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Risking Market Integration without Regulatory Integration: The Case of NAFTA and BSE

David H. Sparling and Julie A. Caswell

Under the North American Free Trade Agreement (NAFTA), there has been a dramatic increase in the integration of markets for live cattle and beef products in Canada, Mexico, and the United States. These markets were severely disrupted in 2003 by the confirmation of single cases of bovine spongiform encephalopathy (BSE) in Canada and the United States. The bulk of this disruption could have been avoided if the countries had developed more closely coordinated risk management programs based on the guidance of international standards. The BSE events illustrate that failure to address regulatory integration leaves integrated markets vulnerable to recurring disruptions.

Globalization is changing the nature and structure of agricultural and food markets, providing producers with new market opportunities and broader sourcing options and consumers with unprecedented choice and increased value. The result is increased integration of food production and marketing systems across international borders. The Canada–United States Free Trade Agreement (CUSTA) and the North American Free Trade Agreement (NAFTA) accelerated the integration in North America by reducing barriers to the flow of goods among Canada, Mexico, and the United States.

Increased integration also presents new risk management challenges for regulators and industry managers concerning all aspects of plant health, animal health, and food safety. We examine the case of bovine spongiform encephalopathy (BSE), popularly referred to as mad cow disease, in the North American beef industry. BSE is a dramatic example of a class of events, including such risks as Foot and Mouth Disease, Avian Influenza, and bioterrorism, which can disrupt industries and markets within NAFTA, as well as trade with non-NAFTA countries.

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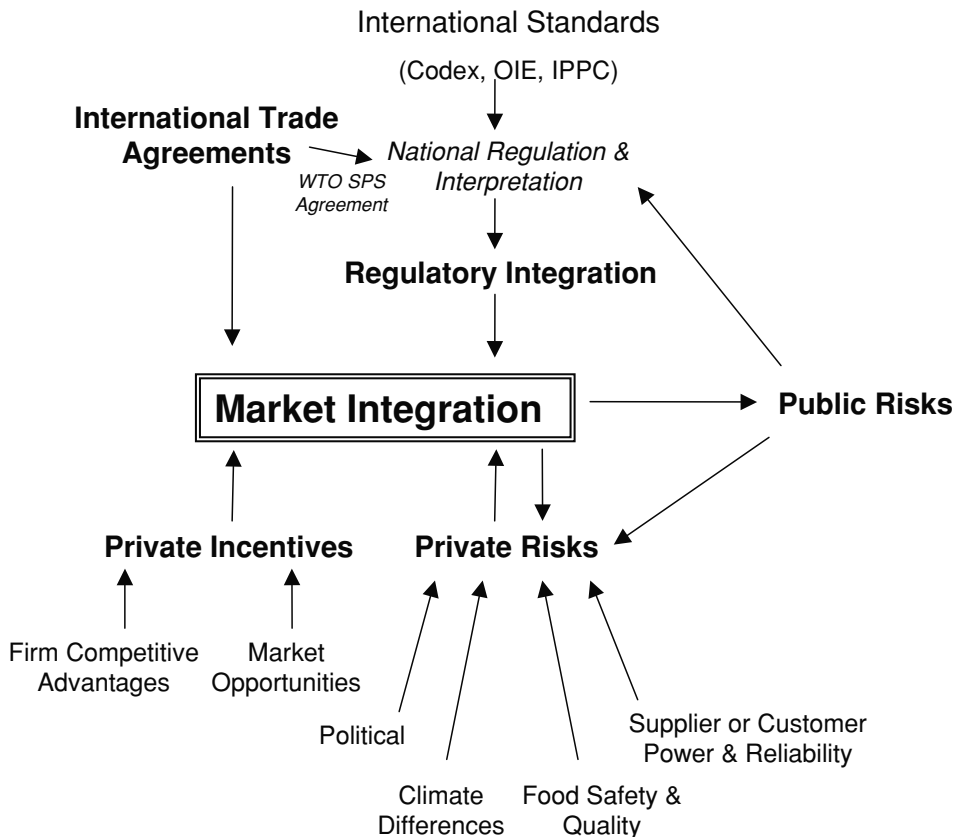
A Framework for Market and Regulatory Integration

Market integration is a matter of degree (Robertson); it can range from relying on private market incentives, to lowering trade barriers through free trade agreements (e.g., NAFTA), to eliminating internal barriers and adopting common policy through a new centralized government (e.g., the European Union [EU]). We consider the interactions between market and regulatory integration using the framework presented in figure 1. The form and extent of market integration depend on the strength of private incentives (the lower part of the figure) and the degree to which integration is promoted or constrained by trade agreements (the upper part of the figure). In agricultural and food markets, market integration also depends on national plant health, animal health, and food safety regulations.

Private Incentives, Regulatory Institutions, and Market Integration

Starting at the center of figure 1, market integration occurs as firms extend their supply chains across national borders to capitalize on opportunities or to minimize perceived risks. Opportunities include the ability to use competitive advantages and market prospects to sell in new international markets, to access skills and

Figure 1. A framework for market and regulatory integration



capabilities not available to the firm in current markets, to reduce sourcing costs, or to source materials not available in current markets. Firms also expand their supply chains internationally to reduce price and supply risks associated with political instability, climate and weather differences, supplier or customer power and reliability, and food safety and other quality attributes.

The top portion of figure 1 also shows that international trade agreements and other regulatory institutions strongly affect the degree of market integration. Trade agreements focus on controlling tariff and nontariff barriers to trade in order to achieve freer market access. Tariff barriers are the familiar duties on imports and other measures, such as quotas, whose major influence is on the price of goods. Nontariff barriers include a huge array of other practices that may impede trade, including regulatory measures adopted by countries to manage risks (Roberts et al., Buzby). To control the potential use of regulations as nontariff barriers, the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) of the World Trade Organization (WTO) sets standards for when nontariff barriers to trade arising from national regulation of plant and animal health and safety, and food safety, will be considered legitimate.

