The

Ontario Animal Health Surveillance Network

A Cornerstone of the
Evolving Ontario Animal Health System

April 2009

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Executive Summary

Good health among animals is not only good for the animals, it also supports economic, public and environmental health. The current Ontario Animal Health System consists of provincial and federal government programs and measures, a number of private sector resources and initiatives, as well as animal health expertise and academic research to support the system. In addition, government expertise and resources in the public health system help to protect people from the negative impacts of animal health issues.

Animal health surveillance provides critical information to assist in the management of risks to these systems. Ontario has a network of skilled people, facilities and evolving systems that can be thought of as the Ontario Animal Health Surveillance Network (OAHSN). This OAHSN integrates information from many sources and serves as a cornerstone of the larger Ontario Animal Health System and related public health. The Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) and the University of Guelph provide core members to the OAHSN. This core OAHSN group has specialists in veterinary diagnostics, disease investigation, epidemiology, meat inspection, technology transfer and policy development. These specialists maintain links to other disease surveillance sources in other provinces, as well as at national and international levels.

This paper describes the current OAHSN, including its vision, mission, activities and outcomes, within the context of a broader, evolving animal health system. Also described are OAHSN objectives, scope, infrastructure, skill-sets, sources of information, definitions, contacts, guidelines for follow-up investigations, some past accomplishments, current and future projects, and next steps for continuous improvement. Since 1998, this is the fifth edition of this document, describing the Ontario Animal Health Surveillance Network. The network is by no means perfect, but it is believed to be moving in the right direction.

Introduction

Animal health surveillance may be defined as the ongoing systematic collection, collation, analysis, and interpretation of animal-health-data, and the dissemination of resultant information to those who need to know, so that appropriate decisions and actions may be taken. "Those who need to know" may be parties at the individual-producer-level, industry/commodity-level, regional, provincial, national or international levels; who are concerned about decisions regarding animal-health or related public-health. Ontario has a network of skilled people, facilities and evolving systems contributing to surveillance, which can be thought of as the Ontario Animal Health Surveillance Network (OAHSN).

Animal health surveillance information is important to decision-makers because animal health is important. Animal diseases or even the threat of disease can have seriously negative impacts on the agri-food economy, animal welfare, food safety, public health or the environment. The sale of livestock and animal products and the value-added through further processing, contribute over $10 billion annually to the provincial economy and employ over 100,000 people in Ontario. At any time, a zoonotic public health incident can occur or agriculture can be severely damaged from an outbreak of disease in livestock. Therefore, reducing the frequency and severity of such negative impacts has great value.

Policy makers, producers, processors and consumers strive to make good decisions. To do so, they may apply the principles of risk analysis and decision analysis (either intuitively or more formally), to make the best choices to balance costs, probabilities of success or failure, and benefits, among the options available to them. If the negative impacts of animal diseases were limited to only the same owners who chose not to manage their animals well, then disease control could be left to market forces. Unfortunately, many diseases have negative impacts that go far beyond those animals owned by such managers. Therefore, surveillance is needed to detect changes and opportunities impacting animal health and welfare (and related public health, trade and environmental issues), far beyond those directly involved initially, because of poor management or misfortune. We must understand the frequency, distribution and determinants of diseases to systematically reduce and avoid their negative impacts. We must identify important changes in disease/hazard frequencies, in space, time and hosts, to make correct decisions and to encourage appropriate and timely actions.

The continuously evolving Ontario Animal Health System strives to provide a sound foundation for the pillars of: prevention, preparedness, detection, investigation, response and recovery; of current and future serious animal diseases affecting Ontario. Many individuals, organizations and initiatives contribute positively to the Ontario Animal Health System. These include participants from industry, universities and governments (federal / provincial / municipal). Unlike other provinces, Ontario does not currently have provincial legislation to specifically address animal health issues. Options for enhancing the Ontario Animal Health System, including possible legislation, are currently under review by the Ontario Government.

