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CANADIAN FEED POLICY AND BSE

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INTRODUCTION

There is clear evidence that bovine spongiform encephalopathy (BSE) spread in Europe in the 1970s and 1980s because of the practice of adding meat products, notably rendered[(1)] ruminants,[(2)] to cattle feed. Experiences in countries such as the United Kingdom have shown that strict controls on animal feed ingredients have helped to reduce the number of BSE cases. It is now recognized that appropriate feed control policy is one of the best tools to prevent the propagation of the disease and to facilitate its eradication.

Canada did not wait for the discovery of BSE in the domestic herd to implement feed control measures.[(3)] This document presents a brief historical overview of the use of animal protein in feed. It then describes the control measures implemented by the federal government, including brief comparisons with measures in the United States where appropriate.

USE OF ANIMAL PROTEIN IN FEED

In the 19th century, the safe disposal of dead animals and animal wastes was seen as a necessity to control animal diseases and to prevent these carcasses from entering the human food system. In this context, the farm community started to show an interest in recovering animal by-products, including carcasses of dead animals, and the rendering industry became an integral part of the agri-food system.

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(1) Rendering is the thermal treatment of inedible animal parts for industrial use. It produces transformed animal proteins and animal fat by-products, such as bone meal and meat meal.

(2) Ruminants include cattle, sheep, goats, deer and camels. These are herbivorous animals that have four stomach compartments – rumen, reticulum, omasum and abomasums – through which food passes in digestion. The animals chew their cud or regurgitate partially digested food for further breakdown in the mouth.

(3) BSE was first discovered in Canada in 1993, in an animal imported from the United Kingdom. In 2003, BSE was discovered in an animal born in Canada.

One of the first essays on the use of animal by-products in animal feed was published in 1830.(4) The idea was picked up again by the German chemist Justus von Liebig, who recommended their use in pig feed in 1865; at the same time, he developed a method to process carcasses into a dry powder that could be transported over long distances. Between 1860 and 1875, scientists published the first tables of animal feeding requirements and nutritional values of feeds; and in 1912, Swift and Company, a Chicago meatpacker, became the first to mass-manufacture rendered protein and fat as animal feed.

Small amounts of animal proteins had long been a normal part of feed rations of non-herbivorous farm animals like pigs, and also poultry; but their use in feed became widespread in the 20th century, and they are still being used in most countries. It is, however, the use of meat products in ruminant feed, particularly cattle feed, that drew public attention when the cause of transmission of BSE was discovered in the 1980s. The BSE Inquiry, an independent study that examined the British government's response to the emergence of the disease, summed up the evolution of the use of meat and bone meals (MBM) in cattle feed:

> In the UK, the use of MBM in ruminant nutrition was well established by the 1920s. MBM was mentioned as a feedstuff in the Fertiliser and Feedingstuffs Act 1926. In the US in 1928, Morrison described the production of MBM and stated that, although this was normally fed to pigs and poultry, when mixed with other feeds it could also be fed to horses, cattle and sheep. During the 1930s and 1940s there were a number of references in scientific literature to the commercial use of rendered meat by-products, for example: as alternative protein for calves in New Zealand; as a supplement to grass for sheep in Australia; and in various experiments on dairy cows, to assess the effect of protein intake and quality on milk production.(5)

The use of MBM increased significantly in the United Kingdom during World War II, when it became difficult to import vegetable feeds, and research showed that animal proteins were an effective feed supplement for cattle:

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(4) Payen, *Notice sur les moyens les plus simples d'utiliser les animaux morts*, Imprimerie de Mme Huzard, Paris, June 1830.

(5) Lord Phillips of Worth Matravers, June Bridgeman, and Malcolm Ferguson-Smith, *The BSE Inquiry: The Report*, Vol. 13, Ch. 7, October 2000.

