Economic analysis and costing of animal health: a literature review of methods and importance

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Summary
Myriads of data, a host of methods, but no single universal indicator. The Performance of Veterinary Services (PVS) Gap Analysis helps to quantify the needs of national Veterinary Services.
In a world of scarce public financial resources and heightened transparency and accountability, official Veterinary Services (national Veterinary Authorities) must be able to justify their needs in economic and budgetary terms to their line minister, national parliament and the public at large, or in negotiations with donors.
Animal health and Veterinary Service activities are a global public good. It is the responsibility of governments to maintain animal health systems, including networks for the surveillance and control of animal diseases to ensure the early detection of suspected animal disease outbreaks, a rapid response and, where possible, eradication of animal disease outbreaks ‘at source’. The establishment of animal health systems is a core responsibility of the State, and it requires the use of public funds, although it does not preclude public–private partnerships and strategies for ensuring complementarity between the partners concerned.
The PVS Gap Analysis mission of the World Organisation for Animal Health (OIE) is a method for analysing and quantifying disparities between a baseline situation (determined by PVS Evaluation using the OIE PVS Tool) and the target levels set by the country itself in accordance with its priorities. An added advantage is that the method can be used for training and awareness raising.

Keywords

Introduction
In a world of dwindling public financial resources and increasing transparency and search for accountability, the official Veterinary Services (national Veterinary Authorities) must be able to justify their requirements in economic and budgetary terms, both to the minister in charge and to their national parliament as well as during any negotiations with donors.

It is an established fact that prevention is better than cure and that it is economically justified to maintain effective national Veterinary Services that comply with international standards, rather than have to deal with not only the cost of animal health crises and their direct economic impact, but also their repercussions in terms of loss of consumer confidence or the disruption of national and international markets (1, 2, 3, 6, 9, 13, 29).
Animal health and the activities of Veterinary Services are recognised as a global public good. It is the responsibility of governments to maintain animal health systems and, in particular, animal disease surveillance and control networks, that will enable early detection of suspected outbreaks of animal diseases, a
The burden of animal diseases

For the period 2000–2010, the World Bank estimated the cost of zoonotic diseases, including public and animal health service costs, compensation mechanisms for animal losses and production and revenue losses to the livestock sector, at over USD 20 billion, with more than USD 200 billion in associated indirect costs (7). However, it should be pointed out that this approach (i) focuses only on zoonotic diseases and (ii) includes the cost of public health and animal health systems, which must be maintained in ‘peace time’. These costs include mechanisms for compensating livestock owners, such as incentives to declare any suspicion of notifiable diseases and financial compensation for deprivation of ownership of seized animals. The costs of human and animal health systems should be excluded from the analysis of the direct and indirect economic impacts of diseases. The latter, whether they involve chronic diseases, outbreaks or flare-ups of animal diseases, or indeed epizootics, comprise expenses to cover compensation and indemnities, eradication expenses and production and revenue losses.

Numerous reports have provided data on evaluating the economic impact of either a single disease, such as highly pathogenic avian influenza (HPAI) (16) or bovine viral diarrhoea virus (BVDV) (15, 28), or of a group of diseases by animal species (5) in a given country or region. Others deal with the cost–benefit analysis of prevention or control measures for a specific disease in a given country, such as African swine fever in the United States (20), or the estimated cost of the introduction or reintroduction of a disease in a country or zone that was previously free of the disease (e.g. foot and mouth disease [FMD] in Australia). Other authors (17, 25) have focused on evaluating the socio-economic impact of some specific animal diseases.

It should be emphasised that these analyses often remain largely qualitative, and, if they are quantitative, the data are often limited to particular animal health episodes, such as outbreaks or flare-ups of a particular disease in a given country, or to a study of the probabilities of risks of a disease being introduced and the associated consequences. Furthermore, the differences between these analyses make any comparison of the results difficult (e.g. some look at the definition and scope of direct costs and indirect costs taken into account, some examine the costs of surveillance networks, others take into account ‘lost revenue’, and still others look at the reduction in the costs of disease control).

It may also be necessary to discuss the way in which the budget should be divided between the various fixed costs relating to:

– surveillance networks
– the maintenance of national Veterinary Services that comply with international standards (in other words, to...
draw a parallel between Veterinary Services and a fire department: the cost of the fire station, its permanent or temporary staff and its equipment – which does not preclude the existence of a complementary system of fire services in the private sector)

– public–private partnerships (for example, payment for veterinarians working for the State on an ad hoc basis)

– variable costs of intervention (control and eradication measures)

– the extraordinary and exceptional costs of biological disasters (cost of animal health crises).