Animal health surveillance is an important component of the larger animal health system. Confidence increases in the health of livestock and products from animals when there is systematic evidence of freedom from, or control of, important diseases. Animal

health surveillance provides critical information to assist in the management of risks to these systems. The Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) recognizes the importance of animal health and therefore supports the Ontario Animal Health Surveillance Network (OAHSN). OMAFRA and the Animal Health Laboratory (AHL), Laboratory Services Division, University of Guelph, support the core of the OAHSN through the allocation of personnel, operations, diagnostics, and investigative and outreach resources. The OAHSN integrates information from many sources.

The objectives of this report are to:
1) describe the Ontario Animal Health Surveillance Network (OAHSN), and
2) identify next steps for continuous improvement of the OAHSN.

Readers are invited to use this document to help understand and explain the concepts, role, and current capability of animal health surveillance in Ontario. Readers are also encouraged to submit constructive comments to help improve surveillance and future editions of this document. Please see Appendix 2 for a list of key contacts of the OAHSN.

Vision, Mission, Activities and Outcomes

The Ontario Animal Health Surveillance Network (OAHSN) serves as a cornerstone that supports the overall animal health system in Ontario and beyond. The overall **vision** is one of healthy animals contributing to a healthy Ontario. Subsequently, the OAHSN **mission** is to advance animal health and welfare, and related public, economic and environmental health, through surveillance. This is achieved by **activities** of ongoing, systematic collection, collation, analysis, and interpretation of animal-health-data, and the dissemination of resultant information to those who need to know. **Outcomes** thus include: the provision of information to facilitate timely, well-informed decisions, to prioritize actions and manage animal-health and related food safety and public health risks to Ontario and beyond.

Objectives, Scope and Scale

The ***overall objective of animal health surveillance*** (through the OAHSN), is to collect, integrate and interpret data from various sources to facilitate evidence-based risk analysis (including: risk assessment, management and communication) and decision analysis, concerning options for "in-scope" diseases and hazards (see Appendix 1).
Specific Objectives of OAHSN include to:

- Achieve the **timely detection** and confirmation (as rapid as possible) of serious animal diseases which are new, emerging or unusual-for-Ontario.
- Obtain objective **evidence of freedom**-from or acceptably-low-prevalence-of serious or specific animal diseases/hazards, in support of safe trade of animals and animal products within and beyond Ontario.
- Support **animal product safety and quality, and add value** through better management of health risks.

- Acquire a quantitative **understanding of the populations at risk** in terms of: animal type, numbers, location in space and time, normal movements and flow, normal interactions, normal production and variability.
- Obtain objective measures, with known statistical confidence, of the **frequency and distribution of important animal diseases and hazards**; in space, time and hosts to: support safe trade, identify adverse changes (i.e., detect undesirable increases in incidence or prevalence), demonstrate desirable changes (i.e., confirm decreases resulting from investments in disease control); using understanding of the populations at risk as the denominator to calculate appropriately stratified prevalence rates.
- Provide information to facilitate the **prioritization of investment in research and risk management.**
- Achieve flexibility within the network, to be able to **rapidly scale-up, scale-down or re-focus** surveillance activities, as conditions require. This includes the ability to rapidly re-scale or re-focus resources including people, equipment, supplies for sample collection, field and laboratory testing, data management, analyses, interpretation and communication. For example, the system must be able to accommodate surges in surveillance needed to demonstrate freedom from avian influenza following control of an outbreak, to regain the confidence of trading partners and consumers. Failure to do so could lead to prolonged loss of trade.

The surveillance system must make ***optimal use of finite resources*** by striving to maximize marginal return on investment. This is achieved by applying the "next available" dollars, so as to acquire the best return on their investment, by obtaining the next most useful data and information.

The ***scope* of diseases** and disease hazards included in the Ontario Animal Health System (and thus the Ontario Animal Health Surveillance Network) includes:
a) those directly or indirectly affecting farmed animals in Ontario, and
b) those in animals that can cross from any animals to affect people, and
c) those in animals that can cross from farmed animals to wildlife or to companion animals, or to zoo animals, or vice versa. Therefore, diseases or disease hazards affecting only people are beyond the scope of this document. They are left to the responsibility of public health officials, as are zoonotic diseases when they are in people. Similarly, diseases affecting only wild animals or only companion animals or only zoo animals (i.e., not able to affect farmed animals or people), are also beyond the scope of this document. They are left to the responsibility of wildlife, zoological and private organizations.

