

Foresight methodologies useful to Veterinary Services

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Summary

The world is facing a broad range of challenges related to agriculture, and particularly the livestock sector, including threats to productivity, the natural environment and human health. While much research has been conducted into potential risks and their drivers, the 2020 COVID-19 pandemic demonstrated how governments can be affected by shocks that are to some extent predictable but for which they are often ill prepared. Policy seeks to anticipate and also influence the future and, as policy-makers, national Veterinary Services have an important role in both anticipating and influencing the future of their countries and the world. The first part of this paper summarises a wide range of Foresight methodologies and tools relevant to, or used by, Veterinary Services or veterinary researchers. This discussion is followed by an example of the adaptation and application of a Foresight framework tailored specifically to Veterinary Services. Finally, conclusions are drawn on Foresight methodologies useful to Veterinary Services.

Keywords

Foresight – Policy – Scenario analysis – Veterinary Services.

Introduction

Foresight has been defined as ‘a systematic, participatory, future-intelligence-gathering and medium-to-long-term vision-building process aimed at enabling present-day decisions and mobilizing joint action’ (1). In these challenging and rapidly changing times, it is more important than ever to be prepared for an uncertain and fundamentally unpredictable future. Veterinary Services have a key role in influencing or mitigating many of the emerging or intensifying factors that threaten livestock and animal systems or could transform them in ways that affect human lives and livelihoods. Some of the major current issues in which the livestock, wildmeat and fish sectors play an important or central role include:

- emerging zoonotic diseases, some with pandemic potential
- global greenhouse gas emissions and climate change
- environmental pollution and degradation
- increasing ethical concerns about animal welfare.

In addition, these sectors play a role in:

- changing landscapes and providing ecological services
- supporting livelihoods for poor producers
- providing nutritious food for consumers, especially those who lack high-quality protein and nutrients
- providing livestock products that may lead to overconsumption linked to the obesity epidemic and non-communicable disease
- acting as a major source of foodborne disease.

As can be seen, these issues cover both positive and negative impacts, making planning and policy development complex.

Foresight methodologies

Foresight as a broad approach was first used by militaries during the Second World War and became popular in the private sector (especially the energy sector) from the 1970s onwards. Since the 1990s, there has been a surge in interest in the approach, which is now increasingly used in the public and private sectors (often referred to as corporate foresight in the latter) to support planning and preparedness as well as proactively moving to a desired goal. Over the last two decades, there has been limited but increasing application of Foresight to animal health and diseases. In the United Kingdom, the Office of Foresight was developed in 2001 as a result of a major foot-and-mouth disease outbreak (2). Recent costly animal health events caused by infectious diseases, such as African swine fever, and by zoonotic diseases, such as bovine spongiform encephalopathy, highly pathogenic avian influenza, Ebola and COVID-19, have underlined the importance of ensuring Veterinary Services have the capacity to manage animal health in the present and be prepared for future risks.

Typical objectives of a Foresight exercise include shaping strategy and informing policy making; building strategic visions; developing capabilities; building a Foresight culture; and mobilising joint action. Several methodological guides for Foresight exercises are relevant to Veterinary

Services, although none are specifically developed for or adapted to Veterinary Services. Some of the more widely used include the following, listed in chronological order:

- *Inventory of Foresight Methodologies and Studies* provides a history of foresight and describes tools commonly used (3);
- The report *Preparing for high-impact, low-probability events*, written after Eyjafjallajökull, focuses on how shocks cascade through economies and on building resilience, particularly with regards to high-impact, low-probability (HILP) events; it contains lessons that are highly relevant to the COVID-19 pandemic (4);
- The manual *Horizon Scanning and Foresight* addresses foresight in food safety and related fields (5);
- *Foresight: The Manual* provides an overview of the use of foresight principles and methods (6);
- *The Futures Toolkit* was designed for policy professionals, especially those new to futures thinking; the toolkit provides background information and describes tools (7);
- Foresight Training Modules is a set of materials and products to better understand Foresight and how to incorporate it into the policy-making process (8);
- *The Future is ours*: this toolkit offers a set of 12 techniques to help non-governmental organisations and their partners to navigate the present and shape the future (9);
- SADC Futures Foresight Training Tool Kit aims to develop Foresight skills to promote climate-resilient agriculture (including livestock) in the South African Development Community region (10).

These resources have been developed by a range of governmental, non-governmental and intergovernmental organisations and their focus varies from specific issues (HILP, food safety) to generic support for policy making.

Many of these guides and toolkits draw on work from academic groups that have engaged in developing frameworks and providing a conceptual basis for Foresight exercises (11, 12, 13, 14).