Alleweldt et al. (3), have proposed a definition for National Prevention Systems (in the context of animal health):

‘Definition of the boundary of the National Prevention System – A definition of the NPS was developed that includes all public sector capacities for surveillance, early detection and rapid response (including services of accredited private veterinarians undertaking public service missions) and is also practicable for the cost assessment, which consequently focused exclusively on public sector expenditures […] – National Prevention System (NPS).

Sum of all services and activities of the public Veterinary Services and other relevant public providers at national and sub-national level allowing early detection and rapid response to emerging and re-emerging animal diseases, including the services of accredited private veterinarians undertaking public service missions financed from the public budget.’

Numerous publications have sought to measure and evaluate the impact of different animal diseases, the impact of specific disease control methods, different risk management choices, and even different institutional choices relating to the organisation of animal health systems (e.g. 1, 2, 3, 8, 11, 14, 16, 17, 19, 22).

Several studies have compiled analyses of the cost of health crises of animal origin and their economic impact (1, 2, 13). These studies should not be confused with quantitative, financial estimates of the direct and indirect economic consequences of possible pandemics (30).

Many of these studies have focused principally on notifiable contagious diseases or diseases with a strong economic impact, but relatively few also include the more chronic so-called ‘production’ diseases or diseases related to zootechnical conditions (respiratory diseases, parasitic diseases, lameness, udder and teat hygiene, mastitis, etc.).

While several studies have sought to measure the global impact of individual diseases, for instance, rabies (8) or human foodborne diseases (31, 32, 33), very few seem to offer any global estimate of the economic impact of animal diseases on animal production, or of the impact of disease on the production of food products of animal origin and on the quantity and nutritional quality of food. It should be noted that many of these studies focus principally on zoonoses, a fact that highlights even more clearly the lack of data on the global burden of non-zoonotic animal diseases or indeed of animal diseases in general. In a communication presented at the Second FAO/OIE Global Conference on the Control of Foot and Mouth Disease, which was held in Bangkok, Thailand, in June 2012, Rushton and Knight-Jones (21) noted that, despite the fact that ‘foot and mouth disease has global importance that is multi-factorial [and that it] affects a colossal number of animals each year and … a huge number of people (producers and consumers) … there are no studies estimating the global socio-economic impact of foot and mouth disease’.

As emphasised by Bennett in a study of the costs of livestock diseases in Great Britain (4):

‘Estimates of the economic costs of animal diseases and infections are only as good as the epidemiological data upon which they are based […] This exercise highlighted that, to obtain reliable estimates of the economic costs of endemic diseases in Great Britain – in this case (author’s note) –, there is no satisfactory alternative to statistically based surveys of the prevalence/incidence of animal disease and infection.’

Other authors have made similar observations: ‘Without understanding the prevalence of a particular hazard along the value chain, it is difficult to identify the most cost-effective measures to reduce health risks’ (7). ‘First it is important to conduct a baseline survey to obtain good pre-intervention measures […] because this will be crucial to obtaining good measures of intervention impacts’ (24). This raises the issue of the importance of having national animal health surveillance networks covering the entire country for all the relevant diseases, so as to be aware of the current health status of livestock populations and allow the early detection of new animal disease events, thereby facilitating a rapid response and, if feasible, eradication at the source.

As many methods as there are needs

Several methods can be used, either alone or in combination: meta-analyses, problem trees, SWOT analysis (SWOT: strengths, weaknesses, opportunities, threats), static or dynamic economic modelling, models that are optimised or used for simulations, budgeting (quantification of consequences), cost–benefit analysis,
cost-effectiveness analysis, or a modified risk analysis framework (10, 24).

Economic cost–benefit analyses are often used to obtain an objective and quantitative assessment of the effectiveness of an intervention, compared to non-intervention, in order to inform decision-making on whether the intervention in question should be undertaken, continued or abandoned (24).