> During the Second World War, Regulations set out minimum and/or maximum proportions of ingredients to be used in feed in the UK. For example, in 1941 the inclusion of a minimum of 2.5% meat meal or MBM was prescribed, which was later increased for young stock to 5%.
>
> Use of MBM as an ingredient of cattle feed continued to grow post-war after ruminant nutritionists identified that cattle digested some proteins (including those in MBM) more efficiently than they did others.(6)

In addition, rations with high protein contents were necessary to increase animal yields, notably in the dairy production. By the mid-1970s, the price of vegetable protein in the United States had increased to the point that rendered animal protein became an increasingly popular cattle feed. In Canada, very little MBM was used in beef cattle rations before the 1997 feed ban. For dairy cows, however, feeds containing MBM were needed to attain high productivity levels (more than 8,000 kg per cow/lactation). Their rations generally included 200 g of blood meal per day for the first 70 days of lactation.(7)

REGULATIONS COVERING BSE-RELATED FEED CONTROL

The discovery of BSE in an imported animal in 1993 showed that Canada was not immune to the risk of an outbreak. At this time, European countries were having to implement disease control measures as several new cases of BSE were discovered every week. Meanwhile, Canada had time to look at the European experience and take measures to prevent the further entry of the disease in Canada and limit its spread. As feed regulations are the cornerstone of any strategy to control BSE, this section presents the evolution of Canadian policy regarding feed manufacturing in relation to BSE.

A. The 1997 Feed Ban

In 1997, rendered protein products derived from almost all mammals were banned for use in ruminant feed under Part XIV of the *Health of Animals Regulations*. Rendered protein products, including bovine products, can still be used in animal feed for non-ruminants such as

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(6) *Ibid.*

(7) *Canada Gazette*, Part II, Vol. 131, No. 16, *Regulations Amending the Health of Animals Regulations*, Regulatory Impact Analysis Statement, 29 March 1997.

hogs and poultry that are not susceptible to BSE. The United States implemented a similar feed ban the same year.

Canadian producers may feed their ruminants only approved animal protein (products) such as pure porcine, equine, poultry and fish products. Protein that includes meat and bone meal from mammals other than pigs and horses is prohibited in ruminant feeds. Milk, blood, gelatin, rendered animal fats and their products have not been banned.

There are labelling requirements to ensure that all products containing prohibited material are clearly identified and bear the following cautionary statement: *Do not feed to cattle, sheep, deer or other ruminants*. If producers feed both ruminants and non-ruminants on the same farm and therefore purchase feeds containing prohibited material (for feeding non-ruminant species), they must keep accurate records and invoices for two years. Farmers, feed manufacturers and renderers are required to take measures to avoid cross-contamination by providing clear labelling, separate storage and dedicated equipment, or by thoroughly cleaning non-dedicated equipment.

B. Review of the 1997 Feed Ban

Following the discovery of two new cases of BSE in the Canadian herd in January 2005, the efficiency of the feed ban was put into question since one of the animals was born shortly after the implementation of the prohibition against feeding ruminants with animal proteins. On 11 January 2005, the Minister of Agriculture and Agri-Food announced that the Canadian Food Inspection Agency (CFIA) would undertake a 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 relevant part of the *Health of Animals Regulations*.

The findings of the CFIA review were announced on 2 March 2005. The Agency determined that the ban was designed in accordance with international guidelines and drew from the science and most current understanding of BSE available at the time. According to the CFIA, the detection of an affected animal born after the feed ban was not unexpected, since similar experiences have been observed in all countries with BSE that have implemented feed controls. The 1997 feed ban did not apply to producers who had feed containing meat meal already in stock on their farms, and prohibited materials could have moved through the ruminant feed system in the months following the ban as the industry developed and implemented new operating processes.

The review also found that on average, 95% of feed mills and 93% of rendering plants inspected over the past three years were either fully compliant with the regulations or reported only minor non-compliance issues, such as documentation requirements, which do not necessarily signify increased risks of cross-contamination of ruminant feeds with prohibited material. Experience in other countries shows that even with less than 100% compliance, feed bans such as Canada's effectively limit the spread of BSE and can be expected to lead to the eventual eradication of the disease.

