive meat or meat products remained in the U.S. food supply (4). The Washington State cow was determined to be six and a half years old at the time that the BSE case was confirmed, meaning that it was born before the ban on feeding animal byproducts to cattle was put into effect in the United States (6).

The second case of BSE in the U.S. was confirmed in a cow located in Texas in June 2005 (2). The Veterinary Laboratories Agency in Weybridge, England once again verified the BSE positive results for the Texas cow (2). This was the first case of BSE to be found in a cow born and raised in the United States (6). The twelve-year-old, Brahman-cross, Texas BSE cow was determined to have been born before August 1997 and, therefore, was born before the ban on feeding animal byproducts was active in the United States (6). As soon as the positive test results for BSE were known by the pet food plant that had possession of the Texas cow, the carcass was destroyed (6).

The most recent case of BSE was found in an Alabama "downer" cow in March of 2006 (2). The Alabama "downer" cow was ten years old at the time the BSE positive determination was made, making it the third American cow with BSE to be born before the ban on feeding animal byproducts to ruminants (6). The Alabama BSE cow never entered the food supply, because it was euthanized by a veterinarian and buried on the farm where it was located (2).

With three positive BSE confirmations in the United States, consumers want to know if it is still safe to eat beef, since variant Creutzfeldt-Jacob Disease, a.k.a. vCJD, has been determined to be the human form of Mad Cow Disease (5). A correlation between consuming BSE-infected cattle products and instance

of human vCJD has been reported and is therefore the source of concern over human illness (5). The incubation period, a time in which no signs or symptoms of the disease will occur, for vCJD is estimated at five to twenty or more years (5). The symptoms of vCJD are similar to the symptoms of BSE in that those infected suffer from neurological deterioration (5).

While the threat of contracting vCJD seems frightening to the American consumer, the chance of this happening is relatively low. There is only a minute chance of being infected with vCJD, because the disease-causing prions are only located in the nervous system tissue of the infected cow, including the brain, spinal cord, and other nervous tissue (4). The muscle tissue of BSE-positive cattle has not been proven to carry the prions necessary to cause vCJD in humans and no direct cow to human infection can occur (4). American vCJD cases are unlikely due to safeguards put in place to prevent BSE-positive products from entering the food supply put into effect by the FDA and USDA (4).

Only one case of vCJD has been reported in the United States and was found in a woman who had recently moved to the U.S. from England where she apparently was infected with the disease (4). In the United Kingdom, as of May 2006, only 155 deaths had been caused by vCJD, a relatively low number considering the many pounds of BSE-contaminated beef consumed in the region (6). Of the ten other cases of vCJD outside of the United Kingdom, six cases were associated with infection inside the United Kingdom (6). Not one person in the United States has been infected with vCJD while being within our countries borders (4).

With the United States government agencies, including the USDA, APHIS, FSIS, and FDA, working together, safeguards have been put into place to protect the American consumer from the dangers of BSE infected cattle (8). First, a ban has been put into effect on "non-ambulatory", or downer, cattle (8). This ban was put into effect after the first Washington State BSE-positive case in the United States making "downer" cattle, cattle that are unable to stand, ineligible for slaughter to enter the nation's food supply (8). Second, Specified Risk Materials, or SMR's, from cattle must be removed during slaughter. An FSIS ruling determined that the skull, brain, trigeminal ganglia, eyes, portions of the vertebral column, spinal cord, and dorsal root ganglia must be removed from all cattle older than thirty months (8). The tonsils and distal ileum are also removed from all cattle, since they are not eaten by humans (8). After removal, these "high risk" cattle parts are separated from all other edible parts of the cattle and disposed of to prevent entry into the U.S. food supply (8). The age of all cattle to be slaughtered to enter the United State's food supply must be proven, and routine inspections of all slaughter facilities are conducted to insure enforcement of this rule (8). Third, a new meat recovery system has been implemented. Advanced Meat Recovery (AMR) is a new method of removing muscle tissue from the bone without allowing bone fragments to come into contact with the meat by use of high pressure (8). AMR ~~prevents~~ also prevents nervous tissue attached to bone from coming into contact with products sold as "meat" (8). Fourth, a ban on using the air-injection method of stunning cattle for slaughter has been put into effect (8). This ban prevents portions of the brain, an SRM,

from being forced into other muscle tissues in the body used for meat during stunning for humane slaughter (8). Lastly, FSIS inspectors must only label a beef product as "inspected and passed" after the cattle have received a confirmed negative test for BSE (8). To test the effectiveness of these BSE safeguards, BSE surveillance programs have also been set into motion (8). In BSE surveillance programs, samples from a percentage of the adult cattle population and cattle populations where the highest risk of finding BSE cattle exist are taken to test for existence of the disease(8).

In order to understand the total United States beef consumption before and after the first confirmed case of BSE, it is necessary to comprehend the United States' trade relationships with other countries and the position of the beef market before BSE. When the first case of BSE was confirmed in Canada in May 2003, the United States, as well as many other countries, immediately ceased receiving beef imports from Canada in an effort to prevent BSE from entering their respective country (6). Since Canada is ~~the~~ one of the world's largest exporters of high quality beef and could no longer export due to BSE, worldwide demand for American beef increased (6). This surge in demand for beef caused the United States beef prices to increase at a time of low cattle and beef supply and existing high prices (6). As the bans on Canadian beef imports were being eased in the United States, the first case of BSE was discovered in the United States. Other countries then began to ban United States beef, which caused the beef supply in the U.S. to rise resulting in a decline in prices that had begun to drop previous to the discovery of American BSE (6). High demand of

United States beef from American consumers allowed beef prices to remain at higher prices in January 2004, after the first American BSE case, than January 2003 prices (6). This allowed for the total United States beef consumption to increase (6). However, United States beef prices would probably have been higher if no American BSE case had occurred (6). All of these situations prevented BSE cases in America from being as destructive to the American beef industry as was previously expected (6). American consumers' response to news of American BSE cases did not ultimately lead to reduced U.S. beef consumption, and therefore, did not lead to lowered beef prices (6).

Before the first confirmed U.S. case of BSE, total U.S. beef consumption was 27.0 billion pounds for 2003 (USDA). After the confirmed BSE case in Washington State in December 2003, U.S. beef consumption was 27.8 billion pounds in 2004 (USDA). U.S. beef consumption also remained steady at 27.8 billion pounds in 2005, despite the subsequent confirmed BSE case in Texas in June 2005 (USDA).

Despite media-induced BSE outbreak fears, it appears that consumers have faith that the United States has the safest food supply in the world. After the first confirmed BSE case in the United States, American consumption of beef actually rose somewhat from the previous year. While BSE is a serious disease that poses some threat to human health, the average American consumer must believe that the safeguards for BSE detection and elimination are sufficient and work effectively to protect the U.S. consumer. While extreme damage from BSE was somewhat expected in the United States, the effects of BSE on the

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American beef industry were not as devastating as in other foreign countries,
such as the United Kingdom.

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