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BYLINE: David Staples
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ILLUSTRATION: Colour Photo: Reuters, File / A cow that became separated from its herd hoofs it down a road west of Cochrane. The mad cow crisis has cost the cattle industry roughly \$7 billion in lost sales and exports.; Colour Photo: Reuters, File / In May 2003, federal investigators collect data from the ear tags of cattle at a feedlot in Barrhead.; Colour Photo: The Journal, File / Mel McCrea pets a Black Angus calf on his ranch in 2003. He commends investigators for treating him fairly, but remains angry that he learned of the impending slaughter of his herd on the radio.; Colour Photo: The Canadian Press, File / Angry farmers demonstrate in downtown Winnipeg last June over the closure of the U.S. border to Canadian cattle exports. Last week, beef producers suffered another setback when a Montana judge agreed to postpone reopening the border.; Colour Photo: The Canadian Press / Karen Brown feeds oats to cattle on her hobby farm south of Barrhead. One of her dairy cows developed bovine spongiform encephalopathy (BSE).

The BSE saga: a long and maddening road: A delay in reopening the U.S. border is just the latest twist in Canada's mad cow story. How did we get here? Could authorities have done more to corral the multibillion-dollar catastrophe?

EDMONTON -- Canada is BSE-free -- this is the mantra Canadian politicians and officials chanted for years.

But was it a case of wishful thinking? Were federal authorities on dangerous and shaky ground when they assured ranchers, consumers and foreign trade partners that Canada's domestic cattle herd was sound, safe and free of bovine spongiform encephalopathy (BSE)?

No doubt, there was a strong incentive to make such a claim.

From 1990 to May 2003, more than 70 per cent of Canadian cattle products were exported. The billion-dollar-plus trade was utterly dependent on Canada being free of frightening, brain-destroying mad cow disease, and federal officials fought hard against anyone who challenged this country's self-proclaimed BSE-free status.

"We are completely free," Claude Lavigne, the Canadian Food Inspection Agency's associate executive director, told the Ottawa Citizen in July 2001. "The risk of transmission in a country where the disease doesn't exist is zero. And that's our situation."

Despite Lavigne's claim, Canada's first homegrown case of BSE was discovered in a Peace River-area cow two years later, leading to more than 30 countries shutting out Canadian cattle products and costing the industry an estimated \$7 billion to date. Three more homegrown cows have tested positive for BSE since that time.

On Monday, Canada's major trading partner, the United States, was supposed to open its border to live Canadian cattle under the age of 30 months, but a court challenge in Montana has postponed that opening, prolonging Canada's suffering and losses. Cliff Edwards, a lawyer for R-Calf, the American ranchers group that pushed for the court injunction, argued it would be "insane" to allow the import of cattle from a country that has already reported two new cases of mad cow disease in 2005.

Critics have attacked the credibility and competence of Canadian federal agriculture officials.

Risk communication expert William Leiss of Queen's University says the Canadian Food Inspection Agency (CFIA) spent too much time downplaying the possibility that BSE was here, and not enough time trying to prevent an outbreak and warning the cattle industry that the disease might show up. "They (the CFIA) knew what would happen if they had one case, but they didn't tell Canadian farmers they were at extreme risk of having their whole export market shut down."

Should the CFIA have done more?

Agency officials always knew that Canada had imported 250 cows from the BSE-infested United Kingdom between 1979 and 1990, the year the BSE crisis shut down all U.K. imports to North America. A large number of those imported cows were slaughtered in the 1980s and early 1990s, their edible meat sent to Canadian supermarkets, their waste organs and bones turned into feed for cattle, pigs and chickens. None of this was a secret to federal agriculture officials, who had access to a 1994 report that contained a statistical analysis showing a small number of the imported cows almost certainly had contracted BSE.

Nonetheless, the no-BSE mantra never changed.

Before May 2003, the CFIA hoped its limited testing and surveillance program for mad cow disease would fail to uncover any cases in Canada's herd of 13.5 million, Leiss charges. "They were pulling the three-monkeys routine: see no evil, hear no evil, speak no evil. They just hoped it would go away and that they wouldn't get a case."

Canadian politicians have complained bitterly about countries such as Japan and the U.S. barring Canadian cattle, but the complaint has little merit, Leiss says. Through the 1990s, Canada itself had been a major proponent of a one-BSE-case-and-you're-out trade policy.