Need For Special Resources and Authority

Appropriate infrastructure of skilled people, trust, legal authority, knowledge of populations-at-risk, diagnostics, capital equipment and renewal, operating resources, and ability to act on findings, are all needed for a surveillance system to work effectively. The OAHSN has some of each of these as summarized below, and continues to strive for improvement.

Even though Ontario does not currently have explicit animal health legislation, some existing legislation does contribute to animal health surveillance. Briefly, under the

authority of the *Livestock Community Sales Act*, *Food Safety and Quality Act*, and the *Dead Animal Disposal Act* of Ontario, it is illegal (punishable by fine or imprisonment) to operate an animal sales-yard, abattoir, deadstock or rendering establishment in Ontario without a license and its associated inspection by government controlled inspectors or veterinarians. Regulations include legal requirement of such facilities to maintain records of the source and disposition of livestock and carcasses. This helps to facilitate tracing animal movements. Currently under the *Veterinarians Act* of Ontario, it is illegal (punishable by fine or imprisonment) to practice veterinary medicine in Ontario without a license from the College of Veterinarians of Ontario (CVO). Licensing is dependent on passing proficiency examinations administered by the National Examining Board. Currently under the federal *Health of Animals Act*, people throughout Canada, including Ontario, are required by law to report as quickly as possible to federal authorities, any suspect cases of federally reportable diseases among animals. For a current list of federally reportable diseases see:
http://www.inspection.gc.ca/english/anima/heasan/disemala/guidee.shtml

Also currently, OMAFRA supports surveillance by funding much of the core infrastructure of the Ontario Animal Health Surveillance Network (OAHSN). The core group of the network is coordinated by Animal Health and Welfare Branch of OMAFRA and the Animal Health Laboratory (AHL) of the University of Guelph. The core includes specialists in various species, diagnostics, epidemiology, meat inspection and data management. Appendix 2 identifies contacts of the OAHSN, their affiliations and contact information. The core group maintains linkages with individuals and organizations in animal industry, private veterinary practice, diagnostic laboratories, food safety, public health, wildlife health, research, extension education and policy; including contacts at the provincial, national and international levels. These linkages help them to coordinate surveillance activity related to animal health in Ontario.

Beyond its core members, the OAHSN depends on an informal and voluntary network of people for important surveillance information. All front-line animal custodians and professionals can contribute to the OAHSN because they are the most familiar with the health of the animals under their care. If the network is to achieve its potential effectiveness and efficiency, then it is necessary that animal owners, handlers, transporters and front line health professionals all be aware of: a) indicators of normal and abnormal health, b) thresholds of concern, c) their responsibilities to contact someone when they see disease (legal and moral), d) who to contact when concerned, e) the important role they play in surveillance, and f) the contribution that surveillance makes to society, and act accordingly. Objective measures of citizens` understanding and implementation of their responsibilities are not available. There is likely room for improvement. Animal-care and veterinary infrastructure are needed, including: education, certification, observation, testing, documentation, re-testing and audit of at least key people in each group within the network including animal-care-givers, producers, inspectors, clinicians, laboratory workers, managers and decision-makers. All are important components that facilitate the building and ongoing operation of an integrated animal health surveillance system. OMAFRA is currently identifying options for improving this system.

Clearly, it is essential to maintain individual owners' privacy and avoid false-positive disease "black-listing" of businesses or animals. Notwithstanding this need for

privacy and accuracy, there also needs to be an effective, efficient and legal means of sharing information, among those who need-to-know, to monitor routine situations and detect, verify and address animal health situations-of-concern. Failure to do so could lead to unnecessary delay in awareness or response to serious health issues. While the current system of information-sharing among the core OAHSN functions reasonably well (within the current limits of resources and authority); it is largely dependent on personal contacts, experience, trust and discretion. While these are important attributes, OMAFRA is also identifying options for improving the system's robustness and authority, to ensure consistency and accountability.

