

The role and functionality of Veterinary Services in food safety throughout the food chain

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Summary

Both national Veterinary Services and international standard-setting organisations have now embraced risk assessment as an essential tool for achieving their goals. Veterinarians have key roles in all aspects of the control of food-borne hazards of animal origin, but additional specialist skills are necessary for assessing, managing and communicating risk. Further, the deployment of Veterinary Services must reflect the multi-functional aspects of public and animal health activities.

A generic risk management framework provides a systematic process whereby food safety standards and other measures are chosen and implemented on the basis of knowledge of risk and evaluation of other factors relevant to protecting human health and promoting non-discriminatory trade practices. In this context, a number of countries are exploring new administrative and structural arrangements for competent authorities.

The traditional focus of veterinary involvement in food safety has been in meat hygiene at the level of the slaughterhouse. While this role continues, the emerging 'risk-based' approach to food control requires increased involvement in other segments of the meat food chain, as well as other areas such as production of milk and fish. This more extensive role requires a wider skill base and establishment of effective networks with a different range of stakeholders.

Keywords

Competent authority – Food chain – Food safety – Food standard – Risk-based approach – Veterinary Services.

Introduction

In a contemporary food safety environment, veterinarians play an essential role in the prevention and control of food-borne zoonoses (diseases and/or infections which are likely to be naturally transmitted from animals to man) and other sources of food-borne disease. Food vehicles include meat and meat products, milk and milk products, eggs and egg products, fish and fish products, and honey and apiculture products.

Risk analysis processes and methodologies are at the heart of modern approaches to food safety and Veterinary Services must adopt new approaches to decision-making and standard setting if they are to be successful risk managers. (For the purposes of this paper, 'Veterinary

Services' refers to veterinary public and animal health activities, irrespective of the organisational arrangements of competent authorities at the national level.) While Veterinary Services operate predominantly at the national level in contributing to public health, food is a significant part of the import and export trade profile of most countries. Thus there is an increasing need for involvement of Veterinary Services in risk-based standard setting at the international level.

Where zoonoses are concerned, it is clear that there is a functional overlap between public and animal health activities. Veterinary competence can be shared in these circumstances, even when public health and animal health objectives are separate and distinct. A number of countries are exploring such synergies in the reform of regulatory systems and structures.

Veterinary roles

Food safety

Veterinary involvement in food safety activities throughout the food chain may encompass food safety, zoonoses and animal health. Risk management activities in these areas will contribute in various ways to reducing food-borne risks to human health by preventing, eliminating or controlling hazards transmitted by food (16). Most veterinary involvement is currently focused on meat hygiene (defined by the Codex Committee on Meat Hygiene as 'all conditions and measures necessary to ensure the safety and suitability of meat at all stages of the food chain', noting that meat includes poultry and game meat (6, 11). However, generic areas of veterinary activity also include:

- development of the public health policy of the competent authority
- scientific evaluation of food-borne hazards and risk assessment
- design, implementation and verification of food controls at appropriate points in the food chain, including primary production
- monitoring of biological and chemical hazards at appropriate points in the food chain
- specialised veterinary inputs, e.g. evaluation and control of antimicrobial-resistant zoonotic bacteria that may be transmitted by food
- risk communication.

Although the primary responsibility for food safety in contemporary food control systems lies with food producers and food processors, veterinarians employed by Veterinary Services, agri-businesses and the practitioner sector will all play a part in ensuring safe food. Furthermore, food safety regulatory reform in a number of countries is changing the traditional roles of each sector. In many countries, industry now has a leading role in implementing food hygiene programmes, and competent authorities are increasingly moving towards verification and audit of outcome-based regulatory requirements. This provides new opportunities and responsibilities for veterinarians.

Food suitability

Food hygiene is regarded as all conditions and measures necessary to ensure the safety and suitability of food at all stages of the food chain. Suitability is regarded as the assurance that food is acceptable for human consumption according to its intended use. It is clear that in the case of

meat hygiene, a major component of suitability is related to detection and removal of abnormalities in meat that are not of public health significance. Other aspects of suitability relating to consumer expectations include certification requirements such as the Codex *General Guidelines for Use of the Term 'Halal'* (5).

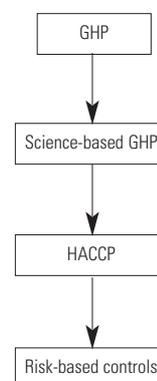
Animal health and animal welfare

In parallel to food hygiene, functionality aspects of Veterinary Services must be considered in relation to other activities that require veterinary competence, such as animal health and animal welfare (see section below – Multi-functionality of Veterinary Services).

A risk-based approach to food safety

Veterinary Services involved in food safety must have a clear understanding of risk analysis processes and methodologies if they are to maximise their contribution to improving public health while ensuring that the food industry operates efficiently and effectively.