The CFIA failed to effectively manage the BSE issue because it has a conflict of interest, argues Mike McBane, executive director of the Canadian Health Coalition. While the CFIA's job is to protect public health, the organization ultimately answers to the federal agriculture minister, whose mandate is to promote the agriculture industry.

"I have absolutely no confidence in any of the CFIA's work," McBane says. "They have no safety culture whatsoever in any level of the organization."

The CFIA failed to take appropriate safety measures at appropriate times, McBane charges. "It reminds me of Inspector Clouseau. It is always after the horse has left the barn. There's no prevention and pre-emptive measures. It's all managing hazards after the fact."

CFIA officials counter that in hindsight it's easy to say what should have been said and done, but it wasn't so simple at the time. Any suggestion that federal agriculture officials have been negligent in hunting down BSE is way off base, they insist.

"At the end of the day, we live here too," says Dr. Gary Little, the CFIA staff veterinarian.

"I'm eating beef. I've got a family. I've got friends. So we need to find the answer. We want the answer as bad as anybody. We want to be able to understand what happened in terms of where we got the disease, where it might be, and make sure our measures are working."

BSE has always been a vexing problem for politicians and scientists. Since it was first identified in the U.K. in 1986, it has been plagued by uncertain science and towering, often irrational fear. In fact, the story of BSE sounds as if it might have come from the mind of some deranged science fiction writer:

- An ancient and mysterious disease, transmissible spongiform encephalopathy (TSE) lurks in various species. In elk, it's called chronic wasting disease; in sheep, scrapie; in humans, kuru or Creutzfeldt-Jakob disease, which occurs spontaneously in about one in a million people around the world.
- The malady is ever-changing, always baffling, always lethal; it eats holes in the brains of its victims, turning them into drooling, lurching creatures before paralysis kills them.
- It is believed to be caused by abnormal prions, almost unimaginably small proteins that rub up against healthy prions in the brain and disfigure them, a process scientists call the kiss of death.
- Outside of rare spontaneous cases of the disease, its main method of transmission is cannibalism.
- In the cattle industry, science of the time and aggressive factory farming practices combine in the 1890s to produce a new type of food, meat bone meal, which sees ground-up cow parts fed to other cows; a spontaneous case of BSE in one U.K. cow in the 1970s thus contaminates other cows, as the infected prions are spread through the meal.
- After repeatedly assuring the public that BSE is not transmissible to humans, the British government must admit in 1996 that humans can get BSE by eating infected cow parts, a chilling prospect as one study shows the average Briton has consumed 15 meals of meat from BSE-infected cattle.

While the BSE story inspires fear, in some respects the British government reacted smartly to the disease. Most notably, it banned the cannibalistic feeding of meal made from cow remains to other cows in July 1988, almost as soon as the cannibalistic practice was identified as the most likely agent of transmission. More than any other measure, this initial feed ban eventually broke the back of the disease in the U.K.

But the British also made several terrible mistakes, such as continuing to peddle BSE-contaminated meal made of cow remains to other nations. British authorities and businesses told trading partners the

meal should only be fed to pigs and chickens, but not everyone listened. The disease quickly spread around the world, infecting cows and destroying export industries in its wake.

BSE arrived in Canada not through meal imports, but by way of the 250 cattle imported from the U.K. from 1979-1990, most of the imports ending up on Alberta ranches. When BSE exploded in Britain in 1990, Canadian agricultural officials tracked down the remaining U.K. imports and began to monitor them.

At the time, no thought was given to prohibiting the imported cows from entering the food chain. Nor was it deemed necessary to round them all up, slaughter them and incinerate their remains, a move that would have greatly decreased the chances of BSE ever spreading here.

It's only in hindsight that such a mass slaughter looks like the right move, says Dr. Norm Willis, one of the key Canadian decision-makers on BSE policy in the 1990s. Willis acted first as director general of animal and plant health for Agriculture Canada, then as chief veterinarian for the newly created CFIA.

"It (a cull) seems an obvious move to have made, but at that time it was not an obvious move to make. The belief was, we didn't think we had it (BSE)," Willis says. "There was insufficient justification to take that kind of action. All these animals looked normal and fine."