Diseases, conditions and threshold situations should be clearly defined, mandated and communicated (e.g., notifiable diseases or conditions), that require reporting, monitoring, follow-up investigation or action. OMAFRA is currently identifying options for improving this situation.

In the future, unequivocal legal authority should be in place to facilitate rapid information collection, analysis and sharing among those who need it to protect the public good. Some industry organizations have called for provincial animal health legislation to provide clearer and more extensive authority. OMAFRA is in the process of identifying options for potential additional provincial legal authority in animal health.

Key Personnel and Skill-Sets

As of December 2008, there were 3706 individuals licensed to practice veterinary medicine in Ontario. The licensing body, the College of Veterinarians of Ontario (CVO), maintains records of the primary professional activity of veterinarians. There were 707 veterinarians working in livestock or poultry medicine, 41 employed by Provincial government, 243 Federal government, and 112 Ontario veterinarians listing research as their primary activity. Sub-groups of veterinarians that share similar interests in livestock medicine have been organized within Ontario. Examples include the Ontario Association of Bovine Practitioners (OABP), the Ontario Association of Swine Veterinarians (OASV), and the Ontario Association of Poultry Practitioners (OAPP). Despite these numbers and associations, some producers in some areas of the province suggest it can be difficult to obtain the services of a veterinarian. For the purposes of surveillance, it is important that these front-line veterinarians (including the large contingent of pet animal veterinarians), submit diagnostic samples to the AHL and notify authorities of unusual cases, especially those that are suspected of impacting several animal holdings, agri-food trade or public health. OMAFRA is considering options for improving this situation.

OMAFRA's Animal Health and Welfare Branch employs 19 veterinarians including veterinary specialists in dairy, beef, swine, poultry, equine, small ruminant and alternative livestock, as well as meat safety, epidemiology, biosecurity and animal health policy. Part of their time is spent in support of the OAHSN. The OAHSN is further strengthened through its collaborative links with the Ministry of Health and Long Term Care, Ministry of Natural Resources, Public Health Agency of Canada, the Canadian Food Inspection Agency, the Canadian Animal Health Surveillance Network, the Council of Chief Veterinary Officers, and the CCVO's Surveillance and Epidemiology Advisory Committee (SEAC). As a member of the World Organization for Animal Health (OIE),

Canada is obligated to submit disease reports to the OIE. Ontario fully supports Canada's obligations to the OIE and World Trade Organization (WTO) through the Canadian Animal Health Surveillance Network (CAHSN).

The Animal Health Laboratory (AHL) of the University of Guelph is fully accredited by the American Association of Veterinary Laboratory Diagnosticians (AAVLD) and its two locations are staffed by 16 professional and 65 technical specialists in veterinary pathology, microbiology (including *Mycoplasma* spp.), immunology / serology, virology, parasitology, and toxicology.

The main campus of the University of Guelph, including the Ontario Veterinary College (OVC) and the Ontario Agricultural College (OAC) is located in Guelph Ontario. This institution is world famous for its expertise in teaching and research in veterinary medicine, animal science and food science. The OVC offers courses in continuing education for veterinary practitioners. At the annual renewal of licenses to practice, veterinarians are required to document the time they committed to continuing education during the previous year.

Sources of Information

Examples of ***sources of surveillance data*** include data from: producers, industry, veterinarians, diagnostic laboratories, abattoirs and food safety systems, surveys, research and scientific literature, reports from other health organizations or jurisdictions, international media and electronic notice boards. The members of the OAHSN work to integrate information from theses various sources. But first it is important to have some understanding of the animal populations at risk of disease in Ontario.