These cost–benefit analyses are sometimes confused with the concept of risk analysis (‘Modified risk-analysis approach or framework’ [7, 16, 24]). This confusion can lead to a misunderstanding of the concept of ‘risk management’ as defined under the World Trade Organization (WTO) rules (the standards and recommendations relating to risk analysis of the Codex Alimentarius Commission and of the OIE, recognised by the WTO). However, while the results of cost-effectiveness analysis are important inputs for risk-management decisions (24), cost–benefit analyses should only be one of the factors taken into consideration in risk management decisions based on the analysis and assessment of risks and on the technical disease control measures to use. These technical control measures depend on the disease concerned and must also take account of the latest recognised scientific data available.

‘Benefits can be derived from the value of reduction of economic costs based on the costs associated with implementing each intervention that would likely reduce the risk of illness from microbial pathogens or avoid […] production losses or in terms of savings due to reduced costs of illness or changes in the composition of demand. Indirect benefits result from increases in productivity or costs offset, for example reduced cost of illness and lives saved thanks to reduced mortality. […] For governments, acceptable interventions (or policies) are typically those for which expected benefits are greater than or equal to expected costs’ (24).

Taken in context, these definitions refer to human diseases, but they can also be applied, mutatis mutandis, to animal diseases and livestock production. It should, however, be noted that while this approach can incorporate the trade consequences of a change in the animal health situation (e.g. change in demand), it does not directly take into account the concept of public good, which implies public expenditure to fulfil the core responsibility of governments, although it does not rule out cost-sharing mechanisms and public–private partnerships. ‘Quarantine services possess properties of public goods and are not provided adequately by the mechanisms of the free market’ (Mishan, 1981, as cited in Rendleman & Spinelli [20]).

The costs resulting from ‘non-intervention’, including the potentially disastrous consequences if there are no surveillance systems to allow early disease detection and a rapid response, as well as the collection of reliable epidemiological data, must also be taken into account.

The analyses can be based on the analysis of responses to questionnaires (sometimes a source of bias), small-scale surveys, the use of spreadsheets to estimate the direct or indirect costs of the diseases under study, or the use of models. These approaches give rise to suppositions and hypotheses, simulation scenarios, and a choice of parameters and new models that may be difficult to apply in another context and tend to complicate the comparison or consolidation of results, due to the inherent limitations of each analysis.

Countries’ national Veterinary Services often use cost–benefit analyses to prepare management choices and decisions (e.g. on the implementation of an animal identification system [11]), and can be used to justify the setting up of new control programmes for a specific disease (e.g. BVDV in Norway [28]), the maintenance of protection measures to avoid the introduction or reintroduction of a given disease (see, for example, Rendleman & Spinelli [20]), or to justify the setting up and financing of emergency standby resources (e.g. emergency funds, compensation funds and antigen or vaccine banks).

For example, it has been calculated that the pig production sector in the Philippines suffered estimated losses of USD 95 million during the FMD outbreaks in 1995. Studies have reported that the potential cumulated gross gains for the Philippines and Thailand could amount to USD 20 million per year if these two countries were able to export products of porcine origin in the absence of FMD (OIE Bangkok, personal communication, 2011). Australia’s status as a country that is ‘FMD free where vaccination is not practised’ constitutes a major trade advantage for animal products. In 2002, the Australian Productivity Commission estimated that the cumulated losses to the national economy resulting from an FMD outbreak would be 2 to 3 billion Australian dollars (AUD) for a short-term outbreak, increasing to 8 to 13 billion AUD for an epizootic lasting 12 months (18).

In a recent communication, Zinsstag et al. (36) emphasised that cross-sector societal analyses for zoonotic diseases are rare. A cross-sector benefit/cost and cost-effectiveness analysis of brucellosis control in Mongolia (36) clearly shows that, although a ten-year programme of mass vaccination of livestock is not profitable to the public health sector, if all the benefits – including private health costs, loss of income and increase in agricultural production – are included, the societal benefit/cost ratio is 3.1. If the cost of intervention is shared proportionally to benefits, the public health sector would contribute 11% of the intervention cost, which would result in a cost effectiveness of USD 19 per DALY averted. Similarly, rabies
control by human post-exposure treatment in an African city costs USD 50 per DALY averted. But an effective dog mass vaccination campaign, capable of interrupting transmission of rabies, becomes more cost effective after six years, reaching USD 32 per DALY. Zinsstag et al. concluded by stating that these examples show the power and added value of the ‘One Health’ concept, which, by taking a cross-sector perspective, shows economic results that could not be achieved by a single-sector perspective alone.

