

Veterinary diagnostic laboratories and their support role for Veterinary Services

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Summary

National Veterinary Services administer a number of regulatory programmes, such as foreign animal disease (FAD) surveillance and exclusion of FADs, and certification of regions as free from disease. Laboratory testing is an important part of any surveillance or control programme. Most countries have a national laboratory which performs testing for FADs and provides support for national disease eradication and control programmes. State laboratories provide testing for surveillance programmes and export purposes, in addition to diagnosis of clinical cases. Many national and state laboratories are developing quality assurance programmes to assure the reliability of testing results. Veterinary Services are reliant on the diagnostic expertise of the laboratory system of that country to be able to respond to FAD introductions and to provide the surveillance programmes needed to detect the introduction of diseases and to certify freedom from disease.

Keywords

Diagnostic laboratory – Disease control – Foreign animal disease – Surveillance – Veterinary Service.

Introduction

Countries around the world have national Veterinary Services to address the various needs of animal health protection and food safety. An integral part of these organisations is the veterinary diagnostic laboratories. Surveillance and diagnosis of clinical cases of animal disease are necessary to determine the existence or introduction of a disease and laboratory testing is a crucial part of these surveillance programmes. Therefore, veterinary diagnostic laboratories are the backbone of disease control programmes administered by the Veterinary Services of a country.

Types of veterinary diagnostic laboratories

Most Veterinary Services have national veterinary diagnostic laboratories. These laboratories report to the Chief Veterinary

Officer who can request diagnostic testing in support of government programmes. Most countries also have separate state/regional laboratories which may report to the national veterinary diagnostic laboratory. Interactions between these laboratories vary widely among countries. In many cases, the national veterinary laboratory is used by the state/regional laboratories for:

- testing samples from suspected foreign animal disease (FAD) cases
- testing samples from suspected emerging disease problems
- testing which requires special expertise or equipment
- testing to confirm unusual results
- the provision of training and reagents.

National laboratories are often involved in providing proficiency tests to participating laboratories for quality assurance purposes, as well as providing reagents and/or test protocols which are not available from commercial sources. Privately owned veterinary laboratories perform routine testing

which plays a role in the national surveillance testing programme, even though they are not officially part of the Veterinary Services of a country.

Roles of veterinary diagnostic laboratories

Foreign animal disease diagnosis

Foreign animal disease diagnosis is generally a function of the national veterinary diagnostic laboratory. Many of these laboratories have biocontainment facilities, which allow them to work with highly contagious or controlled agents, such as foot and mouth disease virus. Suspect cases submitted to state or regional laboratories are forwarded to the national laboratory for diagnosis and/or confirmation of a suspected FAD. In the event of an outbreak, the national laboratory provides extensive laboratory support for the control or eradication programme. In the United States of America (USA), a new laboratory network is being established to provide 'surge capacity' (i.e., large-scale emergency capability) if an FAD outbreak occurs. This National Animal Health Laboratory Network comprises the National Veterinary Diagnostic Laboratories and twelve state and university veterinary diagnostic laboratories. These laboratories will employ new molecular techniques, as well as traditional testing methods, to increase surveillance testing and provide surge capacity testing in the event of an FAD outbreak.

Surveillance

One of the integral functions of the Veterinary Services of a country is disease surveillance, both active and passive. This is specified in the OIE (World organisation for animal health) *International Animal Health Code* (the *Code*), which states that a country can only be considered free of a disease if that country has a surveillance programme for that disease (3). The *Code* provides specific guidelines for certain diseases, such as bovine spongiform encephalopathy, bluetongue and rinderpest (3). If a country wishes to apply for OIE certification as being free from these diseases, the results of surveillance testing must be supplied to the OIE. These OIE surveillance requirements carry important trade implications, as the OIE was designated in the Sanitary and Phytosanitary (SPS) Agreement of the World Trade Organization as the standard-setting organisation for animal health (6).

The veterinary diagnostic laboratory system serves as the cornerstone for both types of surveillance by performing the testing necessary to determine the disease status of targeted animal populations. Active surveillance programmes, such as those for newly eradicated diseases, for example Aujeszky's disease in the USA, involve a statistically determined sampling of a population of animals. Passive disease surveillance generally involves taking receipt of clinically affected animals

and/or tissues to determine the cause. Testing for active surveillance programmes requires the establishment of protocols and personnel dedicated to processing a large volume of samples. Passive surveillance samples submitted to veterinary diagnostic laboratories generally originate from premises with clinical disease.

Most Veterinary Services administer disease control programmes. These may include eradication programmes for diseases such as brucellosis and tuberculosis. Some control programmes primarily involve requirements for the control of animal movements such as for equine infectious anaemia in the USA. Both national and federally approved state/regional laboratories may be involved in performing assays as part of these programmes.

Export testing

The *Code* specifies testing requirements which must be met to import animals and animal products into disease-free countries (3). Most of these requirements include diagnostic tests. National and state veterinary diagnostic laboratories are involved in performing this export testing, as well as other testing to qualify animals for movement. The national laboratories play a major role in facilitating export testing. The SPS Agreement requires that standard tests, as specified by the OIE, be used for export testing and that the methods and results be made available to trading partners (6). The national laboratories in many countries perform testing to qualify animals for import or export. In those countries where testing is performed by state or regional laboratories, a quality assurance programme must be administered. These programmes generally include the use of standard protocols and the issuing of laboratory approvals based on proficiency panels. In addition, state, regional and private laboratories must follow standard test protocols outlined by the OIE *Manual of Standards for Diagnostic Tests and Vaccines* (2).

