Canadian Food Inspection Agency | Agence canadienne d'inspection des aliments

Completed investigations of bovine spongiform encephalopathy (BSE) cases in Canada

As published at the moment the investigation was completed.

Canada

Contents

Case 1

SUMMARY OF THE REPORT OF THE INVESTIGATION OF BOVINE SPONGIFORM ENCEPHALOPATHY (BSE) IN ALBERTA, CANADA

Background

On January 31, 2003, a cow in Northern Alberta was identified at slaughter as a downer (unable to walk). It had been sent to a provincially inspected abattoir, where the animal was condemned due to a post mortem finding of pneumonia. The head (which, along with the brain, comprises 2/3 of the infectivity of BSE) was removed and sent to the Alberta provincial laboratory for BSE testing under Canada's program of routine surveillance for this disease. No part of the cow entered the human food chain, the rest of the carcass having been sent to be rendered into animal feed. On May 16, 2003 the province made a preliminary diagnosis of BSE which was confirmed by CFIA's National Centre for Foreign Animal Disease on May 18th and by the international reference laboratory in the United Kingdom (UK) on May 20th.

The CFIA immediately started an epidemiological investigation, which has provided much detailed information about the case. We are now at the point where the investigation is sufficiently complete to summarize our findings. On the basis of the available information the CFIA is confident (with a 95% probability, as defined by the CFIA's chief investigator) that the animal was born in Canada and we have traced the sequence of farms through which the animal passed during its lifetime. There remains a 5% probability that the animal could have originated from an alternate line of procurement. This report describes the investigation, with particular emphasis on the risk factors relevant to the occurrence of BSE in this cow.

Identifying herds associated with the BSE-infected cow

The infected cow was between six and eight years old at the time of slaughter. It spent the last six months of its life in an 80-cow herd that had been established in 2001-2002 from two distinct lines of cattle. As part of the investigation, the CFIA used DNA testing to rule out several potential herds in which the cow may have been born. In addition, we have identified cattle that may have spent time in herds with the infected cow during its lifetime, including cattle that had moved out of those herds before the infected cow was identified. More than 2,700 animals were destroyed and more than 2,000 of these animals that were 24 months of age or older were tested for BSE, with negative results in all cases.

The cause of the BSE case in Canada

Consistent with scientific knowledge from the UK and Europe, in which BSE emerged and has been most prevalent, the most likely source of BSE for the infected cow would have been the consumption of feed containing meat and bone meal (MBM) of ruminant

origin contaminated with the BSE prion before the US and Canada implemented a feed ban in August 1997.

The ban meant that feed containing mammalian protein, with some exceptions, could not be fed to any ruminant species. Investigations undertaken by the CFIA revealed that some herds in which the infected cow resided had access to feed concentrates and/or high energy feed blocks which may have contained MBM prior to the feed ban. Inspection of feed mill records and compounding formulae confirmed that the incorporation of MBM in both products ceased in 1997.

As a result of the extensive integration of the cattle industries in Canada and the United States of America (US), the contaminated feed could have been manufactured in Canada or imported from the US. Historically, approximately fifty percent of the MBM used in Canadian feed mills was imported from the US. However, it is not possible to confirm if the supplements fed to the herds in which the cow resided were manufactured using MBM of Canadian or US origin.

The original source of the BSE prion in MBM is likely to have been from a limited number of cattle imported directly into either Canada or the US from the UK in the 1980s, before BSE was detected in that country. It is likely that some of these animals were slaughtered or died and entered the animal feed system prior to a ban on further importations from the UK in 1990.

Following the detection of BSE in an imported cow in Canada in 1993 all remaining imported animals in Canada, which had been under surveillance since the import ban in 1990, were slaughtered and incinerated. Similarly, once the situation with BSE became clear in the UK many, but not all, imported cattle were destroyed in the US. The rendering and feeding practices that existed at that time in both Canada and the US would have allowed BSE, if present, to cycle through cattle feed and potentially infect other cattle. Since the incubation period (the period from initial infection to the development of clinical signs) of BSE is prolonged (2-7 years) and very few potential cases of BSE are likely to have entered the feed chain prior to the 1997 feed ban, the number of animals subsequently infected with BSE is likely to have been extremely small. This view is supported by the report of the international team of experts, which noted that the feed ban would have been effective in limiting the spread and amplification of BSE.

While the infected cow, detected in Alberta, confirms that BSE is present in North America, the actual number of infected animals present in the cattle population is likely to be extremely low. Canada has conducted surveillance for BSE since 1992 and has generally met or exceeded international standards. There is no doubt that the steadily increasing intensity of surveillance has contributed to the probability of finding a case of BSE. This serves to illustrate how seriously Canada takes its international obligations for disease surveillance and reporting.

It is important to note that any further cases that might be identified are almost certainly indicative of exposure to BSE prior to the feed ban. In addition, the cumulative effect of the numerous stringent measures in place since 1990, as recognized by the international team of experts, and risk assessments conducted by other countries, ensures that the finding is not a precursor to a widespread outbreak. This is supported by the Harvard Risk Assessment and the Canadian self assessment of the risk of BSE being present in Canada which both indicate that, if BSE was present, the prevalence would have peaked or started to decline by the time it was detected.

Other possible causes of BSE have been proposed for a number of years including: spontaneous mutation of normal protein to a pathogenic (resistant) form of prion protein or exposure to prions associated with another transmissible spongiform encephalopathy, such as scrapie of sheep and goats or chronic wasting disease (CWD) of deer and elk. However, despite exhaustive investigations, the scientific evidence to date does not support any of these theories. Furthermore, it is important to note that the prion associated with the index case was characterized by molecular analysis at the international reference laboratory in the UK as BSE, not CWD.

Disposal of animal feed made from the BSE-infected cow

The remains of the BSE-infected cow were traced through their distribution into pet food and animal feed. As many as 1,800 farms (600 recipients of bulk feed and 1200 recipients of bagged feed) may have received animal feed containing MBM made from the infected cow. Inspections undertaken by CFIA confirmed that the renderer and the feed mills had very good records of compliance with the feed ban. Notwithstanding the fact that the feeding to cattle and other ruminants of products containing ruminant origin MBM is prohibited, the CFIA conducted on-farm investigations on a representative sample of (170) farms to evaluate the risk of ruminant exposure to the contaminated feed. Based on these investigations, the CFIA concluded that 99% of farms experienced no (96%) or incidental (3%) exposure to potentially contaminated feed. In 1% of farms, ruminants may exceptionally have been exposed to feed containing prohibited material. Three farms were quarantined and 63 cattle that may have eaten poultry feed were destroyed. Taking into account the very small probability of exposure of ruminants on the remaining farms, and impending enhancements to BSE risk management, the CFIA decided not to impose specific risk management measures on other farms. This decision was consistent with the recommendations of the international scientific experts who reviewed the CFIA's investigation.

Current Activities

The CFIA is refining approaches to surveillance and working with the Harvard Risk Assessment Group to re-evaluate the North American BSE exposure model. Trilateral meetings with NAFTA members are underway to refine the North American risk management strategy to take account of the most up-to-date thinking on BSE risk factors in North America.

The CFIA is actively reviewing policy adjustments in the areas of specified risk materials, surveillance, feed measures, and traceability and awareness programs, in consultation with federal, provincial, territorial, and industry representatives.

Case 2

INVESTIGATION OF THE SECOND CASE OF BOVINE SPONGIFORM ENCEPHALOPATHY (BSE) IN CANADA

Background

On December 17, 2004, a cow in Northern Alberta was identified as a downer (unable to walk) and was euthanized and sampled by a private veterinarian under Canada's National BSE Surveillance Program. Brain samples from the animal were sent to the Alberta provincial laboratory and screened for BSE using a Bio-Rad rapid test. Testing produced a reaction on December 27, 2004 and again on December 28, 2004. Brain samples were then sent to the Canadian Science Centre for Human and Animal Health in Winnipeg where BSE was confirmed on January 2, 2005 using the immunohistochemistry procedure for BSE. No part of the cow entered the human food or animal feed chains, and the carcass was secured at the index premises before being transported to the Canadian Food Inspection Agency's Animal Diseases Research Institute in Lethbridge, Alberta for incineration.

The Agency quickly located the farm of origin and immediately started an epidemiological investigation on the following three lines of inquiry:

- calves born to the affected cow during the two years prior to the onset of clinical signs;
- the birth cohort (cattle born on the farm of origin within 12 months before and 12 months after the birth of the affected animal); and
- feed to which the animal may have been exposed early in its life.

Animal Investigation

The infected Holstein cow was just over eight-years-old at the time of death on the index farm, having been born October 5, 1996. The animal left its farm of origin by sale through a livestock auction in June 1999 and was subsequently purchased from a livestock dealer in March 2000, prior to arriving on the index farm. Before being euthanized and sampled for BSE testing, the animal had been sick for some time and had experienced posterior paralysis for a few days before the veterinarian was called. It previously had problems delivering its last calf in 2004.

The investigation revealed that the cow had two calves during the previous two years, one born in 2003 and the other in 2004. Both calves were determined to have died of causes unrelated to BSE. An investigation was also undertaken to locate the birth cohorts of the affected animal.

The size of the birth cohort was determined to be 135 animals. The trace-out investigation identified nine living birth cohorts which were subsequently euthanized, sampled and tested negative for BSE. These animals were disposed of through

incineration and did not enter the human food or the animal feed chains. Because birth cohort cattle would be seven- to nine-years-old today, most had previously died or been slaughtered. Finding more than one case of BSE in a birth cohort is rare. This has been consistently shown internationally, even in the United Kingdom during the height of their BSE epidemic. It has also been demonstrated in all investigations completed to date in North America. The remaining 126 animals were traced as follows:

- five animals had died of causes unrelated to BSE on the farm of origin;
- 110 had died elsewhere or had been slaughtered;
- six animals were confirmed to have been exported to the United States for slaughter;
- four animals were untraceable because of missing records;
- one animal had previously entered the National BSE Surveillance Program in November 2004 and tested negative for BSE.

Feed Investigation

A full on-farm investigation into feed purchases and feeding practices was undertaken at the farm of origin. The investigation revealed that the index animal was exposed to a dairy ration containing meat and bone meal between early April and mid-May 1997. The animal was further exposed to meat and bone meal in the latter part of September 1997 through a heifer ration manufactured in March 1997. Fifteen per cent of the meat and bone meal used in both feed rations was derived from ruminant material, which was permitted under the regulations then in effect.

Investigation Overview

While this second case of BSE is unwelcome, it was not entirely unexpected. The first case, detected in May 2003, indicated that Canada had a low, previously undetected incidence of BSE. Therefore, increased testing of older animals, particularly those with signs of neurological disease, as was the case with this animal, was bound to lead to the detection of one or more additional cases of BSE. However, it is reassuring that this is only the first case of BSE detected amongst more than 23,000 tests conducted in 2004, confirming that the level of BSE in Canada is indeed extremely low.

The investigation revealed that this animal was most likely exposed to a low level of BSE infectivity through consumption of feed containing ruminant meat and bone meal during its first year of life. The suspect lots of feed were manufactured at a time when the use of meat and bone meal in cattle rations was still legal, i.e. before the use of such materials was prohibited in 1997. Given the direct relationship between level of exposure and length of incubation period, the age of this animal confirms that the amount of BSE infectivity present in the feed consumed in 1997 was most likely very small. Finally, the detection of this case attests to the strength and integrity of Canada's National BSE Surveillance Program.

Case 3

REPORT OF THE INVESTIGATION OF THE THIRD CASE OF BOVINE SPONGIFORM ENCEPHALOPATHY (BSE) IN ALBERTA, CANADA

Background

On January 4, 2005, a beef cow in Innisfail, Alberta was euthanized and sampled by a private veterinarian under Canada's National BSE Surveillance Program. Brain samples from the animal were sent to an Alberta provincial laboratory where they were screened for BSE using a Bio-Rad rapid test and produced a reaction on January 6, 2005 and again on January 7, 2005. Brain samples were then sent to the Canadian Science Centre for Human and Animal Health in Winnipeg where BSE was confirmed, using the immunohistochemistry procedure for BSE on January 11, 2005. No part of the cow entered the human food or feed chain. The carcass was secured from the index premises and transferred to the CFIA Lethbridge Laboratory where it was subsequently incinerated.

The CFIA immediately initiated an epidemiological investigation along three lines of inquiry, based on World Animal Health Organization (OIE) guidelines, namely:

- calves born to the affected cow during the two years prior to the onset of clinical signs;
- the birth cohort (cattle born on the farm of origin within 12 months before and 12 months after the birth of the affected animal); and
- feed to which the animal may have been exposed early in its life.

Animal Investigation

The affected Charolais beef cow was just under seven years old at the time of death, having been born on March 21, 1998. The animal remained on the farm of birth during its entire life. The cow had separated from the herd, experienced loss of condition and eventually hind-limb dysfunction that the owner attributed to injury. A private veterinary practitioner was consulted and the animal was euthanized and sampled for BSE testing.

The investigation revealed that the animal had two progeny born within the previous two years, one of which was confirmed to have been slaughtered. The other has been euthanized and incinerated at the CFIA Lethbridge Laboratory. This animal was not tested for BSE because it was less than one year of age.

The birth cohort was determined to comprise 349 animals. The trace-out investigation of the birth cohort located 41 live animals that were subsequently euthanized, sampled and tested negative for BSE. These animals were disposed of by incineration. Because birth cohort cattle would be five-to-seven years old today, most had previously been slaughtered or had died of natural causes. The other 308 animals were traced as follows:

- 273 animals were confirmed to be dead or slaughtered in Canada
- 32 animals had died on the farm of origin
- three animals were deemed untraceable because of inadequate records.

Feed Investigation

A thorough investigation into feed purchases, feeding practices, manufacturing processes and documentation was undertaken at the farm of origin, feed manufacturers and retailers. The investigation revealed that the index animal was exposed to four commercial feed sources (calf ration, creep feed, and two mineral supplements) during its early development that may have been the source of infection. Although these four feed sources should not have contained ruminant meat and bone meal (MBM), the possibility that one or more of them may have been contaminated cannot be ruled out. The feed manufacturers were handling ruminant MBM for the manufacture of non-ruminant feeds during the time-frame of interest. These feed sources were likely manufactured a short time after the feed ban was implemented, however, as historical production records were not available, manufacturing dates could not be confirmed.

Investigation Overview

Consistent with risk assessments and knowledge derived from previous investigations, this most recent case of BSE was not entirely unexpected. The first case, detected in May, 2003, indicated that Canada had a low, previously undetected incidence of BSE. Since that time, Canada's national surveillance program, which targets cattle most likely to be affected by BSE, has tested more than 30,000 animals. With this testing intensity and focus, the sporadic detection of a small number of additional cases was anticipated. Both the age and number of animals identified through intensified surveillance testing continues to suggest that the level of BSE in Canada is low and declining. The fact that the feed ban was introduced almost six years prior to the detection of BSE in a native-born animal in May, 2003, has been extremely important in preventing amplification and limiting the spread of BSE. These cases also demonstrate the integrity of Canada's surveillance system and the commitment of Canadian cattle producers and veterinarians to responsibly and pro-actively report animals for testing.

This investigation identified that certain feed materials, likely manufactured a short time after the implementation of Canada's feed ban, may have been contaminated. This finding is consistent with the experience of all countries with BSE which have implemented feed bans. As with any major policy that requires restructuring of operations, some time may have been required for the feed ban to be implemented completely and uniformly. Renderers, feed manufacturers, retailers, distributors and producers were required to develop and implement new processes into their operations. These processes included sequencing and flushing systems in feed mills manufacturing a variety of feed sources, as well as new label requirements and enhanced record keeping generally. As these changes were being developed, implemented and refined,

it is possible that some ruminant feed produced shortly after the feed ban became contaminated with prohibited materials.

The feed ban is an important animal health measure whose primary objective is to curtail the spread of BSE in a cattle population, and that is why, in 1997, Canada implemented this measure, in advance of the detection of any native cases. The degree of effectiveness of the feed ban can influence the length of time it could take to completely eliminate the disease from a cattle herd population. It is clear that Canada's feed ban has been effective enough to limit the occurrence of BSE in Canada to an extremely low level and lead to elimination of the disease over time. The results of Canada's surveillance program to date bear this out, based on the small number of cases found and the age of the affected animals. Given that the incubation period of BSE is influenced by the level of infectivity to which an animal is exposed (the higher the exposure, the shorter the incubation period, and *vice versa*), the older age of the affected animals indicates that the level of contamination in the feed source would have been very low, even before the feed ban was implemented. Notwithstanding short delays in the implementation of the feed ban in 1997, there is a strong basis to believe that the feed ban, as designed and delivered, is doing its job. Proposed enhancements to the ban would serve to further shorten the time required to achieve complete elimination of BSE from Canada.

While the feed ban is an important BSE animal health measure, the detection of this animal, born after its introduction, does not impact on the safety of meat currently being produced in Canada. Following the initial detection of BSE, the Government of Canada moved quickly to implement the most effective public health measure that a BSE-affected country could take by requiring the removal of specified risk materials (SRM) from all cattle slaughtered in Canada. Removal of SRM is verified by inspection staff of the CFIA and provincial and territorial counterparts. This science-based measure ensures that consumers in Canada and in importing countries are effectively protected from exposure to BSE infectivity in meat products produced in Canada.

With respect to birth cohorts slaughtered prior to the July 2003 implementation of the requirement to remove SRM from the food chain, a number of factors contribute to the very low risk associated with meat from these animals. These include the fact that the majority of animals slaughtered for beef consumption in Canada are between 18-22 months of age and are, therefore, considerably less likely to develop infective levels of the disease, that all animals in the federal system are subjected to ante and post mortem inspection, that the "within herd" incidence of BSE is a rare event which has been reconfirmed by the recent Canadian experience in which no additional BSE positive animals have been found upon tracing and testing, and finally, that the highest level of prions are located in the brain, spinal cord and eyes, all of which are not generally included in the diets of the majority of Canadians.

Case 4

REPORT ON THE INVESTIGATION OF THE FOURTH CASE OF BOVINE SPONGIFORM ENCEPHALOPATHY (BSE) IN ALBERTA, CANADA

Background

On January 12, 2006 a private veterinarian in North Central Alberta euthanized and sampled a Holstein-Hereford cross bred cow under Canada's National BSE Surveillance Program. Brain samples from this animal were sent to an Alberta provincial laboratory where they were screened for BSE using a Bio-Rad rapid test. The sample produced an inconclusive reaction on January 17, 2006. In accordance with the prescribed testing protocol, the test was repeated and on January 18 produced a reaction a second time. Brain samples were then sent to the National BSE Reference Laboratory at the Canadian Science Centre for Human and Animal Health in Winnipeg where BSE was confirmed using the immunohistochemistry procedure on January 22, 2006. No part of the cow entered the human food or animal feed chain. The carcass was secured from the index premises and transferred to the Canadian Food Inspection Agency (CFIA) Lethbridge laboratory where it was subsequently incinerated.

The CFIA immediately initiated an epidemiological investigation along three lines of enquiry, based on the World Organization for Animal Health (OIE) BSE guidelines, namely:

- calves born to the affected cow during the two years prior to the onset of clinical signs;
- the birth and feed cohort (cattle born on the farm of origin within the twelve months before and the twelve months after the birth of the affected animal or animals purchased and present on the farm during this period which were also in their first year of life); and
- feed to which the animal may have been exposed early in its life.

Animal Investigation

The affected Holstein-Hereford cross cow was born on April 15, 2000 and therefore was 69 months or just under six years old at the time of death. The animal lived her entire life on the farm of birth. The affected cow had a history of not performing well for at least the past month. When examined on January 12, 2006 the animal exhibited abnormal locomotion and posture. The practitioner and producer determined that the animal should be euthanized, and because it met the criteria of Canada's National BSE Surveillance Program, samples were forwarded for laboratory analysis.

The investigation revealed that the affected cow had two calves during the two years prior to the onset of clinical signs. The 2005 offspring was located on the farm of origin. It was transported to the CFIA Laboratory in Lethbridge, where it was euthanized, sampled and tested negative for BSE. The carcass was incinerated.

The 2004 offspring had been sold in a lot of 14 cattle to another producer, and was determined to have died during its first year of life on the second premises.

Its carcass did not leave the premises.

The index premises comprised a dairy herd and a cow-calf beef operation. The birth and feed cohort was determined to comprise 156 animals which, along with the affected animal, were born on the index premises in the dairy operation. The cohort included purebred Holsteins destined for the dairy herd or for sale and cross bred offspring removed to the beef herd at approximately one year of age or sold at an earlier age. The trace-out investigation of the birth and feed cohort located 38 live animals on the index premises and in other herds to which they had been sold. These animals were subsequently euthanized, sampled and tested negative for BSE. Because the birth cohort cattle would now be five to seven years of age, most had previously been slaughtered or died of natural causes. The disposition of the remaining 118 animals in the cohort was determined to be:

- 27 animals had died on the farm of origin
- 90 animals were traced and determined to have died or been slaughtered at other locations
- One animal was traced and confirmed to have died and been tested under Canada's National BSE Surveillance Program with negative results.

Feed Investigation

A thorough and detailed feed investigation was conducted at the farm of origin to identify all of the feed materials used, the suppliers and sources of these products, and the feeding and feed storage management practices. The on-farm investigation focused on potential cross contamination or incidental exposure to feeds that could have contained prohibited ruminant feed ingredients.

Investigations were conducted at all identified feed suppliers and included identifying use of, or potential contamination with, material prohibited from feeding to ruminants. Specific attention was directed to ingredient sourcing, transportation, handling, manufacturing, storage and delivery practices.

Results of the investigation on the farm revealed that the index animal had direct exposure to four different commercial products representing two different suppliers during the first year of life and a further four different commercial products from the same two suppliers at approximately 12 to 14 months of age.

None of the product formulations contained material prohibited from use in ruminant feeds. One of the two suppliers produced feeds for ruminants as well as feeds for non-ruminant species. The feeds produced for non-ruminant species included material prohibited for use in ruminant feeds. This manufacturing facility had procedures in place to minimize opportunities for contamination of ruminant feeds with prohibited material and comply with the regulatory requirements of the feed ban.

A detailed review of individually manufactured products from this facility and to which the index animal was or was potentially exposed, identified incidents of concern where ruminant feed was processed or transported immediately following the processing of a feed for non-ruminant species containing prohibited material. Documentation did not always demonstrate that proper clean out of cross-utilized equipment had occurred.

Forages used on the farm were grown and harvested on the farm or occasionally purchased from neighbours and transported with farm owned equipment. The only on-farm mixing equipment was a feed wagon used to combine forages with commercially prepared rations for the lactating dairy herd. This equipment was never shared or loaned off the farm. The use of commercial feed products was limited to those intended for ruminants and a bagged pet food product for dogs that was stored in the garage and fed at the house. Bin management practices on the farm extensively minimized but did not completely eliminate the possibility that feed products produced prior to the ban were present to some extent on the farm, three years subsequent to the ban.

Investigation Overview

Given current knowledge about the epidemiology of BSE, it is reasonable to presume that this animal was exposed to feed containing a low level of infectivity during its first year of life. The investigation into the current case identified a number of possibilities but it was impossible to determine the exact source of exposure with a high degree of certainty. However, the findings indicate that a particular calf grower ration could have become contaminated during either manufacture or distribution. Furthermore, investigators could not rule out the somewhat remote possibility of residual pre feed ban materials persisting on the farm.

It is uncertain if such contamination is attributable to a remnant of the low level of infectivity previously demonstrated to be circulating in the feed system in this geographical area or a more contemporary occurrence.

