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The application of epidemiology in national veterinary services: Challenges and threats in Brazil

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ABSTRACT

The application of epidemiology in national veterinary services must take place at the interface between science and politics. Animal health policy development and implementation require attention to macro-epidemiology, the study of economic, social and policy inputs that affect the distribution and impact of animal or human disease at the national level. The world has changed fast over the last three decades including the delivery of veterinary services, their remit and the challenges addressed by public and animal health policies. Rethinking the role of public services and how to make public programs more efficient has been at the heart of the political discussion. The WTO through its SPS Agreement has changed the way in which national veterinary services operate and how trade decisions are made. Most low and middle income countries are still struggling to keep up with the new international scene. Some of these countries, such as Brazil, have very important livestock industries and are key to the global food systems. Over the last two decades, Brazil became a leading player in exports of livestock products, including poultry, and this created a strong pressure on the national veterinary services to respond to trade demands, leading to focus animal health policies on the export-driven sector. During the same period, Brazil has gone a long way in the direction of integrating epidemiology with veterinary services. Epidemiology groups grew at main universities and have been working with government to provide support to animal health policy. The scope and quality of the applied epidemiological work improved and focused on complex data analysis and development of technologies and tools to solve specific disease problems. Many public veterinary officers were trained in modern epidemiological methods. However, there are important institutional bottlenecks that limit the impact of epidemiology in evidence-based decision making. More complex challenges require high levels of expertise in veterinary epidemiology, as well as institutional models that provide an appropriate environment for building and sustaining capacity in national veterinary services. Integrating epidemiology with animal health policy is a great opportunity if epidemiologists can understand the real issues, including the socio-economic dimensions of disease management, and focus on innovation and production of knowledge. It may be a trap if epidemiologists are restricted to answering specific decision-making questions and policy makers perceive their role exclusively as data analysts or providers of technological solutions. Fostering solutions for complex issues is key to successful integration with policy making.

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1. Veterinary epidemiology and national veterinary services in a fast changing world

The application of epidemiology in national veterinary services must take place at the interface between science and politics. Animal health policy development and implementation require attention to macroepidemiology, the study of economic, social and policy inputs that affect the distribution and impact of animal or human disease at the national level (Hueston and Walker, 1993). Therefore, veterinary epidemiology should apply scientific methods to deal with complex policy issues through approaches that consider the economic, legal, and cultural context, as well as the biological and medical issues (Hueston, 2003).

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The world has changed fast over the last three decades, including the delivery of veterinary services, their remit and the challenges addressed by public and animal health policies. The post-war expansion of the services provided by governments was over in the 1980s. New free market economics gained ground and have dominated the economic and political landscape since then, in advanced and developing economies alike. Rethinking the role of the state and how to make public programs more efficient in an era of small government, or rather smaller budgets, has been at the heart of the political discussion.

The Sanitary and Phytosanitary Agreement (WTO, 1995) has also changed the way in which national veterinary services operate and how trade decisions related to agriculture products are made. It requires World Trade Organization (WTO) members to base their sanitary measures on international standards, guidelines and recommendations, which should be defined by the World Organization for Animal Health (OIE), as regards animal health and zoonoses. Zepeda et al. (2005) recognized that national veterinary services worldwide, especially those in developing countries, are facing major challenges to adjust to this new international decision-making scenario. Being a member of the WTO and having signed regional or bilateral trade agreements demands greater responsibility and puts additional pressure upon existing infrastructure, whilst governments' budgets have decreased in many countries. Likewise, risk averse consumers in food producing and importing countries alike, with easy and ready access to information, add to such pressure and bring about the need for transparency and better risk communication. Zepeda et al. (2005) summarized the impact of the SPS Agreement on national veterinary services and identified areas where veterinary epidemiology can contribute to the development of cost-effective solutions: harmonization; equivalence; risk analysis and determination of the appropriate level of protection; regionalization and compartmentalization; transparency, including the need for comprehensive surveillance systems.