Under the SPS Agreement, countries have the right to choose the appropriate level of protection and to implement programs to achieve it in the least trade-restrictive manner. Increasingly, governments base their regulatory decisions on risk analysis, which involves risk assessment, management, and communication. Because factors vary between countries, as does the evaluation of risk and the regulatory infrastructure, national governments tend to make different decisions about how to control risks.

The SPS Agreement influences national regulation via a second route through its recognition of standards set by three international standards bodies (the Codex Alimentarius Commission [Codex], the World Animal Health Organization [OIE], and the International Plant Protection Convention [IPPC]) as reference rules. A country whose standards conform to those of one of these bodies cannot be challenged in a trade dispute based on the legitimacy of its standards. However, in all cases, national level governments interpret international standards and may establish new standards.

As shown in figure 1, the SPS Agreement and international standards influence national regulation and interpretation. In turn, the agreement and standards, in conjunction with what other countries are doing, determine the level of regulatory integration among trading partners. Increased market integration usually rests in part on facilitating integration through cross-country regulatory compliance by trading partners. This regulatory integration can be pursued in three ways:

- **Policy Coordination:** gradually reducing differences in policies, frequently based on voluntary adherence to international codes of practice.
- **Equivalence Agreements:** agreeing to accept the regulatory program of the trading partner as achieving the same standard (i.e., being equivalent).
- **Harmonization:** adopting identical or highly integrated standards and enforcement mechanisms.

In practice, all three routes to regulatory rapprochement have proven rocky. Equivalence agreements are notoriously difficult because they often involve

exhaustive reviews of each other's frequently changing policy. Harmonization requires agreement on regulatory goals and mechanisms that is hard to achieve among independent countries. Countries are loath to turn over any of their risk management and regulatory decision making to outsiders.

Frustration with the slow pace of regulatory integration motivated the EU to consolidate significant regulatory functions in a central government structure to achieve harmonization (Harvey). The NAFTA countries, on the other hand, are practicing weaker forms of policy coordination or at most equivalence. This necessarily places limits on the degree of sustainable market integration.

Market Integration and Risk

Integration implies interdependence, which affects risk. In highly integrated systems, problems in one country can have significant impacts on the production systems and markets of others. In the case of food safety, plant health, and animal health, the repercussions of a risk event depend on its nature and the country where the event occurs. Integration can increase both the probability and scale of an event. We classify challenges to food systems into private and public risks.

The impacts of private risks, and the events associated with them, are primarily in an individual supply chain and its customers. The impacts of hazards like *E. coli* or *Salmonella*, although dangerous to the public, are generally limited to the food chains directly handling and distributing the affected products. The government response tends to be censure (prosecution), recalls, fines, increased monitoring of the responsible firm(s), and introduction of further regulations. Consumer response tends to be focused on the products and firms involved, through reduced consumption and legal action in the form of individual or class action lawsuits. If the event is particularly serious, there may be short-lived spillover effects on demand in food chains with similar products. As shown in figure 1, private risks affect market integration and vice versa.

Market integration has the largest effect, however, where public risks are being managed; that is, they extend far beyond the chain where they are discovered, disrupting national industries and reducing market integration. Public risk events, such as BSE or Foot and Mouth Disease, cause large-scale disruption due to national regulatory responses, including border closures. Private risk is magnified due to market curtailment or loss. In such cases, it is common for government and industry to work together to control the hazard and re-open export markets.

Government and firm reactions affect the level of regulatory and market integration. Government responses include further risk assessment, supporting or requiring changes in the production/processing systems operated by individual firms, improving detection/identification systems, supporting research aimed at reducing risk, and assisting the industry in recovering from the negative financial and reputation effects. Policy decisions for trading partners concern conditions that result in closing the border, which products will be affected, and when to re-open the border to all or selected products. Longer-term decisions revolve around risk management strategies and the degree to which regulations will be integrated or harmonized with those of major trading partners. Firms' choices on how to manage the risk of market disruption and potential disintegration directly affect the level of market integration.

Table 1. NAFTA beef and cattle consumption and trade, 2002

2002 Beef Consumption and Trade (in '000 metric tons)					
	Consumption	Imports	Exports	Net Trade	Net Trade as a Percentage of Consumption
Canada	992	307	610	303	30.54%
Mexico	2,409	489	10	-479	-19.88%
U.S.	12,738	1,460	1,110	-350	-2.75%

2002 Cattle Slaughter and Trade (in '000 animals)					
	Slaughter	Imports	Exports	Net Trade	Net Trade as a Percentage of Slaughter
Canada	3,753	138	1,690	1,552	41.35%
Mexico	8,310	206	948	742	8.93%
U.S.	36,970	2,503	244	-2,259	-6.11%

Source: U.S. Department of Agriculture, Foreign Agricultural Service.

BSE as a Case Study

The relationships between levels of market integration, regulatory integration, and public and private risk are complex. Our case study of BSE in the North American beef industry uses the framework developed in figure 1 to examine the implications of having an integrated market without a supporting integrated regulatory infrastructure. Under NAFTA, this market has become integrated on every level of the supply chain from feed production through prepared food products. This integration was severely challenged in 2003 when both Canada and the United States confirmed their first BSE cases.

