

The benefits of incorporating the One Health concept into the organisation of Veterinary Services

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Summary

This article analyses the potential benefits of disseminating and implementing the One Health concept at the country level. It explores the need to improve administrative structures, organise inter-agency relationships, build the capacity of the veterinary profession and mainstream the issues of environment and climate change. It also stresses the importance of demographic analysis in disease control and prevention. This article contributes to the discussion by Veterinary Services on how to mainstream the One Health concept.

Keywords

Climate change – Environmental change – Foodborne disease – Food chain – One Health – Veterinary education – Veterinary Services – Zoonosis.

Introduction

This article seeks to identify and develop a proposal to improve understanding of the One Health concept and increase its application at national government level, in particular by using the wide definition of the concept adopted by the World Organisation for Animal Health (OIE) and Food and Agriculture Organization of the United Nations (FAO): 'the interplay between environmental factors, animal health and human health' (1, 2).

Veterinary Services

Most OIE national Delegates are responsible to their country's Ministry of Agriculture, with the exception of 30 countries; in 25 of these countries, Delegates report to ministries with a remit that extends to food and, in the other five, Delegates report to ministries with responsibility for public health (2). This would indicate that, in most OIE Member Countries, public health and animal health are managed separately by at least two national authorities. Moreover, in the majority of Member Countries, terrestrial and aquatic resources are also assigned to separate authorities.

This means that veterinarians working in the areas of food safety, public health, terrestrial and aquatic animal health and environmental protection come under a variety of political and administrative structures within each country. This makes it difficult to implement policies that ensure coordination and complementarity among One-Health-based objectives and actions. In the past ten years, a number of countries have brought animal health control and food safety control under a single authority, e.g. Canada (Canadian Food Inspection Agency), South Korea (Ministry for Food, Agriculture, Forestry and Fisheries) and Chile (Food Safety Agency) to name but a few. While this may make it easier to include the One Health concept in government policies, it focuses solely on the relationship between food, animal health and public health and fails to resolve the difficulties of coordinating the management of other health risks. It is therefore important for countries to consider establishing a formal structure that is able to draw together the various government agencies to arrive at jointly agreed, standardised policies on One Health. One option might be to form a network of Veterinary Services, Public Health Services and equivalent environmental health authorities or experts within each country, which would allow permanent and ongoing interaction among all competent authorities.

Disease prevention, primary production, zoonoses and foodborne diseases

Given that ‘a majority of the infectious diseases that have emerged in humans since the 1940s can be traced back to wildlife’ (1), that ‘livestock health is the weakest link in our global health chain’ (1) and that ‘disease must be addressed at its source – particularly in animals’ (1), it would be logical to conclude that efforts to control disease (both zoonoses and foodborne diseases) should focus on primary production. Implementing cross-department use of the One Health concept at national level would break down the barriers that currently exist between control strategies for animal health and those for public health. These strategies are characterised as follows.

- animal health strategies are geared heavily towards controlling and eradicating animal diseases identified as economically important because they either undermine production efficiency or restrict international trade in animal products
- animal diseases not identified as economically important remain under the control of primary production operators, which have access to a range of therapeutic options that enable them to maintain their production efficiency
- public health strategies are geared towards improving public health indicators, relying heavily on an efficient primary health care system that allows for early disease identification and effective treatments, reducing mortality rates but not necessarily incidence
- wildlife health strategies vary by country and the focus ranges from protecting the health of wildlife (natural resource management) to protecting livestock or people from wildlife-associated diseases.

The implementation of strategies involving the One Health concept would further the development of sustained, systematic control of zoonoses and foodborne diseases at primary production levels, which in turn would prevent the occurrence of human cases of zoonoses and foodborne disease and, if coordinated with wildlife management authorities, could also lead to improved natural resource management.

As antimicrobials are used in animals in primary production, the implementation of One-Health-based strategies at primary production level would make it possible to control the use of antimicrobials. Antimicrobials can introduce harmful chemicals into the food chain and their misuse

can encourage the development of antimicrobial-resistant strains. This could lead to the re-emergence of diseases with more drug-resistant variants, potentially impacting on animals and humans (3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14).

The food chain

The concept of the food chain as a unidirectional flow of nutrients from farm to fork has been strengthened over the past 20 years. The introduction of the One Health concept could change this traditional vision because, in many cases, animal-derived nutrients are reintroduced into the food chain, which entails identifying hazards and mitigating the risks associated with such practices, as seen in Figures 1 and 2.

Under the traditional food chain concept depicted in Figure 1, risk analysis tends to consider only the occurrence of hazards in each link of the chain in a single direction. Figure 2 shows that consideration must also be given to the reintroduction of hazards at the primary production stage through animal feed inputs and even grassland fertilisation, as this may lead to resistant microorganisms or bio-accumulative pollutants persisting in production cycles.