The United States Department of Agriculture (USDA) also conducted its own assessment of the Canadian feed ban. The USDA review indicated that "Canada has a robust inspection program, that overall compliance with the feed ban is good and that the feed ban is reducing the risk of transmission of bovine spongiform encephalopathy in the Canadian cattle population."(8)

Early in 2005, media reports suggested that a CFIA field trial using microscopic analysis was indicative of non-compliance with the feed ban. The CFIA trial was designed to assess whether microscopic analysis of feed samples could help in evaluating compliance with the feed ban. The tests detected animal materials in some of the samples but could not differentiate between prohibited material and materials that could enter the feed chain through the grain harvesting and feed distribution system (e.g., small rodents or birds). The trial was combined with physical inspections of the facilities from which the samples were taken; the inspections confirmed that the samples containing animal tissues did not contain prohibited materials. The CFIA confirmed that the trial only demonstrated the limitations of the testing methodology, and that compliance with the feed ban is verified at multiple points in the feed chain.

C. Proposed Amendments to the 1997 Feed Ban

The 1997 feed ban provided an appropriate level of animal health protection for a BSE-free country. In 2003, however – and again in 2005 – isolated cases of BSE were discovered in cows born in Canada. Now that Canada has detected indigenous cases of the disease, there is a need to reinforce feed controls in order to further mitigate the risk of BSE spread in Canadian cattle.

(8) USDA, *U.S. Department of Agriculture's Assessment of the Canadian Feed Ban*, February 2005.

In June 2003, a report was released by the international team of animal health experts that had reviewed Canada's investigation into the May 2003 case of BSE. The report recommended a series of actions to strengthen national animal health and food safety measures, including the removal and redirection of specified risk materials (SRM) from animal feed. SRM are cattle tissues that may contain the agent that causes BSE.

On 10 December 2004, the government proposed a series of amendments to the *Meat Inspection Regulations, Feed Regulations, Fertilizer Regulations* and *Health of Animals Regulations* to prohibit SRM from use in all animal feed, pet food and fertilizers. Currently SRM are removed from the human food system but can still end up, like other ruminant proteins, in animal feed for non-ruminants, such as hogs and poultry, which are not susceptible to BSE.

Preventing SRM from entering the feed production chain would enhance the existing feed ban by reducing the risk of potential cross-contamination of animal feeds that could occur as feed is produced and distributed, as well as any inappropriate on-farm use. The provision to prohibit the use of SRM in fertilizers is intended to prevent the potential accidental or intentional misuse of fertilizers as feed. As well, it addresses the possibility that contaminated grazing pastures might transmit BSE, although the current science surrounding the environmental behaviour of the disease is inconclusive on this point.

The proposed regulations have been published in the *Canada Gazette*, Part I, and the comment period ended on 24 February 2005. The CFIA is reviewing the comments, and the regulatory amendments are expected to come into force later in 2005 following the publication of the regulations in the *Canada Gazette*, Part II.

If the proposed regulations come into force, the disposal of SRM will have to be addressed. Overall Canadian production of SRM is estimated at 2 million pounds per week.(9) In the 2005 federal budget, the government redirected $80 million of the funding earmarked for the BSE recovery strategy(10) to help the industry dispose of the material.

In July 2004, the U.S. Food and Drug Administration (FDA) also requested comments on the removal of SRM from all animal feed. The U.S. industry has been opposed to this measure, although it was recommended by the teams of international animal health experts that reviewed the Canadian and U.S. responses to the discovery of BSE cases. The National

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(9) Standing Senate Committee on Agriculture and Forestry, Interim Report, *Cattle Slaughter Capacity in Canada*, 1st Session, 38th Parliament, May 2005.

(10) The strategy to reposition the Canadian livestock industry was announced on 10 September 2004, and funding was initially budgeted at $488 million.

