

## Bluetongue viruses and trade issues: a North American perspective

W.R. DeHaven<sup>(1)</sup>, J.A. del Valle Molina<sup>(2)</sup> & B. Evans<sup>(3)</sup>

- (1) Veterinary Services, Animal and Plant Health Inspection Service, United States Department of Agriculture, 1400 Independence Avenue, SW, Washington, DC 20250, United States of America  
 (2) Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación, Municipio Libre #377, 7° Piso, Ala 'B', Santa Cruz-Atoyac, Delegación Benito Juárez, Mexico DF, CP 03310, Mexico  
 (3) Animal Products Directorate, Canadian Food Inspection Agency, 59 Camelot Drive, Ottawa, Ontario K1A 0Y9, Canada

### Summary

The geographic distribution of bluetongue (BT) viruses (BTVs) is governed by definable virus-vector-ecological/environmental relationships. The infection can only be transmitted by competent vectors. In the United States of America (USA), the New England States (Maine, Vermont, New Hampshire, Massachusetts, Rhode Island and Connecticut) and the northern tier of states from Maine to Montana are free of BTV because they are vector-free. Likewise, the eastern provinces of Canada are free of both the vector and the viruses. In Mexico, different virus-vector ecosystems exist in the northern and southern regions of the country. Historically, significant trade in cattle has occurred between Canada and the USA and the USA and Mexico. Although unrestricted year-round movement of cattle from BTV-endemic areas to vector-free and BTV-free areas occurs, BTVs have never been isolated from resident cattle in such virus-free areas in the USA. The authors discuss current BT-related requirements for trade within North America and elsewhere.

### Keywords

Bluetongue virus – Canada – *Culicoides* – Cattle – Mexico – North America – Trade.

### Bluetongue virus serotypes and vector relationships in mainland North America

The geographic distribution of bluetongue (BT) viruses (BTVs) is governed by definable virus-vector-ecological/environmental relationships. BTVs can only be transmitted by competent vectors. Within the United States of America (USA), the New England States and the northern tier of states from Maine to Montana are essentially BTV-free because they are vector-free. Despite the fact that Montana, like the prairie provinces of Canada, is not free of *Culicoides sonorensis*, there is little evidence that these populations are competent vectors. Moreover, while Canada has concerns about the competence of *C. sonorensis* populations in Montana, there is limited serological evidence of the presence of BTV antibodies in cattle. No virological or clinical evidence has been detected that suggests that BTV transmission occurs or that competent vectors exist in Montana. Regardless, Canada recently has recognised that Montana has a low risk of virus transmission.

Five serotypes of BTV, 2, 10, 11, 13 and 17, occur in the continental United States. Serotypes 10, 11, 13 and 17 are associated with *C. sonorensis*, which is prevalent in much of the middle, southern and western USA. This vector does not persist in the north-east USA, perhaps due to competition with *C. variipennis*, the probable vector of epizootic haemorrhagic disease viruses. The other virus-vector association which has been reported is with BTV-2 and *C. insignis* in southern Florida. A similar vector-virus relationship exists with BTV serotypes 1, 3, 4, 6, 8, 12, 14 and 17 in the Caribbean islands and the territories of Puerto Rico and the United States Virgin Islands, again associated with *C. insignis*.

Canada conducts triennial serological surveys for BTV exposure and has occasionally found serological evidence of infection in the Okanagan Valley of British Columbia, which extends into the State of Washington. In addition, *C. sonorensis* has been found in southern portions of the western provinces.

Mexico, on the other hand, has both *C. sonorensis*-BTV serotype associations typical of those in the

mainland USA and *C. insignis*-BTV associations common to the rest of the tropical regions of the Americas.

Mainland USA has no BT requirements on cattle from Puerto Rico or the United States Virgin Islands, despite the different virus-vector ecosystems in the Caribbean Basin. The same is not true regarding trade between other Caribbean islands and the USA. Regardless, Caribbean BTV serotypes have not been introduced by livestock movement into the continental USA.