For an analysis of the temporal and spatial distribution of BSE in North America, refer to Canada's Assessment of the North American BSE Cases Diagnosed From 2003 to 2005 - Part II published February 2006. It is available at: www.inspection.gc.ca/english/anima/heasan/disemala/bseesb'eval2005/evale.sht ml

The detection of BSE affected animals born after the introduction of a feed ban is not unique to Canada, and does not indicate a failure of the measures in place to reduce and eventually eradicate BSE. In other countries that have experienced cases of BSE, similar events have occurred. While measures equivalent to Canada's feed ban have been demonstrated to curtail the amplification and spread of BSE in cattle and would lead to the elimination of the disease over time, additional measures to further reduce any potential for cross-contamination would hasten eradication.

The safety of meat currently being produced in Canada is assured by public health measures enacted in 2003, following the first detection of BSE in Canada. The removal

of specified risk materials (SRM) from all animals slaughtered for human consumption in Canada is the most effective single measure to protect consumers in Canada and importing countries from exposure to BSE infectivity in meat products.

While this fourth case of BSE is unwelcome, it is not unexpected. The first case, detected in May 2003, indicated that Canada had a low, previously undetected level of BSE. Therefore increased testing of animals from high risk categories, as was this case, an animal exhibiting signs neurological abnormality, was intended to determine the prevalence of BSE in Canada, and to monitor the effectiveness of the suite of mitigating measures in place. It is reassuring that, among over 88,000 targeted tests conducted since 2003, this is only the fourth positive animal detected, indicating an extremely low prevalence of BSE in Canada. Such detections also demonstrate the integrity of Canada's surveillance system and the commitment of Canadian producers and veterinarians to contributing to the elimination of this disease in Canada.

Case 5

REPORT ON THE INVESTIGATION OF THE FIFTH CASE OF BOVINE SPONGIFORM ENCEPHALOPATHY (BSE) IN CANADA

Background

On April 8, 2006 a Holstein cow on a dairy farm in the Fraser Valley area of British Columbia was euthanized and sampled under Canada's National BSE Surveillance Program. The carcass was placed under detention and held pending testing results. Brain samples from this animal were sent to a British Columbia provincial laboratory where they were screened for BSE using a Prionics rapid test. The sample produced an inconclusive reaction on April 11, 2006. In accordance with the prescribed testing protocol, the test was repeated on April 12 and produced a reaction a second time. Brain samples were then sent to the National BSE Reference Laboratory at the Canadian Science Centre for Human and Animal Health in Winnipeg where BSE was confirmed by the immunohistochemistry procedure on April 16, 2006. The carcass was secured from the sampling site and, after additional tissues were taken for research purposes, transferred to the Canadian Food Inspection Agency (CFIA) Lethbridge laboratory and subsequently incinerated. No part of the carcass entered the human food supply or animal feed chain.

The CFIA immediately initiated an epidemiological investigation along three lines of enquiry, based on the World Organization for Animal Health (OIE) BSE recommended guidelines, namely:

- calves born to the affected cow during the two years prior to the onset of clinical signs;
- the birth cohort (all cattle born in the same herd as, and within 12 months of the birth of, the BSE affected animal) or the feed cohort (all cattle which, during their first year of life, were reared with the BSE affected animal during its first year of life, and which investigation showed consumed the same potentially contaminated feed during the period); and
- feed to which the animal may have been exposed early in its life.

Animal Investigation

The affected Holstein cow was born on April 29, 2000, and was 71 months, or circa six years old at the time of death. It had been moved from its farm of birth, to the index premises, just over one year prior to the onset of clinical signs of disease. The producer reported the duration of illness was approximately one month, during which the animal displayed progressive signs of impaired locomotion, culminating in the animal becoming non-ambulatory (downer). At that time a decision was made to euthanize the animal and, because it met the inclusion criteria of Canada's National BSE Surveillance Program, arrangements were made to forward appropriate samples for laboratory evaluation.

The investigation revealed that the affected cow had two male calves born during the two years prior to the onset of clinical signs (born March 27, 2005 and April 7, 2004). CFIA investigators determined that the 2005 calf was either euthanized shortly after birth or entered the fattening/slaughter stream at a young age and subsequently died or was slaughtered. The 2004 calf was determined to have entered the fattening / slaughter stream and subsequently died or was slaughtered.

The birth farm was also a dairy operation. The feed cohort was determined to comprise 146 animals which, along with the affected animal, were raised on the birth farm. This cohort included Holstein females and males raised as breeding stock. Males sold at less than two weeks of age for fattening and subsequent slaughter without having access to any commercially prepared feeds were excluded from the investigation because they were not exposed to the same potentially contaminated feed as the index case. The trace-out investigation of the cohort located 23 live animals on the index premise and in other herds to which they had been sold. Twenty-two of these animals have been euthanized, sampled and tested negative for BSE. Disposal of the carcasses was by incineration. The remaining animal (under CFIA quarantine) is very near to calving, and for this reason its destruction and testing has been postponed. Because the cohort cattle would now be five to seven years of age, many had previously been slaughtered or died of causes unrelated to BSE. The following is the disposition of the remaining 123 animals in the cohort:

- 67 animals were traced and confirmed to have died or been slaughtered (one animal had previously been tested under Canada's National BSE Surveillance Program with negative results);
- 8 animals were traced and presumed to have died or been slaughtered at other locations
- 15 were exported to the USA for breeding purposes (this information has been forwarded to US authorities for follow up)
- 33 animals were determined to be untraceable because of inadequate records

Feed Investigation

A thorough and detailed feed investigation was conducted at the birth farm to identify all of the feed materials used, the suppliers and sources of these products, and the feeding and feed storage management practices. Investigators focussed on all potential avenues of direct exposure to prohibited material, as well as potential areas of cross-contamination. Compliance with regulatory requirements of the feed ban was assessed throughout the investigation.

Investigation at the birth farm revealed it to be a dedicated dairy operation with no other livestock species present. All feed products to which the index animal had access were intended for feeding to ruminants and consisted of farm-grown or purchased forages (hay and silage) as well as commercially prepared feed. Pets on the farm (cats and one dog) were fed pet food that was stored and fed away from the dairy operation, thus

eliminating these rations as a potential source of prohibited material to the BSE positive animal. Consistent with this farm's practices, the index animal was housed in a series of indoor pens and did not have access to fertilizers, compost or other potential sources of prohibited material.

A review of feed storage and feeding practices identified the use of bagged, block and bulk commercially-prepared products. The only on-farm mixing equipment was a mixer wagon used to combine forages and commercially prepared lactation rations for the milking herd which was never shared or loaned off-farm.

All commercially prepared rations were purchased from a single supplier. Five products (representing the largest quantities the animal consumed) were manufactured by the supplier, in its own facility. A further six products (specialty products such as milk replacer and mineral/salt blocks) were manufactured in facilities owned by other companies.

Three of four facilities supplying specialty products (milk replacer, salt and mineral blocks) were dedicated free of all ingredients prohibited from use in ruminant feeds. The fourth facility (a supplier of mineral blocks to the birth farm) did handle prohibited material. Examination of the mixing records at this facility, for products to which the index animal may have been exposed, revealed improper sequencing between the manufacture of one lot of mineral blocks and a previous product that contained prohibited material. However, the nature of the product and the age of potential exposure (beginning at 6 months) make this an unlikely source of exposure of the affected animal as consumption would be extremely low.

The five major products manufactured in-house by the primary supplier, representing the largest quantities of feed the animal accessed (calf starter, calf grower, 2 different lactation rations and a dry cow ration), were formulated in a facility dedicated free of ingredients prohibited from use in ruminant feeds. The investigation confirmed the integrity of the procedures and equipment dedicated to all aspects of ingredient storage, processing, mixing, pelleting and feed storage, ruling out the possibility of cross-contamination occurring within the facility. However, the investigation also revealed that the facility shared an ingredient receiving system and bulk feed delivery trucks with another facility that did use prohibited materials in the manufacture of feeds for non-ruminant species. Under these circumstances, cross-contamination of feeds manufactured by the primary supplier could have occurred as a result of either the shared ingredient receiving system or during the delivery of bulk feed.

Interviews with staff at the latter facility identified that flushing procedures were used to prevent cross-contamination of ingredients and feeds at these points. However, written procedures in place at the time did not identify these requirements, and it was also not the practice at the time of production to document when flushing procedures were applied.

The risk of exposure of the index animal to a potentially contaminated feed cannot be ascribed to any specific product. In the absence of written records of procedures used to prevent cross-contamination, and lack of documentation to demonstrate these procedures were followed, it is not possible to verify actual production practices in place or to assess occurrence of possible failures. The effect of this is to identify all bagged feeds manufactured by this facility as representing a similar risk (due to shared ingredient receiving) and all bulk feeds as posing a similar risk (due to shared ingredient receiving and shared bulk delivery).

Identification of suppliers to the facility with shared ingredient receiving and bulk delivery trucks revealed five different sources of prohibited material. One of the major suppliers of prohibited material to this facility was the sole supplier to the facility servicing the birth farm of the BSE-affected cow diagnosed on January 23, 2006. These two most recent cases share the same susceptibility period as a result of their similar birth dates.

The findings of this investigation indicate that compliance with the1997 feed ban regulations was largely achieved through adoption of dedicated manufacturing facilities. Despite this, it is evident that opportunities for cross-contamination remained where conveyances and equipment were cross-utilized.

Investigation Overview

Given current knowledge about the epidemiology of BSE, it is reasonable to presume that this animal was exposed to feed containing a low level of infectivity during its first year of life. The investigation into the current case identified a number of possibilities but it was impossible to determine the exact source of exposure with a high degree of certainty. However, the findings suggest that the major rations could have become contaminated during manufacture or distribution.

For an analysis of the temporal and spatial distribution of BSE in North America, refer to Canada's Assessment of the North American BSE Cases Diagnosed From 2003 to 2005 - Part II published February 2006. It is available at: www.inspection.gc.ca/english/anima/heasan/disemala/bseesb'eval2005/evale.sht ml

The occurrence of this fifth case of BSE in Canada is consistent with the geographical and temporal clusters proposed therein.

The location of the index case's birth farm may suggest yet an additional geographic cluster. However, given its possible relationship with a previously identified source of prohibited material, this occurrence similarly suggests that the feed distribution area associated with the existing geographic cluster may not be confined to Alberta, but may include additional Western provinces. The timing of the presumed exposure of Cases 4 and 5, born in the same year and month, suggests an insult to the feed system separate and apart from the one associated with the previous cases born in 1996 - 1997. Cases 4 and 5 suggest that the previously acknowledged and undetected first generation indigenous BSE cluster contained a minimum of two animals.

The detection of BSE affected animals born after the introduction of a feed ban is not unique to Canada, and does not signal failure of the measures in place to reduce and eventually eradicate BSE. Measures equivalent to Canada's feed ban have been demonstrated to curtail the amplification and spread of BSE in cattle and be likely to eliminate the disease over time. Additional measures are currently being considered to further reduce the potential for contamination of ruminant feed, and hasten eradication.

The safety of meat currently being produced in Canada is assured by public health measures enacted in 2003, following the first detection of BSE in Canada. The removal of specified risk materials (SRM) from all animals slaughtered for human consumption in Canada is the most effective single measure to protect consumers in Canada and importing countries from exposure to BSE infectivity in meat products.

CFIA significantly increased the frequency of inspection of the animal feed system beginning in 2000. Since that time there has been an increasing level of compliance with the requirements of the feed ban.

Since the detection of BSE in Canada in May 2003, the increased testing of animals from the high risk categories (including this downer animal) was directed at determining the level of BSE in Canada, while monitoring the effectiveness of the suite of mitigating measures in place. It is reassuring that, among over 105,000 targeted tests conducted since 2003, this is only the fifth positive animal detected, indicating an extremely low level of BSE in Canada. Such detections demonstrate the integrity of Canada's surveillance system, the level of awareness which exists at all levels of the animal and food production system and the commitment of Canadian producers and veterinarians to the elimination of this disease.

Case 6

REPORT ON THE INVESTIGATION OF THE SIXTH CASE OF BOVINE SPONGIFORM ENCEPHALOPATHY (BSE) IN CANADA (Province of Manitoba)

Background

On June 15, 2006, a commercial beef producer in Manitoba euthanized a diseased Charolais cross bred cow. Tissue samples were collected by the producer's private veterinarian for testing under the National BSE Surveillance Program.

The sample was received by the Manitoba provincial laboratory on June 22, 2006 where it was screened for BSE using a rapid BSE test (BioRad ELISA). The preliminary test results received on June 29, 2006 did not rule out BSE. Therefore, in accordance with standard operating procedures, the test was repeated on June 30, 2006 using the original and re-cut tissues which produced identical results.

Staff of the National BSE Reference Laboratory (BSE-RL) collected the brain for confirmatory testing at the Canadian Science Centre for Human and Animal Health in Winnipeg. On June 30, additional positive rapid screening test results were generated using the Prionics-Check Priostrip and Prionics-Check Western Blot and BSE was confirmed on July 3, 2006 using the immunohistochemistry procedure. At the same time, the Hybrid Western Blot test was performed and differences in immunobiochemical patterns including the apparent molecular weight of PrP^{res} protein, glycoform distribution, and detection using P4 monoclonal antibody, confirmed this case as BSE with a phenotype consistent with a less prevalent strain of BSE previously reported in Europe and the US.

The CFIA immediately initiated an epidemiological investigation along three lines of enquiry, based on the previously established World Organization for Animal Health (OIE) BSE guidelines, namely:

- calves born to the affected cow during the two years before the onset of clinical signs;
- the birth and feed cohort (cattle born on the farm of origin within 12 months period before and after the birth of the affected animal or animals purchased and present on the farm during these periods, which were also in their first year of life and subject to the same feed); and,
- feed to which the animal may have been exposed early in its life.

Animal Investigation

When the positive BSE sample was collected, a second BSE surveillance sample was taken from another cow on the same premises. To ensure sample integrity and the identification of the remainder of the carcass, DNA analysis was performed on both

samples and their associated animal parts. DNA results confirmed the submission as originally submitted and the identity of the hide.

The affected cow was determined to be 16 or 17 years old at the time of destruction, based on the owner's records. The age of the animal limited the investigation as the time period exceeded normal information retention including written records (auction records are kept for seven years) and human memory.

The affected cow had deteriorated in the week before its death and had become non-ambulatory. Based on the poor prognosis for this animal, the producer decided that the animal should be destroyed and, because it met the criteria of Canada's National BSE Surveillance Program, a private veterinarian was called to collect samples for laboratory analysis.

The index premises is a beef cow-calf operation with approximately 125 head on site. The producer retains some replacement heifers from their stock and purchases heifers. The producer also buys older cull cows and maintains them in a non-traditional production unit. The BSE-infected cow was an aged animal that had been purchased by the index farm in January 1992 as a bred heifer. The farm records indicated that she had her first calf in the spring of 1992. Therefore, the cow was either two or three years old in 1992 and was born in 1989 or 1990. This cow was originally purchased in 1992 from local cattle dealers as part of an assembled group of heifers. Confirmation that the cow was part of the 1992 shipment is based on: her dentition at the time of euthanasia, which was consistent with an aged cow; the finding of a unique dealer's brand on the hide; and, supporting farm records and tags. Tracing the birth farm was attempted, but proved not to be possible because the required records were not retained. The animal date of birth predates the mandatory animal identification program initiated in 2001.

The CFIA investigation could not exclude other cows as birth or feed cohorts that were part of the original January 1992 shipment. In addition to the index cow, the cohort included one cow bearing the same unique brand which was located on the index farm before being destroyed and testing negative for BSE on July 11, 2006. In addition, two cows on the index farm were confirmed dead by the owner, one cow was confirmed slaughtered (USA, Nov. 1995), and 17 cows were sold by the index farm and are presumed dead based on the age of these animals and traditional beef cattle management practices.

The investigation revealed that the affected cow had two female calves (2004, 2005) during the two year period before the onset of clinical signs and was pregnant at the time of its death. It has been verified that neither calf was registered by birth date in the Canadian Cattle Identification Agency database, a requirement for export to some countries. The 2004 calf was sold in December 2005 and entered a feedlot in western Canada (Saskatchewan or Alberta); it either died in the feedlot or was slaughtered in a Canadian plant at a young age. It is known that a Canadian Cattle Identification Agency (CCIA) tag was assigned to this calf, but there is no retirement history for the tag in the

CCIA's database. The 2005 heifer calf is also presumed to be dead, as it was pastured with the index cow, but did not return from pasture at the end of the pasture season.

The carcass and hide from the BSE positive case, along with other contaminated materials, were placed under control and deep buried in an area that complied with provincial environmental regulations. No part of the cow's carcass entered the human food or animal feed chain.

Feed Investigation

In view of the length of time the index cow lived on the premises, the CFIA conducted a review of feed and management practices on the index farm.

Interviews with the farm's owners, a review of their records, and tours of the premises all support the farm as a dedicated cow-calf operation with no other commercial livestock species present. All available information indicates the cattle only had access to feed products appropriate for cattle.

Feeds consumed before 1997, at the index premises or any previous locations, may have contained meat and bone meal (MBM) which were permitted under the regulations of the time. Formulations and sources of MBM, if used, were not available, so it was impossible to determine whether there were any links to feeds identified in previous cases.

Investigation Overview

Canada has confirmed its sixth case of BSE. The five previous cases of BSE found in Canada were characterised as being similar to the majority of the BSE cases found around the world; however, this sixth case is a less prevalent strain of BSE which has also been reported in Europe and in the U.S.

With refinement and advancement in diagnostic test methods, scientists have only very recently demonstrated the existence of more than one strain of BSE, although multiple strains are known to occur in both human (CJD) and sheep (scrapie) prion diseases.

This less prevalent BSE strain is more difficult to detect and affects mainly older animals. Of the more than 200,000 BSE cases recorded worldwide, less than 100 are known to have been infected with different BSE strains. There is some speculation that the discovery of these different strains came to light as a result of the enhanced BSE surveillance programs occurring worldwide.

Relevant Considerations

The safety of meat being produced in Canada is assured by public health measures enacted in 2003, following the first detection of BSE in Canada. The removal of specified risk materials (SRM) from all animals slaughtered for human consumption is the most effective single measure protecting consumers in Canada and importing countries from exposure to BSE infectivity in meat products.

On June 26, 2006, the CFIA announced that it is banning cattle tissues capable of transmitting BSE from all animal feeds, pet foods, and fertilizers. Such tissues have been prohibited from inclusion in feed produced for cattle, sheep, goats and other ruminant species since 1997. The enhancement will significantly accelerate Canada's progress toward eradicating the disease from the national cattle herd by preventing more than 99% of any potential BSE infectivity from entering the Canadian feed system, and thereby eliminate the potential for cross contamination during production, transportation or storage.

Case 7

REPORT ON THE INVESTIGATION OF THE SEVENTH CASE OF BOVINE SPONGIFORM ENCEPHALOPATHY (BSE) IN CANADA

Background

On July 2, 2006, a dairy cow on a farm in northern Alberta died due to complications related to mastitis. The following day, a private practitioner sampled the cow under Canada's National BSE Surveillance Program. Brain samples from this animal were sent to the Alberta Agriculture, Food and Rural Development (AAFRD) Laboratory, where they were screened for BSE using a Bio-Rad rapid test. The preliminary test results received on July 6, 2006 did not rule out BSE. In accordance with the prescribed testing protocol, the test was repeated on July 7 and produced a second reaction. Brain samples were then sent to the National Centre for Foreign Animal Disease in Winnipeg, where BSE was confirmed by the SAF immunoblot and immunohistochemistry (IHC) procedures on July 13, 2006. The staining pattern from the confirmatory IHC tests supported the notion that this animal seemed to have been detected at an earlier stage of BSE incubation. Had the animal succumbed to BSE and not to an unrelated disease, it may have been some time before BSE symptoms would have been noted. The carcass was secured from the farm, transferred to the AAFRD laboratory and incinerated. No part of the carcass entered the human food supply or animal feed chain.

The CFIA immediately initiated an epidemiological investigation based on the most recent World Organization for Animal Health (OIE) recommended BSE guidelines. Specifically, the CFIA investigated:

- the birth cohort (all cattle born in the same herd as, and within 12 months of the birth of the BSE-positive animal);
- the feed cohort (all cattle which, during their first year of life, were reared with the BSE positive animal during its first year of life, and which investigation showed consumed the same potentially contaminated feed during the period); and
- feed to which the animal may have been exposed early in its life.

At the time that this cow was confirmed to have BSE, it was not in milk production. With respect to the milk this cow produced prior to the detection of the disease, scientific research indicates that BSE is not transmitted through cow's milk, even if the milk comes from a cow with BSE. Therefore, milk and milk products are considered safe and no action on such products was required.

Animal Investigation

The positive cow was confirmed to be a purebred dairy animal born on April 22, 2002, and was 50 months old at the time of death. It was born and lived its entire life on the index premises. The producer reported the duration of illness was two days, during

which the animal displayed signs of toxic mastitis, and, despite treatment, became non-ambulatory (downer) and died. The following day, a private practitioner attended the premises to perform a post-mortem examination, which revealed the likely cause of death was toxic septicaemia attributable to the acute mastitis. Because the animal met the inclusion criteria of Canada's National BSE Surveillance Program, arrangements were made to forward appropriate samples for laboratory evaluation.

The investigation revealed that the positive cow had one male calf born during the two years prior to her death (born March 17, 2005). Based on advances in science, the OIE (Terrestrial Animal Health Code 2006) no longer recommends regulatory action with respect to calves of BSE positive cows. The hypothesized increased risk to calves born within 24 months of the onset of clinical signs in dams with BSE is not supported by ongoing research and analysis of data. Therefore, the CFIA has amended its policy regarding such calves and will no longer require their destruction. However, the CFIA will trace calves born to a positive female in respect of current export certification requirements requested by importing countries.

The index farm was a dedicated dairy operation. The birth and feed cohort was determined to comprise 172 animals that, along with the positive animal, were born or raised on the farm. The trace-out investigation of the cohort located 38 live animals on the index premises and in other herds to which they had been sold. The majority of these animals were euthanized and their carcasses disposed of by incineration, in accordance with OIE recommendations. Because testing of cohort animals is not required by OIE recommendations and has proven to be of little epidemiological value in Canada's and other countries' experience, the CFIA has discontinued the practice of testing the cohort animals. Four animals have been retained under quarantine for a short period to allow for calving or collection of valuable genetic material. As BSE is not contagious, these animals do not represent a risk of horizontal transmission to other animals. Once these animals are euthanized, their carcasses will be destroyed and excluded from the food and feed chains, as per OIE guidelines. The following is the disposition of the remaining 134 animals in the cohort:

- 113 animals were traced and confirmed to have died or been slaughtered (two animals had previously been tested under Canada's National BSE Surveillance Program with negative results);
- 13 animals were traced and presumed to have died or been slaughtered; and

- Eight animals were determined to be untraceable because of inadequate records.

The trace-out investigation is complete.

Feed Investigation

The feed investigation focussed on the critical period of susceptibility during the first year of life and encompassed all potential avenues of direct exposure to prohibited material as well as potential areas of cross contamination. Compliance with the

regulatory requirements of the 1997 feed ban was assessed throughout the investigation.

Investigation at the birth farm revealed that laying hens, rabbits, cats, a horse, a dog and possibly some goats were present during the time of interest. Feed products for these species were purchased in bags and stored in original packaging in the same building as bagged products for dairy animals. The rations for the layers and rabbits did not contain prohibited material and were manufactured in a facility free of prohibited material. The cat and dog food products are presumed to have contained prohibited material but were understood to be fed as intended and away from the dairy animals. The horse and goats were not fed commercial horse or goat products.