Environment and climate change

The ongoing clearing of wildlife habitats for livestock and crop farming increases the chances of humans and domestic animals coming into contact with wildlife species, which may lead to the emergence of new pathogenic microorganisms or different strains that have remained in the wild for many years. What is more, this increased contact may involve animal species that are more closely related to humans than are livestock – such as primates. For this reason, Veterinary Services should participate in multidisciplinary groups to analyse such disease outbreaks and define mitigation measures.

Another important consideration is that global climate change is changing ecosystems and their processes, allowing species whose habitat range was formerly limited to tropical or subtropical areas to expand into new areas where the average temperature used to be low enough to mitigate the arrival and spread of vectors or certain diseases.

Not only does climate change directly impact on the spread of vectors and diseases, a change in wildlife populations can also alter the number and distribution of vectors. One example of this is the decline in North America’s bat population, which has been caused by the spread of white-nose syndrome. This drop in population must be taken

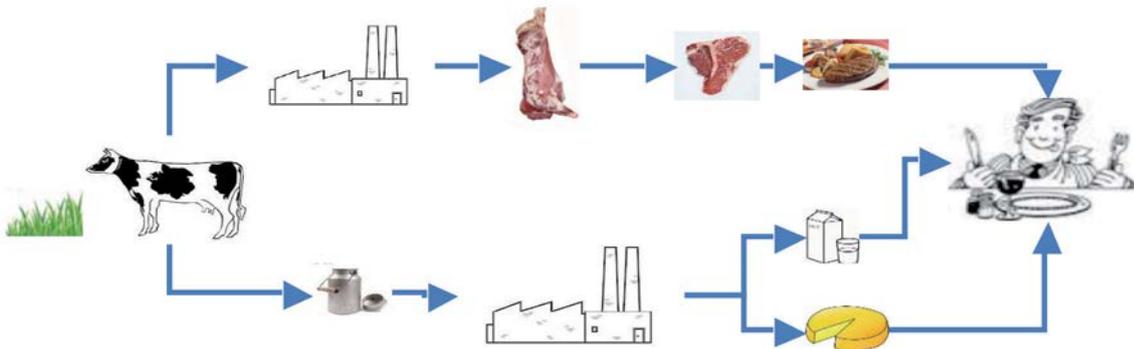


Fig. 1
Unidirectional food chain

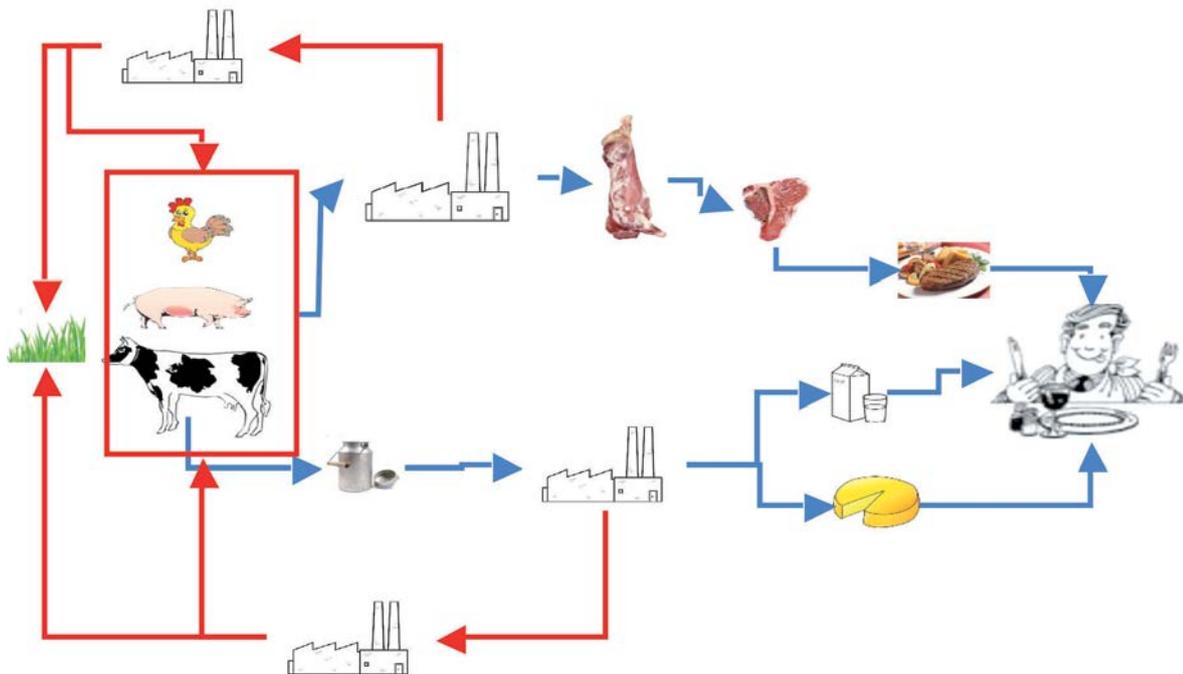


Fig. 2
Multidirectional food chain

seriously, because bats are one of the main insect predators and if their population declines as a result of white-nose syndrome, more insects remain to come into contact with humans, animals and food crops and facilitate the spread of disease. A similar case is the spread of the spore-forming fungus *Batrachochytrium dendrobatidis* (15). This fungus causes chytridiomycosis of amphibians, an OIE listed disease that has decimated populations of frogs, toads and salamanders worldwide, arousing concern that it might cause the extinction of several such populations.