### Cattle trade between the United States and Canada

The USA has been the primary destination for Canadian beef exports; the estimated value to industry is US\$1.2 billion annually. In 2002, the USA imported just under 1.7 million head of live cattle from Canada, mostly for slaughter. During the same year, the USA exported 134 220 head of live cattle to Canada, with a trade value estimated at US\$50 million. Most of these cattle were feeder cattle imported into Canada under the 'restricted feeder programme'. This programme mitigates the principal disease concerns of Canada, namely BT and anaplasmosis, and does so by allowing the controlled importation of cattle during winter months only (October to March) from certain low-risk states and with a treatment protocol for anaplasmosis.

The volume of cattle trade involved in the restricted feeder programme from 2000 to 2002 ranges from approximately 209 000 to 119 000. During 2003, trade was reduced significantly due to drought and the finding of a single case of bovine spongiform encephalopathy (BSE) in Canada, which led to a cessation of live cattle exports from Canada to the USA.

The USA and Canadian cattle industries have been working to find ways to increase exports to Canada, while continuing to protect the health status of the Canadian cattle herd. Increasing scientific evidence has indicated that the risk of BTV and anaplasmosis spread and disease establishment in Canada through live cattle trade may not be as great as previously thought; risk may be mitigated through simple, science-based measures.

The eastern provinces of Canada, the northern tier of states from Minnesota to Montana and the New England states, extending as far south as Maryland and Pennsylvania, are BTV-free because they are vector-free. While populations of a known BTV vector species, *C. sonorensis*, occur in Montana and the southern parts of the prairie provinces of Canada, there is no virological or clinical evidence to

suggest that these populations are competent vectors. The scant serological data may reflect the limits of the serological tests. Environmental and ecological conditions in the northern states and Canadian provinces may not permit the phenotypic expression of the genetically controlled oral susceptibility of these populations to BTV. Recognising this, Canada has taken action to lift their restrictions for the movement of feeder cattle from all parts of the USA to the eastern provinces.

Under a pilot programme, Canada has expanded the restricted feeder programme for cattle from Montana and North Dakota into the summer months because the proposed importation into defined feedlots with vector control programmes was judged to present a low risk for the introduction of BTV. While vector competence and vector capacity studies are being conducted on populations of *C. sonorensis* from Alberta and Montana by scientists in Lethbridge (Alberta) and Laramie (Wyoming), respectively, the four basic criteria to prove vectorship must be satisfied and evaluated with the considerable body of historic virological and clinical evidence that BTV transmission does not occur in these areas.

As Canada is vector-free (except for occasional incursions into the Okanagan Valley of British Columbia) and BT-free, the perspectives for Canada are significantly different from those for the USA and Mexico. Due to its classification as 'free' from BT, Canada must immediately report any case of this Office International des Épizooties (OIE) 'List A' disease. By contrast, BTV is endemic in many parts of the USA and in Mexico. As such, it is notifiable annually to the OIE. Canada has committed to work with the USA to address the classification matter at the international level.

Trade in live animals during the vector-free period, recognising the incubation and infective period of the disease, has been facilitated. The experience gained suggests that amendments to the existing OIE *Terrestrial animal health code* provisions could be accommodated without jeopardising the health status of the receiving country. The vector-free principle can be applied equally to the country of origin as well as to the country of destination.

One of the first international success stories for the use of regionalisation was achieved in Canada in 1988 through the use of ongoing surveillance and sentinel programmes and movement controls, as well as recognition of vector dynamics. Consequently, the international community has recognised Canada to be free of BTV infection with a small geographically defined exclusion zone in the Okanagan Valley of

the Province of British Columbia and provided a science-based standard for trade.

The current ban on the importation of live cattle and other ruminants from Canada into the USA is due to the finding in May 2003 of a single case of BSE in Canada. The Animal and Plant Health Inspection Service (APHIS) of the United States Department of Agriculture (USDA) continues working to resolve the impediments to live cattle exports to Canada where this is technically possible and as resources allow. APHIS has fostered continued collaboration with states, representatives of the cattle industry, universities, USDA Agricultural Research Service scientists, and the Canadian Food Inspection Agency (CFIA). APHIS has provided available information to CFIA and will continue to foster the sharing of data. Furthermore, APHIS is actively consulting with CFIA on anaplasmosis and BT, and intends to continue submitting requests for risk evaluation by CFIA to further reduce Canadian import requirements for BT, giving consideration to existing and emerging scientific knowledge.