Foresight methodologies use one or more (typically more) tools to generate evidence and insights. Foresight tools are categorised in different ways; a common classification focuses on the techniques used to gather information: qualitative, quantitative and semi-quantitative (12). This classification is also used for risk assessment, which many Veterinary Services use regularly. **Table I** summarises some of the Foresight tools used by or relevant to animal health and disease. Where possible, it provides recent, high-quality references to the use of the tools in

animal health or veterinary medicine, which may serve as a guide for those interested in applying them.

A Foresight framework suitable for Veterinary Services

A Foresight exercise tailored specifically to Veterinary Services was used to develop a Technical Item for the OIE (30). (The tools from Table I that were used appear in boldface). The framework used was developed and implemented for over 30 years at the University of Houston (14). The exercise began with ‘scene setting’, which involves setting out the objectives and scope of the Foresight exercise (‘How external factors [e.g. climate change, conflicts, socio-economics, trading patterns] will impact Veterinary Services, and the adaptations required’) and providing a glossary, as much Foresight terminology is somewhat abstruse. Scene setting sets out the Foresight issue and its scope in terms of geography and time. The more precise the definition, the more focused the information search. It is also important to specify the objectives of the Foresight exercise, who is expected to use it and how.

The next section was the ‘current assessment’ – that is, a snapshot of the current situation highlighting essential facts, quantities and structures about the domain (in this example, adaptation of Veterinary Services to external factors), identifying key players who will be affected or have an interest in the possible outcomes (**stakeholder analysis**), their current interests and announced goals and plans for the future, and the historical events that brought about the domain’s current state.

The next section focused on forecasting. Identifying what is driving future change (including events, trends, cycles and shocks) is central to understanding the potential future of the domain. A common method for driver mapping starts with a **brainstorming** exercise to generate a longlist of major drivers affecting the delivery of Veterinary Services (Table II). Individual brainstorming is sometimes more effective than group brainstorming. Driver mapping requires identifying which drivers are most important for the future of the policy area or strategic endeavour. One must also distinguish between certain and uncertain outcomes resulting from the action of drivers.

Once a longlist has been gathered, drivers are typically grouped into categories. These categories derive from **horizon scanning** and are often summarised by acronyms:

- PEST: political, economic, social and technological factors
- PESTLE: political, economic, social, technological, legal and ethical factors
- PESTLED: political, economic, social, technological, legal, ethical and demographic factors

- STEEP: social, technological, economic, environmental and political factors
- STEER: social, technological, economic, environmental and regulatory factors

In the example described, a combination of PESTLE and STEER was used.

This step was followed by a **scenario analysis**, for which four scenarios were offered; the first was the ‘baseline future’, which uses **trend analysis** to extrapolate from current trends, cycles and potential shocks to develop a baseline future. As actual futures rarely follow extrapolation, plausible alternate futures were derived, bringing in faint signals, wildcards and other disruptors. Based on inputs from an **expert panel**, a ‘preferred future’ scenario was identified. Preferred futures are value driven and used in organisational planning to bring about a desired future.

The baseline and alternate futures provide opportunities and challenges that require adaptation of Veterinary Services. The preferred future, in addition, would require influence from Veterinary Services for its attainment. The final section asked for inputs on how the OIE could support Veterinary Services in these efforts. **Table III** summarises the process.

This example demonstrates one way in which a Foresight approach can be applied to Veterinary Services. There are opportunities to use other Foresight approaches and frameworks with different methodologies for a range of purposes across Veterinary Services, and some have already been used in various Foresight exercises.

Conclusions

Foresight is not a prediction tool, and forecasts have been increasingly discredited owing to their unreliability. Rather, Foresight aims to broaden thinking about the future, increase preparedness and influence the present to help bring about a preferred future. It differs from traditional planning by considering plausible, possible, probable and preferred futures equally. As such, it is intrinsically more robust than conventional planning, which all too often does not attain its objectives because of assumptions that are not met (or questioned), failure to consider external factors, and a deterministic rather than stochastic approach to future events. For example, the COVID-19 pandemic has derailed many well-laid plans.

Foresight has not been widely used by Veterinary Services but has great potential to improve strategy and policy development and to improve the performance, reputation and funding of Veterinary Services. There is clearly an opportunity to emphasise the increasing recognition by governments (including Veterinary Services) of the need to develop Foresight capacity more generally. However, doing so requires building capacity in Foresight and identifying

methodologies and tools that are most relevant to Veterinary Services. This paper provides an overview and links to sources that can guide Veterinary Services in the implementation of Foresight and lead to a better future for animals and humans.