In this respect, three waves of change in approaches to food safety have been seen in recent years (Fig. 1). The early 1990s saw more rigorous science being applied in review of traditional controls based on good hygienic practice (GHP). The mid-1990s brought more targeted food safety systems – particularly those based on hazard analysis critical control point systems – and challenging of standards based on reducing hazards to levels that were 'as-low-as-reasonably-achievable'. The late 1990s saw the need for risk-based controls emerge as a global goal.



GHP: good hygienic practice
HACCP: hazard analysis critical control point

Fig. 1
Changes in approach to food safety in the last two decades

Good hygienic practice

Good hygienic practice throughout the food chain is a prerequisite to a risk-based approach to food safety. Regulatory GHP requirements generally apply during primary and secondary processing, are prescriptive, and describe process requirements rather than outcomes. Some quantitative specifications may be included, such as chlorine levels for potable water or acceptable defect rates for visible contamination on chilled carcasses. Requirements for GHP may be also mandated during primary production of food: good veterinary practice in the use of veterinary drugs, for example.

Implementation of GHP in all segments of the food chain is a responsibility that is shared by all stakeholders. For example, non-regulatory codes of hygienic practice are often part of quality assurance (QA) schemes administered by farmer groups at the level of primary production, and GHP in the home is often the subject of public education programmes formulated by competent authorities and consumer advocate groups.

Risk-based approaches

The emergence of risk-based approaches to food hygiene at both the national and international level has been highly influenced by the signing of the World Trade Organization (WTO) Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement). A risk-based approach to food safety requires decisions, standards and actions to be based on specific knowledge of risks. Risk-based standards formulated according to quantitative or qualitative information about risks are designed to achieve an established level of health protection, and should be able to be explained and validated in these terms.

Risk management frameworks

A generic risk management framework (RMF) provides a systematic process whereby food safety standards and other measures are chosen and implemented on the basis of knowledge of risk and evaluation of other factors relevant to protecting human health and the promotion of non-discriminatory and least trade-restrictive practices.

Veterinary Services have essential roles in the application of the RMF process. Some activities draw almost exclusively on Veterinary Services, whereas others require multidisciplinary inputs. The four steps in applying an RMF (Fig. 2) are outlined in the sections below.

Preliminary risk management activities

Once a food safety issue has been identified, the initial process includes the establishment of a risk profile to place

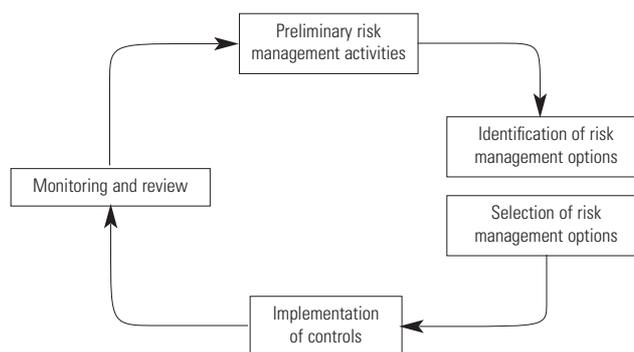


Fig. 2
The risk management framework

the issue within a particular context and provide as much information as possible to guide further action. Risk profiling may also be used for ranking or prioritising different food safety issues. Although a detailed risk assessment is not necessary in many cases, the risk manager may commission one as an independent scientific process to inform decision-making.

Identification and selection of risk management options

This is the process whereby potential risk management options are identified, and then selected according to appropriate decision-making criteria. This will usually involve balancing expectations in terms of minimising risks against available food control measures, and may include reaching a decision about an appropriate level of protection (ALOP). Although this process is facilitated by Veterinary Services, both industry and consumers have critical inputs to such decisions.

Food controls should be implemented by industry at those steps in the food chain where there is maximum reduction of risk for the effort required. Various food safety controls can be simulated in a risk assessment model to determine their individual impact on minimising risks to consumers.

Implementation of controls

Implementation of food controls by industry will usually be by means of a tailor-made programme that is based on GHP and may contain one or more critical control points. Regulatory limits or procedures derived from risk assessment may also be present. The final responsibility for verification of the food safety programme on an ongoing basis lies with the Veterinary Services.

For some hazards, it may not be practical or cost-effective for industry to implement food controls on an individual premises basis; an example is testing for chemical residues of one sort or another. National chemical residue programmes can usually provide risk-based food safety assurances in such circumstances.

Monitoring and review

Processes are monitored and reviewed by the gathering and analysing of data on human health so as to give an overview of food safety and consumer health. Monitoring (which includes surveillance) is usually carried out by national public health authorities and should identify new food safety problems as they emerge. Where there is evidence that food safety goals are not being achieved, food safety controls will need to be redesigned. Both Veterinary Services and industry will be involved in this task.