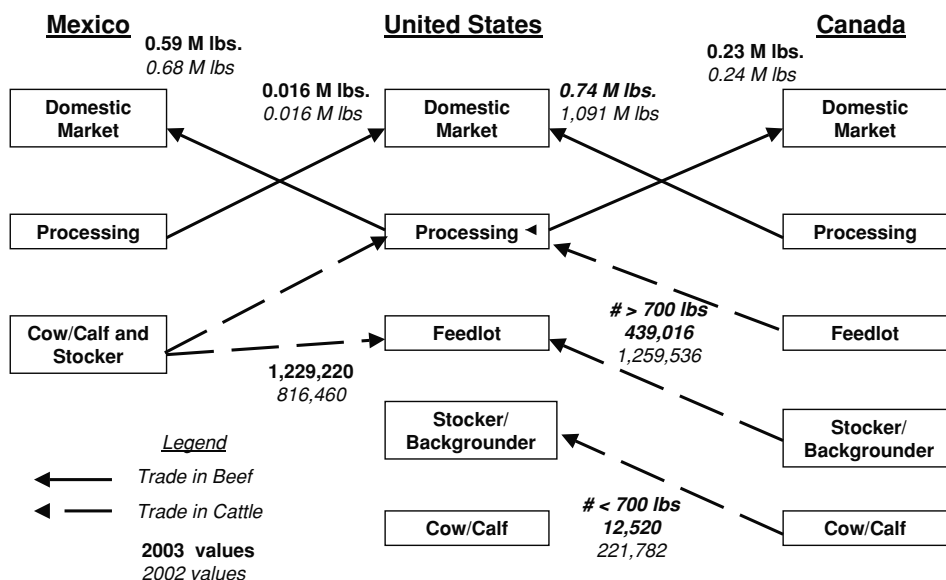
Market Integration in the NAFTA Beef Industries

Prior to CUSTA and NAFTA, tariffs inhibited trade in cattle and beef among Canada, Mexico, and the United States; their beef industries operated relatively independently. Relaxation and integration of trade regulations through CUSTA (1989) and NAFTA (1994), along with changes to Canadian grain transportation subsidies, led to a dramatic increase in the integration of beef production and marketing in the three countries.

Trade in beef animals and products falls into two broad categories: live cattle, destined for feedlots or processing, and beef, which refers to the meat products from processed cattle. Other categories, like tallow, offal, and hides, comprise less than 1% of industry trade. Table 1 shows the relative sizes of the NAFTA beef industries in 2002, the last full year before BSE cases were confirmed. As the largest consumer of beef in the world, the United States drives the NAFTA beef industry.

Trade patterns within NAFTA (figure 2) reflect the different private opportunities and risks of the three countries, particularly differences in comparative

Figure 2. NAFTA cattle and beef trade flows, 2002 and 2003



advantage and market structure. Canada's relatively low-cost production system has allowed it to expand exports of live cattle and beef to the United States, the recipient of 90% of Canadian exports (Poulin and Boame). The percentage of total Canadian beef production exported to the U.S. increased from 12% in 1990 to almost 48% in 2002. Canadian cattle herds grew by approximately 50% since CUSTA and the termination of the Crow grain transportation subsidy, while U.S. and Mexican herds saw little growth (Canfax and Gracey; U.S. Department of Agriculture, National Agricultural Statistics Service).

NAFTA cattle trade occurs primarily in the form of Canada and Mexico supplying U.S. feedlot operators and processors with live animals, with 68% from Canada in 2002 and Mexico supplying the rest, mainly to feedlots (U.S. Department of Agriculture, Economic Research Service, 2004b). Many U.S. feedlots and processing facilities became dependent on imported cattle for normal operations. Trade in beef and veal products within NAFTA is less significant (figure 2). Although the U.S. is a net importer of beef within NAFTA, it has taken on an export role as a source of products targeted for higher end consumption in Canada and Mexico.

Although the U.S. and Canada rank second and third in global beef exports with 16% and 15% of the global trade, respectively, the U.S. is the only major NAFTA exporter and importer in non-NAFTA markets (U.S. Department of Agriculture, Economic Research Service, 2004b). Sixty-five percent of U.S. beef exports were to non-NAFTA countries, mainly Japan and Korea. About 66% of beef imports were from non-NAFTA countries, predominantly from Australia and New Zealand. Thus, while the integration of the beef industries within NAFTA has increased dramatically, the degree of integration varies radically by country. Canada's 1.45 million cattle exported to the U.S. annually comprise almost 25% of Canadian

cattle inventories but amount to less than 5% of U.S. numbers. In contrast, Mexico's cattle exports to the U.S. amount to only 3% of Mexican cattle inventories. As a result, the private risks from trade disruption are markedly different across the countries.

Regulating BSE as a Public Risk

BSE is a transmissible spongiform encephalopathy (TSEs) that affects the central nervous system in cattle and is an animal health risk. BSE also is thought to be linked to the human disease variant Creutzfeldt–Jacob Disease (vCJD) through the consumption of meat products from BSE-infected cattle. BSE first emerged in the United Kingdom (UK) in the 1980s, reaching a peak of over 37,000 cases in 1992 (OIE, 2004a, 2004d). BSE cases have been confirmed in over 20 countries, including most of the EU, Japan, Canada, and the United States (OIE, 2004a, 2004c). No cases have been reported in Mexico.

The management of BSE-related risk requires a broad set of public and private measures ranging from feed practices to the movement of live animals, surveillance, slaughter, distribution of beef products, rendering, and even handling of plate waste. From a trade perspective, the regulation of BSE is accomplished through international standards that are interpreted and applied at the national level. However, national interpretation of the international standards and a lack of regulatory integration are disrupting trade patterns and reversing the integration of the NAFTA beef markets.