It's important to remember that Willis and other Canadian officials were then going on the theory that BSE wasn't a public health threat because it was a form of scrapie, the sheep version of the brain-destroying disease. No less an expert than Dr. Carleton Gajdusek, who won a Nobel Prize for this research into TSE, said in November 1990 there was no evidence BSE could spread to people. Humans had been eating meat from scrapie-infected sheep for centuries without any harm done, Gajdusek said. "We don't know that it causes any problem."

To combat the BSE menace, the Paris-based world animal health agency, the Office international des epizooties (OIE), devised international guidelines in 1992. The OIE suggested all cattle-producing countries should test for BSE. As Canada had no known cases of BSE, it had only to do minimal testing, 300 tests per year.

In 1992, Canada did 225 tests, targeted at Alberta. In 1993, 645 tests were done. One test in December 1993, on a **cow** imported from the U.K. to the Red Deer area in 1987, turned out positive. In early 1994, Agriculture Canada officials rounded up the remaining British imports, then slaughtered, tested and incinerated them. The same was done to the offspring of the infected Red Deer **cow**, along with 200 other cows from the Red Deer herd.

A storm of protest blew up, mainly from Canadian ranchers who owned prized British breeding cattle. Their bulls were worth \$40,000 to \$50,000, but the Canadian government had placed a maximum \$2,500 payout for any lost animal.

Some ranchers resisted. In Morinville, Agriculture Canada officials had to raid a farm at dawn in September 1994 to truck away a purebred Charolais bull which was under a death sentence. "They've proved to me they're dictators," the bull's owner, Walter Jerram, said then of Agriculture Canada. "I'm not going to put up with what they did. I've never been screwed like this before in my life."

"It was not a happy time," Willis now says. "We were accused of being a little draconian in our approach. The charges were obviously troublesome. We felt we were taking the responsible action to the best of our knowledge. We knew it was causing hardship."

No further cases of BSE were found in the Red Deer herd or in any of the slaughtered imports. Canadian cattlemen could breathe again. Canada's BSE-free status was intact. "The belief was that we had one animal, that's all," Willis says.

At the time, Willis himself believed that his department had been pushed to take overzealous action. "Actions were taken out of sheer paranoia with people significantly hyped by the media," he told the Canadian Veterinary Medical Association's convention in 1996. "We took actions that went way beyond ones that were scientifically justified."

As aggressive as Canada's anti-BSE measures seemed, it's now clear they weren't sufficient. BSE was lurking and spreading below the surface of Canada's surveillance program.

By 1994, Canadian scientists were aware of this possibility. In a report that year, Dr. Randy Morley calculated that "the probability of entry of BSE infected cattle through the 1982-89 importation of 183 cattle from the U.K. appears to be very high."

Still, agriculture officials contended BSE wasn't a problem here, partly because our farming practices differed from those in the U.K. It was then believed that cows needed to eat a large quantity of BSE-contaminated feed to contract the disease but, unlike their British counterparts, Canadian ranchers didn't feed much of the meal made from **cow** remains to their cattle. In Canada, most of that feed went to pigs and chickens.

"In my 25 years of experience feeding cattle, I've never bought a pound of the stuff," Ben Thorlakson, vice-president of the Canadian Cattlemen's Association, said in 1996. "I'd really be surprised if people used it, because canola meal is a cheaper source of protein."

The best way for Canada to have snuffed out the BSE threat would have been to ban the cannibalistic feeding of **cow** remains to other cattle, which the British had done in 1988. But only a few activists, such as Montana-rancher-turned-vegetarian Howard Lyman, pushed North American governments to do this in the early to mid-1990s. At the time, there were still valid scientific reasons to reject the need for such a feed ban. It wasn't until the late 1990s -- after the British ban was clearly shown to have slowed the spread of the disease -- that scientists could prove that feed made of **cow** remains was the problem, says Dr. Stephen Dealler, a British expert on BSE.

Not much thought was given in Canada to introducing such a feed ban in 1994-96, Dr. Willis says, mainly because officials remained certain the Canadian herd was BSE-free. The rendering industry would have demanded evidence that a ban was necessary, Willis says, evidence that wasn't yet conclusive. "You've got to have some good grounds for taking large program decisions, and if the belief is that we don't have the disease, that weakens it."

