

Introduction

The spread of pathogens through international trade

The fear of spreading animal diseases from country to country is a major barrier to trade in animals and animal products. The World Organisation for Animal Health (OIE) was founded in 1924 in response to the introduction of rinderpest into Europe through the importation of cattle, and history provides a number of similar examples (8, 10, 11, 16, 20, 23, 25). However, the risks of such spread have decreased in the decades since the OIE was founded, partly as a result of the improvement of the global animal health situation and partly because of the work of the OIE in the development and implementation of international sanitary standards that ensure the safety of traded animals and animal products (29). Nevertheless, with increasing globalisation, concern about the risks of spreading pathogens through trade in animals and animal products remains high amongst veterinary authorities (3).

In 1997, the OIE devoted two issues of the *Scientific and Technical Review* to the disease risks posed by animal products contaminated with pathogens (1, 27) and in 2001 published a conference proceedings which dealt with the disease risks posed by trade in aquatic animals and their products (22). Many of the papers in the current issue update or expand on topics examined in those earlier publications.

Despite greatly increased volumes of trade in animals and animal products (17), and complex patterns of trade (10, 25, 30), concerns about the spread of pathogens through trade are not always well founded. In this issue of the *Review* a number of papers (2, 4, 8, 12, 20) show that there is little evidence that many commodities pose a real disease risk. In 2004, MacDiarmid (14) argued that the risks posed by bovine spongiform encephalopathy (BSE) were not nearly as great as many people feared. The passage of time has confirmed this and in this issue Matthews and Adkin (15) present arguments for a re-examination of some of the OIE standards applicable to managing BSE risks in international trade. Much of the information published in this collection will be useful to regulators wishing to assess disease risks posed by trade; Sugiura and Murray (26) outline the application of the OIE risk analysis methodology (5) for this purpose.

It is true that risk is proportional to the volume of trade (32), and that the volume of animals and animal products traded is increasing significantly (17). However, careful examination of published scientific literature, and application of the import risk analysis methodology developed by the OIE (5), strongly support the view that international trade based on the sanitary standards of the OIE (29) can be conducted with little risk of spreading pathogens of animal and public health importance. Data on historical trade often provide valuable insight into whether or not imports of a particular commodity pose a risk of introducing specific diseases. There may be reports in the literature, for example, of a certain pathogen sometimes being recovered from a particular commodity, but this does not, of course, necessarily mean that importing that commodity poses a risk of introducing the disease, because there may be no realistic pathways for exposure. A useful first step, therefore, in conducting an import risk analysis can be to obtain trade data on volumes of the commodity which have been traded between countries in which

the disease of concern is known to be endemic and countries where there is surveillance information to support claims of freedom from that disease. If large volumes of the particular commodity have been exported from countries where the disease of concern is endemic, yet there have been no reports of the disease being introduced into importing countries, then one can have some assurance that such imports pose little risk (5).

The role of illegal trade in spreading animal pathogens is touched on in a number of papers (2, 10, 16, 30). Hueston and coll. (13) present an interesting discussion on the unintended effects of overly restrictive risk mitigation measures, which actually increase risk through increasing the incentive to import illegally. This journal has reported previously on the deliberate, illegal introduction of animal disease (18) and one of the papers in this current issue (6) greatly expands on this theme.

A number of papers together provide an overview of patterns of global trade in animals and animal products (17) and examine the main pathways by which significant diseases of livestock have been spread historically (2, 9, 10, 11, 31). The specific risks posed by trade in meat (8, 19, 25) and other commodities (2, 25), livestock (12, 25), germplasm (7, 28), wildlife (30), aquatic animals (23) and bees (16) are examined.

Several authors examine the various means by which the risks of spreading pathogens through trade may be mitigated. Risk mitigation measures examined include embryo transfer (28), vaccination against foot and mouth disease (12), international standards (29), commodity-based trade (4), compartmentalisation (21), and the good governance of national Veterinary Services (19, 24). Modern molecular techniques for elucidating the epidemiology of viral diseases are discussed in papers by Di Nardo and coll. (10) and Drew (11).

As the 21st Century progresses, this issue of the *Review* continues the OIE tradition of presenting veterinarians around the world with authoritative and comprehensive studies of issues of major importance confronting national Veterinary Services.

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