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Personal View

Contagious animal diseases: The science behind trade policies and standards ☆

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Introduction

Contagious animal diseases have a negative effect on animal production and public health worldwide. The extent of economic losses is considerable, but has been quantified at global level for very few diseases (Junker et al., 2009; Knight-Jones and Rushton, 2013). As diseases spread across geographical and political boundaries, old diseases appear in new areas and new diseases emerge. The impact of disease increasingly extends beyond the agricultural sector and includes indirect economic consequences, thus increasing the costs of outbreaks.

Several underlying drivers account for the increased impact of contagious animal diseases (Harrus and Baneth, 2005; Steinfeld et al., 2006). Diseases are spreading more widely and quickly due to increased global trade and faster transport. Trade of animals and animal products is driven by demand and increasing global purchasing power as a result of expanding world populations, increasing urbanisation and growth of the middle classes in developing economies. Urbanisation and demographic changes also create new interfaces between animal and human populations, leading to novel or altered exposure to pathogens.

These changes emphasise the importance of aligning trade standards and science to ensure safe trade and prevent the spread of disease, including its impact on public health. This paper summarises some of the issues debated at a seminar arranged by the Centre for Global Animal Diseases, Swedish University of Agricultural Sciences, Stockholm, Sweden, on 17 October 2013.[1]

Increased global trade, demand and production

Global trade of animal and animal products is increasing, reflecting increased consumer demand for livestock products and fish (Narrod et al., 2011). Increased consumer demand is not the only driver for increased international trade, since there is also replacement of locally produced products by internationally produced items. As an example, the European Union (EU) has almost doubled imports of meat over the last decade, although neither population nor per capita meat consumption has doubled. Closer examination of trade and consumption data suggests substitution, where some products are now imported, while others, previously consumed domestically, are exported. The reasons behind these shifts are mainly

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[1] See: www.slu.se/cgd (accessed 6 June 2014).

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economic, since foods may be produced at lower costs elsewhere due to lower labour costs, more favourable climate, specific quality requirements or, in some instances, subsidised production.

Food and agricultural products are also important for the livelihoods of the majority of the world's population. Outbreaks of contagious animal diseases are devastating for the affected producers and have large effects on trade, economy and domestic food production (Domenech et al., 2006; Morgan and Prakash, 2006). One example of this is the collapse of the poultry and egg export market in Thailand during the outbreak of highly pathogenic avian influenza (Upton, 2006). The original market shares were permanently lost as producers on other continents filled the gap. A more recent example is the incursion of African swine fever into the Caucasus region and its spread to the EU, presenting new challenges to trade legislation.[2] There are numerous other examples demonstrating that, despite clear trade standards, trade is regularly disrupted even for countries that are not involved in disease outbreaks.

Increased trade also can lead to increased concentration and specialisation in production, as well as increased genetic homogeneity in animal species. This can have implications for disease spread in terms of vulnerable animal populations and production systems.

Principles of free trade and animal diseases

The World Trade Organization (WTO) is founded on the principle of free trade.[3] However, this principle is not absolute, due to the disease risks related to unrestricted trade. The risks and benefits of food trade need to be balanced to account for potential risks to human and animal health, i.e. animal health transmission risks vs. access to larger high price markets and public health risks vs. food security. Risk analysis is an important tool to manage and quantify risks and benefits; it can also take into account economic assessments.

The principles of the Sanitary and Phytosanitary (SPS) agreement under the WTO provide the international legal basis for an importing country to stop trade if there is evidence of a health risk for humans, animals and/or plants,[4] as long as the scientific basis of these risks can be demonstrated by risk assessment. The Common Agricultural Policy (CAP) within the EU promotes free markets and open borders. Therefore, science has to be embedded in appropriate legislative acts to prevent, manage, control and eliminate contagious animal disease risks. However, refining legislation is seldom the primary goal (or expertise) of scientists, even though science is a necessary input to drafting appropriate legislation.