Les méthodes de prospective utiles pour les Services vétérinaires

Résumé

Le monde est confronté à un large éventail de défis en lien avec l'agriculture et plus particulièrement avec le secteur de l'élevage, parmi lesquels figurent les menaces pesant sur la productivité, l'environnement naturel et la santé humaine. Alors même que maints travaux de recherches ont été menés sur les risques potentiels et leur facteurs déterminants, la pandémie de COVID-19 de 2020 a montré que les gouvernements peuvent être atteints par des chocs qui sont, jusqu'à un certain point, prévisibles, mais auxquels ils sont souvent mal préparés. La politique cherche à anticiper et à influencer l'avenir ; en tant que responsables des politiques à mener, les Services vétérinaires nationaux jouent un rôle majeur aussi bien pour anticiper l'avenir de leur pays et du monde que pour y influencer. Dans une première partie, l'auteure présente une synthèse des diverses méthodes et outils de prospective pertinents pour les Services vétérinaires ou les chercheurs du secteur vétérinaire, voire déjà utilisés. Elle examine ensuite l'exemple d'un cadre de prospective qui a été adapté et appliqué dans le but de répondre spécifiquement aux besoins des Services vétérinaires. Enfin, elle tire des conclusions sur les méthodes de prospective les plus utiles pour les Services vétérinaires.

Mots-clés

Analyse par scénarios – Politiques – Prospective – Services vétérinaires.

Métodos de prospectiva útiles para los Servicios Veterinarios

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Resumen

El mundo hace frente a un rosario de problemas ligados a la agricultura, y en especial al sector ganadero, entre ellos las amenazas que pesan sobre la productividad, el medio natural y la salud humana. Aunque se ha investigado mucho sobre los posibles riesgos y sus condicionantes, la pandemia de COVID-19 de 2020 puso de relieve cuán afectados pueden verse los gobiernos por choques hasta cierto punto predecibles, pero para los cuales suelen estar mal preparados. Las políticas tienen por objetivo anticipar el futuro y también influir en él. Los Servicios Veterinarios

nacionales, como artífices que son de ciertas políticas, cumplen una importante función a la hora de prever y orientar el futuro de su país y del mundo. En la primera parte del artículo, la autora resume toda una serie de métodos y herramientas de prospectiva que emplean los Servicios Veterinarios o los investigadores en veterinaria o que revisten interés para ellos. A continuación presenta un ejemplo de adaptación y aplicación de un marco de prospectiva concebido específicamente para los Servicios Veterinarios. Por último, extrae conclusiones sobre los métodos de prospectiva que son de utilidad para los Servicios Veterinarios.

Palabras clave

Análisis de situaciones hipotéticas – Política – Prospectiva – Servicios Veterinarios.

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Table I**Summary of selected Foresight tools**

Category	Tool
Qualitative tools	<p data-bbox="370 491 1066 604">Backcasting defines an imagined future and then works backwards to identify how to attain that future. It has been used to a limited extent in veterinary medicine, for example in considering the future of veterinary research (15).</p> <p data-bbox="370 636 1066 772">Stress testing is the process of determining whether a policy or programme can maintain effectiveness under worst-case scenarios. It has not been widely used in animal health but could have value in exploring the widely acknowledged gap between policy and implementation in many low- and middle-income countries.</p> <p data-bbox="370 804 1066 947">Brainstorming is a creative and interactive method used in face-to-face and online group working sessions to generate new ideas around a specific area of interest. It aims at removing inhibitions and breaking out of narrow and routine discussions. Brainstorming is often part of stakeholder meetings on animal health.</p> <p data-bbox="370 978 1066 1150">Scenario planning involves the production of accounts of 'plausible' future events based on a creative combination of data, facts and hypotheses. This activity requires insightful and intuitive thinking about possible futures, normally based on a systematic analysis of the present. It has been used to a limited extent in animal health, for example in considering the effect of Brexit on animal health surveillance (16).</p> <p data-bbox="370 1182 1066 1346">Horizon scanning involves observation, examination, monitoring and systematic description of the external environment; this often considers different domains or drivers, such as social, technological, economic, environmental, political, legal, regulatory, ethical and demographic factors. It has been used in animal health by government agencies, especially the United Kingdom and Australia (17).</p> <p data-bbox="370 1377 1066 1493">Expert panel consists of a group of around 10 to 20 people considered especially knowledgeable who deliberate on futures of specific aspects in which they have expertise. This is widely used in animal health, especially by international agencies (18) but also by the private sector (18).</p> <p data-bbox="370 1524 1066 1696">SWOT analysis is a method that first identifies factors internal to the organisation or geopolitical unit in question (resources, capabilities, etc.) and classifies them in terms of 'strengths' and 'weaknesses', while external factors are classified as 'opportunities' and 'threats'. A relatively simple method, it has been widely used in animal health, for example in analysing China's prevention and control strategy for COVID-19 (20).</p> <p data-bbox="370 1728 1066 1892">Wild cards and weak signals (Wi-We). Wild cards are situations/events with a perceived low probability of occurrence but potentially high impact if they were to occur. Weak signals are unclear observables bringing messages from the future (including about wild cards). They have been little used in animal health, although there is speculation in non-academic literature that COVID-19 may be considered a wild card and was preceded</p>

by weak signals, such as concern over wildlife trade and the emergence of novel human disease from animals.

