FSIS-2006-0011-4
FSIS-2006-0011
Linda A. Detwiler

4

Linda A. Detwiler, DVM
225 Hwy 35
Red Bank, NJ 07701
Phone: 732-741-2290
Fax: 732-741-7751

October 30, 2006

USDA, FSIS
Docket Clerk
300 12th Street, SW
Room 102, Cotton Annex
Washington, DC 20250

Re: [Docket No. FSIS-2006-0011E]
Harvard Risk Assessment of Bovine Spongiform Encephalopathy (BSE)
Update; Notice of Availability and Technical Meeting

Dear Sir or Madame:

Thank you very much for the opportunity to comment on the 2005 update of the Harvard BSE Risk Assessment which was released in July 2006. The combination of comprehensive surveillance and continual assessment are essential components of a program to monitor the trend of BSE in the US national herd and adjust policy accordingly. Measures taken throughout the past two decades have resulted in keeping the level of BSE in the United States at a very low level. It is important that we do not let our guard down and prematurely relax current regulations or not take additional necessary steps to maintain this status.

I had the fortunate opportunity to work with Drs. George Gray, Joshua Cohen and Sylvia Kreindel on the original project as a Senior Staff Veterinarian for APHIS. After a review of this update I would like to comment on the following issues:

Consideration of new research
By the end of 2004 there was increasing evidence in species other than cattle that peripheral nerves and muscle have infectivity. In some of these species, studies indicate that the agent migrates to the brain and spinal cord, replicates to high levels in the central nervous system (CNS) and then spreads centrifugally from the spinal cord back down through the spinal neurons to the neuromuscular junction into the muscle cells themselves. (Bosque et al., 2002; Glatzel et al., 2003;Bartz et al., 2002; Androletti et al., 2004; Mulcahy et al., 2004; Thomzig et al., 2003; Thomzig et al., 2004)

A recent German study (Buschmann and Groschup, 2005) examined nerves and muscle from a **cow naturally infected with BSE** and found that infectivity was present in several peripheral nerves. The method of detection was bioassay in bovinized transgenic mice that show the same or greater sensitivity to transmission of BSE as cattle. It must be pointed out that the amount of infectivity in the peripheral tissues appears to be at significantly lower levels than which is found in the CNS.

Results from a collaborative study between scientists in Japan and the United Kingdom concur with these findings. The testing which was completed in Japan found PrP^{res} in peripheral nerves. There is increasing evidence that the pathogenesis of BSE might not be entirely different from TSEs in other species, in that at the point of clinical disease or just prior to the onset of clinical signs, there may be peripheral involvement. (International Conference -Prion Diseases of Domestic Livestock; The Radisson Edwardian Hotel, Heathrow, London, United Kingdom, 28-30 May 2006)

The current USDA regulations prohibiting certain SRMs from food for humans do not remove these peripheral tissues and tests are not conducted on cattle passing ante mortem and postmortem inspection. Thus, if BSE infected cattle near or at the end of the incubation period are passed for slaughter and there is infectivity in peripheral nerves edible product may be contaminated. This new research is not considered in the model.

Ability to detect BSE by clinical observation alone

The updated Harvard Risk Assessment assumes that USDA inspectors would be able to detect 95% of the cases of BSE which can still walk and 85% of those which are down by visual inspection alone. These cattle would then be prevented from being passed for slaughter (http://www.fsis.usda.gov/PDF/BSE_Risk_Assess_Report_2005.pdf). The assessment did not provide data to support these assumptions.
The percentages of detection seem optimistically high. Unless FSIS has hard data to support such assumptions, they should consider the comments from Peer Reviewer One and other sources of information as provided below to adjust these figures accordingly:

Comments from Peer Reviewer One

Peer reviewer one provided actual data from the United Kingdom and observations from other European countries. These data suggest that the US assumptions considerably overestimate the ability of inspectors to identify BSE. In the United Kingdom, the country with the most cases of BSE in the world, inspectors have only identified half of the BSE cases prior to slaughter. Testing has identified the other half. Reviewer one states, “So it seems as if only approximately 50% of clinical cases may be detected at ante-mortem inspection at abattoirs in the UK at present, and even then they are still only identified as “risk animals” rather than as BSE suspects.”
(http://www.fsis.usda.gov/PDF/BSE_Risk_Assess_Appendix_4_2005.pdf)