There are some well-known examples of changes in trade legislation in response to animal hazards and to protect international trade. The most significant trade disruption of global scale was probably caused by bovine spongiform encephalopathy (BSE), which triggered repeated revisions of relevant standards and legislation at European and international level. The related losses for Germany alone were estimated to be as high as €2 billion,[5] only 1% of which was attributed to direct measures and compensation for affected farms (Probst et al., 2013). This hazard currently presents a new challenge to the legal system, i.e. when and how to reduce or lift restrictions after a hazard is almost extinct (Hueston, 2013).

An option for countries not able to fulfil the WTO requirements is to form bi- or multi-lateral trade agreements. In a region where the World Organization for Animal Health (OIE) criteria for freedom from a particular animal disease cannot be fulfilled, trade can still continue within the region using this type of agreement.

Science vs. legislation

Science in the field of veterinary medicine usually focuses on the technical aspects of animal diseases and does not take other aspects, such as economics and social factors, into account. In particular, legal aspects, which are crucial when it comes to implementing control and eradication measures, are not always in the focus of scientists. Useful and modern diagnostic techniques often are not embedded in legislation and scientific advances often outpace the legal process of developing legislation and regulations. In principle, there is often enough scientific evidence to support trade regulations following outbreaks of contagious animal diseases, but these have to be embedded promptly in appropriate legislative acts. One example of this is the amendment of an EU decision (2008/855/EC) concerning animal health control measures relating to the use of PCR as a diagnostic tool to prove freedom from classical swine fever (CSF). The old legislation proscribed serological tests, but these provide less security for trade than PCR. The EU legislation concerning testing and control of CSF was subsequently amended based on scientific evidence relating to tests for this disease (McGoldrick et al., 1999; Paton et al., 2000a and b).

The complexity of science means that simple solutions to challenges provided by contagious animal diseases are rare. Cost–benefit analyses are very important for policy makers as a basis for deciding on cost effective control measures. Such analyses are not straightforward and depend on data availability and quality, as well as decisions on which costs should be included and how costs are calculated (Dijkhuizen et al., 1995; Rushton, 2009).

Usually, estimates of costs for outbreaks of severe contagious animal diseases are based on limited data. Even more data are needed when estimating costs related to production, distribution and consumption, lost benefits of consuming animal products and loss of economic values due to disease for individuals and society as a whole. The cost–benefit analysis also may demonstrate that the control programme itself is more costly than the disease. These findings may be politically unwelcome, leading to evidence being ignored. Such political decisions and a lack of understanding of the complexity of political decision making may lead to frustration and resignation among the scientific community.

Another example is the refinement of EU legislation on control of foot and mouth disease (FMD). Scientific studies on transmission of FMD virus between different species when using different vaccines (Orsel et al., 2005, 2007a and b; Eblé et al., 2006) formed the basis for mathematical models estimating the effect of vaccination as a control tool (Backer et al., 2012a and b). These mathematical models are now the basis for the Dutch FMD contingency plan. However, a scientific basis for use of vaccination is not sufficient. In the large FMD outbreak in the United Kingdom (UK) and several other countries in the EU in 2001, the option of 'vaccinate to live' (i.e. vaccinated animals are not eliminated but allowed to survive or be slaughtered and enter the food chain) was not used because there was too much uncertainty about the response of trading partners. The option for 'vaccination to live' is now included in the EU FMD directive (2003/85/EC). This shows that a strong interaction between science and policy is needed.

This interaction involves several phases. Initially, research questions are selected and included in funding programmes. The political process of setting the research agenda, particularly for sources of substantial government funding, such as the EU Horizon 2020, is complex and very few scientists actively engage and lobby for their views. Then, after research results become available, these have to be communicated, not just to a scientific audience, but also to policy makers. If scientists do not engage with policy makers, this can lead

[2] See: http://ec.europa.eu/food/animal/diseases/controlmeasures/asf_en.htm (accessed 15 June 2014).
[3] See: http://www.wto.org (accessed 15 June 2014).
[4] See: http://www.wto.org/english/tratop_e/sps_e/spsagr_e.htm (accessed 15 June 2014).
[5] €1.00 = GB£0.80 = US1.35 as of 15 June 2014.