All feed products to which the BSE positive animal had access were intended for feeding to ruminants. These consisted of farm-grown or purchased grains and forages, and feed products from three different commercial suppliers. On-farm mixing equipment consisted of a stationary mixer used to combine forages with commercial products for lactating animals and those over two months of age.

For the first two months of life, the BSE positive animal was housed by itself in a single calf hutch and fed colostrum, milk or milk replacer and a commercially prepared 20% Calf Starter. The milk replacer and calf starter were manufactured in facilities that did not receive, store or use prohibited material.

From two to six months of age, the animal was housed in an outdoor group pen with animals of similar age and fed a16% Heifer Grower (for approximately six weeks), followed by an 18% Calf Starter (until reaching about six months of age), and forages (hay and silage). Other feed products available at this age were canola meal and, possibly, free choice mineral.

From six to fourteen months of age, the calf was fed a farm-mixed ration consisting of barley silage, canola meal, and commercial dry cow/heifer premix.

Other commercial products used on the farm included two different rations for the lactating cows and one for dry cows. These products were not fed to the index animal prior to 14 months of age, although the same mixer was used for both the index animal and the lactating cows. Various salt blocks and miscellaneous types of bagged products from facilities not handling prohibited material were used as well.

Three different commercial suppliers were identified through the on-farm feed investigation. Investigations at the primary supplier of the calf products (manufactured the 20% and 18% Calf Starters which were fed for approximately 4 or 5 of the first 6 months of life) confirmed it to be free of prohibited material. This facility was dedicated free of prohibited material for more than ten months before manufacturing feeds during the time frame of interest. Feeds from this facility were delivered to the index farm in dedicated, company-owned trucks.

Investigations at the other two facilities-that did receive, store and use prohibited material during the period of interest-confirmed that all feed product formulations for the index farm (16% Heifer Grower, 2 different lactation rations, lactation and dry cow/heifer premixes) were not manufactured using prohibited material. Therefore, the remainder of the investigation focused on production practices and the records for manufacture and delivery of feeds specific to the index animal.

Both manufacturing facilities received prohibited material from the same rendering plant implicated in previous BSE investigations. Both facilities had procedures in place to comply with the 1997 feed ban. However, a review of production records revealed that one of these facilities failed to document a flush of equipment used to pellet 2.08 tonnes of commercial 16% Heifer Grower ration. The equipment had previously been used to pellet a feed containing prohibited materials for non-ruminants. This entire load of commercial Heifer Grower ration was delivered to the index farm (on May 25, 2002) and used in the feeding of the index animal and others on the premises at the time. An enforcement investigation into feed mill activities is underway.

Canola meal from the second facility is believed to have been fed to the index animal for a period of about two weeks when it was two to three months of age. Production records from this facility, while not pointing to any instances of potential cross contamination of this feed, were incomplete and did not allow for the desired level of certainty. The procedural error associated with the 16% Heifer Grower ration makes that feed the most likely source of infection.

Considering the feeding regime on the farm and specific production records reviewed, the most likely source of exposure to BSE infectivity appears to be the heifer ration referred to above, which could have become contaminated by prohibited material from the non-ruminant ration produced immediately before it. Because of incomplete or absent documentation, the possibility of cross contamination during transportation being a contributing factor could not be ruled out.

Investigation Overview

Since detecting BSE in May 2003, Canada has significantly increased its targeted testing of cattle in high-risk categories (including animals which die on farm). This effort is directed at determining the level of BSE in Canada, while monitoring the effectiveness of the suite of risk mitigating measures in place. Canada's National BSE Surveillance Program continues to demonstrate a very low level of BSE in Canada, with seven positive animals detected among over 117,000 targeted tests conducted since 2003. Such detections demonstrate the effectiveness and integrity of Canada's surveillance system; the level of awareness existing at all levels of the animal and meat production systems; the value of financial reimbursement provided for sampling and carcass disposal; and the commitment of Canadian producers and veterinarians to eliminating this disease. Canada's surveillance program fully respects OIE guidelines.

The detection of this case at an early stage demonstrates the highly sensitive and robust nature of Canada's BSE surveillance program. This animal was detected and diagnosed with BSE during a pre-clinical phase of the disease. The normal disease course to expression of clinical signs in this animal would be expected to have included an additional three to six months of incubation followed by an additional one to two months of clinical expression prior to being recognized as symptomatic of BSE and targeted for testing. Had an unrelated disease not hastened her entry into the surveillance stream, this animal would most likely have demonstrated clinical signs sometime between 54 and 56 months, not significantly different from the age range of previous cases.

It is important to recognize that the incubation period seen internationally ranges from 21 months of age to 216 months of age and is thought to be a function of the age of an animal when exposed and the dose of exposure. With an age range of 50 months to 180 months or more, Canada's cases are consistent with international data suggesting low dose exposures.

The location of Case 7's birth farm in northern Alberta and the possible relationship with a previously identified source of prohibited material make this occurrence consistent with the previously identified geographic cluster.

Other Relevant Information

Regarding the nature and effectiveness of Canada's ruminant feed ban, it is recognized that any potential BSE infectivity entering the beginning of the animal feed supply chain requires management throughout a complex feed and animal production system. As such, the current framework of the ban provides limited potential opportunities for prohibited animal proteins to contaminate feeds for ruminants, particularly when errors are made during mixing and manufacturing in multi-purpose facilities. Given the nature of the ban and these opportunities, the detection of BSE cases in Canadian cattle born after the implementation of the ban is consistent with the experiences of other countries that have detected a small number of domestic cases of BSE in recent years. International experts have agreed that the proactive implementation of the 1997 mammalian to ruminant feed ban in Canada has been a critically important factor in limiting the spread and preventing the amplification of BSE in the feed system.

Since the year 2000, the CFIA has significantly increased the frequency of inspections of the animal feed system. For example, the inspection frequency for commercial feed mills has increased from once per year to twice per year for all mills and is being increased further, to up to four times per year for higher risk facilities. Internal and external reviews have been conducted to assess inspection activities and the ban's effectiveness. Both the United States Department of Agriculture (USDA) and Canadian Food Inspection Agency's (CFIA) reviews in 2005 concluded that the ban, as designed, implemented and currently applied, is providing an effective barrier that is contributing to reducing the risk of BSE.

In 2005, the CFIA received additional funding to increase inspection and enforcement activities associated with the ban and to work toward implementing enhancements to the existing feed ban proposed by the CFIA in December 2004. Throughout 2005-06, additional inspection staff have been recruited, trained and deployed to augment feed ban-related programs.

Inspection activities are focussed on renderers, commercial feed manufacturers, retail and on-farm locations. Currently, there are approximately 30 renderers, 515 feed mills, 1300 retailers and over 100,000 farms (ruminants) in Canada. Approximately 115 new staff are working in this area. This is in addition to the approximately 70 cross-utilized inspection staff who worked in the program in the year 2000. These new inspection resources are deployed on a risk basis with emphasis on facilities that receive, store, use and distribute prohibited material.

Regulations to enhance Canada's feed ban were announced on June 26, 2006. The most important enhancement will require the removal of specified risk material (SRM) from all animal feeds, pet food and fertilizer. The enhancement will significantly accelerate Canada's progress toward eradicating BSE from the national cattle herd by preventing more than 99% of any potential BSE infectivity from entering the Canadian feed system. For further information, please see the fact sheet, "Canada's Enhanced Feed Ban", available at http://www.inspection.gc.ca/english/anima/feebet/rumin/enhrene.shtml.

The safety of beef produced in Canada is assured by public health measures enacted in 2003, following the first detection of BSE in Canada. The removal of SRM from all animals slaughtered for human consumption in Canada is the most effective single measure to protect consumers in Canada and importing countries from exposure to BSE infectivity in meat products.

Case 8

REPORT ON THE INVESTIGATION OF THE EIGHTH CASE OF BOVINE SPONGIFORM ENCEPHALOPATHY (BSE) IN CANADA

Background

On August 9, 2006, a commercial beef cow on a farm in northern Alberta died following a short history of neurological disease. The following day a private practitioner sampled the cow under Canada's National BSE Surveillance Program. Brain samples from this animal were sent to the Alberta Agriculture, Food and Rural Development (AAFRD) Laboratory, where they were screened for BSE using a Bio-Rad rapid test. The preliminary test results received on August 16, 2006 did not rule out BSE. In accordance with the prescribed testing protocol the test was repeated on August 17 and produced a second reaction.

Brain samples were then sent to the National Centre for Foreign Animal Disease in Winnipeg where rapid screening tests were performed, validating the work of the AAFRD, and BSE was confirmed by the Scrapie Associated Fibril immunoblot and MAB monoclonal antibody 6H4 procedure on August 23, 2006. This method had been chosen because of poor tissue quality (autolysis and freezing artefact) which prevented a definitive identification of target areas for immunohistochemistry. The carcass was secured from the farm, transferred to the AAFRD laboratory and incinerated. No part of the carcass entered the human food supply or animal feed chain.

The CFIA immediately initiated an epidemiological investigation based on the most recent World Organization for Animal Health (OIE) recommended BSE guidelines. Specifically, the CFIA investigated:

- The birth cohort (all cattle born in the same herd as, and within 12 months of the birth of the BSE-positive animal);
- the feed cohort (all cattle which, during their first year of life, were reared with the BSE positive animal during its first year of life, and which investigation showed consumed the same potentially contaminated feed during the period); and
- feed to which the animal may have been exposed early in its life.

Animal Investigation

The positive cow was a Charolais crossbred cow estimated as approximately eight to ten years of age at the time of death by examination of her dentition. The herd on the index premises had been assembled since 2001, including the purchase of the index case. The positive cow was therefore purchased within the previous five years and was not born at the index premises. The producer reported the duration of illness was more than one week, during which the animal exhibited neurological signs including ataxia and tremors and became non-ambulatory (downer). The producer treated the animal for milk fever, but despite treatment, she died. The following day a private practitioner attended the premises to perform a post-mortem examination which revealed the likely cause of death was peritonitis. Because the animal met the inclusion criteria of Canada's National BSE Surveillance Program, arrangements were made to forward appropriate samples for laboratory evaluation.

The index farm was a commercial cow-calf operation. The index animal was a purchased addition and there was no evidence that any members of its birth or feed cohort were also present on the index premises. The investigation initially focused on the determination of the farm of origin (birth farm) of the positive cow. Because the positive cow was not uniquely identified within the herd, and the farm's purchase records did not conclusively document a specific transaction for the acquisition of this particular cow, all purchases made by the producer since the inception of the herd in 2001 were investigated. It is possible that the cow was acquired before the introduction of the first phase of regulations requiring official identification of individual animals at the time of their movement (July 2001) or before enforcement of the regulations was implemented. There would have been no requirement for subsequent application of official identification to the cow, as it had not been moved from its farm of residence since.

Of 56 possible sources of the farm of origin of the positive cow that were investigated, 43 were definitively ruled out based on the profile of the index cow (estimated age, color, breed-type, sex) and the potential source farms' management practices (age of cows sold, colour, breed-type, producers' application of man-made identification). Information provided by the Livestock Identification Services Ltd. in Alberta and the Canadian Cattle Identification Agency (CCIA) was integral to the investigation. Because it was impossible to distinguish among the 13 remaining possible sources of the index cow, the animal was determined to be untraceable and no further action could be undertaken with respect to the birth or feed cohort, or the feed investigation.

The CFIA's previous experience with trace out investigations of birth and feed cohorts would suggest that for a cow of this age (eight to ten years), over 90% of its birth or feed cohort would have previously left the cattle population due to attrition.

Feed Investigation

BSE feed investigations focus on the critical period of susceptibility to BSE during the first year of life of positive animals and encompass all potential avenues of direct exposure to prohibited material as well as potential areas of cross-contamination. Because the birth farm of this animal could not be definitively determined, no feed investigation could be conducted. It has previously been demonstrated that the BSE agent was present on limited occasions in the Northern Alberta area during the period (1996-1998) spanning the estimated first year of this animal's life and its maximum susceptibility period. This period also coincides with the introduction of regulations to prohibit the feeding of mammalian protein to ruminants in Canada. The animal would have been born and exposed before the feed ban came into effect or during the early stages of implementation. At that time feed containing prohibited material may have remained on farms and feed mills which were adapting to the new requirements.

The possibility that the exposure occurred on the index premises where the positive animal lived since approximately 2001 was ruled out based on the very limited susceptibility of older animals.

Investigation Overview

Since the confirmation of BSE in a native-born animal in May 2003, Canada has significantly increased its targeted testing of cattle in high-risk categories advocated by the OIE (including animals which die on-farm). This effort is directed at determining the level of BSE in Canada, while monitoring the effectiveness of the suite of risk-mitigating measures in place. Canada's National BSE Surveillance Program continues to demonstrate an extremely low level of BSE in Canada, with eight positive animals detected among over 128,000 targeted tests conducted since 2004. Such detections demonstrate the effectiveness and integrity of Canada's surveillance system; the level of awareness existing at all levels of the animal and meat production systems; the value of financial reimbursement provided for sampling and carcass disposal; and the commitment of Canadian producers and veterinarians to eliminating this disease. Canada's surveillance program adheres to OIE guidelines.

Other Relevant Information

Canada remains committed to the achievement of high standards of animal and public health protection and food safety. As neither science nor international standards are static, continuous assessment and adjustments are undertaken to reflect new knowledge, technology or approaches.

Amendments to the Health of Animals Regulations to enhance the Canadian Cattle Identification system instituted in July 2001 were made June 14, 2005. These amendments removed exemptions from the requirement to tag animals. The requirement to identify was extended to dead stock and the requirement to report

information on identified dead stock was expanded to include producers disposing of dead stock on their own premises.

To facilitate traceability, tag distributors were required to report producer information to the national database within 24 hours. Individuals were required to report the correlated numbers when applying a new tag to an animal that was already identified and it was no longer permitted to replace an approved tag with another tag for animals destined for the export market.

On September 1, 2006, the CCIA further enhanced the Canadian Cattle Identification Program. CCIA's Policy now requires Radio-Frequency Identification (RFID) tags on all cattle leaving their herds of origin. This will facilitate Canada's tracing of movements and electronic recording of identification at additional levels in the animal production chain.

The safety of beef produced in Canada is assured by public health measures enacted in 2003, following the first detection of BSE in a native-born animal in Canada. The removal of Specified Risk Materials (SRM), those tissues which have been demonstrated to have the potential to harbour BSE infectivity, from all animals slaughtered for human consumption is the most effective single measure to protect consumers in Canada and importing countries from exposure to BSE infectivity in meat products.

International experts agreed that the proactive implementation of the 1997 mammalian to ruminant feed ban in Canada was a critically important factor in limiting the spread and preventing the amplification of BSE in the feed system. In independent reviews in 2005 the United States Department of Agriculture and the Canadian Food Inspection Agency concluded that the ban, as designed, implemented and currently applied, provides an effective barrier that is contributing to reducing the risk of BSE.

Regulations to enhance Canada's feed ban were announced on June 26, 2006. The most important change will require the removal of specified risk material from all animal feeds, pet food and fertilizer. The enhancement will significantly accelerate progress toward eradicating BSE from the national cattle herd by preventing more than 99% of potential BSE infectivity from entering the Canadian feed system and eliminating opportunities for cross-contamination within the complex system of production, transportation and storage of animal feeds. For further information, please see the fact sheet, "Canada's Enhanced Feed Ban", at http://www.inspection.gc.ca/english/anima/feebet/rumin/enhrene.shtml.

Footnote:

Based on revisions to the Bovine Spongiform Encephalopathy Chapter of the OIE Terrestrial Animal Health Code (2006), the CFIA amended its policy regarding the destruction of calves of BSE positive cows born within 24 months of the development of clinical signs. Since August 2006, CFIA no longer requires their destruction for disease

control. However, the CFIA will continue to trace calves born to a positive female in respect of current export certification requirements requested by some importing countries.

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Case 9

REPORT ON THE INVESTIGATION OF THE NINTH CASE OF BOVINE SPONGIFORM ENCEPHALOPATHY (BSE) IN CANADA

Background

Between January 20 and 22, 2007, a bull on a commercial beef farm in northern Alberta died after having experienced a loss of body condition over the course of the winter. A private practitioner sampled the animal under Canada's National BSE Surveillance Program on January 24, 2007. Brain samples were received by the Alberta Agriculture and Food (AAF) Laboratory on January 29, where they were screened for BSE using a Bio-Rad rapid test. The preliminary test results received on January 30, 2007, did not rule out BSE. In accordance with the prescribed testing protocol, the test was repeated on January 31 and produced a second reaction. Brain samples were then sent to the National BSE Reference Laboratory in Lethbridge, Alberta, where rapid screening tests validating these results were performed. BSE was confirmed by the Scrapie Associated Fibril (SAF) immunoblot procedure with monoclonal antibody 6H4 on February 7, 2007. This method had been chosen as the main confirmatory test because of poor tissue quality (autolysis and freezing artefact). Immunohistochemistry was also performed for additional confirmation and was positive on February 7, 2007. The carcass was secured from the farm, transferred to the AAF laboratory and incinerated. No part of the carcass entered the human food supply or animal feed chain.

The CFIA immediately initiated an epidemiological investigation based on the most recent World Organization for Animal Health (OIE) recommended BSE guidelines. Specifically, the CFIA investigated:

- the birth cohort (all cattle born in the same herd as, and within 12 months of, the birth of the BSE-positive animal);
- the feed cohort (all cattle which, during their first year of life, were reared with the BSE-positive animal during its first year of life, and which investigation showed consumed the same potentially contaminated feed during the period); and
- feed to which the animal may have been exposed early in its life.

Animal Investigation

The producer identified the positive animal as an unregistered Angus bull 79 months of age at the time of death. The animal was born on the farm and remained there throughout its life. The bull had been losing condition over the course of the winter and died from undetermined causes. A private veterinary practitioner attended the premises to determine if the animal met the inclusion criteria of Canada's National BSE Surveillance Program. A post-mortem examination could not be performed because the carcass was frozen, but the animal was assessed as having a body condition score of one (emaciated) and arrangements were made to forward appropriate samples for laboratory evaluation.

In an effort to corroborate the producer's recollection of the animal's origin and age, samples for DNA analysis were obtained from animals on the premises that were identified by the owner to be the sire and dam of the affected bull. The DNA results confirmed the parentage of the case animal and, therefore, that it was a home-bred animal as described. This demonstrated that the farm of origin was also the birth farm of the positive animal.

The dam of the positive animal, located on the birth farm, was demonstrated to have been born in 1998 according to the producer's tagging system. This indicated that her first calf - the positive bull - was born as part of the spring 2000 calf crop, which corroborated the producer's recollection.

The birth and feed cohort comprised 600 animals that, along with the positive animal, were born or raised on the farm. This includes animals born in the entire 1999, 2000 and 2001 calving seasons. It also includes additional animals sold from the farm that cannot be distinguished from the cohort based on their description at the point of sale. The trace-out investigation of the cohort identified 64 live animals retained by the producer. These animals are currently quarantined on the producer's premises pending humane destruction and disposal. The following is the disposition of the remaining 536 animals in the cohort:

- 440 animals were traced and confirmed to have died or been slaughtered,
- 53 animals were traced and presumed to have died or been slaughtered,
- One animal was traced and confirmed to have been exported and the importing country has been notified,
- 42 animals were deemed untraceable due to incomplete records.

Feed Investigation

The feed investigation focussed on feeds to which the animal may have been exposed during its first year of life. Review of the manufacture, transportation and handling of these feeds did not demonstrate a link between production practices for a specific product and potential cross-contamination with prohibited material.

Other species present on the farm included horses, dogs, and cats. On-farm mixing and delivery equipment consisted of a portable mix mill used to combine ground grain with commercial products and a mixer wagon used to combine forages with grain. Feed products available to the horses were the same as the commercial farm operation - no special products were purchased for them. Cat and dog food products were purchased and presumed to have contained prohibited material. These products were stored and fed in the house since 1999 and were not available to be accessed by the index case.

All identified feed products to which the BSE-positive animal had access were products intended for feeding to ruminants and consisted of farm-grown or purchased grains and forages, as well as commercially prepared feed products. Commercial products included

frequent purchase of trace mineralized salt and intermittent purchase of other mineral, limestone, protein supplement, molasses, vitamin premix and a complete feed.

The case animal was moved from a pen to pasture shortly after birth and remained on pasture until weaned at approximately six months of age. While on pasture, the animal also had access to mineral and trace mineralized salt. The animal was weaned into a pen where it remained until approximately 10 months of age, prior to returning to pasture. Feeds available during this time included forages and barley mixed on-farm with limestone, trace mineralized salt, and vitamin premix. Other products that the animal may have accessed included a 32% protein supplement and a complete feed.

Commercially prepared products were either purchased directly from a manufacturer or from a retail supplier that purchased from various manufacturers concurrently. The mineral and trace mineralized salt products that were purchased directly from the manufacturer were produced in a facility that had discontinued using prohibited material prior to May, 1999. These products were therefore ruled out as a possible source of contamination.

Investigation at the retailer identified two possible manufacturers of the trace mineralized salt, one manufacturer of the protein supplement, one manufacturer of the vitamin premix, one supplier of the limestone and one manufacturer of the complete feed. Of these, only the protein supplement, vitamin premix and one of the sources of trace mineralized salt were manufactured in facilities also handling prohibited material. The manufacture of the other products was therefore also ruled out as a possible source of contamination.

The facility manufacturing the protein supplement employed sequencing and flushing procedures to ensure products for ruminants were free of contamination with prohibited material. Investigation of specific products potentially received by the farm confirmed these sequencing and flushing procedures were followed and documented. The protein supplement was ruled out as a potential source of contamination.

The facility manufacturing the vitamin premix was also the second manufacturer of the trace mineralized salt. Manufacturing records for products from this facility for the time frame of interest are no longer available so production practices to prevent cross-contamination of ruminant feeds by prohibited material as required by the regulations could not be verified. Ingredient receiving records do not document that appropriate procedures were always followed after receipt of prohibited material so opportunities for cross-contamination may have existed at this point in the manufacturing process. However, there are no records to associate specific production lots through the manufacturer and retailer to the producer.

Transportation records for the complete feed and grain were not available so confirmation of compliance with regulatory requirements at the time could not be verified. The possibility of cross-contamination during transportation cannot be ruled out for these products. The other commercial products were packaged in such a manner

(bags or totes) to eliminate contamination during subsequent transportation and storage.

No direct link between specific products and production practices associated with potential cross-contamination can be made in this case. Facilities that handle prohibited material and manufacture ruminant rations are considered higher risk and did manufacture products to which the positive animal had access. The facilities identified in the investigation and which handled prohibited material, were each supplied exclusively by the same rendering facility common to previous investigations.

Investigation Overview

The detection of this case does not change any of Canada's BSE risk parameters. The location and age of the animal are consistent with previous cases, and the BSE surveillance results to date, including this new case, still reflect an extremely low level of BSE in Canada. In essence, the case confirms what was already known about an extremely low level of BSE infectivity having existed in Canada's feed system during the late 1990's and early 2000's within a previously determined geographic area and time interval.

Since the confirmation of BSE in a native-born animal in May 2003, Canada has significantly increased its targeted testing of cattle in high-risk categories advocated by the OIE (including animals which die on-farm). This effort is directed at determining the level of BSE in Canada, while monitoring the effectiveness of the suite of risk-mitigating measures in place. Canada's National BSE Surveillance Program continues to demonstrate an extremely low level of BSE in Canada, with nine positive animals detected among over 150,000 targeted tests conducted since 2003. Such detections demonstrate the effectiveness and integrity of Canada's surveillance system; the level of awareness existing at all levels of the animal and meat production systems; the value of financial reimbursement provided for sampling and carcass disposal; and the commitment of Canadian producers and veterinarians to eliminating this disease. Canada's surveillance program adheres to OIE guidelines.