Consultation and interpretation

Consultation with clients, including interpreting results in the context of the clinical disease picture, is a significant role of veterinary diagnostic laboratories. State and regional laboratories interact directly with veterinary practitioners and animal owners to provide the interpretation and application of test results to the disease scenario (5). National laboratories provide national veterinary authorities, such as state veterinarians, with expertise in testing for control/surveillance programmes. Veterinary diagnostic laboratories also provide expertise in the disciplines of pathogenesis, diagnosis, epidemiology and disease prevalence (1).

Research

Most veterinary diagnostic laboratories are involved with some form of research and development work. In general, these

research efforts are directed towards development and/or validation of new assays or improvement of existing assays. Movement towards more molecular-based assays, such as polymerase chain reaction, has occurred in recent years. Biotechnology has also been used to improve existing assays, such as baculovirus expression systems which provide more specific antigens for serological tests.

Quality assurance

Some countries are moving towards the establishment of quality assurance programmes for their veterinary diagnostic laboratories for the purpose of accreditation. There is a particular focus on quality assurance and test standardisation for export testing. The OIE Standards Commission has established standard test methods for most diseases that affect trade between countries (3). In addition, the Standards Commission has published a quality assurance guideline based on the International Organization for Standardization (ISO) guideline ISO 17025:1999, which veterinary diagnostic laboratories can use to establish their quality assurance programmes (4).

Conclusion

The veterinary diagnostic laboratory system is the cornerstone of the Veterinary Services of a country. This system is commonly made up of national, state and private veterinary laboratories. These laboratories provide diagnostic testing and consultation for foreign and domestic animal diseases, surveillance programmes and trade. Laboratory personnel provide expertise in the development of animal disease control and eradication programmes, in addition to the interpretation of test results for clinical cases. Participation in quality assurance activities is increasing and many countries are pursuing laboratory accreditation. As veterinary diagnostic laboratories maintain and improve their expertise in animal disease diagnosis, they provide Veterinary Services with the diagnostic capability that allows the country to respond to foreign disease incursions and to endemic disease concerns. These laboratories also provide the capability for surveillance testing which enables a country to meet the OIE requirements for freedom from a particular disease and to certify that this freedom is maintained. ■

Les laboratoires vétérinaires de diagnostic et leur rôle de soutien aux Services vétérinaires

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Résumé

Les Services vétérinaires nationaux sont chargés de la gestion de divers programmes réglementaires concernant, par exemple, la surveillance et l'exclusion des maladies animales exotiques ou la certification du statut sanitaire des régions. Les essais de laboratoire constituent un volet important des programmes de surveillance ou de prophylaxie. La plupart des pays disposent d'un laboratoire national, qui a pour responsabilités de dépister les maladies animales exotiques et de soutenir les activités exercées dans le cadre des programmes nationaux de prophylaxie et d'éradication des maladies. Outre le diagnostic des cas cliniques, les laboratoires d'État réalisent des épreuves à des fins d'exportation ou pour le compte des programmes de surveillance. Un grand nombre de laboratoires nationaux et de laboratoires d'État travaillent à l'élaboration de programmes d'assurance qualité en vue d'assurer la fiabilité des résultats de leurs analyses. Les Services vétérinaires sont tributaires des compétences de diagnostic du réseau national de laboratoires, à la fois pour faire face à l'introduction de maladies animales exotiques et mettre en œuvre les programmes de surveillance qui permettront de dépister les maladies introduites et de certifier l'absence de maladie.

Mots-clés

Laboratoire de diagnostic – Maladie animale exotique – Prophylaxie – Service vétérinaire – Surveillance. ■

Los laboratorios de diagnóstico veterinario y su función de apoyo a los Servicios Veterinarios

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Resumen

Los Servicios Veterinarios nacionales gestionan una serie de programas de control, por ejemplo de vigilancia y exclusión de enfermedades animales de origen foráneo o de concesión a las regiones del estatuto de 'libre de enfermedad'. Las pruebas de laboratorio son un componente importante de cualquier programa de vigilancia o control. La mayoría de los países cuentan con un laboratorio nacional que practica pruebas de detección de enfermedades animales exóticas y presta apoyo a los programas nacionales de control y erradicación de enfermedades. Los laboratorios de ámbito estatal, por su parte, además de diagnosticar los casos clínicos, realizan pruebas con fines de vigilancia o exportación. Muchos laboratorios de nivel nacional o estatal están elaborando programas de aseguramiento de calidad para tener la seguridad de que sus pruebas arrojan resultados fidedignos. Para poder responder a la introducción de enfermedades animales exóticas, poner en marcha los programas de vigilancia necesarios para detectar esa circunstancia o certificar la ausencia de determinadas enfermedades, los Servicios Veterinarios dependen de la competencia técnica en materia de diagnóstico que ofrezca el sistema de laboratorios del país.

Palabras clave

Control de enfermedad – Enfermedad animal exótica – Laboratorio de diagnóstico – Servicio veterinario – Vigilancia.



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