Effective risk management relies on appropriate risk communication and stakeholder representation at all steps.

The wider food safety and biosecurity environment

Application of an RMF to food safety issues is increasingly being recognised as an optimal means to bring about a reduction in health risks across all food safety and biosecurity sectors: public, animal, plant and environmental health (9). Activities involved in the four steps of the RMF differ somewhat across these sectors, but harmonised application allows:

- decisions to be taken in all sectors that are proportionate to the risks involved
- systematic evaluation of the likely impact of specific standards in managing identified risks
- due regard to be taken of costs as well as benefits
- cross-sector risk management decisions that take into account competing health risks.

The role of Veterinary Services in the application of a risk management framework

Legislation and infrastructure

Establishment of a legislative framework and an institutional structure is a prerequisite for the proper functioning of a food hygiene programme, and Veterinary Services contribute to this in various ways. Legislation includes acts, regulations, requirements and procedures that cover protection of human (and animal) health, and protection of consumer rights and fair trading conditions. Institutional structures must successfully interface with non-governmental and private sectors and also facilitate a range of professional inputs, for example from human health specialists, food technologists and agricultural scientists.

In recent years, several approaches have emerged in the organisation of veterinary public health, veterinary animal health and public health services within national competent authorities (13, 14, 15, 17). Integrating all nationally mandated food inspection systems under a single competent authority is promoted as having several advantages, including a reduction in overlap and improvement in service delivery (6).

Whatever the structural arrangements, a primary driver in the re-organisation of the role of government has been the need for clearer delineation of responsibilities between the part of government that deals with economic issues of food production and trade, and the part concerned with public health and consumer protection (7). A consolidation of multiple legislative and functional activities that were previously spread over several legislative jurisdictions gives practical meaning to multidisciplinary approaches to food hygiene and implementation of a 'production-to-consumption' approach.

While organisational structure will inevitably vary from country to country, it is essential that coverage, resources and technical capabilities deliver a continuously high standard of service. Not only is this important at the national level, but credible public and animal health assurances are essential for access of animal products to international markets.

Key food hygiene legislative responsibilities of Veterinary Services include:

- establishment of policies and standards
- design and management of inspection programmes
- scientific evaluation and risk assessment
- assurance and certification that inspection and compliance activities are appropriately delivered
- dissemination of information throughout the food chain
- conformance with WTO obligations
- negotiation of mutual recognition and equivalence agreements with trading partners.

Implementing risk-based food hygiene programmes presents particular challenges in developing countries, which are often under-resourced in terms of regulatory systems and scientific capacity. Development of risk-based standards based on an integrated production-to-consumption approach to food hygiene ideally requires application of an RMF. This, however, is likely to be difficult where there is limited communication between veterinary public health, animal health and medical professionals, and poor monitoring and feedback of information about zoonoses and other food-borne diseases.

Preliminary risk management activities

The initial step in the RMF involves key veterinary competencies. Consideration of all food-borne hazards and their significance in terms of risks to human health is an essential food hygiene activity. Hazards arising from animals can be grouped into several categories, including:

- zoonoses (resulting from clinical disease in animals or from asymptomatic carriage)
- microbiological contaminants arising from the food processing environment
- chemical residues in live animals.

Emerging food safety issues often involve zoonoses that have newly appeared in a population or are rapidly increasing in incidence and/or range, and risk profiling will be heavily reliant on a production-to-consumption approach. Recent examples are bovine spongiform encephalopathy, haemolytic uraemic syndrome caused by *Escherichia coli* O157:H7 and acute diarrhoea caused by *Campylobacter* spp.

Ante- and post-mortem meat inspection programmes are ongoing responsibilities of national Veterinary Services. Wherever possible, inspection procedures should be designed according to a risk-based approach and management systems should reflect international norms. This requires that, as part of preliminary risk management activities, Veterinary Services should be constantly aware of changing hazard profiles associated with slaughter animal populations.

Where necessary and practicable, risk assessments focused on a specific hazard/food combination will be commissioned by Veterinary Services. This scientific work is often carried out by other branches of government or external science providers, as multidisciplinary skills are required. However, Veterinary Services will probably have the in-house expertise to carry out qualitative risk assessments, and may also embark on quantitative risk assessments when time and resources allow.

While focusing on reducing food-borne risks to human health, Veterinary Services must also strive to implement food safety standards in ways that do not incur unnecessary costs or rigidities for the industry. ‘Traditional’ meat inspection procedures, for example, are complex and resource-intensive, and so a number of recent studies have used a risk assessment approach to determine their relative value in minimising meat-borne risks (10). In contrast to quantitative risk assessments focused on a specific hazard/food combination, scientific studies of this kind are usually carried out by Veterinary Services. Risk-based post-mortem inspection standards that are tailored to the particular type and geographical origin of slaughtered

animals should achieve at least the same level of consumer protection as ‘traditional’ procedures.