All this means that public agencies responsible for disease control and public health will, in one way or another, be forced to set up multidisciplinary teams (which must include ecologists, economists and experts in wildlife species and vectors) that are able to go beyond traditional risk analysis. A possibility that may at present seem remote for some countries, or areas within countries, is to incorporate these environmental-balance issues into the One Health concept, making an innovative contribution to disease risk assessment.

Veterinary education and the competencies of Veterinary Services

In order to disseminate and implement the One Health concept, at both national and international level, there must be coordination between institutions and professionals in the areas of human health, economics, ecology, psychology and veterinary medicine. This calls for an evaluation of vocational education to enhance the skills of such professionals and so enable them to contribute to the identification of potential factors determining the emergence, spread and persistence of zoonoses and foodborne diseases using a multidisciplinary approach.

Veterinary education is currently a key issue, and it is one which the OIE, together with its Member Countries, has prioritised. To this end, the OIE has developed a set of guidelines for establishing a veterinary education core curriculum, in order to contribute to the design of veterinary curricula and to quality standards in veterinary education (16).

These guidelines refer to the various disciplines that should be included in veterinary education curricula (including epidemiology, economics, public health, food safety and hygiene, veterinary legislation and communication). However, an assessment should be made of the need to incorporate soft skills, such as teamwork and leadership, into curricula, and to include scientific course content relating to ecology and information technology. This would enable all veterinarians to play an active role in multidisciplinary work requiring the One Health approach.

As veterinary education varies widely in most Member Countries, the OIE published *OIE Recommendations on the competencies of graduating veterinarians ('Day 1 graduates') to assure national Veterinary Services of quality* (17).

The OIE recommendations list the competencies that new veterinarians should have. These competencies are grouped under a number of different headings: the organisation of Veterinary Services; inspection and certification procedures; the management of contagious disease; food hygiene; the application of risk analysis; research; the international trade framework; and administration and management. However, it would be advisable for advanced competencies to also include knowledge and understanding of the interplay between human health, animal health and the environment. This would help to ensure that, from day one, all professionals joining Veterinary Services are able to

contribute to the formation of multidisciplinary teams to identify disease control actions to be implemented using a holistic approach.

The OIE has also developed the OIE Tool for the Evaluation of Performance of Veterinary Services (PVS Tool). The PVS Tool can be used to carry out a quantitative evaluation to objectively identify potential areas of improvement in Veterinary Services; this evaluation can then be used to establish a work plan to remedy any shortcomings (18).

It is necessary to determine how the OIE PVS Tool Evaluation – or particular elements of it – can be used to encourage the adoption of the One Health concept in Veterinary Services, to help build institutional capacity and to coordinate the activities of Veterinary Services with those of other institutions.

Further elements to be considered

When implementing One-Health-based measures nationally, apart from considering the above-mentioned issues, it is also important to bear in mind that changes in the demographic structure of many OIE Member Countries can lead them to focus their human and animal health activities on specific actions.

Since the mid-20th century, the demographic structure of a number of countries has evolved; some countries have 'progressive' growing populations and others have 'regressive' ageing populations. This factor, which varies from country to country, should be taken into account because, in countries with a larger number of older adults, disease occurrence rates can be elevated owing to the weakened immune systems of people in this sector of the population. When we also consider the fact that this population group tends to develop emotional dependence on companion animals, it becomes clear that we should consider focusing zoonosis control and surveillance on this type of animal.

Concluding remarks

– While a series of OIE- and FAO-sponsored activities have successfully positioned the One Health concept (or issue) internationally, the idea still needs to be promoted more widely in each country; moreover, there is little evidence that the concept is being implemented, as it is difficult to find examples of explicit actions to coordinate animal health and public health agencies.

– The potential structural and administrative changes arising from the implementation of the One Health concept should be assessed on a country-by-country basis; this assessment should also include a review of control policies at primary production level, and should identify climate impacts on each country's agro-climatic ecosystems and the influence these effects will have on disease control capabilities.

– The implementation of the One Health concept should be viewed as an opportunity to strengthen each country's Veterinary Services and improve its veterinary education; this will entail assessing the need to strengthen the PVS Tool by clarifying the evaluation chapters relating to the One Health concept.

– Finally, actions to disseminate and implement One Health policies should take into account countries' specific circumstances, including their demographic structure; this may lead to actions being targeted or prioritised differently from country to country on the basis of the characteristics of each country's population.

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