Past performance of clinical BSE detection in North America

Past performance indicates that the system of clinical examination of the nonambulatory bovines was not adequate for determining a disposition regarding BSE. This was clearly illustrated by the first two native cases of BSE in North America in 2003. Both cases of BSE (May and December) were observed by veterinarians prior to slaughter. Neither was specifically set aside as a BSE clinical suspect. The Washington State case was passed for human consumption because she was determined to have a calving injury (injuries may be a result of the manifestations of BSE rather than the primary cause of illness). Meat from this animal was sold into the retail grocery system.

The May 2003 case detected in Canada was submitted for slaughter in January but condemned as a case of pneumonia. The carcass went to rendering but because it was not identified as an actual BSE suspect, it was not tested until May. By this time, the meat and bone meal produced from this cow was disseminated. In fact three farms with cattle were depopulated as a result of this exposure.

As per CFIA, the other 6 Canadian cases were all nonambulatory. None presented with classical clinical signs of BSE thus none were "BSE suspects". They were picked up under the testing program for nonambulatory cattle (3D/4D).

The subtlety of clinical BSE

In many cases the clinical signs of BSE are so subtle as to go unnoticed especially if the observer is not familiar with the normal behavior of the animal. In addition, a number of clinical signs may be easily mistaken for other conditions. As indicated by data from the United Kingdom and Europe, even veterinary inspectors with experience are not able to detect the majority of cases by clinical examination alone. To further illustrate this point, I have attached some clips which are from a CD on the clinical signs of BSE. This was produced by the United Kingdom's Veterinary Laboratories Agency (VLA).

Performance in detecting scrapie by ante mortem inspection

In the United States certain sheep are tested for scrapie at slaughter. If they have recognizable clinical signs they are not passed for human consumption. If they appear to be "normal healthy" sheep and pass ante mortem inspection samples are taken to be screened for scrapie. I believe that looking at the data regarding the ability of inspectors to detect scrapie by visual inspection alone may be a useful tool when estimating this number for BSE.

Since its inception in April 2003 until July 2006, the USDA, APHIS scrapie slaughter testing program has identified 258 sheep that have passed ante mortem inspection but subsequently tested positive for scrapie. (http://www.aphis.usda.gov/vs/nahps/scrapie/) I could not calculate the total percentage of scrapie suspect sheep which may have been removed from the system prior to slaughter by visual inspection alone as I did not have data from FSIS going back to April 2003.

The number of scrapie positive samples collected at slaughter and tested positive by APHIS in fiscal year 2005 was 100 and in fiscal year 2006 (Sept 2005-July 2006) was 52. In 2005 FSIS inspectors condemned 2 mature sheep as nonambulatory and 3 mature sheep which were recorded as having signs of a central nervous system disorder. In 2006 (until July 27) FSIS inspectors condemned 1 mature sheep as non ambulatory and none as having a central nervous system disorder. I could not calculate a performance rate as APHIS tallies data by fiscal year and FSIS by calendar year. Despite not being able to calculate a percentage, the total figures suggest that the vast majority of scrapie infected sheep are identified at slaughter not by clinical observation, but by testing.

Accurate assumptions regarding the ability of inspectors to recognize BSE by clinical signs alone are extremely important as they affect a number of outputs of the model. If inspectors were to be able to identify the majority of the BSE positive animals prior to slaughter as the model suggests, any risk to humans from SRMs, other tissues and cross contamination is significantly reduced because the animals never enter the processing system. This assumption is reflected in the conclusion which states that the removal of nonambulatory cattle for human consumption decreases the risk to the public by only 3%. However, if the rate of performance is as low or lower than data provided by peer reviewer 1, the risk to humans from down cattle increases by at least 50%. This may also affect the other conclusions.