The safety of beef produced in Canada is assured by public health measures enacted in 2003, following the first detection of BSE in a native-born animal in Canada. The removal of Specified Risk Materials (SRM), those tissues which have been demonstrated to have the potential to harbour BSE infectivity, from all animals slaughtered for human consumption is the most effective single measure to protect consumers in Canada and importing countries from exposure to BSE infectivity in meat products.

As demonstrated by the surveillance system, the feed ban implemented in 1997 is effectively preventing the amplification of BSE in Canada's feed system. The detection of BSE in a few animals born after the 1997 feed ban is not unexpected and does not indicate a failure of those measures. Additional regulations to enhance Canada's feed ban were announced on June 26, 2006. The most important change will require the

removal of specified risk material from all animal feeds, pet food and fertilizer. The enhancement will significantly accelerate progress toward eradicating BSE from the national cattle herd by preventing more than 99% of potential BSE infectivity from entering the Canadian feed system and eliminating opportunities for cross-contamination within the complex system of production, transportation and storage of animal feeds. For further information, please see the fact sheet, Canada's Enhanced Feed Ban, at http://www.inspection.gc.ca/english/anima/feebet/rumin/enhrene.shtml.

Case 10

REPORT ON THE INVESTIGATION OF THE TENTH CASE OF BOVINE SPONGIFORM ENCEPHALOPATHY (BSE) IN CANADA

Background

On April 24, 2007, a cow on a dairy operation in the Fraser Valley area of British Columbia was destroyed following a brief illness. On April 25, 2007, the Canadian Food Inspection Agency (CFIA) sampled the animal under Canada's National BSE Surveillance Program. On April 25, 2007, brain samples were received by the British Columbia Ministry of Agriculture and Lands (BCMAL) Laboratory, where they were screened for BSE using a Prionics rapid test. The result of this preliminary test did not rule out BSE. In accordance with the prescribed testing protocol, the test was repeated and produced a second reaction that day. Samples were then forwarded to the National BSE Reference Laboratory in Lethbridge, Alberta, where rapid screening tests (Prionics-Check PrioStrip and Prionics-Check Western) to validate these results were positive on April 26, 2007. On May 2, 2007, BSE was confirmed by the immunohistochemistry procedure and the Scrapie Associated Fibril Immunoblot. The carcass was secured at the sampling site, and was subsequently transferred to the CFIA Laboratory in Lethbridge for incineration. No part of the carcass entered the human food supply or animal feed chain.

The CFIA immediately initiated an epidemiological investigation based on the most recent recommended BSE guidelines of the World Organisation for Animal Health, referred to as OIE. Specifically, the CFIA investigated:

- the birth cohort (all cattle born in the same herd as, and within 12 months of the birth of the BSE-positive animal);
- the feed cohort (all cattle that, during their first year of life, were reared with the BSE-positive animal during its first year of life, and that investigation showed consumed the same potentially contaminated feed during the period); and
- feed to which the animal may have been exposed early in its life.

Animal Investigation

The positive animal was a registered Holstein cow born on November 10, 2001, and it was 66 months of age at the time of death. The animal was born, raised and had spent its entire life on the same farm. The cow had appeared to be lame for a few weeks prior to calving. After calving, she became unsteady and then non-ambulatory (downer). The producer determined that the animal should be destroyed, and because it met the inclusion criteria of Canada's National BSE Surveillance Program, arrangements were made to forward appropriate samples for laboratory evaluation.

The birth farm was a dedicated dairy operation. The feed cohort was determined to comprise 156 animals, which, along with the case animal, were raised on the birth farm. This cohort consisted of Holstein females. Males sold at a few weeks of age for

fattening and subsequent slaughter without having access to any commercially prepared feeds were excluded from the investigation, because they were not exposed to the same potentially contaminated feed as the case animal. No males were retained or raised on the farm. The trace-out investigation of the feed cohort located 41 live animals on the premises and in one other herd. Five of the animals have been humanely destroyed, for reasons unrelated to this investigation, and their carcasses and will be disposed of along with the case animal. The remaining feed cohorts are currently quarantined and agreement has been reached with the Producer to allow animals to calve out before humane destruction and disposal. This is due mainly to the operation being a purebred Holstein one and the need to retain genetics and farm production cycle. The following is the disposition of the remaining 115 animals in the feed cohort:

- a total of 92 animals were traced and confirmed to have died or been slaughtered (five animals had previously been tested under Canada's National BSE Surveillance Program, with negative results); and
- a total of 23 animals were determined to be untraceable because of records limitations.

Feed Investigation

The feed investigation focused on feeds to which the case animal may have had access during its first year of life and on the manufacturing practices used to produce each of these feeds.

Investigation at the farm revealed that the only non-bovine species present were one or more barn cats and a dog. Only the dog, which was fed at the house, received a commercially prepared, bagged pet food. There was no pasture use on the farm, and all forages (hay and silages) were grown on land fertilized with commercial fertilizer and harvested using farm-owned equipment. Non-forage feed products included three different commercially prepared complete feeds and mineralized salt blocks—all provided by one commercial feed manufacturer.

Two of the complete feeds (one for the lactating cows and one for young heifers) were always delivered in bulk and transferred directly into their respective bulk storage bins. The third ration, a pre-lactation ration, was delivered in 20 kg bags, or in bulk, and then transferred directly into bulk bags on the farm.

Feed mixing and handling practices described for the farm preclude feeding of the lactation or pre-lactation feeds to heifers less than 12 months of age. The lactation feed was mixed with forages in a mobile mixer wagon and fed to the milking cows. The pre-lactation ration was pail-fed directly to dry cows and bred heifers for the last two to three weeks before calving.

Consistent with management practices for all heifer calves on the farm, the case animal was housed in a single enclosed pen for approximately the first three months of life, and then moved through a series of group pens with other heifers of similar age and size.

Calves were fed colostrum, followed by milk, until weaning at approximately 12 weeks of age. Heifer calves were introduced to the commercial ration beginning at approximately six weeks of age, and they were pail-fed increasing amounts until approximately six to eight months of age. From six to eight months of age through to two or three weeks pre-calving, the animals were fed forage (hay and silage) only. Therefore, the case animal's only direct exposure to a mixed ration was the heifer ration; however, incidental exposure to the lactation ration, the dry-cow ration and the mineralized salt block cannot be completely ruled out.

Investigation at the commercial feed manufacturer identified that the mineralized salt blocks were manufactured in a separate, specialized facility free of prohibited material and other rendered products. The mineralized salt block was therefore ruled out as a possible source of contamination. The three complete feeds were manufactured on-site using equipment cross-utilized between feeds for ruminants and those containing prohibited material. Procedures to prevent cross-contamination of ruminant feeds with prohibited material existed at the facility, but, for some procedures, did not include a requirement to document that the procedure was followed.

For procedures accompanied by documentation to indicate that they had been followed, no deviations were noted for the specific feed products of interest. Procedures not accompanied by documentation to indicate that they had been followed (flush of common receiving system after receipt of prohibited material and cleaning of compartments of cross-utilized trucks) cannot be assessed for specific failures. As a result, cross-contamination during the receipt of feed ingredients and/or during the transportation of prepared bulk rations cannot be ruled out. The investigation supports that the most likely source was cross-contamination of the heifer ration through ingredient receiving or transportation, but it cannot rule out other products or other steps in the manufacturing process.

Prohibited material was regularly supplied to the manufacturing facility from four different rendering facilities, one of which supplied prohibited material to each feed supplier identified in previous BSE cases.

Investigation Overview

The detection of this case does not change any of Canada's BSE risk parameters. The location and age of the animal are consistent with previous cases, and the BSE surveillance results to date, including this new case, reflect an extremely low level of BSE in Canada. In essence, the case confirms what was already known about an extremely low level of BSE infectivity having existed in Canada's feed system during the late 1990s and early 2000s.

Since the confirmation of BSE in a native-born animal in May 2003, Canada has significantly increased its targeted testing of cattle in high-risk categories advocated by the OIE (including non-ambulatory animals). This effort is directed at determining the level of BSE in Canada, while monitoring the effectiveness of the suite of risk-mitigating

measures in place. Canada's National BSE Surveillance Program continues to demonstrate an extremely low level of BSE in Canada, with 10 positive animals detected among the over 169,000 targeted tests conducted since 2003.

With respect to BSE, the safety of beef produced in Canada is assured by public health measures enacted in 2003, following the first detection of BSE in a native-born animal in Canada. The removal of specified risk material (SRM)—those tissues that have been demonstrated to have the potential to harbour BSE infectivity—from all animals slaughtered for human consumption is the most effective single measure to protect consumers in Canada and importing countries from exposure to BSE infectivity in meat products.

As demonstrated by the surveillance system, the feed ban implemented in 1997 is effectively preventing the amplification of BSE in Canada's feed system. The detection of BSE in a few animals born after the 1997 feed ban is not unexpected and does not indicate a failure of those measures. Additional regulations to enhance Canada's feed ban were enacted on July 12, 2007. The most important change is the removal of SRM from all animal feeds, pet food and fertilizer. The enhancement will significantly accelerate progress toward eradicating BSE from the national cattle herd by preventing more than 99 per cent of potential BSE infectivity from entering the Canadian feed system.

On May 22, 2007, Canada was officially categorized under the OIE's science-based system as a controlled BSE risk country. This status clearly recognizes the effectiveness of Canada's surveillance, mitigation and eradication measures, and acknowledges the work done by all levels of government, the cattle industry, veterinarians and ranchers to effectively manage and eventually eradicate BSE in Canada.

Case 11

REPORT ON THE INVESTIGATION OF THE ELEVENTH CASE OF BOVINE SPONGIFORM ENCEPHALOPATHY (BSE) IN CANADA

Atypical BSE

Background

On December 9, 2007 a cow located on a commercial beef farm in East Central Alberta was destroyed following an illness of approximately three and a half months duration. A private practitioner sampled the animal on December 9, 2007 under Canada's National BSE Surveillance Program. On December 11, 2007, brain samples were received at the National BSE Reference Laboratory in Lethbridge, AB, where they were screened for BSE using a Prionics-check priostrip test. The result of this preliminary test did not rule out BSE. In accordance with the prescribed testing protocol, the test was repeated and produced a second reaction that day. Additional rapid screening tests (PrionicsCheck Western, Bio-Rad Elisa and Hybrid Western Blot) conducted at the National BSE Reference Laboratory, were positive to BSE on December 12, 2007 and December 13, 2007, respectively. The Scrapie Associated Fibril Immunoblot was positive on December 14, 2007 and on December 17, 2007, the immunohistochemistry procedure was positive. The carcass was secured at the sampling site, and was subsequently transferred to the CFIA Laboratory in Lethbridge for incineration. No part of the carcass entered the human food supply or animal feed chain.

The CFIA immediately initiated an epidemiological investigation based on the most recent recommended BSE guidelines of the World Organisation for Animal Health, referred to as OIE. Specifically, the CFIA followed the recommended guidelines for a country with controlled BSE risk status and investigated:

- the feed cohort, comprising all cattle which, during their first year of life, were reared with the BSE cases during their first year of life, and which investigation showed consumed the same potentially contaminated feed during that period, or
- the birth cohort, comprising all cattle born in the same herd as, and within 12 months of the birth of, the BSE cases, if the above cannot be identified.

Animal Investigation

The positive animal was an unregistered Hereford cow born on March 15, 1994 and was 165 months of age at the time of death. The age of the animal complicated the investigation because it exceeded the normal information retention period of the commercial enterprises involved (for example, auction records are normally kept for seven years). However, farm records were extensive and indicated the case animal was born, raised and had spent its entire life on the same farm. The producer reported that the cow had been ill for approximately three and a half months and that prior to death

was lame and had an abnormal posture. The producer determined that the animal should be destroyed, and a private veterinary practitioner attended the premises to determine if the animal met the inclusion criteria of Canada's National BSE Surveillance Program. Since the inclusion criteria of Canada's National BSE Surveillance Program were met, arrangements were made to forward appropriate samples for laboratory evaluation. A post-mortem examination was conducted, abdominal adhesions were observed, and a presumptive diagnosis of peritonitis was made by the submitting practitioner.

The case premises is a beef cow-calf operation. The operation has both a purebred and commercial component. The birth cohort was determined to comprise 357 animals, which, along with the case animal, were born on the birth farm. This includes male and female animals born from March 15, 1993 to March 15, 1995. Both sexes were included as they had access to the same commercially prepared feeds and may have been exposed to the same potentially contaminated feed as the case animal. During the time period of interest, no animals one year of age or less were purchased. All replacements were sourced from the producer's own calf crop. Therefore, there were no additional feed cohorts.

The trace-out investigation of the cohort located eight live animals on the premises and in one other herd. The eight animals have been humanely destroyed, and their carcasses were disposed of along with the case animal's by incineration, in accordance with OIE recommendations.

Because the cohort cattle would now be 13-15 years of age, most had previously been slaughtered or died of natural causes. The following is the disposition of the remaining 349 animals:

- 81 animals were traced and confirmed to have died or been slaughtered,
- 254 animals were traced and presumed to have died or been slaughtered,
- 14 animals were determined to be untraceable due to incomplete records.

The investigation revealed that the case animal had two calves born within the previous two years. The CFIA no longer requires the destruction of calves of BSE positive cows born within 24 months of the development of clinical signs, in accordance with the current Bovine Spongiform Encephalopathy Chapter of the OIE Terrestrial Animal Health Code (2007). However, the CFIA continues to trace calves born to a positive female in respect of the current export certification requirements of some importing countries. The 2006 progeny was confirmed to have been slaughtered and the 2007 progeny was located on the case farm and was humanely destroyed to ensure Canada's continued compliance with current export certification requirements. Its carcass was incinerated at the CFIA Lethbridge Laboratory.

Feed Investigation

The feed investigation yielded limited records specific to the animal's first year of life. A probable feeding regime was identified through recollection of standard feeding practices and an index of feed products used was developed based on invoices available for the period when the animal was 10 - 20 months of age. These records provided the basis for determining the types of products used and the feed suppliers with which a business relationship existed.

Review of the information identified feeding practices consistent with an operation of this type. The case animal was reported to have remained with its dam from time of birth through to weaning at approximately eight months of age. Prior to weaning, the animal was kept on community pasture and had access to mineral feed products. At the time of weaning, the animal was removed from pasture and fed farm-harvested forage as well as a farm-mixed ration comprised of farm-grown grains, commercial protein supplement, and/or mineral feed products. Feeding of this type of product continued through to approximately 13 months of age.

Other feed products identified on the farm but not directly linked to the subject animal included milk replacer and commercially prepared complete feed. Commercial feed products (minerals, milk replacers, protein supplements, complete rations) were purchased from a variety of suppliers and represented all identified businesses within the trading area.

The period of interest of this feed investigation, pre-dates the implementation of Canada's initial ruminant feed ban in August of 1997. The age of the animal further limited the investigation as the time period exceeded normal information retention periods. As a result trace back inspections at the suppliers and manufacturers of commercial feeds distributed to the birth farm did not yield specific distribution records or mixing formulas for the time frame of interest. Three of four possible manufacturers supplying a protein supplement likely fed to the animal could have included meat and bone meal (MBM) as an ingredient in its formulation. One of these manufacturers was able to confirm usage of meat and bone meal in supplements and confirm a source of MBM to be one common to previous BSE investigations. This information is consistent with the commercial feed industry's practice of using of meat and bone meal as a source of protein in livestock feeds at the time (prior to the 1997 Feed Ban).

A review of the common feeding and manufacturing practices indicates probable exposure to infectious material through a commercial feed supplement containing meat and bone meal.

Investigation Overview

Canada's eleventh case of BSE has been attributed to a less prevalent, atypical strain of BSE which has also been reported in Europe. This is the second case of BSE in Canada that has involved an atypical strain. A common feature of atypical BSE cases is that the affected animals are of an advanced age at the time of diagnosis (for example,

both of Canada's atypical cases involved cattle that were over 13 years of age at the time BSE was confirmed). This is in contrast to Canada's classical BSE cases where the average age has been approximately 6 years.

The identification of these atypical strains of BSE is a reflection of an increased global awareness of the potential for multiple strains of the BSE agent to exist, continuous advancements in diagnostic test methods and is a direct result of the enhanced BSE surveillance activities occurring worldwide.

Since the confirmation of BSE in a native-born animal in May 2003, Canada has significantly increased its targeted testing of cattle in high-risk categories advocated by the OIE. This effort is directed at determining the level of BSE in Canada, while monitoring the effectiveness of the suite of risk-mitigating measures in place. Canada's National BSE Surveillance Program continues to demonstrate an extremely low level of BSE in Canada, with 11 positive animals detected.

With respect to BSE, the safety of beef produced in Canada is assured by public health measures enacted in 2003, following the first detection of BSE in a native-born animal in Canada. The removal of specified risk material (SRM)-those tissues that have been demonstrated to have the potential to harbour BSE infectivity-from all animals slaughtered for human consumption is the most effective single measure to protect consumers in Canada and importing countries from exposure to BSE infectivity in meat products.

As demonstrated by the surveillance system, the feed ban implemented in 1997 is effectively preventing the amplification of BSE in Canada's feed system. Additional regulations to enhance Canada's feed ban were enacted on July 12, 2007. The most important change is the removal of SRM from all animal feeds, pet food and fertilizer. The enhancement will significantly accelerate progress toward eradicating BSE from the national cattle herd by preventing more than 99 per cent of potential BSE infectivity from entering the Canadian feed system. These measures are effectively minimizing the risk of transmitting BSE.

On May 22, 2007, Canada was officially categorized under the OIE's science-based system as a controlled BSE risk country. This status clearly recognizes the effectiveness of Canada's surveillance, mitigation and eradication measures, and acknowledges the work done by all levels of government, the cattle industry, veterinarians and ranchers to effectively manage and eventually eradicate BSE in Canada.

Case 12

REPORT ON THE INVESTIGATION OF THE TWELFTH CASE OF BOVINE SPONGIFORM ENCEPHALOPATHY (BSE) IN CANADA

Background

On February 7, 2008 a private veterinarian in Northern Alberta euthanized and sampled a Holstein cow under Canada's National BSE Surveillance Program. Brain samples from this animal were sent to the Alberta Agriculture and Food (AAF) laboratory where they were screened for BSE using a Bio-Rad rapid test on February 13, 2008. The result of this preliminary test did not rule out BSE. In accordance with the prescribed testing protocol, the test was repeated and on February 14, 2008 produced a reaction a second time. Brain samples were then sent to the National BSE Reference Laboratory in Lethbridge, AB. Additional rapid tests for BSE (Prionics-Check PrioStrip and Prionics-Check Western) were conducted at the National BSE Reference Laboratory to validate the result of the screening test and were positive on February 19 and 20, 2008, respectively. The Hybrid Western Blot was positive on February 20, 2008 and on February 22, 2008, the Scrapie Associated Fibril Immunoblot was positive. On February 25, 2008, BSE was confirmed using the immunohistochemistry procedure. The carcass was secured at the sampling site, and was subsequently transferred to the CFIA Laboratory in Lethbridge for incineration. No part of the carcass entered the human food supply or animal feed chain.

The CFIA immediately initiated an epidemiological investigation based on the recommended BSE guidelines of the World Organisation for Animal Health, referred to as the OIE. Specifically, the CFIA followed the recommended BSE guidelines for a country with controlled risk status and investigated:

- the feed cohort, comprising all cattle which, during their first year of life, were reared with the BSE case during its first year of life, and which investigation showed consumed the same potentially contaminated feed during that period, or
- the birth cohort, comprising all cattle born in the same herd as, and within 12 months of the birth of the BSE case, if the above cannot be identified and
- feed to which the animal may have been exposed early in its life.

Animal Investigation

The positive animal was a registered Holstein cow born on December 21, 2001 and it was 73 months of age at the time of death. The animal was born, raised and had spent its entire life on the same farm. The producer reported the duration of illness was approximately one month, during which the animal displayed progressive signs of impaired locomotion, culminating in the animal becoming non-ambulatory (downer). When examined by a private practitioner on February 7, 2008, the animal was recumbent. The practitioner and producer determined that the animal should be euthanized . Since the inclusion criteria of Canada's National BSE Surveillance Program were met, arrangements were made to forward appropriate samples for laboratory evaluation.

The birth farm was a dairy operation. The feed cohort was determined to comprise 114 animals, which along with the case animal, were raised on the farm. Animals which were sold at less than one week of age for fattening and subsequent slaughter, without having access to any commercially prepared feeds, were excluded from the feed cohort investigation, because they were not exposed to the same potentially contaminated feed as the case animal. The trace-out investigation of the feed cohort located 13 live animals on the case farm. Three of the animals have since been humanely destroyed; their carcasses, and that of the case animal, disposed of by incineration. In recognition of the fact that BSE in not a contagious disease, ten animals are being retained, under quarantine, to allow for calving or collection of valuable genetic material. Subsequent to these events, the animals will be humanely destroyed and their carcasses incinerated in accordance with the OIE recommendations. The following is the disposition of the remaining 101 animals in the feed cohort:

- 41 animals were traced and confirmed to have died or been slaughtered,
- 56 animals were traced and presumed to have died or been slaughtered,
- Three animals were traced and confirmed to have been exported for slaughter and the importing country has been notified,
- One animal was determined to be untraceable.

The investigation revealed that the case animal had two calves born within the previous two years. The CFIA no longer requires the destruction of calves of BSE positive cows born within 24 months of the development of clinical signs, in accordance with the current Bovine Spongiform Encephalopathy Chapter of the OIE Terrestrial Animal Health Code (2007). However, the CFIA continues to trace calves born to a positive female in respect of the current export certification requirements of some importing countries. The 2006 and 2007 progeny were located on the case farm and were humanely destroyed to ensure Canada's continued compliance with certain export certification requirements. Their carcasses were incinerated at the National BSE Reference Laboratory.

Feed Investigation

The feed investigation focused on feeds to which the case animal may have had access during its first year of life and the manufacturing practices used to produce each of these feeds.

Investigation at the farm revealed cattle to be the only commercially farmed species present. Other animals present included a dog, several cats, and rabbits. Pet food is considered to contain prohibited material and investigators confirmed it was stored and fed separately from other feeds and animals.

There was no pasture use on the farm and all forages (hay and silages) were grown on land fertilized with commercial fertilizer and harvested using farm-owned equipment. Non-forage feed products included four different commercially prepared complete feeds, mineralized salt blocks, and loose mineral feeds supplied by two commercial feed manufacturers and one retail outlet.

Two of the complete feeds (the dairy ration and the heifer ration) were delivered in bulk and transferred directly into their respective bulk storage bins. A third feed, the dry cow ration, was delivered in 25 kg bags and fed directly to dry cows and pregnant heifers only. A complete starter ration for calves was also purchased in bags.

Consistent with management practices for all heifer calves on the farm, the case animal was housed in a single enclosed hutch for approximately the first eight weeks of life, and then moved through a series of group pens with other heifers of similar age and size. Calves were initially fed colostrum, followed by milk and calf starter beginning at three days of age and continuing to approximately eight weeks of age. Heifer calves were introduced to the commercial heifer and dairy rations beginning at approximately eight weeks of age and pail-fed increasing amounts (in mixed proportion) until approximately eight months of age. From approximately eight to 13 months of age, heifers were fed heifer ration with mineral feeds. Forages were provided throughout. Feed mixing and handling practices described for the farm preclude feeding of the dry cow ration to heifers less than 12 months of age. Therefore, feeds to which the case animal may have been exposed and which warranted investigation were: calf starter, heifer ration, dairy ration, mineralized salt blocks, and mineral feeds.