Understanding Animal Populations-At-Risk

Disease prevention, detection, response and mitigation can all be more strategic, effective and efficient if industry and government managers understand the populations-at-risk, in terms of their: distribution in space and time, normal flow through the system, and critical control points. With respect to surveillance, such understanding improves: a) the design and implementation of components of surveillance systems, and b) facilitates analyses and interpretation of findings relative to the denominator of populations-at-risk. This means that systematic premises-identification and animal-identification systems, complete with timely geo-location, animal attribute, counts, movement and owner/manager contact data, are important for the development and implementation of truly effective animal health surveillance and response systems. Various organizations are currently working to improve data quantity and quality in this regard. The following sections briefly describe livestock populations at risk of disease in Ontario. Some examples of current or potential surveillance activities are identified.

Dairy Cattle

All farmers that produce and sell bovine milk or cream in Ontario must be licensed by the Dairy Farmers of Ontario (DFO). In 2008 there were approximately 4400 producers licensed to produce and sell milk in Ontario. Ninety-five percent of dairy herds are geographically located in southern Ontario, primarily southwestern and eastern

Ontario. Although the average size of dairy herds is approximately 54 cows, statistics suggest that approximately 20% of mature dairy cows are located within 5% of the herds. Approximately 70% of dairy herds participate in a Dairy Herd Improvement program. Some DHI data can also be useful for animal health surveillance. Its contribution to the OAHSN is being considered.

Beef Cattle

The Statistical Services Unit of OMAFRA reported that as of July 2008 there were approximately 18,000 beef farms in Ontario with a total of approximately 1,190,000 cattle and calves. Approximately 716,000 cattle and 48,000 calves were slaughtered at provincial and federal abattoirs in 2007. All slaughtered animals underwent ante-mortem and post-mortem inspection (see section on abattoirs below and Appendix 5 concerning use of these data), thus contributing to surveillance.

Swine

As of the fall of 2008, there were approximately 3000 swine farms in Ontario with approximately 3,180,000 pigs on farms at any given time, and producing over 6,250,000 pigs per year. In 2007, approximately 4,800,000 pigs were processed at licensed abattoirs in Ontario (federal and provincial) including market hogs, BBQ hogs, cull sows and boars. All of these animals underwent ante-mortem and post-mortem inspection, contributing to surveillance.

The Ontario Swine Health Information Program certifies the health status of approximately 12,000 sows in 15 swine breeding herds across Ontario. Under the program, a minimum of 4 inspections and herd health visits are conducted each year at each participating farm, by OMAFRA veterinarians or private practitioners. During such visits, quantitative assessments of biosecurity, health, medications and vaccinations are conducted. Health status is determined by sampling and laboratory testing twice each year for *M. hyopneumoniae, A. pleuropneumoniae*, PRRSV, atrophic rhinitis and clinical inspection for mange, TGE and dysentery. This program adds data to the OAHSN.

Poultry

There are approximately 1700 commercial poultry farms in Ontario, with a total of about 44,000,000 chickens (egg and meat type), 3,600,000 turkeys and 2,700,000 other poultry (ducks, quail, geese, pheasants etc.), on farms at any one time. Most poultry production in Ontario is done under various contract arrangements among different combinations of producers, breeding companies, feed companies and processors. Many of these organizations either directly employ or have retainer contracts with veterinarians who specialize in poultry practice. Within this well-organized industry, essentially all commercial breeder, multiplier and production poultry flocks are closely monitored for variations in health and production. Exceptions to this general rule may include small operations involving a few laying hens, meat, or "fancy birds" (the latter are often raised for show purposes).

The Ontario Hatchery and Supply Flock Policy (OHSFP) provides monitoring and testing in Ontario that meets the national Canadian Pullorum-Typhoid and Hatchery Sanitation requirements, and the US National Poultry Improvement Program. The OHSFP includes mandatory testing for *Salmonella* Pullorum, *S. gallinarum* and other paratyphoid infections, and can include additional testing for *Mycoplasma gallisepticum, M. synoviae, and M. meleagridis*. This testing contributes data to surveillance.

In Ontario, approximately 217,000,000 birds are processed annually at licensed abattoirs (federal or provincial). All slaughter lots undergo ante-mortem and post-mortem inspection, contributing to animal health surveillance.