Such studies show that, in the specific case of rabies control, although the initial cumulated total cost of such programmes seems prohibitively high (obligation to fund the cost of dog vaccination campaigns while having to continue to meet the high cost of human post-exposure treatment), very real public health benefits and substantial savings can be achieved in the medium term by attacking the animal disease at the source (vaccination of dogs). Not vaccinating dogs means continuing to suffer from the disease both in economic terms (high cost of human post-exposure treatment) and in public health terms (worldwide, more than 55,000 people die from rabies each year).

To date, there does not appear to be one universal indicator for non-zoonotic animal diseases – comparable to the DALY methodology applied to human diseases (or zoonotic animal diseases) – that can be used to compare the impact of different measures or management choices, whatever the animal species, production system or disease considered. Moreover, we should not lose sight of the fact that, apart from animals used for breeding and animals used for riding or traction, the large majority of livestock are raised for human consumption (specific production cycles).

Several authors (3, 9, 26, 27), and also legislators in the United States (e.g. the Code of Federal Regulations [12]), have proposed using ‘veterinary livestock units’ to facilitate comparisons, feed calculations and data consolidation. For example, in a 2009 study, Alleweldt et al. stated that:

’a Veterinary Livestock Unit (VLU) is an equivalence unit for the estimate of annual veterinary cost and care. For example, according to the definition, one bovine requires the same annual veterinary cost and care as ten sheep or a hundred chickens. The total livestock population, measured in VLU is therefore, by definition, the most appropriate measure of the scale of veterinary service requirements. … This study confirms that the best available indicators for comparative assessments of National Prevention Systems are defined on a per VLU basis. Measures of VLU are calculated from estimates of livestock populations by species and using conversion coefficients for different species … In addition, there appears to be some scope for improving the reliability of VLU conversion coefficients by redefining them, e.g. by including more species and possibly differentiating conversion coefficients according to production system for some species. The latter aspect would, however, depend on the possibility of making available global livestock data in this respect, which appears to be a challenge in itself’ (3).

The PVS Gap Analysis: a tool to help quantify the needs of Veterinary Services

Evaluation of the Performance of Veterinary Services

Sustainably improving compliance of a country’s Veterinary Services with OIE standards is an important foundation for improving animal health and public health, both at national and international level. It should be borne in mind that the activities of the Veterinary Services are a global public good and are consequently eligible for appropriate national or international funding support.

With the development of the OIE PVS Tool, the OIE enables any country that so wishes to determine its level of advancement in 46 different spheres of veterinary activity. Each area of activity is referred to as a ‘critical competency’ and these competencies are grouped in four fundamental components (OIE PVS Tool, 5th Edition, 2010 [34]). Periodic use of the PVS Tool (with an initial PVS Evaluation and subsequent PVS Pathway follow-up missions) thus provides a way of measuring, in standardised terms, the progress that countries have made in sustainably improving their compliance with the OIE quality standards set out in the OIE Terrestrial Animal Health Code (the Terrestrial Code [35]).

The PVS Pathway developed by the OIE on the basis of international standards on the quality of Veterinary Services (standards that were unanimously adopted by the 178 Member Countries of the OIE) is the OIE tool that enables the evaluation of the level of competence of the Veterinary Services of a country; this type of assessment is an essential precondition for an economic analysis. It involves a team of independent OIE-certified experts who evaluate performance in each of the 46 critical competencies and measure their compliance on a scale of one to five (levels).

The results of the OIE PVS Evaluation of critical competencies for 12 countries (eight developing and four
least-developed countries) were compared (23) with avian influenza outbreak data using linear regression statistical analysis (Epi Info, Centres for Disease Control and Prevention in the United States) and R values (correlation coefficient) and R² values (coefficient of determination) were calculated. Some interesting preliminary results were highlighted by the author:

i) poultry density of least-developed countries showed significance (p<0.05) for HPAI outbreak data (R value: 0.92; R² value: 0.85, i.e. 85%) indicating a positive correlation

ii) high-density poultry farms in least-developed countries may be a risk factor for easy transmission of viruses and prolonged HPAI outbreaks