The need for safe transfer, handling and use of living organisms genetically modified by modern biotechnology has created a new focal point for regulatory requirements. Food may be derived from (or traits introduced by) modern biotechnology, and although international guidelines for safety assessment of foods containing genetically modified organisms are being developed, the adequacy of current processes is a continuing issue of public concern.

Identification and selection of risk management options

The identification and selection of risk management options should be based on science and risk assessment wherever possible. Science-based standards are formulated according to objective and verifiable information about relevant hazards, and are designed to eliminate or reduce exposure to hazards, with the expectation that there will be a reduction in risk. Risk-based standards are more demanding; they are formulated according to specific knowledge, whether quantitative or qualitative, of actual risks. They are designed to achieve a specified level of health protection and should be able to be explained and validated in these terms.

It should be noted that, after evaluation, risk management options may not always lead to regulatory standards. Measures implemented by stakeholders other than Veterinary Services may be deemed to be more effective in some cases; examples include farmer-driven QA schemes, and public education programmes to encourage a higher level of food hygiene in the home.

Selection of risk management options must combine available knowledge about risk with other factors relevant to protecting human health. These factors include cost-benefit considerations and the technical feasibility of controls. Where food is exported or imported, the selection process should also promote adoption of non-discriminatory and least trade-restrictive practices. In the case of meat hygiene, application of this step in the RMF has led to the removal of many resource-intensive post-mortem inspection procedures where they have been shown to be of negligible value.

The practicality of standards also relies on Veterinary Service inputs, as does establishment of the competencies of inspection personnel and training requirements. The national competent authority must also provide an appropriate institutional environment for Veterinary Services to develop competency and training requirements.

In meat hygiene, it is now well established that general attention to proper livestock management, environmental hygiene and transport will limit the numbers of live animals shedding and/or being contaminated with enteric pathogens such as *Salmonella*, *Campylobacter* and *E. coli* O157:H7. This will result in a commensurate decrease in pathogen numbers on dressed carcasses. A number of recent studies indicate that minimising the level of inadvertent microbiological contamination with enteric pathogens during processing will significantly reduce meat-borne risks in most situations.

Evaluation of the outputs of specific risk assessment models is also leading to 'whole food chain' changes in food hygiene. For example, an international Food and Agriculture Organization/World Health Organization risk assessment of *Campylobacter* spp. in broiler chickens used modular modelling of the production-to-consumption food pathway to estimate risks to consumers and evaluate the impact of different interventions in each module (2). The model indicated that any intervention that significantly reduces flock prevalence will be of measurable benefit in reducing risks to consumers. The challenge from this work is for regulators to facilitate decisions on an ALOP for this food-borne disease, with industry finding practical and cost-effective ways to implement the necessary interventions at the farm level.

Another expression of the 'whole food chain' approach to food safety is the establishment of controls that prevent the introduction of unacceptable levels of chemical hazards such as residues of veterinary drugs and pesticides at the time of primary production. This involves multidisciplinary inputs. Veterinary Services, for example, are involved in ensuring good practice in the use of veterinary drugs and food monitoring programmes. Other tasks, such as toxicological evaluation, registration and establishment of maximum residue levels, are generally assigned to technical specialists in these areas. The competent authority will be likely to employ specialist policy analysts and risk communicators to bring wider aspects of the risk management of veterinary drug residues in foods to the various stakeholder groups involved.

Implementation of controls

A range of stakeholders may be involved in the implementation step of the RMF, including regulatory authorities, industry and the public. The controls that have been selected may not necessarily be mandated by regulations but rather take effect through, for example, consumer education in safe food handling practices.

Meat hygiene activities are usually undertaken by Veterinary Services, and these must have sufficient numbers of qualified personnel to perform the allocated tasks. The resources required to support those tasks

include equipment, transport, laboratories and training programmes. All inspection procedures and judgements must be performed by personnel who have the appropriate competence.

Veterinary Services also must ensure compliance with regulatory requirements by applying a systematic and functionally independent verification and audit programme. Legislation must provide for the ability to enforce regulatory requirements and impose sanctions in cases of non-compliance.

The provision of written (or equivalent) assurances that food hygiene systems conform to regulatory requirements is a vital function of Veterinary Services. Such assurances can be provided by a competent authority (a government agency having official jurisdiction) or by a 'competent body' (a body officially recognised and overseen by the competent authority to undertake specified food hygiene activities).

International health certificates providing official assurances for trading of food should give full confidence to the country of importation. Importing countries will take commensurate measures to verify certification assurances, including documentary and physical checks at the port of entry, and third-party audits of food hygiene systems in the exporting country (4).