The use of risk analysis has been recognized as a tool for applying scientific knowledge to both domestic and international animal and public health issues (Hueston, 2003), especially in the context of international trade. Risk Assessment can also be used to inform risk management in national disease prevention and control programs and to plan risk-based surveillance systems. Risk analysis increased the demand for epidemiological methods within veterinary services and, most importantly, it brought about the need for sound epidemiological information. It is epidemiology applied to policy decisions at the interface of science and politics.

Regionalization opened up new possibilities for establishing disease free zones/compartments, as defined by the OIE, and using this as a strategic tool for disease control. It increased the demand for epidemiological studies to substantiate disease freedom and for methods to establish zones based on differential epidemiological risks.

Epidemiology also plays a key role in harmonization. The development of international standards and guidelines on animal health at the OIE requires the contribution of veterinary epidemiologists, e.g. providing disease models to inform sanitary measures, new surveillance guidelines and criteria for disease risk categorization of countries or zones, as well as methods for the use and evaluation of diagnostic tests. All countries participate in the process and the national veterinary services have to evaluate and approve changes to the OIE Code, further increasing the need for epidemiological skills at the national level.

Transparency involves the notification of disease status and of SPS measures (Zepeda et al., 2005). It requires well-structured independent veterinary services and depends on the existence of high quality comprehensive surveillance systems, which are now the backbone of national veterinary services with considerable expansion of active components. Epidemiological reasoning and epidemiological tools are key to implement effective surveillance systems. According to Willeberg (2012), animal health surveillance is an ever-evolving activity, since health- and risk-related policy and management decisions now and in the future need to be backed by the best available scientific evidence and methodology. In a world of shrinking government budgets, epidemiology can help reduce costs and improve efficacy of surveillance and this has led to newer methods of risk-based surveillance (Reist et al., 2012; FAO, 2014) or the emergence of strategies like syndromic surveillance (Dórea et al., 2011).

The OIE publishes guidelines on surveillance for terrestrial (OIE, 2015a) and aquatic animals (OIE, 2015b), as well as a guide to terrestrial animal health surveillance (OIE, 2015c). In addition, epidemiologists from around the world organize a new conference fully dedicated to surveillance – the International Conference on Animal Health Surveillance (ICAHS). Surveillance is, therefore, a key area for the application of veterinary epidemiology, and a major challenge for national veterinary services.

It goes without saying that the revolution in information technology and communications has had a profound impact upon the way we do research and the way we make decisions, including health policy decisions. Computer technology is increasingly making possible unlimited data storage and manipulation. The massive increase in captured data will present great opportunities for new scientific discoveries on an unprecedented scale (Weisberg, 2014). Hence, veterinary epidemiology is ever more focused on complex data analysis and development of technologies and tools to solve specific disease problems. Statistics, mathematics and information technology are increasingly at the heart of veterinary epidemiology.

In the process, veterinary epidemiologists must not forget that science progresses as much by providing answers as by refining our questions, because the answer is not separate from the problem (Weisberg, 2014). This is key if epidemiology is to be applied to policy decisions in animal health services. There is no point in providing a solution, using complex and sophisticated methods, if one does not get the question right.

New and more complex challenges require high levels of expertise, notably in veterinary epidemiology, as well as institutional models that provide an appropriate environment for building and sustaining capacity in national veterinary services. In many countries with advanced economies and stable institutions, veterinary epidemiology has been progressively incorporated into the planning and management of animal health policies, albeit with different models. The creation of the European Food Safety Authority (EFSA) stands out as a major development in the European Union. EFSA provides independent scientific advice to the decision makers who regulate food safety in Europe. However, low and middle income economies are still struggling to keep up with the new international challenges. Some of these countries have very important livestock industries and are key to the world food systems. So, let us now look at what has happened in Brazil over the last two decades, a country that is a major producer and exporter of livestock and livestock products.

2. The extraordinary growth of livestock production and exports in Brazil over the last 20 years

The size, structure and focus of national veterinary services should be commensurate with the dimension of a country's livestock and food industry and tuned to the challenges posed to the economy, as well as to animal and public health. When the livestock industry plays an important role in exports, eradication of animal diseases that have an impact on trade tends to be given the highest priority in public policies and investments. This is certainly the case of foot-and-mouth (FMD) disease in Brazil, as in other

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