Cattlemen's Beef Association believes that the need for SRM removal is not supported by science, since there is already a high compliance rate with current ruminant-to-ruminant feed bans in Canada and the United States.(11)

With respect to the feed ban in the United States, the FDA reported a 99% compliance rate in January 2004. Nevertheless, according to a February 2005 U.S. Government Accountability Office report,(12) the FDA's data on feed inspections were so severely flawed that the FDA did not know the full extent of industry compliance. The FDA does not include all serious violations in its calculations of compliance on its Web site because it reclassifies firms as "in compliance" once they correct violations, regardless of how long the problem may have existed. The FDA believes, however, that the weaknesses identified do not place U.S. cattle at risk for BSE, and that its risk-based inspection approach assures adequate oversight of the feed-ban rule.

FEED IMPORTS

In addition to strict controls on feed manufacturing and labelling in Canada, the government had to ensure that no BSE-infected material entered the country. This section looks at Canadian feed import policy related to BSE and provides some comments on available feed import statistics.

A. Import Policy

In the early 1980s, before the advent of animal health risk analysis, Canada was protective of its animal health status. The import of products that could introduce foreign diseases was not allowed. Given that the focus was mainly on foot-and-mouth disease, many animal products that had the potential to spread BSE, such as MBM, were already banned from being imported, except from the United States.(13)

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(11) Standing Senate Committee on Agriculture and Forestry (2005).

(12) United States Government Accountability Office, *Mad Cow Disease: FDA's Management of the Feed Ban Has Improved, but Oversight Weaknesses Continue to Limit Program Effectiveness,* GAO-05-101, 25 February 2005.

(13) Canadian Food Inspection Agency, *Risk Assessment on Bovine Spongiform Encephalopathy in Cattle in Canada*, Part A, "Evaluation of Risk Factors," Ottawa, 2002.

In the late 1980s, in response to domestic and international trade initiatives, the regulatory process was reviewed with respect to the import of animals and animal products. The resulting 1988 General Import Policy for Inedible Meats and Animal Products specified the conditions under which certain animal products could be imported. The import of commercial shipments of meat meal, blood meal, bone meal, and other inedible meat products from countries other than the United States was prohibited. While not directed at BSE, these measures nevertheless reduced the probability of BSE entry.

As BSE emerged as a significant disease in the United Kingdom, and there was evidence of its spread to other European countries, Canadian import policies and practices were amended accordingly. Permits were required for the import of all rendered animal products, stating the classification of the product (prohibited or non-prohibited for use in ruminant feeds) and the restriction associated with the classification. Rendered products of ruminant origin were not allowed from countries not designated free of BSE. Since February 2000, Canada's policy has been to import feed containing animal protein (from all species) only from countries designated free from BSE.[14]

In April 2005, the CFIA proposed to revise its BSE import policy for bovine animals and their products. A draft import policy has been published for comment, and the CFIA intends to finalize it and implement it as soon as possible after taking into account comments received. The draft policy classifies countries in three categories:

- Category 1 – negligible BSE-risk;
- Category 2 – negligible BSE-risk with commodity-specific mitigation measures; and
- Category 3 – undetermined BSE-risk.

Ruminant-derived MBM, or any commodities (such as feed) containing such products, would be authorized for import only if they come from Category 1 countries. The draft policy is consistent with the new BSE standard adopted by the World Organisation for Animal Health (Office international des epizooties – OIE) in May 2005.

(14) See Appendix 1.