In March 1996, BSE exploded into an international human health crisis. The British government reversed itself, announcing that 10 people with a new form of Creutzfeldt-Jakob disease had likely eaten BSE-infected meat. With the government's flip-flop, mistrust of scientific and agricultural authorities overwhelmed the debate. Massive casualties were predicted. Fear was rampant.

"Infected people will wake up one morning twitching and deteriorate weekly into blindness and epilepsy, while the brain becomes perforated like a sponge," said one activist, American family doctor Michael Greger. "The only way to ensure that your burger is safe is to marinate it in Drain-O."

At once, Canadian officials tried to reassure consumers that our food chain was safe. "The best take-home message is there's no BSE here," Dr. Jamie Hockin, a Health Canada epidemiologist, told Maclean's. "A steak is a non-issue, a sausage is a non-issue."

Others weren't so sure, including noted British microbiologist Richard Lacey, who told the Toronto Sun in May 1996: "Certainly it could happen in North America. ... All cannibalistic feed practices should stop."

Some veterinary scientists at Health Canada took up the cause. A group headed by Shiv Chopra and Margaret Haydon -- who would later be fired for "insubordination" -- criticized what they saw as an official lack of concern about BSE. In a public letter, they warned then-prime minister Jean Chretien that BSE might already have spread to Canada and contaminated the feed supply, an accusation that punctured this country's self-proclaimed BSE-free status.

Haydon, who worked for Health Canada for 22 years, says she and other scientists voiced concerns about Canada's lack of any kind of feed ban but weren't listened to or even understood. "It fell on deaf ears. We have managers in Health Canada who don't understand anything. They don't have a background in science at all, so how do you deal with that?"

In April 1996, the World Health Organization called for a ban on the cannibalistic feeding of **cow** remains to cows in countries with a high incidence of BSE. The U.S. immediately enacted this ban, but Canadian officials were still reluctant, saying there was no scientific justification.

Only in 1997, after the WHO directive was extended to any country that might have been exposed to BSE, did Canada impose the ban. In August 1997, it went into effect, though there was no recall of existing feed.

Critics such as Leiss suggested that the CFIA had moved far too slowly and that the consequences could be catastrophic. But with many convinced that Canada had no BSE, it was hard to persuade the cattle industry such a ban was needed, says Brian Evans, the CFIA's chief veterinarian. "People still were thinking, 'You killed all those animals three years ago and they were all negative (for BSE). Now you're bringing in this feed ban. You guys have really lost it here.' "

Stephen Dealler, the British BSE expert, says the Canadian government did well to bring in the ban despite industry opposition.

"It's very difficult for officials to take action when there is no proof and in something that is going to cost money."

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To get their annual operating permits, Canada's 33 rendering factories and 600 feed mills had to comply with the new feed ban, Evans says.

For some, this meant creating lines specifically for handling cow remains, so the cow waste wouldn't mix in with pig or chicken waste, which could still legally be turned into feed for cattle. Feed mills also had to put appropriate labelling on feed made of cow remains, which could still be fed to pigs and chickens.

At first, compliance rates were low at feed mills and renderers. Within a few years, however, the CFIA was confident the new rules were being followed, Evans says.

But some government scientists, including Chopra and Haydon, weren't satisfied with the 1997 ban, believing that it lacked teeth and wasn't backed up by adequate inspection of feed mills.

"It was no ban," Haydon says. "It was a caution written on a feed tag label. And who read them? Go ask the farmers. How many of them read their feed tags?"

A major blow to Canada's self-proclaimed BSE-free status came in 2000, when the European Food Safety Authority (EFSA) reported that BSE could be in North America. The CFIA filed a protest to the European Union about the report, arguing it was flawed because it focused on the possibility that BSE might be in Canada, rather than considering how probable that might be.

"All sorts of things are possible but that doesn't mean they're going to happen," Dr. Little says.

The EFSA report had caused resentment. The Europeans, who had been implicated in the spread of BSE, were now scolding Canada, trying to tell us what to do and trying to disrupt our international beef trade. "They held everybody else suspect and certainly their feeling was anti-North American, so if they could shaft us as much as they could, they would," says CFIA risk analyst Randy Morley.

A second blast at Canada came in January 2001 when two of England's most reputable newspapers, the Times of London and the Independent, published figures from newly released government documents showing that from 1993-1996, the U.K. had exported 125 tons of meat bone meal, made up partly of BSE-contaminated cow remains, to Canada.

