

BOOK REVIEW

Qualitative Risk Assessment of the Spread of Foot and Mouth Disease by International Trade in Deboned Beef. D.J. Paton, M. Sinclair and R. Rodriguez. Technical Series, Vol. 11. World Organization for Animal Health (OIE). Paris, France. Website: <http://www.oie.int/>

Foot and mouth disease is recognized as one of the devastating diseases of livestock affecting the farming community and the industry in no small measure. There are formidable difficulties in implementing control measures against this disease because of multiple strains of the viruses involved in causing the disease and the disease affecting many species of animals, particularly the cloven footed livestock and wildlife. The sub-clinical carriers are sources of spreading infection to the susceptible stock. International trade in beef is likely to be adversely influenced by the disease since the beef is imported from many countries which are not declared free of the disease. The consequences of this in the long run would be reduction in investment and decline in the growth of this major meat sector. This publication examines the risk of spread of this disease across the globe through deboned beef.

The information provided in this booklet may help to develop an insight into the occurrence of FMDV through beef trade and control measures envisaged. Mitigation procedures adopted by the countries in South America have contributed towards the growth of a safe and specialized beef industry in the region. No incidence of any outbreak of FMD was reported in Europe through the import of deboned beef from South America. The same is true for UK on account of import from Argentina, though substantial quantities were imported for several years. The information is significant since no vaccination was applied in UK during this period of import. About 50,000 to 55,000 steers may have to be slaughtered to obtain 1000 tons of deboned beef. The region from where the beef was produced was reported to be a secondary endemic zone for the disease and this region could have contributed at least in part to the total beef exported from Argentina to UK. Small scale imports also took place from some countries of southern Africa. These African countries demarcated FMD free zones from where export to Europe was permitted. Further, these countries practiced several FMD control measures such as vaccination, fencing of endemic areas, movement restriction of animals exposed to infection, and following 3 weeks incubation time before the beef is exported.

Several factors including veterinary services in place, disease surveillance measures, eradication and control measures, zoning, animal husbandry practices, geo-environmental conditions and meteorological situations contribute to the level of risk involved when the beef is exported from one country to another. The publication discusses a risk assessment scenario tree at a slaughter house. The assessment of the commodity risk factor showed that at different levels, various factors contributed to the risk which are sequentially elucidated and discussed. During ante-mortem inspection the disease may not be detected, since the carrier animals may not have scars on the tongue or foot and may escape detection. But separate studies indicated the presence of high virus titres in lymph nodes 24 hours post-vaccination, before any clinical signs appeared, viraemia in some animals before the onset of clinical symptoms and presence of considerable amounts of virus in the mucosae and lymphoid tissues of the pharyngeal region for periods up to 3 to 9 days before detection of viraemia and other clinical signs. At the post mortem inspection stage, there could be animals not detected for FMD, but carrying considerable amounts of virus in the mucosae and lymphoid tissues of the pharyngeal region. A thorough post mortem examination is at least five times more sensitive than ante mortem examination on account of individual inspection of each carcass.

Pharynx is a major site of primary and secondary virus replication during acute infection and superficial mechanical contamination of beef by the virus present in the throat is a risk which is needed to be considered. The successful removal of potentially infected tissue such as head, feet, pharynx etc. will reduce the risk of contamination of the final product. The virus also survives maturation at temperature above 2°C for a minimum of 24 h even with pH below 6. Prolonged survival of the virus is likely only when the pH is above 6.2. Lymph nodes, bone marrow and blood clots in large vessels do not develop the degree of acidity needed to inactivate the virus. Human element is involved in the presence or absence of virus during the process of deboning and removal of lymph nodes. Beef of cattle slaughtered in the incubation period constitutes a formidable risk. Cross contamination at stages of processing and packaging needs to be avoided. A forward moving conveyor belt ensures that clean products are not moved back to have contact with products at potentially contaminated points of processing. While the virus survives at least for four days in infected blood splashed on carcass surfaces, the virus within the cells, epithelial lesions and discharges containing tissue debris survives longer. The virus on a meat cloth survives for six weeks at 4°C. Meat packaging materials experimentally contaminated and stored at 4°C and 85% humidity have been reported to carry the virus which can survive as long as over 33 days.

The book carries a chart summarising the scenarios for safe preparation and export of deboned beef. Surveillance, vaccination, quarantine and waste product management have been discussed under these scenarios. Early detection of the disease in the source herds and appropriate control measures are extremely important. Cattle develop an effective immune response within 3 to 5 days after vaccination. Vaccination can reduce the number of infected animals and the risk of slaughtering viraemic cattle in pre- or sub-clinical stage of the disease. Neutralising antibodies induced in vaccinated animals are probably the best guarantee for the tissues in the carcass being free of the virus. Antibodies to vaccine viruses may not protect against infection with viruses that are closely related antigenically to the vaccine strain of the virus. High yielding dairy cows have been found to be not always protected from high level challenge with FMDV despite vaccination with vaccine containing eight strains of virus. The countries which are not free from FMDV should identify the types and strains of circulating viruses and use appropriate vaccine for control. The incubation period of FMDV is 14 days. A three week quarantine period of affected animals should be sufficient. A ban on the feeding of swill to pigs or mandatory heat treatment before feeding may mitigate the risk to a considerable extent.

As part of recommendations, the book emphasizes the need for specific guidelines in respect of isolation of affected animals, surveillance and vaccination (vaccination between 4 and 12 weeks prior to slaughter of all cattle destined for presentation at export abattoirs), survey of antigenic variants, role of vets in supervising and approving procedures of accreditation and enforcement, strict regulations for ante- and post-mortem inspection and preparation of specified beef commodity items to provide adequate assurance to the FMDV free status. Further research is needed on behaviour and survival of the virus in bovine fat tissues, amount of residual bone marrow in the final product, effective oral dose of FMDV for pigs, relative contribution of pre-slaughter and at abattoir control measures, survival of a wide range of serotypes and strains in carcasses, especially Asia 1 and SAT viruses and gaps in the availability of suitable vaccine strains in some regions.

Livestock economy and global beef trade ultimately depend upon how far the various stake holder countries are effective in producing beef free of FMDV. This book provides an insight on this challenging task for the benefit of farmers, industry, field vets and academics involved in research. The authors and the OIE need to be complimented for rendering a valuable service toward this noble cause through this book.

N. Balaraman