International OIE Standards Regarding BSE Status and Import Restrictions

Because BSE is a transmissible animal disease that impacts animal and animal product trade, the World Organization for Animal Health (OIE) develops international standards and guidance for the management of BSE and the sanitary safety of world trade. OIE is an inter-governmental organization created by international agreement; it currently has 167 member countries. As noted, the SPS agreement recognizes OIE standards as reference international sanitary rules.

The OIE outlines five levels of BSE status in its Terrestrial Animal Health Code (OIE, 2003): BSE-free, BSE-provisionally free, minimal BSE risk, moderate BSE risk, and high BSE risk. The Code lays out five criteria for determining BSE status (see OIE, 2003, for more details). These criteria set a consistent worldwide hurdle for a country or zone wishing to present evidence regarding its BSE status.

The BSE levels are linked to OIE judgments regarding the degree of trade restrictions that may be imposed by a country that would be consistent with protecting animal and public health (OIE, 2003). At the same time, the restrictions must meet WTO requirements that regulations not be more trade restrictive than necessary and that measures applied to imports must be the same as those applied domestically. Under the Code, several classes of commodities, including milk and milk products, protein-free tallow, and hides and skins, should be authorized for importation regardless of the BSE status of the exporting country or zone. The provisions for cattle, and fresh beef (bone-in and deboned) and meat products from cattle, are very detailed. The essential point, however, is that the provisions

do not suggest complete prohibition of imports when BSE is detected. Instead, for example, "fresh meat may be imported safely from a country of any BSE status but with increasing restrictions so that, for countries presenting a high BSE risk, more severe measures are applied to the cattle and to the meat itself. The experts consider that, if these measures are followed, the meat is safe (OIE, 2004b)."

National Interpretation of BSE Standards

The OIE does not assign countries to the five levels. Instead, importing countries use the levels to judge other countries and then apply their own trade restrictions. In practice, establishing a BSE designation is relatively straightforward, although controversy may exist regarding the adequacy of surveillance and monitoring programs to detect BSE. It is clear that when a case is confirmed, a country loses its BSE-free or BSE-provisionally free status and likely enters the minimal BSE risk level unless additional information indicates a higher incidence of BSE in its cattle herd.

The huge trade impacts from a BSE case come not from the loss of BSE-free status *per se*, but from how national governments react to the loss of this status, i.e., how they have interpreted and implemented OIE standards. The initial reaction across the board has been total bans on cattle and beef imports imposed by trading partners, rather than the graduated restrictions recommended by OIE. The OIE points out that, except for short suspensions of trade during investigation following the confirmation of a case, "It is apparent that some member countries are applying trade bans when an exporting country reports the presence of BSE, without consulting the recommendations in the Code or conducting a risk analysis in accordance with its OIE and WTO obligations (OIE 2004b)." The OIE says such actions result in trade disruptions that are unnecessary to protect human and animal health and present a perverse incentive by penalizing countries that implement well-structured and transparent surveillance systems. Since the ban is not based on a risk analysis, it will be unclear what steps would be necessary to allow resumption of imports. The most significant risk associated with BSE appears to be political rather than scientific.

Disintegration of the NAFTA Market Due to the 2003 BSE Cases

The BSE cases in Canada in May 2003, and in the U.S. in December 2003, resulted in complete closure of international borders to beef and cattle. The closures went far beyond OIE recommendations and temporarily reversed NAFTA market integration. The resulting impact on private business risk was highly dependent on the cattle and beef trade patterns of each country. Canadian cattle farmers and feedlot operators felt the largest impact. The Canadian domestic market was too small to absorb the Canadian beef produced for export and prices plummeted by at least 50% at the farm gate and 10–15% at retail (Boame, Parsons, and Trant). Falling domestic prices knocked out most foreign competition and imports into Canada remained at 50% of their usual level for the remainder of 2003 (Industry Canada). In September 2003, the United States opened its border to boneless beef products and by mid-November, the weekly sales volume for Canadian beef exports had fully recovered (Binkley, 2003a). Exports of

live cattle had not resumed by mid-2005 and Canadian prices for beef and cattle remained low.

Subsequent analysis by Statistics Canada (2005) suggests that revenues in the Canadian beef industry declined by C\$5.3 billion due to lower prices and lost sales to the U.S. By September 2004, Canadian governments had paid out over C\$1.4 billion in BSE relief programs. The prolonged inability to sell live cattle into the U.S. has resulted in a shift in government programs from disaster relief to supporting slaughter capacity expansion through grants and loans. These programs result from growing awareness that under the current situation, cattle market integration is risky. It is less risky to process cattle in Canada and sell beef into the U.S., thus shifting processing jobs to Canada. Imports from the U.S. in 2004 were 70% below pre-BSE levels (Statistics Canada, 2005).

The closure of the Canadian border in May 2003 appeared to have an initial negative spillover effect on cattle trade with Mexico, as U.S. buyers seemed to cut imports until they had time to fully assess the risks associated with all imported cattle. The effect for Mexico was relatively short-lived since the U.S. beef production system is highly dependent on imports of cattle. By autumn 2003, Mexican cattle had replaced much of the Canadian live cattle exports to the U.S. (U.S. Department of Agriculture, Economic Research Service, 2004a).

U.S. prices for both beef and cattle rose throughout 2003 to record highs (Hahn) as the industry struggled to cope with increasing demand and reduced Canadian supply. The disruptions created by the Canadian event were compounded when BSE was confirmed in the U.S. on December 23, 2003, effectively closing its export markets for cattle and beef products. As a net importer, the U.S. was able to redirect its exports into the domestic market; however, the U.S. market remained under-supplied putting upward pressure on prices for live cattle and retail beef. The cessation of beef exports from the U.S. to Mexico provided an opportunity for Mexican producers to capture more of the higher-end Mexican market. In 2004, Mexican imports were forecast to fall to 20% of previously predicted levels and Trejo estimated that retail prices increased 15% by mid-2004.