Investigation at the commercial manufacturer supplying the loose mineral products identified that production of these was in a facility handling prohibited material but with dedicated equipment and in accordance with procedures which ruled them out as a possible source of contamination. Similarly, the mineralized salt blocks were manufactured in a specialized facility which did not handle prohibited material.

Calf starter was supplied exclusively by one commercial manufacturer whereas supply of the heifer and dairy rations alternated between this facility and a second manufacturer. Both facilities cross utilized equipment in the manufacture and delivery of feeds for ruminants and those containing prohibited material. Prohibited material was

supplied to both facilities from the same rendering facility which also supplied prohibited material to feed suppliers identified in previous BSE cases.

The facility supplying approximately half of the heifer and dairy rations had documented procedures in place to prevent contamination of ruminant feeds with prohibited material. The facility providing the remainder of the heifer and dairy rations and all the calf starter reported procedures were in place to prevent contamination but most production records did not include documentation that these procedures were followed.

Four deliveries of calf starter were identified during the time frame of interest and subsequently investigated. There was no means of tracing the deliveries to specific production lots so all lots manufactured during the time frame of interest (total of six) were investigated. Production records identified one of the lots followed a feed containing prohibited material without proper cleanout of the production equipment (pellet mill).

Seven deliveries of heifer ration were identified during the time frame of interest and investigated. None of the records examined indicated contamination with prohibited material occurred during their manufacture, transport or storage.

Twenty-eight deliveries of dairy ration were identified during the time frame of interest and investigated. Production records identified one of these feeds was manufactured after a feed containing prohibited material and without proper cleanout of the production equipment (pellet mill). This feed was delivered to the farm when the case animal was 38 days of age and precedes the estimated age (56 days) at which dairy ration was first offered. A later delivery of dairy ration when the case animal was slightly less than eight months of age may have also had carryover amounts of a feed containing prohibited material due to improper sequencing of a pre-pellet holding bin.

Feeding a contaminated calf starter within the first two months of life is one possible source of exposure to infectious material for the case animal. Additionally, evidence suggests that two other rations supplied to the farm during the time frame of interest may have been cross-contaminated with feeds containing prohibited material and potentially fed to the case animal. In the absence of complete documentation additional exposures can not be ruled out.

Investigation Overview

The detection of this case does not change any of Canada's BSE risk parameters. The location and age of the animal are consistent with previous cases, and the BSE surveillance results to date, including this new case, reflect an extremely low level of BSE in Canada. In essence, the case confirms what was already known about an extremely low level of BSE infectivity having existed in Canada's feed system during the late 1990s and early 2000s within a previously determined geographic area and time interval.

Given current knowledge about the epidemiology of BSE, it is reasonable to presume that this animal was exposed to feed containing a low level of infectivity during its first year of life as supported by the feed investigation findings. The investigation into the current case identified a few possibilities but it was impossible to determine the exact source of exposure.

Since the confirmation of BSE in a native-born animal in May 2003, Canada has significantly increased its targeted testing of cattle in high-risk categories advocated by the OIE (including non-ambulatory animals). This effort is directed at determining the level of BSE in Canada, while monitoring the effectiveness of the suite of risk-mitigating measures in place. Canada's National BSE Surveillance Program continues to demonstrate an extremely low level of BSE in Canada, with 12 positive animals detected among the over 212 000 targeted tests conducted since 2003. Such detections demonstrate the effectiveness and integrity of Canada's surveillance system. Canada's controlled BSE risk status under the OIE's science-based system also clearly recognizes the effectiveness of Canada's surveillance, mitigation and eradication measures, and acknowledges the work done by all levels of government, the cattle industry, veterinarians and ranchers to effectively manage BSE in Canada.

Other Relevant Information

With respect to BSE, the safety of beef produced in Canada is assured by public health measures enacted in 2003, following the first detection of BSE in a native-born animal in Canada. The removal of specified risk material (SRM)-those tissues that have been demonstrated to have the potential to harbour BSE infectivity-from all animals slaughtered for human consumption is the most effective single measure to protect consumers in Canada and importing countries from exposure to BSE infectivity in meat products.

As demonstrated by the surveillance system, the feed ban implemented in 1997 is effectively preventing the amplification of BSE in Canada. The detection of BSE in a few animals born after the 1997 feed ban is not unexpected and does not indicate a failure of the measures in place to reduce and eventually eradicate BSE.

Canada's own BSE experience has served to emphasize the importance of addressing opportunities for cross-contamination of ruminant rations and cross-feeding of ruminants with rations containing prohibited proteins. Although the 1997 feed ban regulations include provisions addressing these risks, the detection of BSE cases in cattle born after 1997 contributed to Canada's decision to implement additional regulations enhancing Canada's feed ban on July 12, 2007. Principally, the enhancements require the removal and redirection of SRM from all animal feed, pet food and fertilizers.

The enhanced feed ban limits potential opportunities for BSE infectivity to contaminate feeds for ruminants by controlling all activities related to the movement of SRM, its distribution, processing, destruction, disposal or alternative uses through a system of permits. This ensures that these materials do not enter the human and animal food

chains or the fertilizer system and effectively contains any potential BSE infectivity thereby preventing exposure of susceptible species to the BSE agent.

This enhancement will significantly accelerate progress toward eradicating BSE from the national cattle herd by preventing more than 99 per cent of potential BSE infectivity from entering the Canadian feed system.

Case 13

REPORT ON THE INVESTIGATION OF THE THIRTEENTH CASE OF BOVINE SPONGIFORM ENCEPHALOPATHY (BSE) IN CANADA

Background

On June 2, 2008 a cow on a dairy operation in the Fraser Valley area of British Columbia was destroyed following a brief illness. The carcass was collected from the farm by a disposal company on June 3, 2008, and subsequently selected for sampling by the Canadian Food Inspection Agency (CFIA) under Canada's National BSE Surveillance Program. Diagnostic specimens were submitted to the British Columbia Ministry of Agriculture and Lands (BCMAL) Laboratory, where they were screened for BSE using a Prionics Check PrioSTRIP rapid test (June 3, 2008). The result of this preliminary test did not rule out BSE. In accordance with the prescribed testing protocol, the test was repeated and produced a second reaction. Samples were then forwarded to the National BSE Reference Laboratory in Lethbridge, Alberta, where rapid screening tests to validate these results were also positive (Prionics Check Prio-strip - June 5, 2008; Prionics Check Western Blot - June 6, 2008; Hybrid Western Blot - June 6, 2008; BioRad TeSeE Elisa - June 6, 2008). On June 12, 2008, these results were confirmed by the Scrapie Associated Fibril Immunoblot. As the positive sample was submitted from a third party premise, the CFIA conducted an investigation to confirm the sample's identity using DNA analysis. No part of the carcass of the affected animal entered the human food supply and no specified risk materials (SRM) entered the animal feed chain.

The CFIA immediately initiated an epidemiological investigation based on the recommended BSE guidelines of the World Organisation for Animal Health (OIE). Specifically, the CFIA investigated:

- the birth cohort (all cattle born in the same herd as, and within 12 months of the birth of the BSE-positive animal);
- the feed cohort (all cattle which during their first year of life, were reared with the BSE positive animal and which investigation showed consumed the same potentially contaminated feed during that period); and
- feed to which the animal may have been exposed early in its life.

Animal Investigation

The positive animal was a Holstein cow born on April 22, 2003, and was 61 months of age at the time of death. The animal was born, raised and spent its entire life on the same farm. The cow had been non-ambulatory (downer) and receiving medical care for two weeks. However, when the animal's condition failed to improve the producer elected to humanely destroy it, and because it met the inclusion criteria of Canada's National BSE Surveillance Program, arrangements were made to forward appropriate samples for laboratory evaluation.

The birth farm is a dedicated dairy operation. The feed cohort was determined to comprise 207 animals, which along with the case animal, were raised on the birth farm. This cohort consisted entirely of Holstein females. No males were retained or raised on the farm and therefore males were excluded from the investigation because they were not exposed to the same potentially contaminated feed as the case animal. The trace-out investigation of the feed cohort located 79 live animals on the premises. These animals are currently under quarantine pending humane destruction and disposal. The following is the disposition of the remaining 128 feed cohort animals:

- 102 animals were traced and confirmed to have died or been slaughtered;
- 13 animals were traced and presumed to have died or been slaughtered; and
- 13 animals were determined to be untraceable because of records limitations.

Feed Investigation

The feed investigation focused on feeds to which the case animal may have had access during its first year of life and on the manufacturing practices used to produce each of these feeds.

All feed products to which the BSE case animal had access were intended for feeding to ruminants. These consisted of farm-grown and purchased forages and feed products from four different commercial suppliers. On-farm mixing equipment consisted of a mixer wagon used to combine forages with commercial products for lactating and dry cows and heifers. A dog on the farm was fed in the house, away from the dairy operation, thereby eliminating pet food as a potential source of prohibited material.

For the first two months of its life, the BSE case animal was housed individually in a calf hutch and fed milk and commercially prepared heifer ration. From two to twelve months of age, the animal was housed in a series of indoor group pens with animals of similar age and continued to be fed heifer ration as well as distiller's grains and trace mineralized salt.

Other commercial products used on the farm included complete rations for the lactating and dry cows as well as a dry cow mineral. These products were not fed to the BSE case animal prior to twelve months of age, however, the same on-farm mixer wagon was used to mix rations for both the BSE case animal and the older animals.

The trace mineralized salt blocks, dry cow mineral and distiller's grains used on-farm were obtained from specialized facilities not handling prohibited material and delivered in dedicated trucks. These products were ruled out as possible sources of contamination.

Following the recommendations of the World Health Organization, Canada implemented a ruminant feed ban in 1997 prohibiting the use of certain animal protein products, known as prohibited material, in the manufacture of feed intended for ruminants. However, these materials could be utilized in the manufacture of feeds for non-ruminant species provided that appropriate measures were taken to avoid contamination of ruminant feed.

Investigation at the commercial feed manufacturer which was the sole supplier of heifer ration and some dry cow ration, identified that this facility utilized prohibited material in the preparation of rations for non-ruminant species. Components of this facility were dedicated to the manufacture of feeds not containing prohibited material in the formula. However, bulk ingredient receiving and finished feed conveyances were cross-utilized. Written procedures and production records were insufficient to rule out possible contamination with prohibited material at these points affecting both ration types delivered to the case farm.

Investigation at a second commercial feed manufacturer that supplied the farm with the majority of both lactation and dry cow rations showed the facility handled prohibited material for a short period of time during the timeframe of interest. Review of production records for the feeds of interest did not identify avenues of contamination with prohibited material.

Investigation at the third commercial feed manufacturer that supplied the farm with some dry cow ration revealed this facility was not handling prohibited material during the time frame of interest. Feeds from this facility were delivered in company owned trucks and were ruled out.

The fourth commercial feed manufacturer supplied the farm with one delivery of each of lactation ration and dry cow ration when the case animal was eleven months old. Investigation revealed that the facility was using prohibited material at this time. Written procedures to prevent contamination with prohibited material were in place, however, review of the production records identified the lactation feed was stored in a load out bin that previously contained a prohibited material feed without documented cleanout in between.

Considering the farm's feeding regime and specific production records reviewed, a likely source of exposure to BSE infectivity was the heifer ration. However, potential ingestion of dry cow ration from the first manufacturer or the single delivery of lactation ration from the fourth manufacturer exists and potential contamination of these products cannot be ruled out.

Investigation Overview

The detection of this case does not change any of Canada's BSE risk parameters. The location and age of the animal are consistent with previous cases. Surveillance results to date, including this case, reflect an extremely low level of BSE in Canada.

Since the confirmation of BSE in a native-born animal in May 2003, Canada has significantly increased its targeted testing of cattle in high-risk categories advocated by the OIE (including non-ambulatory animals). This effort is directed at determining the level of BSE in Canada, while monitoring the effectiveness of the risk-mitigating measures in place. Canada's National BSE Surveillance Program continues to demonstrate an extremely low level of BSE in Canada, with 13 positive animals detected.

With respect to BSE, the safety of beef produced in Canada is assured by public health measures enacted in 2003. The removal of specific risk material (SRM) - the tissues that have been demonstrated to have the potential to harbour BSE infectivity - from all animals slaughtered for human consumption is the most effective single measure to protect consumers in Canada and importing countries from exposure to BSE infectivity in meat products.

As demonstrated by the surveillance system, the feed ban implemented in 1997 is effectively preventing the amplification of BSE in Canada's feed system. Additional regulations to enhance Canada's feed ban were enacted in 2007. The most important change is the removal of SRM from all animal feeds, pet food and fertilizer. The enhancement will accelerate progress toward eradicating BSE from the national cattle herd by preventing more than 99 per cent of potential BSE infectivity from entering the Canadian feed system. These measures are effectively minimizing the risk of BSE transmission.

Canada is officially categorized under the OIE's science-based system as a controlled BSE risk country. This status clearly recognizes the effectiveness of Canada's surveillance, mitigation and eradication measures, and acknowledges the work done by all levels of government, the cattle industry, veterinarians and ranchers to effectively manage and eventually eradicate BSE in Canada.

Case 14

REPORT ON THE INVESTIGATION OF THE FOURTEENTH CASE OF BOVINE SPONGIFORM ENCEPHALOPATHY (BSE) IN CANADA

Background

On July 25, 2008 a commercial beef cow in Northern Alberta was sampled by a private practitioner under Canada's National BSE Surveillance Program. Brain samples from this animal were sent to the Alberta Agriculture and Rural Development (ARD) laboratory where they were screened for BSE using a BioRad rapid test on August 6, 2008. The result of this preliminary test did not rule out BSE. In accordance with the prescribed testing protocol, the test was repeated and produced a reaction a second time. Brain samples were then sent to the National BSE Reference Laboratory in Lethbridge, Alberta. Additional rapid tests for BSE (Prionics-Check PrioStrip and BioRad TeSeE ELISA) were conducted at the National BSE Reference Laboratory to validate the result of the screening test and were positive on August 12, 2008. The Prionics-Check Western and the Hybrid Western Blot was positive on August 14, 2008. Bovine Spongiform Encephalopathy was confirmed on August 14, 2008 using the Scrapie Associated Fibril Immunoblot procedure. The carcass was secured at the sampling site. No part of the carcass entered the human food supply or animal feed chain.

The CFIA immediately initiated an epidemiological investigation based on the recommended BSE guidelines (Terrestrial Animal Health Code 2008) of the World Organisation for Animal Health, referred to as the OIE. Specifically, the CFIA followed the recommended BSE guidelines for a country with controlled risk status and investigated:

- the feed cohort, comprising all cattle which, during their first year of life, were reared with the BSE case during its first year of life, and which investigation showed consumed the same potentially contaminated feed during that period, or
- the birth cohort, comprising all cattle born in the same herd as, and within 12 months of the birth of the BSE case, if the above cannot be identified and
- feed to which the animal may have been exposed early in its life.

Animal Investigation

The positive animal was a commercial beef cow, Gelbvieh cross, born on March 20, 2002 and it was 76 months of age at the time of death. The animal was born, raised and had spent its entire life on the same farm. The producer reported the duration of illness as approximately 6 months with the animal exhibiting gradual deterioration culminating in the animal becoming non-ambulatory (downer).

During this period, the animal showed a change in behaviour resulting in the animal becoming apprehensive/nervous. When examined by a private practitioner on July 25, 2008, the animal was recumbent. Physical examination by the practitioner revealed opisthotonus (muscle spasms). The practitioner and producer determined that the

animal should be euthanized. A post-mortem examination was conducted, and the kidneys were observed to be smaller than normal with a thickened adherent capsule. A presumptive diagnosis of chronic renal disease was made by the submitting practitioner. Since the inclusion criteria of Canada's National BSE Surveillance Program were met, arrangements were made to forward appropriate samples for laboratory evaluation.

The birth farm was a commercial beef cow-calf operation. The birth cohort was determined to comprise 72 animals, which along with the case animal, were raised on the farm. Due to the practice of animals being sold in lots from the case premises, 106 animals (including the 72 birth cohorts) were traced. The trace-out investigation of the birth cohort located 6 live animals on the case farm and 3 live animals on a subsequent premises. All of these animals have since been humanely destroyed; their carcasses disposed of by incineration in accordance with the OIE recommendations. The following is the disposition of the remaining animals in the 97 animals:

- 80 animals were traced and confirmed to have died or been slaughtered,
- 14 animals were traced and presumed to have died or been slaughtered,
- 3 animals were determined to be untraceable because of records limitations.

Feed Investigation

The feed investigation yielded limited records specific to the animal's first year of life. All feed products to which the BSE case animal had access were intended for feeding to ruminants.

Routine feeding practices were to provide animals with pasture during the summer months and to provide additional hay and grain during the winter. It was not farm practice to supplement the diets with commercially prepared rations, however due to drought conditions during the animal's first year of life, three commercially prepared rations were provided in addition to the commonly fed forages, grains, salt and minerals.

For the first seven months of life, the case animal was housed in a cow-calf pen and had pasture access. During this period, the animal received cow's milk and calf starter and had access to loose mineral, salt blocks and pasture. Beyond seven months to the end of the first year of life, the animal was housed in a calf pen where it received a creep feed, feedlot starter and possibly grain and straw and had access to salt blocks.

The three commercial rations made available to the BSE case animal consisted of a calf starter, a creep feed and a feedlot starter which were manufactured by two different commercial feed manufacturers.

Two forms of salt were used on farm: salt blocks and loose mineral salt. The salt blocks were manufactured by a company which does not handle any prohibited material. The loose mineral salt was manufactured by one of the same facilities which manufactured two of the commercially prepared rations received by the farm.

Neither of the two commercial feed manufacturers has production records dating back to the period of interest. As a result, trace back inspections at the manufacturers of commercial feeds distributed to the birth farm did not yield mixing formulas for the period of interest. As this was subsequent to the implementation of the 1997 Mammalian Feed Ban, it is very unlikely that ruminant meat and bone meal was intentionally used in the formulation of any of the three commercially prepared rations or loose mineral salt distributed to the birth farm.

However, as production records are not available for review, it is not possible to rule out that contamination during production could have taken place. One of the two commercial feed manufacturers did handle ruminant meat and bone meal (prohibited material/PM), however they did have procedures in place to prevent the contamination of ruminant feed with PM. The other commercial feed manufacturer did not handle PM directly, though they did receive a premix used in the manufacture of one of the feeds received by the case farm, from another facility which did handle PM.

Investigation Overview

The detection of this case does not change any of Canada's BSE risk parameters. The location and age of the animal are consistent with previous cases. Surveillance results to date, including this case, reflect an extremely low level of BSE in Canada.

Since the confirmation of BSE in a native-born animal in May 2003, Canada has significantly increased its targeted testing of cattle in high-risk categories advocated by the OIE (including non-ambulatory animals). This effort is directed at determining the level of BSE in Canada, while monitoring the effectiveness of the risk-mitigating measures in place. Canada's National BSE Surveillance Program continues to demonstrate an extremely low level of BSE in Canada, with 14 positive animals detected.

With respect to BSE, the safety of beef produced in Canada is assured by public health measures enacted in 2003. The removal of specific risk material (SRM) - the tissues that have been demonstrated to have the potential to harbour BSE infectivity - from all animals slaughtered for human consumption is the most effective single measure to protect consumers in Canada and importing countries from exposure to BSE infectivity in meat products.

As demonstrated by the surveillance system, the feed ban implemented in 1997 is effectively preventing the amplification of BSE in Canada's feed system. Additional regulations to enhance Canada's feed ban were enacted in 2007. The most important change is the removal of SRM from all animal feeds, pet food and fertilizer. The enhancement will accelerate progress toward eradicating BSE from the national cattle herd by preventing more than 99 per cent of potential BSE infectivity from entering the Canadian feed system. These measures are effectively minimizing the risk of BSE transmission.

Canada is officially categorized under the OIE's science-based system as a controlled BSE risk country. This status clearly recognizes the effectiveness of Canada's surveillance, mitigation and eradication measures, and acknowledges the work done by all levels of government, the cattle industry, veterinarians and ranchers to effectively manage and eventually eradicate BSE in Canada

Case 15

REPORT ON THE INVESTIGATION OF THE FIFTEENTH CASE OF BOVINE SPONGIFORM ENCEPHALOPATHY (BSE) IN CANADA

Background

On November 3, 2008, the Canadian Food Inspection Agency (CFIA) sampled a Holstein cow under Canada's National BSE Surveillance Program. Brain samples were received by the British Columbia Ministry of Agriculture and Lands (BCMAL) Laboratory, where they were screened for BSE using a Prionics rapid test. The result of this preliminary test did not rule out BSE. In accordance with the prescribed testing protocol, the test was repeated and produced a reaction a second time. Brain samples were then sent to the National BSE Reference Laboratory in Lethbridge, Alberta. Additional testing for BSE (Prionics-Check PrioStrip, BioRad TeSeE ELISA, Prionics-Check Western and Hybrid Western Blot) was conducted at the National BSE Reference Laboratory to validate the result of the screening test and was positive on Nov 6, 2008. The Scrapie Associated Fibril Immunoblot procedure was positive on Nov 7, 2008 and the immunohistochemistry procedure was positive on Nov 14, 2008. The carcass was secured at the sampling site and will subsequently be transferred to CFIA's Lethbridge laboratory for incineration. No part of the carcass entered the human food supply or animal feed chain.

The CFIA immediately initiated an epidemiological investigation based on the recommended BSE guidelines (Terrestrial Animal Health Code 2008) of the World Organisation for Animal Health, referred to as the OIE. Specifically, the CFIA followed the recommended BSE guidelines for a country with controlled risk status and investigated:

- the feed cohort, comprising all cattle which, during their first year of life, were reared with the BSE case during its first year of life, and which investigation showed consumed the same potentially contaminated feed during that period, or
- the birth cohort, comprising all cattle born in the same herd as, and within 12 months of the birth of the BSE case, if the above cannot be identified and
- feed to which the animal may have been exposed early in its life.

Animal Investigation

The positive animal was a registered Holstein dairy cow born on January 1, 2001, and it was 94 months of age at the time of death. The animal was born, raised and had spent its entire life on the same farm. The producer reported the duration of illness as less than 2 days with the animal exhibiting an abnormal gait (locomotion, change in movement), which was worse on the hind end. The animal had a short stunted gait and exhibited signs of ataxia (uncoordinated movements). The producer elected to have the animal humanely destroyed. Since the inclusion criteria of Canada's National BSE Surveillance Program were met, arrangements were made to forward appropriate samples for laboratory evaluation.

The birth farm was a dairy operation located in the Fraser Valley area of British Columbia. The feed cohort was determined to comprise 187 animals, which along with the case animal, were raised on the farm. This cohort consisted of female Holsteins. Males sold at less than two weeks of age for fattening and subsequent slaughter without having access to any commercially prepared feeds were excluded from the investigation because they were not exposed to the same potentially contaminated feed as the case animal. No males were retained or raised on the farm. The trace-out investigation of the feed cohort located 22 live animals on the case farm. These animals are quarantined and will be humanely destroyed; their carcasses disposed of by incineration in accordance with the OIE recommendations. The following is the disposition of the remaining animals in the feed cohort:

- 122 animals were traced and confirmed to have died or been slaughtered;
- 24 animals were traced and presumed to have died or been slaughtered;
- 5 animals were traced and confirmed to have been exported for slaughter and the importing country has been notified; and
- 14 animals were determined to be untraceable because of records limitations.

Feed Investigation

The feed investigation focused on feeds to which the case animal may have had access during its first year of life and on the manufacturing practices used to produce these feeds.

All feed products to which the BSE case animal had access were intended for feeding to ruminants. These consisted of farm-grown and purchased forages and silages and mixed feed products provided to the farm from one commercial supplier. On-farm mixing equipment consisted of a mixer wagon used to combine forages with commercial products for calves, heifers and lactating cows. Several cats on the farm were fed in the barn and one dog was fed in the house away from the dairy operation. It is reasonable to presume that the cat and dog food did contain prohibited material; however, review of farm feeding practices confirmed that ruminants did not have access to these feeds.