B. Import Statistics

In 2001, as a result of a media report that Statistics Canada's import data showed Canada had imported meat waste from the United Kingdom and Germany during the 1990s, the CFIA conducted an extensive review of import records to determine whether any products that pose a risk for the transmission of BSE had been imported from Europe between 1990 and 2000. The investigation, which was based on the available records of the Canada Customs and Revenue Agency and the CFIA, concluded that no MBM was imported into Canada for use in livestock feeds from BSE-infected countries during that period.(15)

According to the investigation, the imprecise nature of the Harmonized System (HS) coding(16) can lead to a misinterpretation of data, since it does not provide the detail required to track specific import commodities. As an example of the breadth of the HS code categories, HS Code 23011000, which describes flours, meals and pellets of meat or meat offal, was the category used to describe feather meal imported from France for use as animal feed, and also high-protein binder containing porcine blood meal of Danish origin. It is therefore impossible to know exactly what types of products have been imported by analyzing only the Statistics Canada import data.(17)

CONCLUSION: BANNING "CANNIBALISM" IN THE LIVESTOCK INDUSTRY?

The current feed policy in Canada draws on the science and most current understanding of BSE available at this time. Although there is no scientific evidence to suggest that BSE may be transmitted via non-ruminant proteins, there is some debate in Canada as to whether the federal government should mirror the European Union (EU) feed rules and ban all animal proteins in all animal feeds.

In 1994, the EU banned the use of all animal products in ruminant feed, following the lead of some member states that had implemented this measure a few years earlier (the

(15) Canadian Food Inspection Agency, *Report on the Investigation of Commodities Imported from Europe 1999-2000*, May 2001.

(16) The Harmonized Commodity Description and Coding System, or Harmonized System, is a multi-purpose international product nomenclature developed by the World Customs Organization.

(17) See Appendix 2 for examples of import data identified by HS coding.

United Kingdom in 1988, and France in 1990). But in December 2000, it extended the ban to prohibit the feeding of processed animal proteins to all farmed animals (except fishmeal for non-ruminants).

This measure was justified in Europe by a number of factors, including:

- shortcomings in the application of the previous feed ban: in particular, cross contamination frequently occurred between ruminant feed and feed containing processed animal proteins intended for other species;(18)

- concerns about feed control: analytical methods to differentiate ruminant from non-ruminant proteins in feed were not available;(19) and

- the *theoretical* risk of newly emerging feed-borne animal transmissible spongiform encephalopathy (TSE): this risk might be reduced through the prevention of intra-species recycling (e.g., feeding hogs with feed containing rendered swine products).(20)

Low consumer confidence in regulatory bodies and in the industry's ability to comply with the previous feed ban may also have been a factor in the political decision to ban all animal proteins in feed. In this regard, the situation in Canada is somewhat different: consumer confidence does not seem to have been lessened by the discovery of BSE, and the compliance rate with the current feed ban is high enough to ensure food safety.

The proposed amendment to remove bovine SRM from all animal feed addresses the issue of cross-contamination. It leaves the door open, however, to arguments that the recycling of animals into feed carries a theoretical risk of creating new TSEs. Moreover, the removal of all rendered products from the feed chain would pose challenges for their disposal in an environmentally responsible manner. In 2002, the European Commission estimated that 16 million tonnes of animal by-products produced yearly had to be destroyed in the 15 member states.(21) Finally, the effect that a ban on animal proteins in feed might have on other sources of protein (including fishmeal) is largely unknown to date.

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(18) European Commission, *Use of processed animal proteins in animal feed*, 2002.

(19) European Commission, *Commission Working Document with regard to the state of play on the prohibitions to feed animal protein to farmed animals to prevent transmissible spongiform encephalopathies*, 2003.

(20) *Ibid.*

(21) European Commission (2002).

APPENDICES

APPENDIX 1

CURRENT AND PREVIOUS BSE IMPORT POLICIES

The following information is adapted from the CFIA'S 2002 *Risk Assessment on Bovine Spongiform Encephalopathy in Cattle in Canada*, Part A, "Evaluation of Risk Factors."

Current BSE Import Policies (Since February 2000)

Rendered animal protein (all species) including tallow containing protein, pet food, and fertilizers containing animal protein may be imported only from countries designated free from BSE.