A QA system includes the organisational structure, procedures, processes and resources needed to implement QA. Food industries are increasingly committing themselves to such systems due to demand from their customers (8). Inputs to QA systems can be provided by veterinarians employed by industry; for example, industry-led programmes at the level of primary production may involve veterinary supervision and slaughterhouse information servicing. Individual health certification of groups of slaughter animals is a common practice in a number of countries, for zoonotic diseases, veterinary drug residues and vaccination regimes for example.

In the case of ante- and post-mortem inspection, QA systems can be extended to 'co-regulatory' systems that integrate industry and Veterinary Service activities (3). In Australia, the official Veterinary Service is responsible for the broad design of the inspection system and its audits and sanctions, while industry is responsible for further developing, implementing and maintaining the system. The veterinarian responsible for a specific slaughterhouse ensures that the meat safety QA programme implemented by industry meets regulatory requirements on an ongoing basis.

Use of private or public non-veterinary personnel to carry out ante- and post-mortem inspection activities is now well established within many national programmes. However, all ante- and post-mortem inspection arrangements should

satisfy the principles of independence, competence of inspectors and impartiality, and must be carried out under the overall supervision and responsibility of the official Veterinary Services.

A number of institutional models are emerging for the audit and enforcement of regulatory requirements in food hygiene. It is generally recognised that the effectiveness and consistency of audit and enforcement must be demonstrably improved, especially if consumers are to have ongoing confidence in the safety of the food supply.

The auditing and enforcing standards of Veterinary Services may be separate from, or included in, the remit of the centralised competent authority promulgating food hygiene policy and standards. Notwithstanding this, audit and enforcement remain decentralised in some countries and are undertaken by regional or local governments. Whatever the organisational structure, the theme of greater centralisation of responsibility and 'checking-the-checker' is becoming standard audit practice. Risk-based procedures and sanctions are becoming more common, and private third parties are emerging as independent auditing bodies.

Monitoring and review

Most Veterinary Services apply regulatory programmes at various points in the food chain to monitor the presence of specific hazards; examples include statutory veterinary reporting of food-borne infectious diseases and chemical intoxications of animals at the level of livestock production, and national residue surveys. Even though these programmes may not be integrated components of an overall risk-based system, they provide valuable information on the prevalence of hazards over time and the level of regulatory compliance.

Notwithstanding this, the final step in the RMF primarily relies on human health surveillance to complete the RMF process. This function is outside the jurisdiction of Veterinary Services but may be a function of an overarching competent authority. Monitoring and review activities should be specifically designed to service management of food-borne risks, and provide a good example of the multidisciplinary needs of a risk-based approach to food safety. Food-borne disease investigations and strain typing of bacterial hazards can provide a valuable adjunct to human surveillance data.

Contribution to international standards

National Veterinary Services should have an ongoing commitment to the establishment and review of

international standards. The Codex Alimentarius Commission (CAC) elaborates standards and related texts for both safety and suitability aspects of food control, while the World Organisation for Animal Health (OIE) elaborates standards and related texts for the prevention, control and eradication of zoonoses. The OIE has a parallel responsibility for developing standards and related texts for animal health. Both organisations are committed to working together to enhance the scope and scientific quality of international standards, guidelines and related texts, especially in regard to food safety measures applicable at the farm level.

It is essential that all countries contribute to the continuing development of the Codex Alimentarius if they are to optimise food production in terms of food hygiene and access to international markets. As well as protecting consumers' health, food standards reduce the costs of doing business by, for example, reducing the risk of international fraud and the costs of finding reliable trading partners. Consumers are also protected from buying inferior food. In providing benefits to both producers and consumers, Codex standards promote economic welfare and are a prerequisite to the operation of a well-functioning market. If standards are harmonised between countries, they further facilitate trade (1).

National Veterinary Services obviously have a key role in providing the scientific underpinning for international standards, as well as bringing forward national views on 'other legitimate factors' that should be taken into account. In implementing the provisions of the SPS and Technical Barriers to Trade (TBT) agreements of the WTO, Veterinary Services also have an increasing role in developing mutual recognition and equivalence agreements among trading partners. At the national level, differences often occur in food production systems, technological capacity, and regulatory controls themselves. Such situations illustrate the importance of the concept of equivalence. If risk assessment can demonstrate that different practices in different countries can still provide the same level of consumer protection, there should be no impediment to international trade in the food concerned. Application of a risk-based approach to demonstrate the equivalence of new procedures and technologies also facilitates industry efficiency and innovation.

Multi-functionality of Veterinary Services

In meeting veterinary public health and animal health objectives prescribed in national legislation or required by importing countries, Veterinary Services contribute in various ways 'from the direct performance of necessary

veterinary tasks to the evaluation of veterinary activities conducted by operators in the agro-industrial chain' (12). It should be noted that 'Veterinary Services are no longer the sole managers of animal health protection and disease control, but rather guarantors that all parties involved in food production fulfil their respective obligations to guarantee safe food for the consumer' (12).