For the first three weeks of life, the case animal was housed individually in a calf pen and fed milk and a commercially prepared calf ration. From 3 to 9 weeks the animal was

housed in a series of group pens with animals of similar age and continued to be fed calf ration and milk as well as hay and had access to two kinds of mineral blocks. From 9 weeks to 12 months the animal continued to cycle through several group pens with animals of similar age and continued to be fed calf ration, hay and farm grown corn and grass silages as well as having access to two kinds of mineral blocks. Additionally, a dry cow mineral was added to the animal's diet at the 3 month stage.

The only other commercial feed products used on the farm included a complete ration for the lactating cows and a dry cow ration. On-farm investigation confirmed that the lactation ration was not fed to the case animal prior to twelve months of age, however, the same on-farm mixer wagon was used to mix rations for both the case animal and the lactating cows. It was also determined that the case animal could not have access to the dry cow ration which was received, stored and fed directly from bags and away from animals less than one year of age.

Investigation at the commercial feed manufacturer, which was the sole supplier of calf ration and lactation ration, identified that this facility handled prohibited material. Components of this facility were dedicated to the manufacture of feeds not containing prohibited material in the formula. However, bulk ingredient receiving and finished feed conveyances were cross-utilized. Written procedures and production records were insufficient to rule out possible contamination with prohibited material at these points affecting both ration types delivered to the case farm.

Investigation at the commercial feed supplier identified that the two kinds of mineral blocks were manufactured by a separate facility, independent of the main commercial feed manufacturer. Investigation at the manufacturer of these blocks determined that this facility did handle prohibited material during the period of interest; however, no written procedures or production records were available. As the period of interest occurs after the introduction of the 1997 Mammalian Feed Ban, it is unlikely that ruminant meat and bone meal was intentionally used in the formulation of either of these mineral blocks. However, as production records are not available for review, it is not possible to rule out the possibility that contamination during production could have taken place.

The dry cow mineral used on farm was obtained from a specialized facility not handling prohibited material and was packaged in bags. This product was ruled out as a possible source of contamination.

Considering the farm's feeding regime and specific production records reviewed, a likely source of exposure to BSE infectivity appears to be potentially contaminated heifer ration. However, the risk associated with possible ingestion of small amounts of the lactation ration and either of the mineral blocks exists, and potential contamination of these products cannot be ruled out.

Investigation Overview

The detection of this case does not change any of Canada's BSE risk parameters. The location and age of the animal are consistent with previous cases. Surveillance results to date, including this case, reflect an extremely low level of BSE in Canada.

Since the confirmation of BSE in a native-born animal in May 2003, Canada has significantly increased its targeted testing of cattle in high-risk categories advocated by the OIE (including non-ambulatory animals). This effort is directed at determining the level of BSE in Canada, while monitoring the effectiveness of the risk-mitigating measures in place. Canada's National BSE Surveillance Program continues to demonstrate an extremely low level of BSE in Canada, with 15 positive animals detected.

With respect to BSE, the safety of beef produced in Canada is assured by public health measures enacted in 2003. The removal of specific risk material (SRM) - the tissues that have been demonstrated to have the potential to harbour BSE infectivity - from all animals slaughtered for human consumption is the most effective single measure to protect consumers in Canada and importing countries from exposure to BSE infectivity in meat products.

As demonstrated by the surveillance system, the feed ban implemented in 1997 is effectively preventing the amplification of BSE in Canada's feed system. Additional regulations to enhance Canada's feed ban were enacted in 2007. The most important change is the removal of SRM from all animal feeds, pet food and fertilizer. The enhancement will accelerate progress toward eradicating BSE from the national cattle herd by preventing more than 99 per cent of potential BSE infectivity from entering the Canadian feed system. These measures are effectively minimizing the risk of BSE transmission.

Canada is officially categorized under the OIE's science-based system as a controlled BSE risk country. This status clearly recognizes the effectiveness of Canada's surveillance, mitigation and eradication measures, and acknowledges the work done by all levels of government, the cattle industry, veterinarians and ranchers to effectively manage and eventually eradicate BSE in Canada.

Case 16

REPORT ON THE INVESTIGATION OF THE SIXTEENTH CASE OF BOVINE SPONGIFORM ENCEPHALOPATHY (BSE) IN CANADA

Background

On May 8, 2009, the Alberta Provincial Laboratory informed the CFIA Edmonton District office of a BSE Surveillance sample (collected through the Canada Alberta BSE Surveillance Program) with a reaction on the BIO-RAD rapid test that did not rule-out BSE.

Brain samples were forwarded to the National BSE Reference Laboratory in Lethbridge, Alberta. The sample was confirmed as BSE positive using the Scrapie Associated Fibril Immunoblot and mAB 6H4 on May 14, 2009.

Additional testing included the Prionics-Check Priostrip performed on May 12, 2009, Prionics-Check Western, Hybrid Western Blot and BioRad TeSeE ELISA performed on May 13, 2009. All tests were positive. Western blot results indicate the case was c-type (classical) BSE.

The carcass was secured at the sampling site (on farm) and transferred to CFIA's Lethbridge laboratory for incineration. No part of the carcass entered the human food supply or animal feed chain.

The CFIA immediately initiated an epidemiological investigation based on the recommended BSE guidelines (Terrestrial Animal Health Code 2008) of the World Organisation for Animal Health, referred to as the OIE. Specifically, the CFIA followed the recommended BSE guidelines for a country with controlled risk status and investigated:

- the feed cohort, comprising all cattle which, during their first year of life, were reared with the BSE case during its first year of life, and which investigation showed consumed the same potentially contaminated feed during that period, or
- the birth cohort, comprising all cattle born in the same herd as, and within 12 months of the birth of the BSE case, if the above cannot be identified and
- feed to which the animal may have been exposed early in its life.

Animal Investigation

The positive animal was a registered Holstein cow born on August 26, 2002. She was 80 months of age at the time of death. The animal was born, raised and had spent her entire life on the same farm. The producer reported the duration of illness as approximately two weeks. Retrospectively, the owner acknowledged a change in behaviour starting at the end of February, 2009 with the animal exhibiting erratic behaviour, trying to jump the gutters in the barn and falling down a few times.

The case animal became progressively more nervous around the other cows and her status in the herd changed from a dominant position to one of the lowest in the herd. She became stiff gaited in all four legs and during the last week of life she became hypersensitive to touch and reacted abnormally to visual stimuli.

Weight loss and decreased milk production were also reported. At the time of examination by the private veterinarian, she appeared weak with subtle to mild ataxia of the hind legs. The producer elected to have the animal humanely destroyed. Since the inclusion criteria of Canada's National BSE Surveillance Program were met, arrangements were made to forward appropriate samples for laboratory evaluation.

The birth farm was a dairy operation located in Northern Alberta. The feed/ birth cohort was determined to comprise 213 animals which, along with the case animal, were raised on the farm. This cohort consisted of male and female Holsteins. The trace-out investigation located 19 live animals on five premises including the case farm. These animals were quarantined and eight of the 19 live cohorts have been humanely destroyed and their carcasses disposed of by incineration in accordance with the OIE recommendations. The same approach will be followed for the remaining live cohorts.

The following is the disposition of the other animals in the birth/feed cohort:

- 77 animals were traced and confirmed to have died or been slaughtered;
- 67 animals were traced and presumed to have died or been slaughtered;
- three animals were traced and confirmed to have been exported for slaughter and the importing country has been notified
- 47 animals were determined to be untraceable because of records limitations

Feed Investigation

The feed investigation focussed on feeds to which the case animal may have had access during its first year of life and the manufacturing practices used to produce each of these feeds.

Investigation at the farm revealed dairy cattle to be the only commercially farmed species. Other animals present included a dog and several cats.

There was no pasture use on the farm and all forages were farm-grown and harvested using farm-owned equipment. Non-forage feed products included grain (barley) which

was farm-grown or purchased, milk replacer, three different commercially prepared complete feeds and mineral and salt products in block or loose form. All products, with the exception of a commercially prepared complete lactation feed delivered in bulk, were supplied in packages (bagged or blocks) of 20 or 25 kg.

Heifer calves were initially fed colostrum, followed by milk replacer and calf starter beginning within three days of age and with no clearly defined weaning age. Feeding of the calf starter continued to approximately six months with forages and mineral and salt blocks introduced at approximately three months of age. From approximately six months of age onwards, heifers were fed forages, barley, and mineral products only. Bull calves were occasionally kept beyond two weeks of age and, if so, were fed the same way as described for the heifers.

Commercially prepared lactation feed was delivered directly into a bulk storage bin associated with the milking barn for use in preparing a total mixed ration for the lactating herd only. The storage, location, and intended use of this feed, in combination with the separate housing for heifers and lactating cows, as well as a lack of shared mixing or handling equipment, eliminated this feed from further investigation.

Feeds included in the investigation due to direct feeding were: milk replacer, calf starter, barley, mineral blocks and salt blocks. Feeds included in the investigation because exposure could not be eliminated were a small amount of loose mineral and breeder ration.

While much of the barley used was grown on farm, there were purchases for which specific source information was not available. There was also reported use of a third party mobile mix and roller mill employed to roll barley for the farm. Records of other products and how they were used in this roller mill were not available but it was reportedly used to mix grains with commercial supplements for non-ruminants at other locations. Its use can not be eliminated as a source of potential contamination for rolled barley fed on the farm. Investigations of sources of milk replacer and salt products identified that these products were produced in specialized facilities dedicated to non-prohibited material products only, thereby ruling them out as possible sources of contamination.

Investigation at the manufacturer supplying the mineral block products identified these were produced in a facility that also produced feeds containing prohibited material. Cross-utilized equipment at the facility included equipment used to receive bulk ingredients and batch mixing equipment. Review of records associated with these points of production indicated procedures to prevent cross contamination with prohibited material were in place and documented.

The calf starter used during the period of interest was identified as manufactured at two different facilities. One facility provided 125 kg of product within the case animal's first

month of life. The other facility provided 4550 kg of product within the case animal's first six months of life.

Production records for the facility manufacturing the 125 kg of calf starter were not available. One of the mixed pelleted ingredients used in this feed was manufactured in another facility which handled prohibited material but specific production records were not available.

The facility manufacturing the majority of the calf starter also manufactured two other products distributed to the farm (a loose mineral and breeder ration) which the case animal could have been exposed to. This facility also manufactured feeds containing prohibited material with shared equipment throughout all major points of manufacturing. Procedures to prevent cross contamination with prohibited material were in place and documented. Documentation failures at point of bulk ingredient receiving were noted on two occasions.

Findings of the investigation suggest the most likely exposure to infectious material to be through cross-contamination of ingredients used in the manufacture of calf starter fed during the first six months of life (either manufacturer). Additional sources, particularly barley potentially contaminated by cross utilized rolling equipment, can not be ruled out.

Investigation Overview

The detection of this case does not change any of Canada's BSE risk parameters. The location and age of the animal are consistent with previous cases. Surveillance results to date, including this case, reflect an extremely low level of BSE in Canada.

Since the confirmation of BSE in a native-born animal in May 2003, Canada has significantly increased its targeted testing of cattle in high-risk categories advocated by the OIE. This effort is directed at determining the level of BSE in Canada while monitoring the effectiveness of the risk-mitigating measures in place. Canada's National BSE Surveillance Program continues to demonstrate an extremely low level of BSE in Canada, with 16 positive animals detected.

With respect to BSE, the safety of beef produced in Canada is assured by public health measures further enhanced in 2003. The removal of specific risk material (SRM) - the tissues that have been demonstrated to have the potential to harbour BSE infectivity - from all animals slaughtered for human consumption is the most effective single measure to protect consumers in Canada and importing countries from exposure to BSE infectivity in meat products.

As demonstrated by the surveillance system, the feed ban implemented in 1997 is effectively preventing the amplification of BSE in Canada. Additional regulations to enhance Canada's feed ban were enacted in 2007. The most important change is the removal of SRM from all animal feeds, pet food and fertilizer. The enhancement will

accelerate progress toward eradicating BSE from the national cattle herd by preventing more than 99 percent of potential BSE infectivity from entering the Canadian feed system. These measures are effectively minimizing the risk of BSE transmission.

Canada is officially categorized under the OIE's science-based system as a controlled BSE risk country. This status clearly recognizes the effectiveness of Canada's surveillance, mitigation and eradication measures, and acknowledges the work done by all levels of government, the cattle industry, veterinarians and ranchers to effectively manage and eventually eradicate BSE in Canada.

Case 17

REPORT ON THE INVESTIGATION OF THE SEVENTEENTH CASE OF BOVINE SPONGIFORM ENCEPHALOPATHY (BSE) IN CANADA

Background

On February 12, 2010, the Alberta Provincial Laboratory informed the CFIA Edmonton District Office of a BSE Surveillance sample (collected through the Canada Alberta BSE Surveillance Program) with a reaction on the BIO-RAD TeSeE ELISA rapid test that did not rule-out BSE.

Samples were forwarded to the National and OIE (World Organisation for Animal Health) BSE Reference Laboratory in Lethbridge, Alberta. The samples were confirmed as BSE positive using the immunohistochemistry (IHC) procedure on February 25, 2010. In addition to the IHC procedure, the National BSE Reference Laboratory evaluated the sample using the PrionicsCheck Western® rapid test, Hybrid Western Blot, the Prionics Check PrioSTRIP® rapid test, BioRad TeSeE ELISA and the Scrapie Associated Fibril Immunoblot (SAF immunoblot). All test results were determined to be positive. Western blot results indicate the case was c-type (classical) BSE.

The carcass was secured at the sampling site and transferred to CFIA's laboratory in Lethbridge for incineration. No part of the carcass entered the human food supply or animal feed chain.

The CFIA immediately initiated an epidemiological investigation based on the recommended BSE guidelines (Terrestrial Animal Health Code 2010) of the OIE. Specifically, the CFIA followed the recommended BSE guidelines for a country with controlled risk status and investigated:

- the feed cohort, comprising all cattle which, during their first year of life, were reared with the BSE case during its first year of life, and which investigation showed consumed the same potentially contaminated feed during that period, or
- the birth cohort, comprising all cattle born in the same herd as, and within 12 months of the birth of the BSE case, if the above cannot be identified and
- feed to which the animal may have been exposed early in its life.

Animal Investigation

The positive animal was confirmed to be a commercial beef cow born on March 22, 2004, therefore being 71 months of age at the time of death. The animal was born, raised and had spent its entire life on its birth farm. The positive animal was reported by the owner to have been non-ambulatory (downer) in the days preceding its death. No treatments had been given and the animal subsequently died on February 5, 2010. After consultation with the local veterinary practitioner it was determined that the animal met

the inclusion criteria of Canada's National BSE Surveillance Program. Accordingly, arrangements were made to collect and submit appropriate samples for evaluation.

The index farm is a cow-calf operation with both purebred and commercial beef cattle. The birth and feed cohort was determined to comprise 630 animals.

The trace-out investigation located 73 live animals on 3 premises including the index farm. All of these animals have been placed under quarantine. To date, 19 of the 73 live cohorts have been humanely destroyed and 4 cohorts died from natural causes. Twelve of the carcasses have been disposed of by incineration and 11 carcasses at an SRM approved landfill in accordance with OIE recommendations. The remaining cohorts are permanently identified, their movements controlled and will be destroyed or upon their death their carcasses disposed of in accordance with OIE recommendations. The following is the disposition of the other animals in the birth/feed cohort:

- 119 animals were traced and confirmed to have died or been slaughtered;
- 288 animals were traced and presumed to have died or been slaughtered;
- 95 animals were traced and confirmed to have been exported for slaughter and the importing country has been notified
- 46 animals were determined to be untraceable because of records limitations
- 9 animals were subsequently ruled out as equivalent risk animals

Feed Investigation

The feed investigation focused on feeds to which the case animal may have had access during its first year of life and on the manufacturing practices used to produce these feeds. All feed products to which the BSE case animal was known to have had access were intended for feeding to ruminants. These consisted of farm-grown forages and grains, commercially prepared mill-run wheat pellets from a single supplier, and mixed feed products from five other commercial suppliers.

Feeding Practices

Calving occurs annually, in March. During the first four months of life, the case animal would have been fed its mother's milk and creep feed and had access to hay, grain, pelleted cow ration, free choice minerals and salt. No milk replacers were used.

In June, cow-calf pairs were moved to pasture where they stayed until December. During this period, the case animal would have had access to free choice minerals and salt, plus small amounts of grain. The animals may have also had access to wheat mill-run pellets. In December the calves were weaned and fed rolled grain and hay, free choice minerals and salt, until the following March. In addition, it is probable that these calves also had access to pelleted cow and calf rations and wheat mill-run pellets during the winter period.

Feed Sources

Investigation of the facility which was the sole supplier of the wheat mill-run pellets identified that this was a specialized single ingredient feed manufacturing facility which never handled or used prohibited material. Therefore this product was ruled out as a possible source of contamination.

The supplier of the minerals and premixes used on the farm is now out of business. Investigation results from previous BSE investigations confirmed that this facility did not use or handle prohibited material during the time period under review for the current case. Therefore these products were ruled out as a possible source of contamination.

Investigation at a commercial feed mill which provided two medicated complete feeds to the farm during the case animal's first year of life identified that this facility did not use or handle prohibited material. Mineral premix and vitamin premix products used as ingredients in these feeds were traced back to a specialized premix facility which never used or handled prohibited material. These products are therefore ruled out as a possible source of contamination.

Investigation at a commercial feed mill which supplied one non-medicated creep feed identified that this facility did not use prohibited material. Therefore this product was ruled out as a possible source of contamination.

A commercial feed mill which was identified as providing several complete feeds for cows, calves and bulls to the case farm between September 2003 and June 2004 is no longer in business. This facility is known to have used prohibited materials during the time period of interest. It is not possible to rule out that contamination of these products during production or transport could have taken place.

Investigation at a commercial feed mill known to have provided several medicated and non-medicated feeds including creep, calf and cow rations, determined that the facility did use prohibited material during the time of interest. This facility had procedures in place for handling and using prohibited materials. However, some production records for products manufactured between November 2004 and March 2005 were not available and, consequently, it is not possible to to rule out that contamination of these products during their production could have taken place. Review of records associated with a creep feed produced by this facility revealed an incomplete clean out of a truck unloading mechanism between delivery of a hog feed containing prohibited material and the creep feed which was subsequently delivered to the case farm. Record review allowed the remaining products supplied by this facility to be ruled out as a possible source of contamination.

Investigation Overview

The detection of this case does not change any of Canada's identified BSE risk parameters. The location and age of the animal are consistent with previous cases. Surveillance results to date, including this case, reflect an extremely low level of BSE in Canada.

Since the confirmation of BSE in a native-born animal in May 2003, Canada has significantly increased its targeted testing of cattle in high-risk categories advocated by the OIE. This effort is directed at determining the level of BSE in Canada while monitoring the effectiveness of the risk-mitigating measures in place.

With respect to BSE, the safety of beef produced in Canada is assured by public health measures further enhanced in 2003. The removal of specific risk material (SRM) - the tissues that have been demonstrated to have the potential to harbour BSE infectivity - from all animals slaughtered for human consumption is the most effective single measure to protect consumers in Canada and importing countries from exposure to BSE infectivity in meat products.

As demonstrated by the surveillance system, the feed ban implemented in 1997 has effectively prevented the amplification of BSE in Canada. Additional regulations to enhance Canada's feed ban were enacted in 2007. The most important change was the removal of SRM from all animal feeds, pet food and fertilizer to avoid potential cross contamination. The enhancement will accelerate progress toward eradicating BSE from the national cattle herd by preventing more than 99 percent of potential BSE infectivity from entering the Canadian feed system. These measures are effectively minimizing the risk of BSE transmission.

Canada is officially categorized under the OIE's science-based system as a controlled BSE risk country. This status clearly recognizes the effectiveness of Canada's surveillance, mitigation and eradication measures, and acknowledges the work done by all levels of government, the cattle industry, veterinarians and ranchers to effectively manage and eventually eradicate BSE in Canada.

Case 18

REPORT ON THE INVESTIGATION OF THE EIGHTEENTH CASE OF BOVINE SPONGIFORM ENCEPHALOPATHY (BSE) IN CANADA

Background

On February 10, 2011, the Alberta Provincial Laboratory informed the CFIA Edmonton District Office of a BSE Surveillance sample (collected through the Canada Alberta BSE Surveillance Program) with a reaction on the BIO-RAD TeSeE ELISA rapid test that did not rule-out BSE.

Samples were forwarded to the National and OIE (World Organisation for Animal Health) BSE Reference Laboratory in Lethbridge, Alberta. The samples were reported as BSE positive using the immunohistochemistry (IHC) procedure on February 18, 2011. In addition to the IHC procedure, the National BSE Reference Laboratory evaluated the sample using the PrionicsCheck Western® rapid test, Hybrid Western Blot, the Prionics Check PrioSTRIP® rapid test, BioRad TeSeE ELISA and the Scrapie Associated Fibril Immunoblot (SAF immunoblot). All test results were determined to be positive. Western blot results indicate the case was C-type (classical) BSE.

The carcass was secured at the sampling site and transferred to CFIA's laboratory in Lethbridge for incineration. No part of the carcass entered the human food supply or animal feed chain. The CFIA immediately initiated an epidemiological investigation based on the recommended BSE guidelines (Terrestrial Animal Health Code 2010) of the OIE. Specifically, the CFIA followed the recommended BSE guidelines for a country with controlled risk status and investigated:

- the feed cohort, comprising all cattle which, during their first year of life, were reared with the BSE case during its first year of life, and which investigation showed consumed the same potentially contaminated feed during that period, or
- the birth cohort, comprising all cattle born in the same herd as, and within 12 months of the birth of the BSE case, if the above cannot be identified and
- feed to which the animal may have been exposed early in its life.

Animal Investigation

The positive animal was confirmed to be a purebred Holstein dairy cow born on August 23, 2004, therefore 77 months of age at the time of death. The animal was born, raised and had spent its entire life on its birth farm. The positive animal exhibited neurological signs for three weeks before the producer contacted the private veterinarian. It was ataxic, had a head tilt, difficulty getting up and would circle once it was up. After consultation between the producer and the local veterinary practitioner it was determined that the animal met the inclusion criteria of Canada's National BSE Surveillance Program. The animal was euthanized on February 04, 2011 and arrangements were made to collect and submit appropriate samples for evaluation.

The birth farm is a large corporate farming operation. Aside from the dairy herd, they also had poultry, beef cattle and sheep during the period of interest which was determined to be August 23, 2003- August 23, 2005. However, each herd or flock belonging to this operation was managed as a distinct unit under its own manager. The beef herd and sheep flock did not commingle with the dairy herd or with each other and were fed different rations.

The birth and feed cohort was determined to comprise 361 animals. The trace-out investigation located 21 live animals on 3 premises including the birth farm. All of these animals have been placed under quarantine. To date, 2 of the 21 live cohorts have been humanely destroyed and the carcasses have been disposed of at an SRM approved landfill in accordance with OIE recommendations. The remaining cohorts are permanently identified, are under official movement control, and will be destroyed or, upon their death, their carcasses disposed of in accordance with OIE recommendations.