APHIS is actively collaborating in various studies concerning BT and anaplasmosis. Several of these studies include official Canadian participation, as follows:

- 1) the joint Montana-Alberta feeder cattle study is examining the status of feeder cattle from various regions in Montana relative to BTV and *Anaplasma* exposure over a three-year period.
- 2) A BTV surveillance pilot project was conducted in three states (Nebraska, North Dakota and South Dakota). Samples were tested for antibodies to BTV and *Anaplasma*. Data collection is complete and a series of reports are being developed. Preliminary results of the study showing the prevalence of antibodies to BTV in each of the states and the vector trapping results were discussed at the 2002 United States Animal Health Association (USAHA) meeting at the General Session. Ongoing analysis will evaluate animal and operation level factors as well as climatic factors related to BTV exposure. This information should help to explain the observed and expected distribution of BTV exposure.
- 3) The biennial national BTV surveillance project has increased the number of states represented to a total of 24 (six new states in 2003) in 16 groupings, and is looking at anaplasmosis for the first time in many years. Results of the testing for BTV were shared at the 2003 USAHA meeting. The analysis of the *Anaplasma* test results is underway.
- 4) *Culicoides* trapping was conducted in Montana in the summer of 2002 and continued during the

summer of 2003. In addition, serum samples collected in the autumn of 2003 on operations where trapping occurred are being tested for BTV antibodies.

On 15 July 2002, CFIA notified APHIS that Montana is now considered a 'low incidence state' for BTV. This change allows Montana breeding cattle, bison, sheep and goats to enter Canada with a single BTV test during the vector season. CFIA also informed the USA in 2003 that imports of feeder cattle from Hawaii are now permitted year-round without restriction for anaplasmosis and BT.

In October 2002, APHIS convened an expert panel to develop a USDA strategy on anaplasmosis, tick and wildlife issues, treatment mitigation, the use of tetracyclines and to address any research needs. APHIS has shared the document that emanated from this meeting with CFIA and is in the process of implementing the strategy set forth in that document. The United States scientists who participated in that panel expressed support for the industry proposal for a pilot feeder programme during the summer months.

In response to United States and Canadian industry requests, Canadian officials indicated in March 2003 that CFIA would implement a pilot project to permit the summer importation of United States feeder cattle into a single quarantine feedlot in Alberta and that additional feedlots could be added. The project will cover animals originating in Montana and North Dakota, with the main target period for import being August or September. A number of monitoring provisions are being developed. Moreover, an assessment of the project will be performed to determine if it can be continued or expanded. The implementation of the summer programme has been delayed due to the BSE crisis, as resources are diverted from the establishment of the necessary administrative requirements and animal health safeguards and because of market uncertainty for the slaughter cattle product. Cattle prices in Canada are currently very low.

### Cattle trade between the United States and Mexico

In Mexico, different virus-vector ecosystems exist in the northern and in the southern regions of the country. The USA has no BT requirements for cattle and other ruminants from Mexico, despite the existence of a virus-vector ecosystem in southern Mexico and Central America that differs from the vector-virus ecosystem found in the United States and northern Mexico. In large part, this is because the USA has not recognised any disease risk from BTVs during the long livestock trading history

between the two countries. Similarly, Mexico, with its two virus-vector ecosystems, does not impose regulatory controls for BT with its neighbouring countries, the USA to the north, and Belize and Guatemala to the south.

### **Cattle trade between Canada and Mexico**

Traditionally, there has been no export of Mexican cattle to Canada because of a lack of Canadian demand for Mexican cattle. However, prior to the diagnosis of BSE in Canada, Mexico was an important market for Canadian dairy cattle. Mexico recognises Canada as BT-free based upon the geographic and ecological characteristics that make it vector-free. Mexico believes there is no BTV risk associated with the movement of Canadian cattle to Mexico. However, there has been a temporary disruption of trade due to the diagnosis of BSE in Canada.

### **Cattle trade between the United States and Europe**

Exports of live cattle to the European Union (EU) have ceased since 1980 due to BT restrictions on United States cattle. The EU has adopted regionalisation policies that permit the importation of live cattle from countries not entirely free of the disease and/or virus (notably Canada). The scientific community recognises that live cattle can be exported from or imported to regionalised areas of infected countries when following recognised testing and quarantine procedures.