Dealing with BSE: Public and Private Responses

Governments must balance a set of objectives in dealing with risks such as BSE (Caswell). Ultimate risk management decisions rest on a complex consideration of plant, animal, or human health risks, financial risks to industries, and market risks. Sandman and Lanard capture this reality in their characterization of U.S. BSE policy prior to the December 2003 case, "The U.S. government was protecting public health from vCJD as much as it wanted—not as much as possible, but as much as it thought appropriate. And its judgment about how much protection was appropriate was influenced, sensibly enough, by the fact that so far the U.S. had not found any mad cows at all." Public and private preparation for the confirmation of BSE cases in North America has proven to be inadequate.

Protecting Public Health: Revamping Regulations in Crisis Mode

Countries around the world responded to the BSE epidemic in the United Kingdom by implementing regulatory requirements for firms in order to control the establishment and spread of BSE in cattle herds. Central elements included

restrictions on feeding ruminant proteins to ruminants and the establishment of surveillance systems to detect BSE. In both Canada and the United States, the immediate reaction to each having a 2003 BSE case was the institution of new anti-BSE measures. These were particularly sweeping in the United States, leading critics to argue that prior regulations were clearly inadequate and that public health had not been adequately protected.

Protecting Industry Viability: Reopening Borders

Regaining BSE-free status for both Canada and the U.S. will take several years but both countries are eager to resume full trade under some sort of minimal risk status. There are essentially two routes to accomplish border re-openings. The first is demonstrating that the country meets OIE criteria to be classified as minimal BSE risk and encouraging importing countries to follow the relatively unrestrictive OIE trade guidelines. However, countries would have to apply the same standards to others who want to export into their countries.

The second option is to negotiate the reopening of borders on an ad hoc basis pending demonstration of compliance with OIE and countries' own criteria. This is a challenge when the countries have taken a different approach to managing BSE risk, as have Japan and the U.S. The NAFTA countries have more similar risk attitudes and management strategies and have taken steps to reopen borders on an ad hoc basis largely consistent with OIE guidelines for a country with minimal risk. These actions themselves constitute an initial step toward regulatory integration. In September 2003, the U.S. awarded a special low risk BSE classification to Canada and allowed the importation of boneless Canadian beef and other products from cattle less than 30 months of age (Acord, Feldman, and Binkley). Mexico took similar action toward Canada (Binkley, 2003b). This has resulted in only moderate U.S. price relief. A U.S. Department of Agriculture report estimates that re-opening the border to Canadian feeder cattle would result in a return to more normal pricing levels with a shift of roughly \$631 million from producer surplus to consumer surplus, and a net gain of \$12.6 million. Reopening the border to all beef imports would increase the shift to \$1.3 to \$1.5 billion and a net gain of \$91 to \$101 million depending on pricing assumptions (U.S. Department of Agriculture, Animal and Plant Health Inspection Service). In March and April 2004, Mexico and Canada partially lifted their bans on U.S. beef imports (Lewis).

As a result of these actions, the NAFTA beef market was largely, but not completely, reintegrated within months of the BSE cases being confirmed. This could be interpreted to indicate that ad hoc regulatory integration within NAFTA worked reasonably well in response to BSE. However, the key point is that the magnitude of the short-term disruption could have been greatly mitigated by better preparation by NAFTA countries. Furthermore, until mid-2005, the U.S. border remained closed to imports of live cattle from Canada. The economic impact of trade disruption on the Canadian cattle industry continued as domestic slaughter capacity was inadequate to handle the available volume of live cattle.

Protecting Industry Viability: Compensating Industry

An issue in integrated agricultural markets is compensation and subsidies in the case of a public risk event impacting a domestic industry. For example, the

Canadian and provincial governments took several actions to stabilize and support the devastated domestic beef industry, ending supplementary beef imports where Canadian products could be supplied, implementing work share programs to keep processing facilities open, and creating price support programs (Statistics Canada, 2003; LeRoy, Weerahewa, and Anderson). For example, the Canadian government devoted C\$995 million to compensate farmers and, to a much lesser extent, processors for their losses related to the trade disruptions. Compensation has not been made in the U.S. where supplies are tight and prices remain high.

Relief programs could provide an unfair advantage to one member of the trading region. Similarly, government investments in systems designed to prevent or control BSE could be viewed as a subsidy that provides an unfair trade advantage. To date, BSE farm disaster relief has not become a subsidy issue at the WTO or within NAFTA. However, the potential for challenges exists.

Industry Reaction to BSE Risks

The primary risks to private firms from BSE are from the loss of international markets for an unspecified period of time and the resulting increase in domestic competition. Within NAFTA, the private risk level varied depending on two factors. The first was product type. Although borders closed for all parts of the industry, they opened much more quickly for boneless beef products from young animals than for boned products from older animals or live cattle.

The degree of export dependence was the second factor affecting private risk. Firms in export-focused Canada faced the greatest risk associated with a confirmed BSE case. The closure of the U.S. border in 2003 put significant pressure on the Canadian market and, in turn, relieved the impact of the U.S. BSE case for U.S. producers. If only a U.S. case had been found, Canadian beef and cattle would have continued to enter the U.S. and the oversupply caused by the cessation of U.S. exports would have been more widely distributed across the NAFTA region.