Animal health

Transmission via the food chain of hazards that may seriously affect animal health can result in very significant economic loss in animal populations; such hazards include transmission of exotic diseases by feeding of meat scraps to animals, or transmission via meat with a designated non-human end-use, such as uncooked petfood. Consequently, control and/or reduction of hazards of animal health importance during ante- and post-mortem meat inspection is a core function of Veterinary Services. Inspection of slaughter animals can also make a valuable contribution to surveillance for specified diseases of animal health importance, particularly exotic diseases.

The extent to which animal health functions should be carried out by veterinarians whose primary focus is food control is a matter of national jurisdiction. In the past, Veterinary Services were generally the sole competent authority responsible for animal health, and in many cases they were also responsible for food safety aspects of slaughter animals up until the end of primary processing. These legislative arrangements have now been broadened in a number of countries.

The OIE *Terrestrial Animal Health Code*, 2004, describes animal health surveillance as the 'continuous investigation of a given population to detect the occurrence of disease for control purposes', and defines monitoring as 'ongoing programmes directed at detection of changes in the prevalence of disease in a given population' (18). In this context, inspection of slaughter animals can provide an important sentinel function for zoonoses and diseases solely of animal health importance. Further diagnostic tests can be applied in the case of suspect animals.

Animal health surveillance and monitoring allow Veterinary Services to identify and control significant endemic or exotic diseases within their territory, and substantiate reports on the animal health situation in their country. Both functions provide essential inputs to animal health import risk analysis. As in the case of meat hygiene, policies and standards applied at ante- and post-mortem inspection for the purposes of animal health surveillance and monitoring should be risk based and should be feasible and practical in the slaughterhouse environment.

Irrespective of the jurisdiction of the competent authorities involved, it is obvious that Veterinary Services should

integrate their activities to the maximum extent possible and practicable so as to prevent duplication of effort and unnecessary costs. In addition to sharing of routine inspection activities to achieve both public health and animal health objectives, other opportunities that arise are:

- collection and integration of monitoring data, sharing of diagnostic facilities and methodologies
- verification and enforcement of inspection requirements in an integrated manner
- pooling of technical expertise.

Whatever the activity, Veterinary Services must be able to demonstrate that no conflict of interest exists between public and/or animal health objectives on the one hand, and economic support for the food production and processing industries on the other.

Animal welfare

The importance of welfare standards for food-producing animals is widely recognised by Veterinary Services. Animal welfare on the farm, during transport and at the time of slaughter can have an impact on food safety, and is also of increasing concern to consumers in terms of the 'acceptability' of foods of animal origin. Although it is generally agreed that international trade measures based on animal welfare objectives are not permitted under the SPS and TBT agreements, science-based regulatory requirements have been implemented in some WTO Member countries. Industry-led QA programmes for ensuring animal welfare are now well established.

Convergence of food safety and biosecurity

Animal health biosecurity is concerned with import, domestic and export health controls. Import controls are primarily designed to prevent the introduction of hazards pathogenic to animals during trade in animals, animal genetic material, animal products, feedstuffs and biological products. However, trade in animal commodities crossing borders is rapidly changing, especially in terms of the volume, range and complexity of animal products. The increasing availability of animal genetic material has meant a decrease in the international trading of breeding animals; however, the economics of the global food supply is driving an increasing trade in export of live animals for slaughter. Consumption of animal products is rising rapidly in developing countries, especially in Asia. Livestock production is increasing to meet this need, and there is a commensurate increase in animal health risks. The closer proximity of people and animals, especially poultry, adds to these risks.

Within this broad context, emerging zoonoses illustrate the recent convergence of food safety and biosecurity aspects

of human and animal health, and this is likely to lead to significant changes in the roles, partnerships and regulatory activities of Veterinary Services collectively involved in their control. New and emerging diseases of animal health importance are increasing in incidence and geographical range. Where zoonoses are concerned, it is clear that there is often an overlap between public health and animal health objectives. Veterinary competence can be shared in these circumstances and a number of countries are exploring such synergies in the reform of legislative systems.

As with plant biotechnology in the early 1990s, animal biotechnology has reached a point where developers are beginning to market products derived in this manner. This may, in the near future, include agri-food applications. As an example, transgenic animals are derived from recombinant DNA technology or by cloning (somatic cell nuclear transfer), which is a means to generate animals with preferred traits. These animals and/or their products are likely to trigger food safety regulatory requirements in most countries, but guidance on risk assessment is still at the developmental stage.

Other functions

Increasingly, veterinarians are developing multidisciplinary skills that extend their activities well beyond the farm and initial processing of food. Preventing degradation of the environment by contamination with animal wastes and animal products is one example.