Gap analysis is the identification and investigation of specific differences between the current position and the ideal future situation. It is used by the OIE in its hallmark Performance of Veterinary Services tool.

Semi-quantitative tools

Delphi involves repeated polling of the same individuals, feeding back (sometimes) anonymised responses from earlier rounds of polling, with the idea that this process will allow for better judgements to be made without undue influence from forceful or high-status advocates. It has been widely used in veterinary studies, e.g. for a survey on One Health in Australia (21), and software is available to facilitate use.

Multi-criteria analysis is a prioritisation and decision-support technique specially developed for complex situations and problems in which there are multiple criteria by which to weigh up the effect of a particular intervention. It has been widely used in animal health, including for prioritisation of disease (e.g. transboundary animal disease in Belgium [22]) and evaluation of control options (e.g. bovine tuberculosis in Ethiopia [23]).

Roadmapping identifies the actions, steps, technologies, milestones and resources to reach a desired goal. Roadmaps have been widely used by Veterinary Services for disease control (for example of tuberculosis [23]) as well as other aspects of animal health, such as in global research into infectious animal disease (25).

Stakeholder analysis or mapping is a strategic planning technique that takes into account the interests and strengths of different stakeholders in order to identify key objectives in a system and recognise potential alliances, conflicts and strategies. These methods are quite common in business and political affairs. They are also widely used in animal health, for example in a study on animal health surveillance in Australia (26).

Quantitative tools

Benchmarking is a method commonly used for marketing and business strategy planning and has recently become more popular in governmental and intergovernmental strategic decision-making processes. The main focus here is on what others are doing in comparison to what the entity in question is doing. Benchmarking has been widely used in private veterinary practices, especially in high-income countries. It has also been used to identify the most critical measures and important sources of differences among farms in terms of performance (27).

Modelling, simulation and gaming generally refer to the use of computer-based technologies to explore the relations between different factors and outcomes. They are used very widely in veterinary epidemiology; for example, dozens of models have been developed for Rift Valley fever transmission (28, 29).

Trend extrapolation is among the longest-established tools of forecasting. It provides a rough idea of how past and present developments may look in the future – assuming, to some extent, that the future is a kind of continuation of the past. It has had limited use in animal health but is widely used in rural development and sustainability analysis.

Table II
Hypothetical example of a driver mapping

	Trend	Shock	Importance for domain
Environment	Failure of climate change mitigation and adaption Major biodiversity loss Clean energy dominates	Runaway warming Extreme weather events Ecosystem collapse Water crisis	Climate-sensitive diseases increase or decrease More animal emergencies
Economic	Increasing trade Concentrated trade Illicit trade increases Increasing wealth Africanisation of deep poverty	Return to protectionism Fiscal crisis in key economy Food price shock Energy price shock	Divergence importers and exporters More companion animals More resources for Veterinary Services Pro-poor health services
Societal	Urbanisation Changing diets Increasing world population Broadening values Increasing nationalism	Major shift to vegetarianism Mass involuntary migration	More livestock More disease of intensification Livestock in emergencies More work on welfare
Geopolitical	Multipolar world More open government Decentralisation Changing role of inter-governmental agencies Challenge to governance	Interstate conflict Failure of governance Large-scale terrorist attacks	More animal emergencies Operational challenges
Health	Rising chronic disease Emerging antimicrobial resistance Rising foodborne disease in LMICs	Pandemic Major foodborne disease outbreak	Animal role in emergence Animal role in surveillance and control
Technology	Biotechnology Lab meat Big data Blockchain robotics Artificial intelligence	Cybercrime Critical information infrastructure breakdown Adverse unintended consequences of technology	Increased productivity Reduction in livestock Breach in data New ways of working

Certainty high Certainty moderate Certainty low
Importance high Importance moderate Importance low
 Black: some combination of the above (e.g. certainty high but importance low)

LMICs: low- and middle-income countries

Table III

Summary of foresight exercise for Veterinary Services based on the Houston Framework

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- Scene setting (domain definition, objectives)
 - Current assessment (current conditions, stakeholders, history, constants)
 - Forecast (cycles, trends, plans, investments)
 - Alternate and preferred futures (adaptation, challenges, opportunities)
 - Support needed to attain preferred future
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