If true, this would have been a scandalous development, as Canadian politicians had always insisted Canada had stopped importing meat bone meal from the U.K. in 1982 to stop foot-and-mouth disease and other Europe-based animal diseases from spreading here.

The CFIA shifted into damage control, assigning Lori Tracey, an Ottawa administrative assistant, the task of going through 10 years of import documents. While it was clear something had been imported here, Tracey and her CFIA bosses were quite certain that something was not meat bone meal, but was instead some non-infectious animal material, which had been mislabelled as meat bone meal by an imprecise and clumsy customs classification system.

In the end, Tracey spent four months going through 150 boxes containing more than 5,000 documents - tens of thousands of pages of information. All kinds of strange matter had been listed as meat bone meal, such as ground sturgeon bladders for use as a wine additive, and pigs ears and bull penises to be used to make pet food. But Tracey found not one example of meat bone meal being imported to feed any farm animal.

"I felt relieved," she now says. "I was glad that everything turned out as I expected it would."

Tracey's report failed to sway environmental and consumer activists, who continue to insist infectious meat bone meal was imported here. But her work convinced the European Food Safety Authority. In a later study, EFSA concluded that reports of imports of potentially infectious meat bone meal to Canada were unfounded.

EFSA's ongoing assessment that Canada could have BSE pushed the CFIA to do its own risk assessment, which was completed in June 2002, a year before Canada's first homegrown case. Morley estimated that 136 cattle imported from the U.K. may have entered the Canadian food chain from 1979-1990. Three of the U.K. imports had likely developed BSE and possibly more.

In the end, Morley determined there was a seven-in-one-thousand chance that BSE had spread from the infected U.K. imports into the homegrown herd.

"Therefore," he wrote, "the likelihood of establishment of BSE in Canada was negligible."

Others disagreed, not with Morley's numbers, but his conclusions. It was misleading to describe the odds of BSE infecting a Canadian cow as "negligible," Leiss says. The accurate scientific term would have been to describe the risk as "low," just as the EFSA did in its assessment of Canada.

More important, the CFIA's assessment should have focused on the catastrophic economic consequences of Canada developing even one case, Leiss says. Any proper risk assessment takes into account such consequences, but they are rarely mentioned in the CFIA's lengthy report.

As a result, it failed to prepare the Canadian cattle industry for the very real possibility of economic disaster, Leiss says, though it allowed Canadian politicians to continue to assure trading partners that this country was BSE-free.

"They had no basis for saying that. They were just whistling in the dark."

To prove that Canada had no BSE, the CFIA started to test more cows. The numbers went from 759 tests in 1997, to 1,020 in 2000, to 3,377 tests in 2002. This wasn't a sufficient amount, Leiss says, but he adds that Canada wasn't alone in having a weak surveillance program. The U.S., which continues to claim it is BSE-free, was also hoping its inadequate testing program would fail to find any mad cow disease in the domestic herd.

Leiss accuses the Americans of fraud.

"I am convinced they have had cases and covered them up," he says, citing news reports from Texas and Washington, where downed cows that were supposed to be tested suddenly went missing.

No one has proved a coverup, says Michael Hansen, a biologist for the Consumers Union in New York, but the U.S. government has refused to use the most sensitive tests for BSE on suspect cattle, leading to doubts about that country's BSE-free status.

In Canada before May 2003, all obviously sick cows were tested. When none of these cows showed up as positive, Canadian officials became ever more hopeful that Canada would be spared a homegrown case.

"Personally my thoughts were that if we hadn't found it over the last 10 years, then it looked like maybe we didn't have it," Dr. Gary Little says.

Adds Morley: "I didn't think we would see it."

But one CFIA official, chief vet Brian Evans, remained nervous. The 1993 case showed that Canada was vulnerable, he says.

"From that point forward, we knew BSE had come to Canada... People were saying the risk is very low or the risk is negligible, but at my level, I couldn't allow myself to say it still can't happen here."

If a homegrown case was going to show up, Evans realized, it would most likely be in a cow that had eaten contaminated feed in 1997, just before the ban went into effect. Canada most likely had only a small amount of BSE in its feed system, so the cow would get just a minuscule dose of infected material, perhaps one-one-hundredth of a gram or less. This low dose meant it would take longer for the disease to show up in the cow, six or seven years, as opposed to two or three years for a cow that had consumed more infected material.