The SPS Agreement and the standards developed by the CAC and OIE all refer to the need for a systematic process to gather, evaluate and document scientific and other information as the basis for public health and animal health controls. This has long been recognised by Veterinary Services at the national level. The organisation and dissemination of information throughout the food chain involve multidisciplinary activities; for example, animal identification and traceback systems, either for individuals or groups, are necessary to achieve both public health and animal health objectives.

Governments are increasingly aware that the food chain is a potential vehicle for bioterrorism. Strategic responses to the risks of bio-terrorism are well advanced in the United States, and the impact of new food standards to prevent such acts is being felt around the world.

Conclusion

A commitment to risk assessment as the basis for establishing food safety controls has placed new responsibilities and accountabilities on Veterinary Service components of competent authorities. While developing technical capability to assess risks, Veterinary Services must also properly employ other aspects of risk analysis, particularly risk management and risk communication, if they are to effectively protect human health.

The emerging 'risk-based' approach to food control demands increased involvement of Veterinary Services throughout the food chain and systematic application of an RMF when making decisions and taking regulatory action. Harmonised application of an RMF as an optimal means of reducing health risks across all food safety and biosecurity sectors – public, animal, plant and environmental health – will allow decisions to be taken that are proportionate in nature and which take into account competing risks.

In some countries, the organisation of food control at the national level is now falling under a single competent authority that has responsibility for the entire food chain. Concrete benefits have already been reported, particularly in respect of:

- clarifying roles and responsibilities
- reducing overlap and duplication of programme functions
- improving service delivery
- facilitating federal/provincial collaboration.



Le rôle et les capacités opérationnelles des Services vétérinaires en matière de sécurité sanitaire tout au long de la chaîne alimentaire

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Résumé

Pour atteindre leurs objectifs, les Services vétérinaires nationaux, tout comme les organisations en charge de l'élaboration des normes internationales, recourent désormais à cet outil fondamental qu'est l'évaluation des risques. Si les vétérinaires jouent un rôle clé pour tout ce qui concerne la maîtrise des risques d'altération des denrées alimentaires d'origine animale, l'évaluation de ces risques, leur gestion et la communication à leur sujet requièrent une expertise spécifique. En outre, les interventions des Services vétérinaires doivent refléter la diversité opérationnelle des activités de santé publique et de santé animale.

Un cadre générique de gestion des risques doit fournir un processus systématique permettant de choisir et de mettre en œuvre les normes appropriées, notamment de sécurité sanitaire des aliments, en partant de la connaissance du risque et de l'évaluation de tous les facteurs pertinents pour la protection de la santé humaine et la promotion de pratiques commerciales non discriminatoires. À cet égard, de nouveaux dispositifs administratifs et structurels applicables par les autorités compétentes sont actuellement à l'étude dans plusieurs pays.

Traditionnellement, les activités des Services vétérinaires relatives à la sécurité sanitaire des aliments étaient axées sur l'hygiène des viandes et leur inspection à l'abattoir. Certes, ce rôle leur est toujours dévolu, mais avec le développement des approches basées sur le risque, les vétérinaires sont invités à s'investir davantage dans d'autres segments de la chaîne de production alimentaire, ainsi que dans des secteurs tels que les laiteries ou la production de poisson. Cette extension de leur rôle exige des vétérinaires qu'ils élargissent leur champ de compétences et travaillent en réseaux avec les différentes parties prenantes.

Mots-clés

Approche fondée sur le risque – Autorité compétente – Chaîne alimentaire – Norme alimentaire – Sécurité sanitaire des aliments – Service vétérinaire.



Papel y actuaciones de los Servicios Veterinarios respecto de la inocuidad de los alimentos en toda la cadena alimentaria

A.I. McKenzie & S.C. Hathaway

Resumen

La evaluación de riesgos se ha convertido en un instrumento fundamental para el logro de los objetivos de los Servicios Veterinarios nacionales y las organizaciones normativas. Si bien los veterinarios desempeñan un papel clave en todos los ámbitos del control del riesgo de toxi-infecciones alimentarias de

origen animal, para evaluar y manejar el peligro, así como para informar sobre el mismo, se necesitan competencias adicionales. Además, los Servicios Veterinarios deben estar preparados para asumir las múltiples actuaciones que implican las actividades relacionadas con la salud pública y la sanidad animal. La gestión genérica de riesgos es un proceso sistemático que comprende normas sobre inocuidad de los alimentos y otras medidas que se eligen y aplican basándose en los conocimientos sobre los peligros y la evaluación de otros factores pertinentes a fin de proteger la salud pública y fomentar prácticas comerciales no discriminatorias. A este respecto, varios países están estudiando actualmente nuevos acuerdos administrativos y estructurales para las autoridades competentes.