Private risk management strategies should be two pronged. First, they should contribute to reducing the national risk of a BSE event by implementing appropriate prevention, monitoring, and tracing systems. Second, they should position the firm to minimize the impact of a national BSE event. BSE risk-reduction strategies may be industry-wide, such as adopting industry traceability standards or monitoring adherence to feed bans. Strategies also may be supply chain specific, such as enhanced traceability or more extensive testing for BSE for export markets.

The 2003 BSE cases exposed major weaknesses in public and private animal tracing systems. Tracking animals to their source, tracing offspring and cohorts, and tracking feed sources proved time consuming, laborious, and only partially successful. Two additional BSE cases in Canada in early 2005, and a second case confirmed in the United States in June 2005, also raised concerns over adherence to feed bans. Even with the disruptions caused by BSE, the major opposition to stricter controls was from the industry, which is concerned about higher costs (Acord and Feldman).

In the current environment, reversing market integration, or market disintegration, appears to be the most likely strategy for reducing firm exposure to risk from BSE in live cattle markets. Firms shipping processed beef from young animals face much shorter disruptions than farmers or firms shipping live animals or beef from

older animals. Shifting production toward more domestic processing destined for export would reduce the impact of BSE cases, particularly for Canada and Mexico. This strategy reduces the future supply of foreign feeder cattle for U.S. feedlots and processing facilities when the border reopens and could reduce the processing output from U.S. facilities. Such strategies will be implemented at the firm level. In Canada, national and regional support for this strategy is apparent. For example, the Canadian government has made money available to support the development of more cattle processing capacity in Canada and producer groups are taking an active role in promoting and planning for new capacity. By mid-2005, Canadian processing capacity was reported to already have increased by 30% (Binkley, 2005). More traditional strategies related to diversifying products and/or production locations may be employed as well.

Integrated Markets—Integrated Regulations and Planning?

The central question is not whether nations and firms are able to develop BSE-related risk management strategies independently, but whether this is the best strategy for jointly protecting and promoting trade and market integration. Prior to 2003, the NAFTA countries had developed a closely integrated beef market in the absence of anything but the most rudimentary regulatory integration. As a result, the confirmation of BSE cases within NAFTA resulted in large trade disruptions. The bulk of these could have been avoided if the NAFTA countries had developed more closely coordinated risk management programs based on the guidance of international standards. Market integration had outrun regulatory integration, leaving markets very vulnerable to disintegration when faced with a public risk such as BSE. If the NAFTA countries were ill prepared for BSE, what could they have done, or could they do, to develop NAFTA-wide risk management plans, integrated regulations, and cooperative responses to different BSE scenarios?

Considerations in Developing a NAFTA Approach to BSE

With BSE, as with many other public and private risk management challenges, there is uncertainty regarding the benefits and costs of taking action because of uncertainty about the severity of the risks involved, the efficacy of steps that can be taken to mitigate them, and the costs involved. Countries develop different regulatory programs that reflect the nuances of their own benefit–cost calculation and their available resources. For example, Japan is currently testing every animal used for beef products for BSE based on what the government thinks is necessary to sustain consumer confidence. The U.S. views this requirement as unreasonable. Countries cannot coordinate policy closely, let alone seek equivalence or harmonization, unless they agree on approaches to risk assessment and risk management.

NAFTA does not have any bureaucratic mechanism for developing integrated regulatory approaches to risk management beyond committees and working groups that meet intermittently. The integration of systems for BSE risk management is rudimentary within NAFTA. Some progress is evident in that the system avoided new disruptions in beef trade when two additional BSE cases were confirmed in Canada and one in the United States in 2005. However, less progress

is evident on other fronts. For example, representatives from the three countries have developed a joint strategy and issued a Report of the North American Chief Veterinary Officers (CVOs) on Harmonization of a BSE Strategy on March 17, 2005. From a regulatory integration perspective, calling the plan "harmonization" is a bit of a misnomer. The CVOs state that they have developed:

... a set of minimum standards for BSE measures in North America. These minimum standards will be presented to the appropriate animal health and public health officials in each country for consideration within the respective regulatory processes, and therefore should be considered pre-decisional (p. 1).

Thus the harmonized strategy represents fairly weak policy coordination. The strategy will be sorely tested should a BSE case be confirmed in Mexico.

The development of an integrated NAFTA approach is complicated by the response to BSE in non-NAFTA countries. For example, if a country authorizes beef imports from Canada but not the U.S., Canada must be able to show that U.S. product is not present in Canadian exports. If the NAFTA countries had harmonized systems, approval of one for export would imply approval of all and no need for monitoring of cross-shipping between countries. However, in this case, a problem in one would automatically be attributed to all. The use of more extensive public and/or private track and trace systems might allow the exclusion of products from one nation while continuing the exports from nonaffected partners but it is unlikely that this would be acceptable to trading partners.

What Would a NAFTA BSE Management Program Look Like?

A preferred system for NAFTA BSE risk management would be harmonized and borderless with the same or highly compatible standards and risk management strategies used throughout the NAFTA beef production and marketing system. It would involve three components: establishing regulations or standards, applying those standards in the operation of the industry, and monitoring the application of the regulations or standards throughout the industry. Setting the regulations is a government responsibility but applying them is a combined public and private activity.

While defining the full details is beyond the scope of this paper, table 2 lists the requirements for a harmonized BSE risk management strategy, the status of the NAFTA beef industries in meeting each requirement, and the likelihood of achieving NAFTA consensus and implementation in the near term. The list is daunting and does not begin to reflect the complexity of the underlying public risk management policies and private risk management strategies. This complexity, the effort needed to harmonize policy, and the potential loss of the ability to tailor programs to domestic circumstances are the main roadblocks to regulatory integration.