APHIS has continued to negotiate with the EU to open the market to breeders and exporters of United States cattle. In June 2003, APHIS presented a proposal to the European Commission (EC) for the export of live cattle from the USA to the EU. The meeting represented the first assembly of an Animal Health Technical Working Group, a new format for resolution of outstanding animal health issues between the USA and the EU, as recommended by the Joint Management Committee of the Veterinary Equivalence Agreement.

APHIS provided alternative equivalent mitigation measures to those found in the then-approved EU animal health certificate. Equivalent mitigation measures were agreed upon for BT.

As the EC requires compliance with the standards of a new draft animal health certificate concerning the feeding of proteins derived from mammals, a final protocol remains pending. At present, the USA cannot meet these requirements as a complete mammalian to ruminant feed ban is not currently enforced. An updated proposal was forwarded to the EC in August 2003 with the alternative mitigation

measures agreed upon in the meeting for BT. This proposal is under review by the EC.

### **Cattle trade between Canada and Europe**

Traditionally, several European countries were important export markets for breeding cattle from Canada. Cattle exports to Europe ceased in 2001 when the EU implemented the ban on the feeding of mammalian proteins to ruminants and restricted imports to source countries with similar feed standards.

Prior to that time, the sanitary certification for BT for Canadian cattle exports varied from country to country. Several countries recognised the BT-free status of Canada outside of the Okanogan Valley of British Columbia and permitted the importation of Canadian animals without mitigating requirements for BT. The United Kingdom (UK), on the other hand, had traditionally required the animals being imported to be subjected to a serological test for BTV and to arrive in the UK during a defined calendar window, annually.

Canada has not imported breeding cattle from Europe in more than a decade. When cattle were imported from Europe during the 1980s and from the UK before the BSE outbreak occurred, Canada recognised the status of exporting countries for BT and did not require BT certification to accompany the imported animals.

### **Cattle trade between Mexico and Europe**

Historically, Mexico had not imported live cattle and other ruminants from Europe due to foot and mouth disease (FMD). Since the 1980s, however, imports have been restricted because of the diagnosis of BSE in many European countries.

Mexico has conducted negotiations with the EU to export fighting bulls to Spain and France. Mexico has provided surveillance information on BTV and vesicular stomatitis viruses to access this market. Serological and virological evidence of the presence of BTV in the absence of clinical disease has been found in Mexico.

### **Cattle trade between the United States, Australia and South America**

The USA has relaxed BT test requirements/restrictions on importation of cattle from Australia. The USA does not require BTV testing of cattle after 60 days in vector-free isolation.

The USA has not imported any significant numbers of live cattle from South America, in large part due to the presence of FMD in many countries there. During the 1980s and before, when the high-security

Harry S. Truman Animal Import Center was functioning and imports of cattle and other ruminants were permitted, the USA applied isolation and testing requirements for BT. During a period when Uruguay was considered free, importers in both the USA and Mexico expressed interest in cattle from Uruguay and a protocol was under development by the USA. This work is not currently progressing.

### United States bluetongue position

APHIS believes that BT is not an emerging disease. Wind-borne infected vectors, rather than viraemic livestock, have been demonstrated as the cause for virus movement and the establishment of virus in new regions. Ecosystem expansion and contraction is related to prevalent vector species, climatic events, ecology, and environment rather than infected livestock movement. The USA does not consider the unlikely possibility that seropositive cattle may be viraemic to be a disease or trade risk.

Despite unrestricted year-round movement of cattle from the western BTV-endemic areas in the USA to the vector-free northern and north-eastern BTV-free areas of the USA, there has never been a case of BT in, or virus isolated from, resident cattle.

The USA is receptive to considering importation of livestock from other BT-affected countries. Currently, the USA does require some mitigation for BT for animals imported from the Caribbean (outside the USA Territories) and regions with serotypes that are not common to North America.

### Conclusions

The USA believes that BT is a non-tariff trade barrier to the unrestricted movement of cattle. The preponderance of scientific evidence indicates that the movement of infected insects, not infected livestock, is responsible for the movement of BTVs.

Historically, there has been significant trade in cattle between Canada, the USA and Mexico. Although unrestricted year-round movement of cattle from BTV-endemic areas to vector-free and BTV-free areas occurs, the virus has never been isolated from resident cattle in such BTV-free areas in the USA.

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