The following is the disposition of the other animals in the birth/feed cohort:

- 138 animals were traced and confirmed to have died or been slaughtered;
- 128 animals were traced and presumed to have died or been slaughtered;
- 38 animals were traced and confirmed to have been exported for slaughter and the importing country has been notified
- 36 animals were determined to be untraceable because of records limitations

Feed Investigation

The purpose of the feed investigation is to identify possible sources of exposure of the case animal to "prohibited material", animal by-products defined in Canada's *Health of Animals Regulations* that are prohibited from being fed to ruminant animal species due to their risk of transmitting BSE. The feed investigation focused on feeds to which the case animal may have had access during its first year of life and on the manufacturing practices used to produce these feeds. All feed products to which the BSE case animal was known to have had access were intended for feeding to ruminants.

Feeding Practices

Male and female calves were housed in calf hutches for the first four weeks of life. They were fed cow's milk for the first week, and then cow's milk supplemented with a commercially prepared calf starter. Between one and four weeks of age, male calves were sold to a calf feeder while the female calves remained in the hutches and were provided with the same diet until eight weeks of age.

At eight weeks of age, the remaining calves were relocated to pens containing 16 – 20 calves in each, and from eight weeks until twenty weeks of age they would have had access to commercial calf starter ration, hay and salt.

From twenty weeks until one year of age, the calves were housed in larger pens with 35 -40 calves in each and were fed a total mixed ration (TMR) containing silage, barley, heifer mineral, straw, and either canola meal, soymeal or dried distiller's grains. They also had access to hay and a free-choice heifer mineral during this time.

The dairy animals had no access to other commercial feeds used on the farm.

The Investigation revealed that the truck used to transport grains on farm was also used to pick up poultry feeds containing prohibited material from the commercial supplier. These grains included oats destined for use in sheep rations, and barley which was subsequently used in dairy and beef rations. Interviews of farm staff indicate that the truck was physically cleaned between each use, however, the lack of written procedures and records does not allow for the ruling out of the truck as a possible point of cross contamination of grains used in dairy cattle rations with prohibited material.

Feed & Ingredient Sources

Canola and soy meals were usually received from a specialized oilseed processing facility which never handled or used prohibited material. Therefore these products were ruled out as a possible source of contamination. There was one purchase of soy meal from a commercial feed supplier which did handle prohibited material, however review of production records at the facility showed that appropriate control measures were taken, allowing this load of soy meal to be ruled out as a possible source of contamination.

The dried distiller's grains which were used on farm could not be traced back to their source. However, this product would most likely have originated from a specialized single ingredient feed manufacturing facility and would be an extremely unlikely source of contamination.

The calf starter ration, minerals and supplements used by the dairy operation were all provided by a sole commercial feed supplier, different from the supplier of feed to the poultry operation. It was confirmed through inspection reports on file that this facility had not used or handled prohibited material since at least 1997.Therefore these products were ruled out as a possible source of contamination.

The salt blocks used by the dairy operation were purchased at a retailer and confirmed as being sourced from a specialized salt manufacturer. They were therefore ruled out as a possible source of contamination.

Considering the farm's feeding regime and specific production records reviewed, the most likely source of exposure to BSE infectivity appears to be cross-contamination with poultry feed containing prohibited material resulting from incomplete clean out of a conveyance used to also deliver barley to the dairy herd.

Investigation Overview

The detection of this case does not change any of Canada's identified BSE risk parameters. The location and age of the animal are consistent with previous cases. Surveillance results to date, including this case, reflect an extremely low level of BSE in Canada.

Since the confirmation of BSE in a native-born animal in May 2003, Canada has significantly increased its targeted testing of cattle in high-risk categories advocated by the OIE. This effort is directed at determining the level of BSE in Canada while monitoring the effectiveness of the risk-mitigating measures in place.

With respect to BSE, the safety of beef produced in Canada is assured by public health measures further enhanced in 2003. The removal of specified risk material (SRM) - the tissues that have been demonstrated to have the potential to harbour BSE infectivity - from all animals slaughtered for human consumption is the most effective single measure to protect consumers in Canada and importing countries from exposure to BSE infectivity in meat products.

As demonstrated by the surveillance system, the feed ban implemented in 1997 has effectively prevented the amplification of BSE in Canada. Additional regulations to enhance Canada's feed ban were enacted in 2007. The most important change was the removal of SRM from all animal feeds, pet food and fertilizer. The enhancement will accelerate progress toward eradicating BSE from the national cattle herd by preventing more than 99 percent of potential BSE infectivity from entering the Canadian feed system. These measures are effectively minimizing the risk of BSE transmission.

Canada is officially categorized under the OIE's science-based system as a controlled BSE risk country. This status clearly recognizes the effectiveness of Canada's surveillance, mitigation and eradication measures, and acknowledges the work done by all levels of government, the cattle industry, veterinarians and ranchers to effectively manage and eventually eradicate BSE in Canada.

Case 19

REPORT ON THE INVESTIGATION OF THE NINETEENTH CASE OF BOVINE SPONGIFORM ENCEPHALOPATHY (BSE) IN CANADA

1. Case investigation

1.1 Details of the BSE Case

A sample taken from a cow in Alberta, Canada was identified as positive for Bovine Spongiform Encephalopathy (BSE). The case animal was reported by the owner to have been non-ambulatory (downer) in the days preceding its death. After consultation between the producer and the local veterinary practitioner it was determined that the animal met the inclusion criteria of Canada's National BSE Surveillance Program. The animal was euthanized on February 4, 2015 and arrangements were made to collect and submit appropriate tissue samples for evaluation.

On February 7, 2015, the Alberta Agriculture Edmonton Laboratory (now Alberta Agriculture and Forestry TSE Laboratory) informed the Canadian Food Inspection Agency (CFIA) of a BSE surveillance sample (collected through the Canada-Alberta BSE Surveillance Program) with an initial reaction on the BIO-RAD TeSeE ELISA rapid test that remained positive on repeat testing.

As per Transmissible Spongiform Encephalopathies (TSE) ISO quality assurance (QA) guidelines, homogenates and samples were forwarded to the CFIA and OIE (World Organisation for Animal Health) BSE Reference Laboratory in Lethbridge, Alberta. The sample was confirmed as BSE positive using the OIE Immunoblot (SAF and mAB 6H4) test on February 11, 2015. In addition to the OIE Immunoblot, the National BSE Reference Laboratory evaluated the sample using the Prionics-Check Western® rapid test, Hybrid Western Blot, the Prionics Check PrioSTRIP® rapid test, and the BioRad TeSeE ELISA. All test results were determined to be positive. Hybrid Western Blot results characterized the case as C-type (classical) BSE.

The carcass was secured at the sampling site, obtained by and transferred to CFIA's laboratory in Lethbridge for incineration. No part of the carcass entered the human food supply or animal feed chain.

The positive animal (Case #19) was confirmed to be a pure bred Black Angus beef cow born on March 25, 2009, therefore being 70 months of age at the time of death. It had been sold from its birth farm, via an auction mart, to the farm where it was sampled, just over a year prior to detection (Jan 22, 2014). This was the second BSE case born on the birth farm (the previous was case #17, born in March 2004).

The birth farm of the case animal was a cow-calf operation with both purebred Black Angus and commercial beef cattle. At the time of detection of this case, there were 290 breeding cows on the birth farm.

1.2 Case Investigation Overview

1.2.1 CFIA Investigation as Specified by the OIE

The CFIA immediately initiated an epidemiological investigation based on the recommended BSE guidelines (Terrestrial Animal Health Code 2014) of the OIE and the CFIA's BSE Manual of Procedures. Specifically, the CFIA followed the recommended BSE guidelines for a country with controlled risk status and investigated:

Feed: all sources of feed to which the infected animal was or may have been exposed during its first year of life;

Feed cohort: all cattle which, during their first year of life, were reared with the BSE case during its first year of life, and which investigation showed consumed the same potentially contaminated feed during that period; and/or

Birth cohort: all other cattle that were born on the same farm and within 12 months of the infected animal's birth.

1.2.2 Identifying Potential Risk Pathways for Exposure to the BSE agent

BSE case #19 had two unique characteristics when compared with previous cases Canada has experienced to date:

This was the second BSE case to be born on the same birth farm (as was case #17, born in March 2004). Canada has not previously identified more than one BSE case born on the same farm.

The affected animal was born after the enhanced feed ban (EFB): The EFB, implemented on July 12, 2007, ensures that specified risk material (SRM) is excluded from animal feed, pet food and fertilizers. Case #19 was born in March 2009, which is 20 months after the EFB was implemented.

To complete this investigation, on-farm and off-farm risks pathways potentially associated with the unique characteristics of this case were examined. The following sections provide an overview of Canada's feed ban and the potential risk pathways that were considered in the course of the investigation.

1.3 Overview of Canada's Feed Ban and Regulations

In 1997, Canada implemented an initial feed ban as a precautionary measure to limit the potential spread of BSE through the domestic cattle population, should there have been a previously undetected presence of BSE in the country. This ban prohibited the feeding of mammalian-derived proteins (“prohibited material” or PM) to ruminant animals (cattle, sheep, goats, deer, elk and other species), with the exception of proteins derived from a porcine or equine; gelatin or gelatin products derived exclusively from hides or skins of any species; blood or blood products and rendered fats from any

species[1]. Canada's ban also prohibited incorporation of poultry litter and restaurant waste into feed for ruminants.

The detection of Canada's first native-born case of BSE in 2003, followed by a small number of BSE cases between 2003 and 2005 were a manifestation of a low level of exposure to the BSE-agent in the cattle population prior to and around the time the feed ban was implemented. In 2006, the Canadian Food Inspection Agency (CFIA) undertook a comprehensive review of the feed ban in order to look at the control measures put in place and examine the CFIA's inspection program to assess compliance with the *Health of Animals Regulations*. Canadian, U.S. and other international scientific and technical analyses, including a review of the UK experience, confirmed that the ban would have arrested any further amplification and significantly reduced the opportunities for recycling of the BSE-agent in the cattle population. While the impact of the feed ban may not have been absolute, ongoing surveillance confirms the low and declining incidence of BSE. Multiple scientific analyses have concluded that Canada's feed ban would eventually lead to the eradication of BSE in the country[2] [3]. However, Canada decided to take the additional step necessary to accelerate this process by requiring that SRM be excluded from the entire terrestrial and aquatic animal feed chains, as well as fertilizers from July 2007. It is important to note that prior to 2007, SRM were prohibited from being fed to ruminants as they fell under the scope of the original feed ban as prohibited materials. SRM are now segregated at source and redirected to disposal or destruction to ensure that the remaining PM no longer contains SRM.
SRM includes the skull, brain, trigeminal ganglia, eyes, tonsils, spinal cord and dorsal root ganglia of cattle aged 30 months or older, and the distal ileum of cattle of all ages. Collectively these tissues contain more than 99.9% of the BSE infectivity in an infected animal. Considering that any remaining potential infectivity in non-SRM tissues would be at extremely low levels, the likelihood of an animal becoming infected would be negligible even if it consumed feed contaminated with PM.

Preventing SRM from entering the animal feed and pet food production chain enhanced the 1997 feed ban by minimizing the risk of BSE transmission posed by the cross-contamination of ruminant feed by PM, as well as any inappropriate on-farm use. The provision to prohibit the use of SRM in fertilizers was intended to prevent the potential accidental or intentional misuse of fertilizers as feed.

SRM is collected, segregated, stained, and directed to a dedicated line/container. Collection, treatment, transport and disposal of SRM are done under a permitting system[4]. The SRM program is implemented, administered, monitored and enforced by

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[1] Health of Animals Regulations (C.R.C., c. 296) part XIV, food for ruminants, livestock and poultry, rendering plants, fertilizers and fertilizers supplements.
[2] Enhanced Feed Ban Options – Risk Reduction Model and Analysis. Canadian Food Inspection Agency. November 18, 2004.
[3] New Regulations Proposed for BSE-Related Feed Controls. Regulatory Impact Analysis Statement. Canadian Food Inspection Agency. December 2004.
[4] Enhanced Animal Health Protection from BSE - Specified Risk Material (SRM), Canadian Food Inspection Agency

the CFIA through inspection activities at dead stock collection sites, salvaging and rendering facilities, landfills, and other processing and disposal sites.
SRM collected for processing and disposal is predominantly sourced from slaughterhouses and on-farm bovine dead stock (***Figure*** 1). Compliance verification programs of the measures in place to ensure the SRM ban is effective are detailed in Appendix 1.

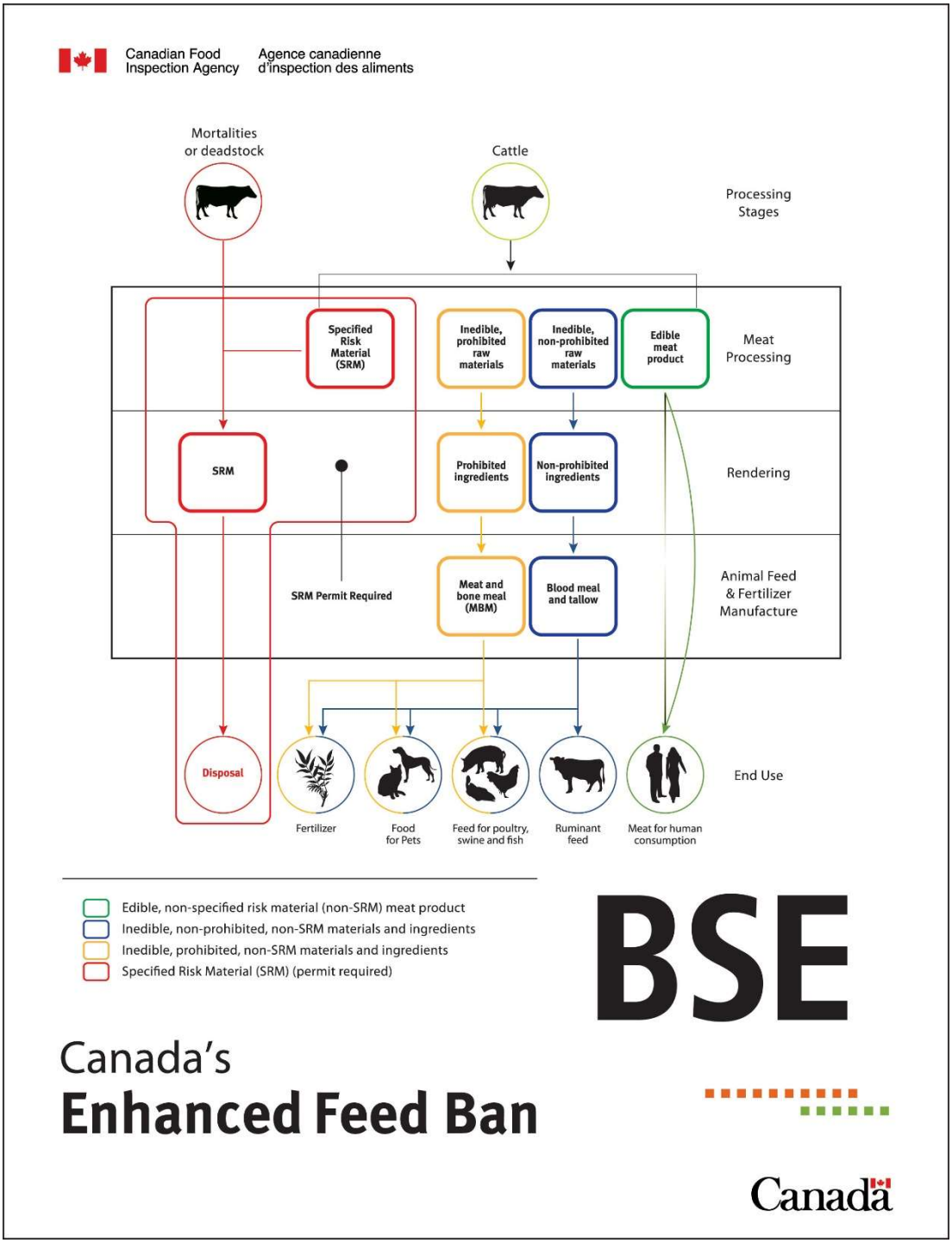

Figure 1. Sources, Processing, Transportation and Disposal of SRMs. The image illustrates how Specified Risk Material (SRM) comes predominantly from slaughterhouses and on-farm bovine dead stock and is collected for disposal. SRM is not permitted to enter the human food and animal feed supply.

1.4 Pathways for On-farm Exposure to the BSE Agent Associated with BSE Case #19

1.4.1 Residual Feed Contamination on Farm

The extensive UK experience with BSE led to the conclusion that the ingestion of contaminated feed remains the most likely source of BSE in infected animals born after the implementation of a feed ban[5].

With two BSE cases diagnosed on the same birth farm the investigation of possible residual feed contamination on farm was conducted. The first case (BSE case #17) was born when the 1997 feed ban was in place, prior to enhancements to exclude SRM (Figure 2). While the second case (BSE case #19) was born 20 months after the enhanced feed ban was implemented, it is possible that small amounts of residual contaminated feed associated with the previous case could have remained on the farm[6]. It is important to note that while the previous case (#17) most likely became infected in 2004, it did not arise as a BSE case until February 2010, almost a year after the birth of the case under consideration.

1.4.2 Maternal transmission

The report of the meeting of the OIE ad hoc group to review the BSE chapter in the OIE Terrestrial animal health code (2006) concluded that there was no evidence that vertical transmission of the BSE agent occurs. In this particular case, it has been determined that case #17 (commercial cow) is not the dam of case #19 (pure bred cow). The producer reported that the dam of case #19 was euthanized after an injury in February 2014, nearly five years after case #19 was born.

In this investigation, we noted that in 2009, case #17 calved on March 30, a few days after the birth of case #19 on March 25 (**Figure 2**). On this farm, as in most cow-calf herd practices, calving frequency was concentrated in time. The current literature5 considers horizontal transmission as a highly unlikely means of transmission of BSE and it was not further considered.

[5] Review of the Evidence for the Occurrence of 'BARB' BSE Cases in Cattle. William G. Hill, DEFRA (2005) PDF (177 kb).
[6] Final report on BSE confirmed in an animal born on 3 October 2001 & 2 cohort animals born on 28 September 2001 & 1 May 2002 in a Pembrokeshire herd. DEFRA (2005) PDF (55.7 kb).

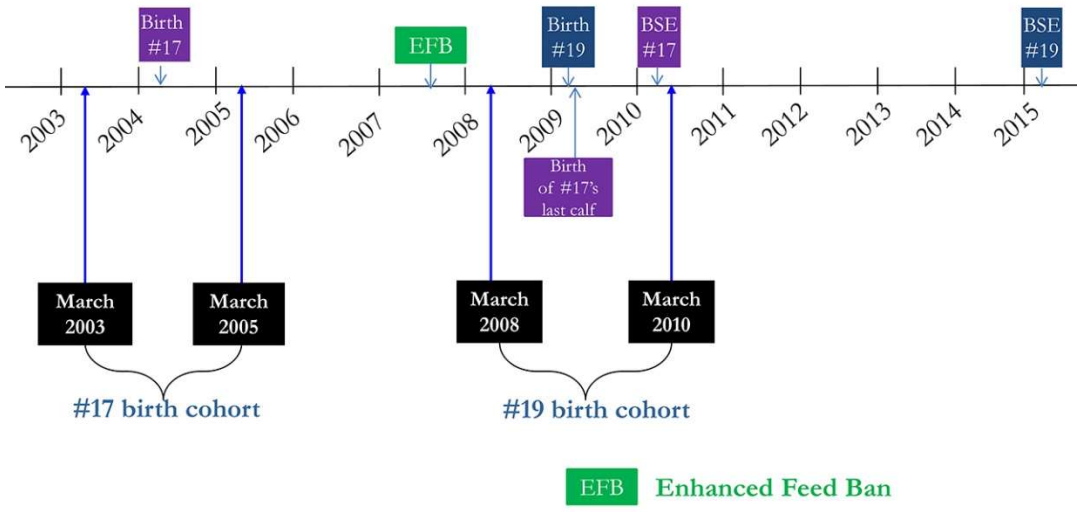

Figure 2. Timeline (birth and death) of BSE Cases #17 and #19 Born on the Same Farm. The image illustrates the timeline of events regarding BSE cases 17 and 19 where both animals were born on the same farm.

- BSE case #17 was detected in February 2010.
- The animal from case 17 was born in March 2004.
- The birth cohort for BSE case 17 was March 2003 – March 2005.
- The CFIA's Enhanced Feed Ban was implemented in 2007.
- BSE case 19 was confirmed February 2015.
- The animal from case 19 was born March 2009.
- The birth cohort for BSE case 19 was March 2008 – March 2010.

1.4.3 Environmental Contamination on Farm (carcass disposal)

Carcass disposal could be hypothesised to contribute to environmental contamination by the BSE agent. Western Canadian cow-calf farms are typically housed on large farmlands. Alberta Agriculture and Rural Development (now Alberta Agriculture and Forestry) legislation allows natural disposal of livestock mortalities under specific conditions (the animal is disposed of on the property owned by owner of the animal; the animal was not suspected of an infectious or reportable disease, nor was it euthanized with drugs or other chemical substances; the total weight of animals disposed of in one site does not exceed 1000kg; compliance with specific distances between sites, wells,

livestock facilities, residences, roads and natural parks or areas; and natural disposal does not create a nuisance)[7].
On the birth farm, dead cattle were disposed of on farm. They were transported to the disposal location, situated on the fence line of a field that is not used for grazing. BSE case #17 was, as reported, incinerated at the Lethbridge CFIA laboratory.

Cows were normally on pasture from June to December. Any animals that died during that period were left on pasture. In the Canadian cow-calf industry, the annual death loss of cows is estimated to approximately 1%[8]. In a farm this size, this could represent one or two cows dead on pasture annually. If one of these were infected, for successful transmission to occur, a susceptible young animal would need to ingest the BSE agent through scavenging the carcass or ingesting contaminated soil or plants. Considering that, unlike Chronic Wasting Disease and Scrapie, there is no evidence in the scientific literature concerning potential environmental pathways for the transmission of BSE, this potential route of infection was not considered further.

[7] Livestock mortality management (disposal), Government of Alberta, 2011 PDF (1.5 mb)
[8] Managing livestock mortalities, Saskatchewan Ministry of Agriculture, 2010.

1.5 Pathways for Off-farm Exposure to the BSE Agent Associated with BSE Case #19

Considering that contaminated feed was the most likely source of infectivity in this investigation, pathways of infective material entering the feed system were examined. Given the fact that the enhanced feed ban was in place over a year prior to the birth of BSE case #19, the potential pathways for feed to become contaminated with infective material are limited, given the extremely low prevalence rate of BSE and the controls surrounding SRM (see Section 1.3; Figure 1; Appendix 1). However unlikely, if the BSE agent were to enter the feed chain, the potential source of contamination could involve two pathways: (1) incomplete removal of SRM from PM, or (2) cross contamination of feed (PM or non-PM) with SRM. Investigating potential cross-contamination with PM would be of interest in mills that use both PM and non-PM material. Investigating cross-contamination of feed with SRM involves examining the sources and movement of SRM from a live infected ruminant that:

1. Dies or is killed on farm:	Carcass (which contains SRM) may be disposed of on farm (see Section 1.4.3), or may be picked up by deadstock for salvaging and rendering.
2. Dies off farm: a. in transport, b. prior to slaughter, or c. at an assembly area	Carcass (which contains SRM) is sent for salvage and rendering.
3. Is condemned at slaughter:	Carcass (which contains SRM) is sent for salvage and rendering.
4. Is slaughtered:	The SRM is removed, treated under a dedicated process and destroyed (or sent for destruction or disposal under license, at a remote facility). Raw inedible material from the slaughter plant is forwarded to the rendering plant.

Through any of these routes, at slaughter, salvage, rendering, or delivery of animal by-products to the mill, should controls fail, cross-contamination could occur. Therefore, the additional risks of feed being contaminated with SRM lie upstream from the feed mill, either at the rendering plant or the slaughterhouse. Many mechanisms are in place to ensure the SRM ban is effective and any potential cross contamination in the complex network of rendering, feed production, transport, storage and use are effectively eliminated (see Section 1.3; Figure 1; Appendix 1).