Protein-free tallow may be imported from countries not designated free from BSE if it is certified that it is protein-free (maximum level of insoluble impurities of 0.15% in weight) and that measures have been taken to prevent cross-contamination.

Animal blood: sprayed dried blood may be imported only from countries designated free from BSE. Bulk fetal bovine serum may be imported under permit but may not be used for the manufacture of veterinary biologics.

Livestock feed may be imported provided it meets the controls on animal products listed elsewhere in the Canadian BSE import policies, and provided that it is labelled in accordance with the Canadian feed ban.

The following products are exempt from import requirements attributable to BSE:

- milk, milk products and derivatives thereof (including casein and lactose);
- hides, skins, hair and products derived from these tissues (including gelatin and collagen prepared exclusively from hides and skins);
- gelatin and collagen other than as described above, provided that it is not for use in livestock feeds;
- products produced by subjecting bones to rigorous processes of extraction and purification, such as ossein, bone ash, bone charcoal, bone oil, and dicalcium phosphate;
- products and by-products containing bovine material sourced from tissues with no detected infectivity for BSE,(1) that have been subjected to rigorous processes of extraction and purification, such as animal glue, oleosterin, triglycerides, glycerol, and sorbitan esters;
- pet chews.

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(1) Tissues with no detected infectivity for BSE are: skeletal muscle, heart, kidney, colostrum, milk, discrete adipose tissues, salivary gland, saliva, thyroid, mammary gland, ovary, testis, seminal testis, cartilaginous tissue, connective tissue, skin, hair, blood clot, serum, urine, bile and feces.

Previous BSE Import Policies

Rendered Animal Protein:

- 1982: Meat meal not allowed from countries other than the United States. Bone meal permitted with certification that it was produced in an approved place and manner.
- 1988: Meat meal, bone meal, blood meal imports banned except from the United States.
- 1990: Rendered animal products allowed from countries other than the United States under the authority of an import permit, provided that Canada was satisfied the product did not pose a hazard for the introduction of serious disease.
- 1996: Animal and pet food or material imported as ingredients of animal and pet food containing material of ruminant origin not allowed from countries not recognized free of BSE. Meat meal, bone meal and blood meal for any use allowed from the following countries: United States, Australia, Denmark, Finland, Iceland, New Zealand, Norway and Sweden.
- 1997: In accordance with the feed ban, permits are required for the import of all rendered animal products, stating the classification of the product (prohibited or non-prohibited for use in ruminant feeds) and the restrictions associated with the classification. Rendered products of ruminant origin (with the exception of milk and blood) not allowed from countries not designated free of BSE.
- 1998 (April): No change.
- 1998 (December): Policy expanded to include ovine (sheep) and caprine (goat) products. Designated countries required to certify that the animal had been slaughtered in that country.
- 2000 (December): The import of all animal protein products, including blood meal and feather meal, from any species from any country that Canada does not recognize as free of BSE was suspended. (Of the import permits suspended because of this action, none had been issued for ruminant MBM. Rendered blood products for use in aquaculture were permitted from Belgium. Porcine MBM, again for use in aquaculture, was permitted from Denmark.)

Inedible Tallow:

- 1982: Inedible tallow may be imported from the United States.
- 1988: Tallow may be imported only from the United States.
- 1996: Tallow exempt (with certification) from import restrictions specific to BSE. Tallow for any use may be imported from designated countries (Australia, Denmark, Finland, Iceland, New Zealand, Norway, and Sweden). This policy remained in effect until December 2000.

Rendered Animal Blood:

- Rendered animal blood imports were regulated identically to rendered animal protein imports, with the following exception: from 6 April 1998 to 7 December 2000, blood products were exempt from import restrictions specific to BSE.