Tradicionalmente, la actuación de los veterinarios en materia de inocuidad de los alimentos consistía en controlar la higiene de la carne en los mataderos. Si bien siguen desempeñando esa función, los nuevos métodos de control de los alimentos basados en el riesgo los llevan a participar activamente en otros segmentos de la cadena de producción de productos cárnicos, así como en otras esferas alimentarias como, por ejemplo, la producción de leche y peces. Estas actuaciones más amplias requieren mayores competencias y la creación de redes eficientes con nuevos interlocutores.

Palabras clave

Autoridad competente – Cadena alimentaria – Inocuidad de los alimentos – Método basado en los riesgos – Norma alimentaria – Servicio Veterinario.



References

1. Anon. (2002). – Report of the Evaluation of the Codex Alimentarius and other FAO and WHO Food Standards Work. Food and Agriculture Organization, Rome/World Health Organization, Geneva.
2. Anon. (2002). – Risk assessment of *Campylobacter* spp. in broiler chickens and *Vibrio* spp. in seafood, a joint FAO/WHO consultation, Bangkok, Thailand, 5-9 August. World Health Organization (WHO), Geneva.
3. Butler R.J., Murray J.G. & Tidswell S. (2003). – Quality assurance and meat inspection in Australia. In *Veterinary Services: organisation, quality assurance, evaluation* (E. Correa Melo & F. Gerster, eds). *Rev. sci. tech. Off. int. Epiz.*, **22** (2), 629-659.
4. Codex Alimentarius Commission (CAC) (1995). – Principles for food import and export inspection and certification (CAC/GL 20). CAC, Rome.
5. Codex Alimentarius Commission (CAC) (1997). – General guidelines for use of the term 'halal' (CAC/GL 24-1997). CAC, Rome.
6. Codex Alimentarius Commission (CAC) (2005). – Code of hygienic practice for meat (CAC/RCP 58-2005). CAC, Rome.
7. Evans B.R., Doering R.L., Clarke R.C. & Ranger R. (2003). – The organisation of federal Veterinary Services in Canada: the Canadian Food Inspection Agency. In *Veterinary Services: organisation, quality assurance, evaluation* (E. Correa Melo & F. Gerster, eds). *Rev. sci. tech. Off. int. Epiz.*, **22** (2), 409-421.
8. Gary F. (2003). – Accreditation of veterinary inspection systems. In *Veterinary Services: organisation, quality assurance, evaluation* (E. Correa Melo & F. Gerster, eds). *Rev. sci. tech. Off. int. Epiz.*, **22** (2), 761-768.
9. Hathaway S.C. (2002). – Risk analysis in biosecurity for food and agriculture. In *Report of an Expert Consultation on biosecurity in food and agriculture, 10-13 September*, Food and Agriculture Organization (FAO), Rome. FAO, Rome.

10. Hathaway S.C. (2004). – Codex Committee on meat and poultry hygiene. In Proc. World Meat Hygiene and Inspection Congress, 6-8 July, Downing College, Cambridge. (Proceedings were sent to all delegates on a CD-rom produced by the United Kingdom Food Standards Agency.)
 11. McKenzie A.I. & Hathaway S.C. (2003). – The role of veterinarians in the prevention and management of food-borne diseases, in particular at the level of livestock producers. Technical item I. 70th General Session of the World Organisation for Animal Health (OIE), 26-31 May, Paris (Doc. 70 SG/9). OIE, Paris.
 12. Marabelli R. (2003). – The role of official Veterinary Services in dealing with new social challenges: animal health and protection, food safety and the environment. In *Veterinary Services: organisation, quality assurance, evaluation* (E. Correa Melo & F. Gerster, eds). *Rev. sci. tech. Off. int. Epiz.*, **22** (2), 363-371.
 13. World Health Organization (WHO) (2002). – Future trends in veterinary public health. Report of a WHO Study Group. WHO Technical Report Series No. 907. WHO, Geneva.
 14. World Organisation for Animal Health (OIE) (1991). – Veterinary public health: part one. *Rev. sci. tech. Off. int. Epiz.*, **10** (4).
 15. World Organisation for Animal Health (OIE) (1992). – Veterinary public health: part two. *Rev. sci. tech. Off. int. Epiz.*, **11** (1).
 16. World Organisation for Animal Health (OIE). (2002). – Report of the Meeting of the OIE Working Group on animal production food safety, 18-20 November, Paris. OIE, Paris.
 17. World Organisation for Animal Health (OIE) (2003). – Veterinary Services: organisation, quality, evaluation. *Rev. sci. tech. Off. int. Epiz.*, **22** (2).
 18. World Organisation for Animal Health (OIE) (2004). – Terrestrial Animal Health Code, 13th Ed. Chapter 1.3.6. Surveillance and monitoring of animal health. OIE, Paris, 52.
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