1.6 Pathways Investigated for BSE case #19

Epidemiological evidence across several countries suggest that a feed-borne source of BSE is the only substantiated route of infection for BSE, even after a feed ban is implemented to mitigate against the risk of feed being contaminated with the BSE agent. Many BSE affected countries that have implemented effective feed bans

have detected limited numbers of cases Born After Reinforced (or enhanced or SRM) Ban. Such animals are referred to as BABs or BARBs[9]. The majority are born within the first few years after the ban is introduced[10]. In the UK, for example, two-thirds of BSE cases in cattle born after the original 1998 feed ban were born in the first few years after it was introduced[11].

Given the abovementioned on-farm and off-farm exposure pathways, two lines of enquiry were pursued to investigate possible sources of BSE infectivity in this case:

(1) On farm through residual or carryover of contaminated feed acquired prior to the enhanced feed ban; and

(2) Off farm through the acquisition of contaminated feed.

2. Feed Investigation

The feed investigation focused on feeds to which the case animal may have had access during its first year of life and on the manufacturing practices used to produce these feeds (March 2008 to March 2010).

2.1 Feeding Practice

A thorough and detailed feed investigation was conducted at the birth farm to identify all of the feed materials used, the suppliers and sources of these products. In addition, the feeding practices and storage and management practices were reviewed. The on-farm investigation focused on potential cross contamination incidents or incidental exposure to feeds that could have contained prohibited ruminant feed ingredients (primarily ruminant meat and bone meal) manufactured prior to July 2007.

On this farm, the calving season extended from February to June, with most calving occurring in March and April. During the first four months of life, the case animal would have nursed from its dam and had access to creep feed. In June, cow-calf pairs were moved to pastures where they were rotated through until December. All pastures were located in the same County as the birth farm, and there was no pasture sharing or mixing of animals with other farms. During this period, the case animal could have had access to hay, grain, pelleted cow ration, pelleted bull ration, free choice minerals and salt. The case animal would not have had access to milk replacer, because the only reported purchase of milk replacer was in February 2010, when the case animal was 11 months of age.

All feed products to which the BSE case was known to have had access were intended for feeding ruminants. Forages fed on the farm were grown and harvested on the farm or occasionally purchased from neighbors and transported with farm owned equipment. The producer did not mix feed on farm. Feed was purchased from the same suppliers over the years. During the period of interest, pelleted feed was delivered to the farm on

[9] Ducrot, et al. Review on the epidemiology and dynamics of BSE epidemics., Vet Res. 2008 39:15.
[10] Review of the Evidence for the Occurrence of 'BARB' BSE Cases in Cattle. William G. Hill, Defra, 2005 PDF (177 kb)
[11] Cattle: TSE surveillance statistics web

a regular basis (every 3 to 9 months). The services of a feed consultant have been used since 2003. Ingredient processing of barley occurred with a portable roller; this equipment was shared with a neighboring farm. It was confirmed that this neighboring farm only used this equipment for rolling barley.

On-farm storage and usage practices of feed were such that all cattle on farm could have had access to any of the different feed types used on farm (creep, calf, cow or bull rations), all intended for feeding ruminants. Pet foods were stored in the dwelling house on site and livestock did not have access to these. Bin management and storage practices on farm could not eliminate the possibility that feed products produced prior to the enhanced feed ban may have remained (to some extent) on the farm post enhanced feed ban. However, there was no indication that feedstuff was stored for extended periods as part of the feeding practices on farm. The on-farm practices consisted of shoveling out a bin when it became empty prior to filling it again. The farmer reported this occurred approximately once a year.

Management practices on farm were similar to that of other cow-calf farms in Canada Given the nature of the feed used on farm (home grown forages, commercial feed/supplements manufactured specifically for cattle, no on farm mixing) there would have been no reason to consider the potential that feed might be contaminated. As discussed earlier, it is important to note that while the previous case (#17) born on this farm most likely became infected in 2004, it was not detected as a BSE case until February 2010, almost a year after case #19 was born and likely became infected. Considering the management practices and timelines of the two cases, it was not possible to rule out the potential for the carry-over of a small amount of residual contaminated feed on the farm.

2.2 Feed Sources

Investigations were conducted at all feed manufacturers to determine if they handled prohibited material and whether or not potential cross contamination of ruminant feed may have occurred. Specific attention was directed to ingredient sourcing, transportation, handling, manufacturing, storage and delivery/receiving practices.

Results of the investigation on the farm revealed that the case animal had potentially been exposed to various commercially prepared feeds during the period of interest (March 2008 to March 2010) (Table 2). None of the product formulations contained prohibited material.

Table 2. Commercially prepared feed sources to which the case animal had potentially been exposed

Commercial Feed Facilities (number of different feeds of interest)	Facility Profile Production Practices	Feed Type	Rendering Facilities supplying ingredients (Number and type of products) Table Note 12	Comments
A (4)	Facility handled Prohibited Material (PM) for feed preparations destined to non-ruminant species. Facility also handled non-PM rendered animal by-products.	Pelleted rations	J (1 PM and 1 non-PM) K (2, non-PM) L (1, non-PM) M (1 PM and 1 non-PM) N (1, non-PM)	Review of available compliance inspection records during period of interest did not identify any situations that would have resulted in the contamination of non-PM sources with PM.
B (1)	Facility did not handle PM, but handled other rendered animal by-products.	Mineral supplement	J (1, non-PM) L (1, non-PM) N (1, non-PM) USA (1, imported, non-PM)	Review of available compliance inspection records did not identify any situations that would have resulted in the contamination of mineral feeds with PM.
C (2)	Facility did not handle PM, but handled other rendered animal by-products.	Mineral supplement	O (3, non-PM) USA (1, imported, non-PM)	Review of available compliance inspection records did not identify any situations that would have resulted in the contamination of mineral feeds with PM.
D (1)	Facility did not handle PM, but handled other rendered animal by-products.	Mineral supplement	L (1, non-PM) USA (1, imported, non-PM)	Review of available compliance inspection records did not identify any situations that would have resulted in the contamination of mineral feeds with PM.
E (2)	Feed manufactured and exported to Canada from a facility in USA	Lick tubs	Not investigated	Letter of guarantee provided by manufacturer stating that all products were free from non-prohibited ingredients in the manufacture of its products (to address BSE/restricted use of animal proteins as per US Regulations).

Table 2. Commercially prepared feed sources to which the case animal had potentially been exposed

Commercial Feed Facilities (number of different feeds of interest)	Facility Profile Production Practices	Feed Type	Rendering Facilities supplying ingredients (Number and type of products) Table Note 12	Comments
F (1)	Feed manufactured and exported to Canada from a facility in USA	Lick tubs	Not investigated	Letter of guarantee provided by manufacturer stating that all products were free from rendered mammalian protein (except gelatin coating on vitamins) provided by manufacturer, as well as, ingredient lists.
G (1)	Facilities did not handle PM or other rendered animal by-products.	Salt product	Not applicable	No animal by-products used in manufacture and only bulk product received is salt. Conveyances delivering salt to facility do not transport rendered products.
H (1)	Facility did not handle PM or other rendered animal by-products.	Salt product	Not applicable	
I (1)	Facility did not handle PM, but did handle other rendered animal by-products.	Milk replacer	P (1, non-PM) Q (1, non-PM) R (1, non-PM) S (1, non-PM) T (1, non-PM) USA (1 imported, non-PM)	Feed was received when case animal was 11 months old, so exposure to this feed ruled out as it would not have been provided in feeding practices of case animal.

For each feed involved, information was gathered from facility management with regards to ingredients, the use of prohibited material in the facility, interviews with CFIA Inspectors and a review of inspection documents, as well as the compliance history of the facilities. Interviews and record reviews were also conducted to characterize transportation of incoming and finished products and to identify if these were transported by company owned or third party owned conveyances.

Based on the presence of PM and non-PM material, Facility A was considered to pose the most likely potential risk for an off-farm source of exposure to the BSE agent, if such an event had occurred. The suppliers of the mineral supplements (Facilities B, C & D) did not handle PM. The facilities did handle non-PM animal by-products, although none were included as ingredients in the mineral supplements. The potential for cross contamination with the BSE agent at Facilities B, C and D was considered negligible. Suppliers of lick tubs (Facilities E & F), located in the USA, were not investigated further. A letter from these suppliers indicated their products were free from rendered mammalian protein. Suppliers of salt products (Facilities G & H) were not considered further at risk because they do not handle PM or non-PM material. The facility supplying milk replacer (Facility I) was eliminated from further investigation with regards to the timing of purchased product and the potential for exposure of the animal. It was noted that facilities A and B were also identified as feed suppliers to the birth farm in the investigation of BSE case #17.

The supplier of the pelleted feeds (Facility A) to the birth farm produced feeds for ruminants and non-ruminant species. The non-ruminant feeds may include PM as an ingredient. Facilities that handle PM and manufacture ruminant rations are considered to be at a greater risk for potential cross contamination of feed. Facility A had documented procedures in place to prevent contamination of ruminant feeds with prohibited material in accordance with the requirements of the Feed Ban and legislative authorities. The commercial mill inspection completion rate for the area was 100% for the years 2008-2010. During the period of interest, Facility A had only one non-compliance recorded related to the feed ban (*Health of Animals regulations*). The non-compliance was a missing lot number on an invoice for feed containing PM and resulted in a corrective action.

A detailed review of individually manufactured feeds of interests at Facility A was conducted. It targeted 10 deliveries of the 4 different rations (creep, calf, cow or bull pellets), to which the case animal was known to be or was potentially exposed. Due to a flood at the facility, production records for 3 of these 10 feeds delivered to the farm, as well as any delivery records were not available. In reviewing the available mill records for all of the feeds delivered to the farm, there was no documentary evidence of potential cross contamination.

2.3 Rendered Animal By-product Sources

For BSE cases born prior to the implementation of the enhanced feed ban (EFB) (July 2007), the focus of the investigations was on commercial feed mills and subsequent transportation of feed to farms, and on farm feeding practices. At that time, SRM were rendered together with other prohibited materials (PM) to produce meat and bone meal (MBM) for feeding to non-ruminant species. Consequently, the feed investigation focussed on identifying possible opportunities for cross-contamination of feeds with PM that the case animal may have been exposed to. Now that SRMs are excluded from the entire animal feed chain, for cases born after the EFB, contamination of ruminant feed with PM is no longer the most likely potential pathway of exposure to the BSE agent.

To this end, as part of the feed investigation in this case, a more detailed investigation of sources of rendered animal by-products on the premises of the commercial feed facilities during the period of interest was also undertaken. As outlined in Appendix 1, the CFIA conducts regular compliance inspections at rendering plants at frequencies based on risks of transmitting BSE down the animal feed production and supply chain. Compliance inspection records for inspections conducted at the various suppliers of rendered animal by-products identified in Table 2 were reviewed. Instances of non-compliance at these facilities were assessed in relation to the likelihood of potential transmission of the BSE agent down the supply chain to a commercial feed facility and ultimately to the birth farm. The results of this analysis are provided in Table 3. In summary, the review of available compliance inspection records did not identify any situations that would have likely resulted in the contamination of PM rendered products with SRM or non-PM rendered products with PM or SRM.

Table 3. Rendered animal by-products sources to which the case animal had potentially been exposed

Rendering Facilities	Products manufactured	Comments
J	MBM (PM), blood meal, animal fat (tallow), animal/vegetable fat blend, SRM cracklings, feather meal	Review of available compliance inspection records did not identify any situations that would have resulted in the contamination of non-PM rendered products with PM or SRM.
K	Porcine MBM, poultry meal, feather meal, blood meal, animal fat, yellow grease, poultry fat, porcine fat	Review of available compliance inspection records did not identify any situations that would have resulted in the contamination of non-PM rendered products with PM or SRM.
L	Spray dried blood plasma	Review of available compliance inspection records did not identify any situations that would have resulted in the contamination of non-PM rendered products with PM or SRM.
M	MBM (PM), animal fat	Review of available compliance inspection records did not identify any situations that would have resulted in the contamination of non-PM rendered products with PM or SRM.
N	Fish meal, poultry meal	Review of available compliance inspection records did not identify any situations that would have resulted in the contamination of non-PM rendered products with PM or SRM.
O	Porcine MBM, animal/vegetable fat blend	Review of available compliance inspection records did not identify any situations that would have resulted in the contamination of non-PM rendered products with PM or SRM.

Table 3. Rendered animal by-products sources to which the case animal had potentially been exposed

Rendering Facilities	Products manufactured	Comments
P	Blood plasma	Review of available compliance inspection records did not identify any situations that would have resulted in the contamination of non-PM rendered products with PM or SRM.
Q	Animal/vegetable fat blend	Review of available compliance inspection records did not identify any situations that would have resulted in the contamination of non-PM rendered products with PM or SRM.
R	Blood meal, porcine MBM	Review of available compliance inspection records did not identify any situations that would have resulted in the contamination of non-PM rendered products with PM or SRM.
S	Fish meal	Review of available compliance inspection records did not identify any situations that would have resulted in the contamination of non-PM rendered products with PM or SRM.
T	Fish meal	Review of available compliance inspection records did not identify any situations that would have resulted in the contamination of non-PM rendered products with PM or SRM.

3. Identifying and Tracing Cohort Animals

Cattle identified as birth cohorts to the case animal are being traced and destroyed in accordance with OIE requirements. This aims to eliminate animals potentially exposed to the same contaminated feed as the BSE case, although it is unlikely to provide any additional protection against the backdrop of the measures already in place, which include the ongoing feed ban and the exclusion of SRM at the time of slaughter from the human food supply.

The feed and birth cohorts were, in this case, indistinguishable because all animals from the birth cohort had access to the same feed as the case animal during the first year of life. The birth cohort was determined to be animals born after March 25, 2008 and before March 25, 2010. It consisted of 746 animals, based on an exact count of births recorded during the period of interest.

The trace-out investigation targeted the 746 animals of the birth cohort. The trace out investigation located 133 live animals, 99 of which were on the birth premises. All live animals, located on 17 different premises (including the birth farm), have been placed under quarantine and have been humanely destroyed. Disposal was in accordance

with OIE recommendations and the CFIA's BSE Manual of Procedures. Disposition of the 746 cohort animals are reported by category in Table 4.

The OIE no longer classifies the progeny of a BSE-positive cow as equivalent risk animals. However, tracing of the calves born to the infected dam within 24 months preceding the diagnosis of BSE (2013 and 2014 calves) was undertaken to satisfy specific country export requirements. Records indicated the 2013 calf died of scours soon after birth. The 2014 calf was born at the sampling site and is currently under quarantine.

Table 4. Disposition of animal traces for BSE #19 birth cohort (n=746)

Trace Category	Description	Number of animals
Located	The animal of interest has been located and quarantined (destroyed).	133 (133)
Confirmed dead	The animal has been traced to a location where it is known to have died.	20
Confirmed slaughtered	The animal has been traced to a slaughter plant, or a location known to assemble animals for slaughter only, including a terminal feedlot.	304
Exported	The animal has been traced to a location where it has been reported as exported.	0
Exported and slaughtered	The animal has been traced to a location where it has been reported as exported for immediate slaughter. The importing country has been notified.	120
Presumed dead	The animal has been traced to a location where it is believed to have died. The animal is not on the premises and there is no record or knowledge of it leaving the premises. There are no further avenues of investigation to pursue. Information on the purported disposition of the carcass is recorded if available.	4
Presumed slaughtered	The animal has been traced to a location where it is believed that the animal left only to slaughter or a terminal feedlot. There are no further avenues of investigation.	149
Untraceable	All avenues of tracing have been exhausted. The animal has not been located, or if located, has not been identified amongst non-trace animals, nor determined or believed to have died or been slaughtered. No further action is required.	16
Total closed traces		746

4. Investigation Summary

Case #19 was a case of classical BSE in a Black Angus beef cow, 5 years and 10 months of age at time of diagnosis. It was born in March 2009, 20 months after the enhanced feed ban was implemented. A previous case of BSE was diagnosed on the same birth farm from an animal born in 2004.

As for other cases of classical BSE in Canada and in other countries, feed-borne infection is the most likely source of BSE in this case. BSE case #19 was born shortly after the enhanced feed ban was implemented, which may suggest residual feed contamination on-farm or off-farm as the source of infection. No significant events could be linked with this case but the potential for the carry-over of a small amount of residual contaminated feed could not be discounted. Considering the stringent safeguards implemented from 2007 to ensure that SRMs are excluded from the entire terrestrial and aquatic animal feed chains as well as fertilizer, together with the rigorous inspection oversight by the CFIA the contamination of both prohibited and non-prohibited materials with SRM at either a slaughter establishment or a rendering facility, would in all likelihood, be highly improbable. As a result, the carry-over of a small amount of residual contaminated feed associated with the earlier case (#17) on the same birth farm is the most plausible explanation for BSE case #19.

Trace-out of birth cohort animals is ongoing and expected to be completed for the end of 2015. Live cohorts traced are permanently identified, their movements controlled and upon death or destruction are disposed of in accordance with OIE requirements and the CFIA's BSE Manual of Procedures.

5. Impact of Current Findings

The results of Canada's ongoing surveillance program continue to confirm that BSE remains under effective control. Since it is widely recognised that cattle are most susceptible to becoming infected in their first year of life, an analysis of surveillance test results stratified by the year of birth (a birth cohort analysis) provides a surrogate measure of exposure to the BSE-agent in the cattle population in any given year. Even though Canada has recently had a BSE case born almost two years after enhancements were made to the feed ban in 2007 to exclude SRM from the entire terrestrial and aquatic animal feed chains, the updated results from a birth cohort analysis incorporating this case confirm that the overall risk profile has not changed[12]. The impact of this case on the prevalence estimates for the 2009 and subsequent birth cohorts is inconsequential. They remain extremely low.

[12] An update on the BSE situation in Canada. Canadian Food Inspection Agency. April 2015

Appendix 1. Enhanced Feed Ban Compliance Inspection Programs

Abattoir:

In federally registered abattoirs inspections are undertaken on a daily basis by an on-site CFIA inspector. This includes segregation in the inedible area, staining, the dedication and labelling of containers and the verification that transporters picking up the SRM have a valid and current CFIA permit authorizing this activity. For non-federally registered abattoirs, inspections are carried out by on-site provincial inspectors, or quarterly by CFIA or provincial inspectors.

Transporters of SRM

Transportation of SRM, including bovine deadstock from which SRM has not been removed, and SRM that has been subjected to intermediate processing (such as rendering or composting), is controlled through the issuance of permits from the CFIA. Permits are issued annually for commercial operations and permitted site is subject to quarterly inspections.

Rendering facilities

During the period of interest (2008-2010), the inspection frequency of inedible rendering plants in Canada by CFIA was as follows:

Table 1.1 – Inspection Frequency for Inedible Rendering Plants

Facility Risk Profile	2008-09	2009-10
Process SRM, PM and/or non-PM	Full time (24 hour daily presence)	Full time[13] (24 hour daily presence)
Process SRM only (stand-alone facility)	4 inspections/ year	4 inspections/ year
Process PM and non-PM	4 inspections/ year	4 inspections/ year
Process PM only	2 inspections/ year	2 inspections/ year
Process non-PM only	2 inspections/ year	1 inspection/ year

All inedible rendering plants operating in Canada require a permit to operate, which is issued on an annual basis by the CFIA. Prior to the issuance of a permit to operate, each rendering plant must be fully inspected to confirm that they are operating in accordance with the conditions of their permit, including compliance with the *Health of Animals Regulations and Feeds Regulations*. Inspections verify that written procedures and records of the facility meet the regulatory requirements related to preventing cross-contamination of non-prohibited materials with PM or SRM during the transportation and handling (e.g. delivery vehicles, containers, tools and other equipment used to collect,

[13] During 2009-10. Inspection frequency at these facilities, based on an excellent level of ongoing compliance, transitioned to 4 inspections/ year

remove and transport) of raw material or finished rendered product. If non-compliance is identified, mechanisms are in place to control and mitigate risks in terms of product control and systemic corrections by the facility.

Confinement and Destruction of SRM

A CFIA permit is required for the confinement and destruction of deadstock cattle containing SRM; meat and bone meal (MBM) made from deadstock cattle or SRM; and compost made from deadstock cattle or SRM and permitted site is subject to quarterly inspections.

Commercial Feed Mills

Commercial Feed Mill inspections are conducted at commercial feed manufacturing establishments to:

- confirm that feeds are being manufactured and used in compliance with the *Feeds Regulations* and *Health of Animal Regulations,* for the purpose of reducing the potential for feed-related problems affecting animal and/or human health or the environment; and
- confirm that feeds are being imported and sold in compliance with the *Feeds Act* and *Regulations* and the *Health of Animal Act* and *Regulations.*

The purpose of this program is to verify that commercial feed mills:

- manufacture safe, compliant, correctly labelled feed; and
- follow procedures relating to feed manufacturing, labelling and record keeping, to ensure that the integrity of the feed is maintained and the complete distribution of any feed is identified.

The risk categorization for commercial feed mills considers the food safety and animal health risks associated with the spread of Transmissible Spongiform Encephalopathies (TSEs) via feeds and the use of medications in feeds.

The following risk categories have been identified for commercial feed mills:

- High Risk –TSE
  - Facilities that manufacture feeds containing prohibited material and manufacture ruminant feeds
- Low Risk-TSE
  - Facilities that do not have both risk factors for TSE
- High Risk – Medications
- Low Risk - Medications

These risk factors are used to determine inspection task frequencies for feed manufacturing facilities. The table below identifies the risk factors and the

corresponding number of inspection tasks to be assessed at commercial feed mills based on the risk categories.

During the period of interest (2008-2010), the inspection frequency of commercial feed mills was as follows:

Table 1.2 – Inspection frequency for commercial feed mills

Risk Category	Risk Factors	2008-09	2009-10
1	High Risk TSE and High Risk Medications	4 inspections/ year	3 inspections/ year
2	High Risk TSE and Low Risk Medications	2 inspections/ year	2 inspections/ year
3	Low Risk TSE and High Risk Medications	2 inspections/ year	2 inspections/ year
4	Low Risk TSE and Low Risk Medications	1 inspection/ year	1 inspection/ year

Case 20

Laboratory detection of atypical bovine spongiform encephalopathy

On December 17, 2021, the Canadian Food Inspection Agency (CFIA) notified the World Organisation for Animal Health (WOAH; founded as Office International des Épizooties (OIE)) of a case of atypical bovine spongiform encephalopathy (BSE) in a 8 and a half year old beef cow on a farm in Alberta.

The detection and reporting of an atypical BSE case will not affect the WOAH negligible risk status of Canada and market access for Canadian animals and beef products should be unaffected.

The Government of Canada will work with the cattle and beef industries to maintain the confidence of international trading partners to maintain market access for Canadian animals and products.

Cases of atypical BSE are generally observed in animals aged 8 years or older. Atypical BSE has worldwide distribution, even in countries where no classical BSE has been reported. These two factors support the assumption that this extremely rare disease develops spontaneously. Atypical strains occurs naturally and sporadically in all cattle populations at a very low rate and which have only been identified in older cattle.

The beef cow was euthanized on the farm and did not enter the food or animal feed chain. Canada continues to maintain its safeguards in order to prevent the introduction of certain cattle tissues capable of transmitting BSE, known as specified risk material (SRM). The detection of atypical BSE in Canada underscores the ongoing effectiveness of Canada's robust targeted BSE surveillance program.

As this case has been confirmed as an atypical case, no further actions on the index farm are required. There is no quarantine or other restrictions in place for the farm.