I strongly urge that FSIS not use this data as part of a justification to allow nonambulatory cattle to be passed for human consumption. The combination of the new research findings as stated above and the difficulty in determining BSE status by inspection alone warrants the continual ban on this class of high risk animals.

Compliance with the FSIS regulations

The Harvard model ran the all of the calculations assuming 100% compliance in regard to SRM removal. FSIS ran simulations at 99, 98, 97, 96 and 95% levels of compliance. They found that for each percent drop in compliance there was an increase of 1 percent risk to the public which illustrates the importance of full compliance with the SRM removal regulations.

The FSIS regulations state that specified risk materials are inedible and cannot be used in human food. The plants must develop and implement plans to remove, segregate and dispose of the SRMs. Furthermore, they must take corrective action when either the establishment or FSIS deems that the procedures are not effective in keeping specified risk materials out of human food. On the surface this sounds very straight forward.

It is my opinion that these requirements are difficult for FSIS to monitor unless the standard operating procedure designates a point prior to boning where SRMs are completely prohibited. For example, if the plant HAACP program merely states that SRMs are to be removed and not included in product, this allows for the possibility that spinal cord may be allowed into the boning room. Unless an inspector observes the cord

in edible product or observes it fall into edible product this may not be recognized as a deficiency.

I would argue that once spinal cord or other central nervous system tissue enters the boning room and contaminates the tables and equipment, the potential risk from BSE is already there and removal at this point is not completely sufficient. The properties of the causative agent require more than sanitation at 180° F for inactivation. One suggestion would be to require the removal of spinal cord, and other such SRMs on the slaughter floor using dedicated equipment. This approach reduces the risk of cross contamination and provides a defined point from which one could audit. In my current position as a consultant, I have visited as well as audited numerous slaughter establishments both in the United States and in other countries.

Again, I appreciate the opportunity to be able to provide comments and share my experiences. If I can be of any assistance please do not hesitate to contact me.

/s/
Linda A. Detwiler, DVM

References

Andreoletti O, Simon S, Lacroux C, Morel N, Tabouret G, Chabert A, Lugan S, Corbiere F, Ferre P, Foucras G, Laude H, Eychenne F, Grassi J, Schelcher F. PrPSc accumulation in myocytes from sheep incubating natural scrapie. Nat Med. 2004 Jun;10(6):591-3. Epub 2004 May 23.

Bartz JC, Kincaid AE, Bessen RA. Retrograde transport of transmissible mink encephalopathy within descending motor tracts. J Virol. 2002 Jun;76(11):5759-68.

Bosque PJ, Ryou C, Telling G, Peretz D, Legname G, DeArmond SJ, Prusiner SB. Prions in skeletal muscle. Proc Natl Acad Sci U S A. 2002 Mar 19;99(6):3812-7.

Bushmann, A., and Groschup, M.; Highly Bovine Spongiform Encephalopathy-Sensitive Transgenic Mice Confirm the Essential Restriction of Infectivity to the Nervous System in Clinically Diseased Cattle. The Journal of Infectious Diseases, 192: 934-42, September 1, 2005.

Glatzel M, Abela E, Maissen M, Aguzzi A. Extraneural pathologic prion protein in sporadic Creutzfeldt-Jakob disease. N Engl J Med. 2003 Nov 6;349(19):1812-20.

Mulcahy ER, Bartz JC, Kincaid AE, Bessen RA. Prion infection of skeletal muscle cells and papillae in the tongue. J Virol. 2004 Jul;78(13):6792-8.

Thomzig A, Schulz-Schaeffer W, Kratzel C, Mai J, Beekes M. Preclinical deposition of pathological prion protein PrPSc in muscles of hamsters orally exposed to scrapie. J Clin Invest. 2004 May;113(10):1465-72.

Thomzig A, Kratzel C, Lenz G, Kruger D, Beekes M. Widespread PrPSc accumulation in muscles of hamsters orally infected with scrapie. EMBO Rep. 2003 May;4(5):530-3.