iii) although economic indicators play a role in laboratory capacity and diagnostic facilities, other factors – such as environment, ecology, poultry production systems, Veterinary Services, implementation of control measures – also play a vital role:
- negative correlation between the level of advancement in the critical competency ‘Professional and technical staffing of the Veterinary Services’ and eradication time, mortality rate, culling rate and number of outbreaks
- negative correlation between staffing of veterinary paraprofessionals and mortality rate
- negative correlation between the level of advancement in the critical competency ‘Competencies of veterinarians and veterinary para-professionals’ and mortality rate
- negative correlation between the level of advancement in the critical competency ‘Continuing education’ and mortality rate
- negative correlation between the level of advancement in the critical competency ‘Emergency funding’ and eradication time
- negative correlation between the level of advancement in the critical competency ‘Epidemiological surveillance’ and HPAI eradication time
- negative correlation between the level of advancement in the critical competency ‘Veterinary medicines and biologicals’ and culling rate and number of outbreaks
- negative correlation between transparency and culling rate/number of outbreaks
- negative correlation between the level of advancement in the critical competency ‘Disease prevention, control and eradication’ and eradication time, culling rate and number of outbreaks.

Swayne (23) concluded that the increase in the level of advancement in the critical competencies of Veterinary Services is associated with an improvement in avian influenza outbreak control.

PVS Gap Analysis

For developed countries, the sustainable strengthening of their Veterinary Services’ compliance may well be possible in the framework of existing procedures and mechanisms and with the help of the findings and general recommendations of a PVS Evaluation. However, for many in-transition or developing countries, which face budgetary constraints and have many different major national priorities, Veterinary Services require specific expert assistance, based on the methodological framework developed by the OIE, to implement procedures for sustainably strengthening compliance. This is the aim of the PVS Gap Analysis Tool.

On the basis of a country’s PVS report, which establishes the level of performance (from 1 to 5) for each of the 46 critical competencies of the PVS Tool, and after an in-depth discussion with the country’s Veterinary Services to define the objectives and the targeted level for the priority critical competencies depending on the country’s specific constraints (e.g. field of competence of the country’s Veterinary Services, administrative and geographical constraints, production systems, national production), the PVS Gap Analysis can be used to prepare an indicative five-year budget.

A PVS Gap Analysis mission facilitates the definition of a country’s Veterinary Services’ objectives in terms of compliance with OIE quality standards, suitably adapted to national constraints and priorities. The country PVS Gap Analysis report includes an indicative annual budget and, when relevant, one exceptional budget (for exceptional investments), which are consolidated to propose an indicative five-year budget for the Veterinary Services. In practice, this means:
- defining, together with the Veterinary Services, and in accordance with national priorities and constraints, the expected result (i.e. level of advancement defined in the OIE PVS Tool) at the end of the five-year period for the critical competencies of the OIE PVS Tool that are relevant to the national context
- determining the activities to be carried out in order to achieve the expected results for the critical competencies of the OIE PVS Tool that are relevant to the national context of the country
- determining, with the help of information, data or interviews, the tasks and human, physical and financial resources required to implement these activities to enable the Veterinary Services to function appropriately.

The PVS Gap Analysis must be established with the full participation and approval of the Veterinary Services. It serves as the basis for discussion with:
– the Ministry(ies) responsible for the Veterinary Services, the Ministry in charge of the budget, and in some cases with the national parliament, to justify the resources needed to meet the priority objectives defined by the country

– if needed, international funding agencies, when requesting their support for all or some of the activities or investments defined in the PVS Gap Analysis.

Detailed programming following this analysis cannot be carried out until the political authorities and any financial partners have endorsed the analysis and have taken all aspects into account. Its implementation does not therefore fall within the responsibility of the OIE experts. The outcome of the PVS Gap Analysis can be used by government authorities and potential funding partners to prepare specific investment programmes.

The indicators and expected results are set out in the OIE PVS Tool. They facilitate the follow-up of the implementation of the PVS Gap Analysis during regular PVS Pathway follow-up evaluation missions.

The country’s PVS Gap Analysis objectives focus primarily on the national context of the country and its priorities. When a specific regional context exists, for example, if the country is member of a sub-regional economic community or of a regional economic integration organisation, the regional strategy/priorities, regional legislation, regional policies (border controls, etc.) may also need to be taken into consideration, where relevant.

In terms of the budget to be allocated to the various components of the Veterinary Services, a study (Commault, unpublished working paper, 2011) on the five-year budgets established by the OIE PVS Gap Analysis missions shows that, on average, two components should channel the main part of the financial support provided (based on the sample studied and on reports established from the 2010 edition of the PVS Gap Analysis Tool). The PVS Gap Analysis budgets comprise five ‘pillars’: Trade, Animal Health, Veterinary Public Health, Veterinary Laboratories, and Management and Regulatory Services. The two pillars in question are: (i) Animal Health, both in terms of countries’ annual regular budgets (41.4% of the budget on average) and their programmes of exceptional investments (30.2% of the investments to be carried out), and (ii) Management and Regulatory Services, which has a particularly important place in countries’ investment programmes (28.7% of investments).