However, since each country must have a regulatory structure in place to accomplish BSE management, there may be benefits in terms of efficiencies in joint development of a plan. The major benefit of harmonized policy would be an integrated regulatory system that supports market integration and provides increased assurance to private parties against market disruption. The success of any NAFTA BSE management system will depend on more than regulatory integration.

Table 2. Requirements for an integrated NAFTA BSE management program

Requirement	State of the Industry and Regulations	Likelihood of NAFTA Agreement
Harmonization of feed regulations concerning the use of animal protein in cattle and dairy feed.	Regulations are fairly consistent across NAFTA. However, testing and monitoring regimes vary.	High for standards. Moderate for monitoring and testing.
Standards for production, shipping, and slaughter.	U.S. has moved to a common process-based system for meat products, requiring HACCP for firms shipping processed meat into the U.S. However, this is only for one range of products and one level of the beef supply chain.	Reasonable for HACCP but much lower at other levels of the chain, in part due to national differences in production systems.
Common requirements for tracking animals through the system. Requires common data standards, the integration of systems for information and trace-back in the event of a problem.	Systems are rudimentary in most cases. Resistance to mandatory implementation is high, particularly in the U.S. Capabilities among small farming operations in all three countries are low.	Traceability systems will continue to be implemented, particularly in Canada. Full NAFTA systems in the near term are unlikely.
A common testing regime where participants in each country use: a. Technologies approved by all parties. b. Common standards for testing frequency. c. Common standards for storage and reporting results. d. Common approaches to exception testing.	Testing regimes broadly based on OIE standards but vary in testing frequency. Standards for tracking and reporting are not common across NAFTA. In Canada, tracking is mandated for individual animals, but roughly 30% of U.S. animals are tracked individually and tracking is lower in Mexico.	Agreement on testing regimes and technologies is possible. Coordinating testing programs, tracking capabilities, and data standards is less likely.
Jointly planned response to outbreaks anywhere in the system.	Recent outbreaks have revealed deficiencies in planning. Some are being addressed under BSE and bioterrorism programs.	Although there are discussions, nations are working on internal plans first.

Continued

Table 2. Continued

Requirement	State of the Industry and Regulations	Likelihood of NAFTA Agreement
Agreement on subsidy levels a. For investments in traceability and testing systems. b. For industry participants in the event of an outbreak.	Subsidies for systems are not yet addressed. Canada has compensation program for BSE disruptions.	Agreement unlikely.
A common approach to monitoring the execution of the regulations regarding inputs, processing, testing, and tracing.	Agreement on the principles of HACCP for ensuring safety and monitoring. No consensus on specifics for BSE.	This will likely be an equivalence situation.

Market participants at all levels of the NAFTA beef industry must take an active role in integrating their risk management systems, particularly their traceability and testing systems.

Lessons Learned

There are two likely culprits when agricultural and food markets are severely disrupted because of plant health, animal health, or food safety risks: inadequate risk management within a country or a lack of harmonized risk management approaches between countries. Both are present in the case of BSE in NAFTA. First, risk management programs in Canada and the U.S. were inadequate to prevent the confirmation of cases causing both to lose their presumptive BSE-free status. An alternative perspective is that the countries failed to structure risk management programs under which the confirmation of a small number of cases could be convincingly presented as being within the bounds indicating very low risk.

Second, the NAFTA market has suffered from poor harmonization of BSE policy. While this is somewhat common across the world, the overwhelming bulk of the trade affected by the NAFTA BSE cases in 2003 was internal to NAFTA. Regardless of whether the world decided to abide by OIE guidance, the NAFTA countries could have done so, developed more closely coordinated risk management programs around OIE guidance, and thereby avoided much of the trade disruption. There was adequate time to develop such an approach because the BSE risk and the consequences of a case have been known for years.

NAFTA countries are pursuing high levels of market integration through the elimination of tariff barriers but have a relatively primitive level of coordination in regard to nontariff barriers. The BSE case illustrates the risks to which industries are exposed when economic integration outruns regulatory integration. NAFTA

currently has no mechanism to move toward regulatory integration, except on a very fragmented, ad hoc basis. This will be a continuing drag on market integration and will lead to a reversal of that integration when major risk events occur. Failure to address regulatory integration will leave other integrated markets, such as the NAFTA hog industry, vulnerable to the same type of disruption as experienced in the beef industry with BSE.