If Canada had BSE, cases would start to show up in 2003 or 2004, Evans believed. He wasn't prepared to breathe easier until August 2005, after the feed ban had been in place for eight years.

In May 2003, the so-called "negligible" happened. Canada's first homegrown case was discovered.

Morley now says his calculation was incorrect because he may not have known all the risk factors. "There could be a rendering process that is extremely deficient. Anything like that could happen at a local level."

The CFIA responded by changing policies. BSE testing jumped from 3,361 cows in 2003 to 23,555 last year. This year, 30,000 cows will be tested.

Feed regulations were also changed. Most of the infectious material of a BSE-ridden cow is in the brain, eyeballs and spine. In July 2003, the CFIA advised the rendering industry that none of this material from cattle aged 30 months or older was to go into the human food chain. (Not much of risky materials had likely ever gotten into human food such as sausages and hot dogs, but cow brain is considered a delicacy by some ethnic groups.)

Critics remain unconvinced that the CFIA is doing enough.

In Europe, there's a complete ban on feeding any animal remains to any farm animal. But in Canada, calves are still fed cow blood, a practice the Food and Drug Administration has said will be banned in the U.S., though no action has been taken.

In both North American countries, feed made out of the remains of cattle continues to be fed to pigs and chickens. In turn, feed made from the remains of pigs and chickens is fed back to cattle.

While pigs and chickens have never gotten BSE from eating feed made of cow remains, critics still suggest the disease might be spread that way. "That's BSE recycling," McBane of the Canadian Health

Coalition says. "You're basically passing it on from one animal to another, from one species to another."

A new feed ban, now working its way through federal approval processes, will deal with such concerns, Evans says, by removing the specified risk material -- cow brains, spines and eyeballs -- of all slaughtered cattle over the age of 30 months from animal feed. "No animal feed in Canada, for any animal species, would have any material in it that would be of risk of transmitting BSE."

This stricter feed ban could cost the government and the rendering industry \$150 million a year, Evans says, but as long as these risky materials are still being processed, there's a chance they will contaminate feed intended for cattle.

Ninety-five per cent of feed mills and 93 per cent of renderers inspected over the past three years were either fully compliant with anti-BSE measures or reported only minor compliance issues, a new CFIA study reports. But the contamination of cow feed could happen at non-compliant renderers and mills, during transport, or on mixed farms where cattle might get into pig and chicken feed, Evans says.

"It's a very small risk, and it will come at significant cost, but we still feel it's the most appropriate thing to do in order to get BSE behind us in the shortest possible time."

McBane says Canada is refusing to enact tougher European-style regulations because our main trading partner, the U.S., doesn't want them. "Instead of raising the bar to the highest standards in the world -- which have been raised because of hard-learned lessons -- we've lowered the bar to the American level, and in doing so we will kill our markets offshore."

But Dr. Mo Salman of the College of Veterinary Medicine at Colorado State University and a member of EFSA, says existing feed bans are enough to eliminate BSE in North America, so long as existing rules are enforced. "If we do that, then I don't think other rules will really have a major impact."

Evans worries that because BSE was so badly mismanaged by the British government in the early 1990s, and the fear of the disease has been so intense, any rational attempts to control BSE continue to be undermined.

For instance, the London School of Public Health initially estimated 10 million people would die of BSE, but only 150 to 160 have died of the disease in the U.K., and only 250 to 300 are expected to die by 2070. When it comes to public policy, however, countries still act as if the worst-case scenario was playing out.

"People remember the 10 million," Evans says. "Not many people have heard the 300 figure. The fear is still there."

For Canada, the key health issue hasn't been people eating BSE-infected meat and contracting the human form of the disease, Evans says, but rather the impact on cattle country, where people have become stressed, depressed and suicidal over their ruined economy. Yet hundreds of millions of dollars have been spent on eradicating BSE here, instead of on far more common and deadly diseases.

"That, I think, is the ongoing legacy of BSE," Evans says. "In the same way that people have been critical that the government didn't do enough in some people's minds in 1990 and 1993 to prevent BSE

from getting into the cattle population, my view is that people will look back in 2020 and say, 'What was the government thinking when it spent all that money on this particular disease?' "