These two pillars also present a limited coefficient of variation (0.40 and 0.68 for Animal Health and Management and Regulatory Services, respectively, taking into account only the regular budgets, and 0.54 and 0.85 if one also takes the exceptional budgets into account) in the sample of 22 countries for which PVS Gap Analysis reports were available at the time of the analysis. This suggests that the relative importance of these two pillars is a robust result (with this version [2010] of the PVS Gap Analysis Tool).

Discussion

Even if, according to certain generals, ‘the support troops must abide by the strategic decisions’, the consequences for Napoléon Bonaparte of the delay of Marshall Grouchy at the battle of Waterloo illustrate the effects of underestimating one’s operational capacities and the late arrival of the expected resources! In fact, this is the situation for the many Veterinary Services that develop technical strategies without being in a position to negotiate the means at their disposal or do not have control of the organisation or the management of their human, technical and financial resources.

Yet, if the Veterinary Services are to be independent, as required under the terms of the OIE Terrestrial Code, they need to have control over these areas. Core State responsibilities and the activities of the Veterinary Services require public funding (as a global public good) to guarantee the independence of these services and of their risk management decisions, e.g. management of animal disease outbreaks, compulsory slaughter measures, decisions to close establishments). While the techniques for developing project-implementation budgets are quite well known, many PVS Gap Analysis missions have shown that these techniques are not used when it comes to the budget of the public Veterinary Authorities.

These budgets are very often built on the basis of a budgetary accounting system that includes expenditure headings but no detailed cost accounting. The budget trade-offs that have taken place over the years, often without any technical basis, have led to major imbalances between these budget headings, thus requiring, to a greater or lesser extent, ‘correction phenomena’.

For example, one might find a budget of CFA francs 1,500,000 for petrol for a region, which would be enough to cover 30,000 km in a 4×4 vehicle, but the Veterinary Services’ fleet of ten vehicles actually covers 2,500,000 km per year, and travel in the field for control and inspection purposes is in fact the main working tool of the Veterinary Services, without which the other expenses would no longer be justified. In a similar fashion, it sometimes occurs that new investments are made without any corresponding changes being made to the operating budgets, a situation that can lead to contortions or even irregularities, contrary to the rules of good governance.
The construction of budgets according to the methodology of the PVS Gap Analysis is based on determining the means required to carry out the various tasks, and it is therefore the description of these tasks, in terms of their nature and volume, that is essential. This work requires both relevant indicators and managerial competencies. The indicators must enable a precise analysis not only of the expense items and distribution of costs but also of the technical results obtained, so as to evaluate their unit cost. It is important not to dissociate the accounting aspects from the technical results, as is the case in many administrations which separate the financial report and the technical report. In this respect, information systems constitute one of the most interesting tools.

However, the indicators are no more than objective findings. Their importance lies in how they are applied, and this requires not only the necessary competencies but also the appropriate organisation. Chief Veterinary Officers, in their capacity as managers, have to make the best possible use of the resources allocated to them if they are to achieve their objectives and they must, therefore, have the necessary competencies. However, the financial resources, the human resources and the technical data are often dealt with and evaluated separately and decided by separate administrations with their own independent criteria. Under these conditions, there is little likelihood of successfully matching means to the objectives.

Good governance of Veterinary Services therefore requires technical decisions (objectives) and decisions on the necessary human and financial resources to be placed in the hands of a single person in charge. That person will have to have the competencies necessary for this role. Chief Veterinary Officers, as ‘good governors’, should ideally have received, in addition to scientific and veterinary education, management training, including human resources management and organisational and financial management. Training of this kind could be provided during the initial training of veterinarians or within the framework of initial and continuing training of official veterinarians and, in particular, the national Delegates to the OIE (in most cases the country’s Chief Veterinary Officer).

The regular use of the PVS Evaluation Tool and the PVS Gap Analysis Tool can enable OIE Delegates and their line Ministers to better identify, measure and quantify their needs in terms of human, technical and financial resources, according to their priorities and their national, regional and international constraints (international obligations and commercial interests) and on the basis of international standards for the quality of Veterinary Services.

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