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References

- Acord, D., and B. Feldman. "Meat Industry Says USDA 'Grossly Underestimates' Cost of New BSE Rules." *Food Chem. News* (April 2004):13–14.
- Acord, D., B. Feldman, and A. Binkley. "USDA Begins Issuing Permits for Canadian Beef Imports." *Food Chem. News* (September 2003):32–33.
- Binkley, A. "Canadian Beef Sales to the United States, Mexico Rebound." *Food Chem. News* (November 2003a):14.
- . "CFIA Solicits Comments on New BSE Import Policy." *Food Chem. News* (May 2005):10.
- . "U.S., Mexico Ease Beef Bans; Canadian Producers Face Massive Backlog." *Food Chem. News* (August 2003b):8.
- Boame, A., W. Parsons, and M. Trant. "Mad Cow Disease and Beef Trade: An Update." *Statistics Canada* 11-621-MIE, 2004 Available at: <http://www.statcan.ca/english/research/11-621-MIE/11-621-MIE2004010.htm>.
- Buzby, J.C., ed. *International Trade and Food Safety: Economic Theory and Case Studies*. Washington DC: U.S. Department of Agriculture, Agr. Econ. Rep. 828, November 2003. Available at: <http://www.ers.usda.gov/publications/aer828/>
- Canfax, and C. Gracey. "The Cattle Cycle." Unpublished, Canadian Cattlemen's Association, 2002.
- Caswell, J.A. "A Food Scare a Day: Why Aren't We Better at Managing Dietary Risk?" *Human and Ecological Risk Assessment*, in press.
- Hahn, W. *U.S. Beef and Cattle Prices*. Washington DC: U.S. Department of Agriculture, Economic Research Service, 2004. Available at: <http://www.ers.usda.gov/BRIEFING/FOODPRICESPREADS/MEATPRICESPREADS/BEEF.HTM>
- Harvey, D.R. "European Perspective on Market Integration." In *North American Agrifood Market Integration: Situation and Perspectives*, K.M. Huff, K.D. Meilke, R.D. Knutson, R.F. Ochoa, J. Rude, and A. Yunez-Naude, eds., pp. 30–50. Guelph, Ontario, Canada: University of Guelph, 2005.
- Industry Canada. *Trade by Product (HS)–HS Codes*, 2004. Available at: http://strategies.ic.gc.ca/sc_mrkti/tdst/tdo/tdo.php#tag
- LeRoy, D., J. Weerahewa, and D. Anderson. "Disruption in the Supply Chain for Beef and Pork: What Has Happened and What Is NAFTA Doing?" Presented paper, Second Annual North American Agrifood Market Integration Workshop, San Antonio, Texas, May, 2005.
- Lewis, S. "Mexico Imposes Strict Controls on U.S. Beef Imports." *Food Chem. News* (March 2004):9–10.
- OIE, World Organization for Animal Health. "Geographical Distribution of Countries that Reported at Least One BSE Confirmed Case–1989–9 Jan. 2004." 2004a. Available at: http://www.oie.int/Cartes/BSE/a_Monde_BSE.htm
- . "The OIE Standards on BSE: A Guide for Understanding and Proper Implementation." 2004b. Available at: http://www.oie.int/eng/press/en_040109.htm
- . "Number of Reported Cases of Bovine Spongiform Encephalopathy (BSE) Worldwide (Excluding the U.K.)." 2004c. Available at: http://www.oie.int/eng/info/en_esbmonde.htm
- . "Number of Cases of Bovine Spongiform Encephalopathy (BSE) Reported in the United Kingdom." 2004d. Available at: http://www.oie.int/eng/info/en_esbru.htm
- . "Terrestrial Animal Health Code 2003." Chapter 2.3.13., 2003. Available at: http://www.oie.int/eng/normes/mcode/a_00068.htm
- Poulin, D., and A. Boame. "Mad Cow Disease and Beef Trade." Statistics Canada, 2003. Available at: <http://www.statcan.ca/english/research/11-621-MIE/11-621-MIE20030005.htm>
- Report of the North American Chief Veterinary Officers on Harmonization of a BSE Strategy. March 17, 2005. Available at: http://www.aphis.usda.gov/lpa/issues/bse/04-01-05na_bse_harmonization.pdf

- Roberts, D., L. Unnevehr, J.A. Caswell, I. Sheldon, J. Wilson, T. Otsuki, and D. Orden. "The Role of Product Attributes in the Agricultural Negotiations." Paper #19, IATRC, May 2001. Available at: http://agecon.lib.umn.edu/cgi-bin/pdf_view.pl?paperid=3022
- Robertson, R. "Defining North American Economic Integration." In *North American Agrifood Market Integration: Situation and Perspectives*, K.M. Huff, K.D. Meilke, R.D. Knutson, R.F. Ochoa, J. Rude, and A. Yunez-Naude, eds., pp. 5–29. Guelph, Ontario, Canada: University of Guelph, 2005.
- Sandman, P.M., and J. Lanard. "Misleading Toward the Truth: The U.S. Department of Agriculture Mishandles Mad Cow Risk Communication." 2004. Available at: <http://www.psandman.com/col/madcow.htm>
- Statistics Canada. *Cattle Statistics*. 23-012-XIE, 2003. Available at: <http://www.statcan.ca/english/freepub/23-012-XIE/23-012-XIE2003002.pdf>
- Statistics Canada. *Livestock Estimates. The Daily*, Feb. 17, 2005. Available at: <http://dissemination.statcan.ca/Daily/English/050217/d050217b.htm>
- Trejo, S. *GAIN Report: Mexico Livestock and Products Semi Annual 2004*. Washington DC: U.S. Department of Agriculture, Foreign Agricultural Services GAIN Report MX4014, 2004
- U.S. Department of Agriculture. *Agricultural Statistics Data Base*. Washington DC: National Agricultural Statistics Service (NASS). Available at: <http://www.nass.usda.gov:81/ipedb/>
- . "Economic Analysis Proposed Rule Bovine Spongiform Encephalopathy: Minimal Risk Regions and Importation of Commodities." Animal and Plant Health Inspection Service (APHIS), Washington DC. APHIS Docket No. 03-080-1, 24 October 2003. Available at: http://www.aphis.usda.gov/lpa/issues/bse/bsecan_econ_anal.doc
- . *Foreign Agricultural Service Production, Supply, and Distribution, Complete Raw Data Files*. Foreign Agricultural Service (FAS). Available at: http://www.fas.usda.gov/psd/complete_files/default.asp
- . *Monthly Meat Statistics*. Washington, DC: Economic Research Service (ERS), 2004a. Available at: http://www.ers.usda.gov/Publications/LDP/xlstables/monthly_US_livestock_meat_trade.xls
- . *Newsroom: Background Statistics on U.S. Beef and Cattle*. Washington, DC: Economic Research Service (ERS), 2004b. Available at: <http://www.ers.usda.gov/News/BSECoverage.htm>