Livestock Feed:

- 1982: The import of livestock feed was restricted to countries free of foot-and-mouth disease. Rendered animal protein was allowed to be imported only from the United States.
- 1996: Animal and pet food containing material of ruminant origin was prohibited from countries not recognized as free of BSE.
- 1998 (April): The import of mammalian protein or products containing mammalian protein (except protein derived from milk, blood or sourced exclusively from equines or swine) for use in feeding ruminants was prohibited.
- 1998 (December): No change.
- 2000 (December): Feeds containing any rendered animal products of any species were no longer eligible for import from BSE-infected countries.

APPENDIX 2

DATA ON SELECTED CANADIAN IMPORTS, 1995-2003

Table 1: Total Canadian Imports from the World*

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Soybean Residues (HS 2304)	797m	687m	649m	774m	791m	809m	1,004m	1,076m	1,043m
Animal Feed Preparations (HS 2309)	397m	368m	370m	336m	306m	316m	395m	363m	341m
Flour, Meal (HS 2301)	90m	95m	121m	115m	106m	143m	149m	135m	112m
Veg. and Waste (HS 2308)	6m	12m	30m	59m	44m	30m	28m	50m	44m
Other Solid Residue (HS 2306)	9m	8m	12m	12m	13m	7m	20m	29m	18m
Peanut Residues (HS 2305)	1m	158t	277t	625t	385t	691t	1m	4m	6m
Wine Lees; Argol (HS 2307)	4t	109t	2t	55t	195t	182t	32t	28t	7t

Source: *World Trade Atlas.*

* Quantities in millions (m) or thousands (t) of kilograms.

Table 2: Total Canadian Imports of Soybean Residues by Selected Countries (HS 2304)*

	1995	1996	1997	1998	1999	2000	2001	2002	2003
United States	797m	687m	649m	774m	780m	808m	1,004m	1,075m	1,042m
Taiwan	25t	16t	9t	159t	388t	129t	173t	100t	311t
China	18t	22t	35t	0	0	33t	362t	390t	125t
Denmark	0	0	0	0	0	0	0	0	68t
South Korea	0	1t	1t	0	0	10t	13t	23t	34t
Australia	9t	0	0	0	0	0	0	29t	25t
Japan	37t	200t	23t	0	11t	5t	0	0	0
Christmas Island	0	0	0	0	0	0	0	89t	0
Brazil	0	0	0	0	10m	0	0	0	0
Netherlands	0	0	0	0	0	0	0	110t	0

Source: *World Trade Atlas.*

* Quantities in millions (m) or thousands (t) of kilograms.

Table 3: Total Canadian Imports of Animal Feed Preparations by Selected Countries (HS 2309)*

	1995	1996	1997	1998	1999	2000	2001	2002	2003
United States	383m	353m	355m	316m	286m	293m	371m	348m	324m
China	259t	648t	2m	2m	2m	2m	2m	2m	3m
Germany	681t	545t	666t	1m	1m	1m	2m	1m	1m
Denmark	122t	194t	413t	285t	189t	1m	347t	179t	1m
Taiwan	326t	417t	265t	367t	649t	522t	448t	710t	1m
France	2m	1m	1m	2m	2m	2m	2m	925t	1m
Norway	361t	106t	785t	55t	719t	1m	779t	590t	1m
Netherlands	511t	737t	979t	2m	702t	781t	533t	1m	801t
Thailand	2m	2m	2m	1m	1m	1m	1m	681t	489t
Peru	2m	3m	1m	6t	9t	992t	51t	8t	0
Japan	400t	342t	238t	392t	339t	333t	396t	390t	404t
Chile	1m	1m	1m	0	0	0	28t	60t	164t
United Kingdom	767t	740t	791t	812t	414t	290t	231t	205t	99t
Brazil	462t	442t	229t	1m	1m	1m	1m	321t	45t
South Korea	375t	390t	551t	207t	222t	261t	343t	111t	99t
Malaysia	72t	100t	125t	376t	438t	6t	261t	226t	76t
India	291t	175t	382t	386t	369t	983t	295t	519t	253t

Source: *World Trade Atlas*.

* Quantities in millions (m) or thousands (t) of kilograms.