Small Ruminants

There are approximately 295,000 sheep and lambs and an estimated 76,000 goats in Ontario. Nearly 300,000 small ruminants are slaughtered at registered abattoirs in 2007. All of these livestock undergo ante-mortem and post-mortem inspection. Currently a surveillance project testing for scrapie among a sample of mature sheep at small abattoirs and one sales yard is underway.

Equine

There are approximately 325,000 horses in Ontario. Some examples of specific hazards that are monitored among equine submissions through the AHL include: West Nile virus, Eastern and Western equine encephalitis virus.

Alternative Livestock

Numbers of alternative livestock such as cervids, ratites and wild boar fluctuate with prices. All such animals slaughtered for commercial purposes in Ontario undergo ante- and post-mortem inspection at provincially- or federally-inspected abattoirs. Currently a surveillance project testing for chronic wasting disease (CWD) among farmed cervids at farms and abattoirs is underway. Also, "fish farming" (aquaculture) is growing in importance. OMAFRA has extension personnel dedicated to such alternative livestock, and the AHL (University of Guelph) has pathologists available for such species.

Producers and Production Records

Front-line animal care-givers and owners routinely observe farm animals the most frequently of anyone. They monitor production on an ongoing basis. As such, those observations and records could provide the most extensive health surveillance coverage. Since most disease spread is inherently exponential in nature, ongoing prevention and early detection have huge benefits in loss-avoidance. Therefore training, understanding and routine application by front-line workers, of detecting and notifying management of decreased health or production events, are important to the entire surveillance system. It facilitates appropriate follow-up investigation and control measures to be taken. Opportunities exist for more efficient health surveillance through electronic monitoring of various production data and statistics, across multiples businesses. Confidentiality would have to be demonstrably maintained, as well as validity, representation, timeliness, utility and trust. Nevertheless, this avenue should be explored further. It should be noted that currently, within the geographic area of Ontario, only federal regulations require the reporting of specific diseases to federal authorities. The Ontario Government is in the process of examining the need for provincial animal health legislation, similar to that which all other provinces have in place.

Veterinary Practice and Farm-Call Data

Given their routine interaction with animals, private veterinarians are often the first health professionals to become aware of unusual or serious animal health threats that have the potential to impact negatively on many animals, premises, trade or people. The

potential scale of such threats may only be apparent when observations from a number of veterinarians are combined.

Currently, Alberta Agriculture and the Quebec Ministry of Agriculture, Food and Fisheries systematically collect and monitor veterinary farm-call data as part of their surveillance systems. This approach involves standardized up-loading of veterinary clinical farm-call data, to a central, monitored database in near-real-time. The information collected includes the call-date, the township or county in which the animals are located, type of animals involved, number at risk, number sick, number dead, duration of problem, clinical syndrome, and if laboratory submission(s) have been made. For trading partners, summary analyses of such farm-call data demonstrate and document effective ongoing surveillance. It quantifies the normal variability in clinical observations and facilitates rapid detection of unusual clinical trends.

OAHSN has not done this yet in Ontario to the same extent as Alberta or Quebec. However, various sources of public funding have been use to run two pilot studies in Ontario involving swine veterinarians' farm-call-data. OMAFRA and the AHL are currently working together to migrate these pilots into an ongoing program involving swine, cattle, equine and small ruminant veterinary practice data.

Diagnostic Laboratories

An infrastructure of sophisticated, internationally-recognized, diagnostic laboratory support should be readily available, at non-prohibitive service-fees, to encourage submission of samples for diagnoses and objective demonstration to trading partners of passive surveillance coverage of all regions and classes of animals. Failure to provide such infrastructure can lead to a significant delay in the identification of serious disease outbreaks and a larger negative impact on health and the economy. In Ontario this infrastructure is achieved, in part, through OMAFRA base-line-funding of the Animal Health Laboratory (AHL) as part of the formal OMAFRA / University of Guelph Agreement.

The AHL is the only veterinary diagnostic laboratory in Ontario that provides complete post-mortem and full diagnostic work-up services. It has facilities located at Guelph and Kemptville, serving the two major livestock regions of Ontario. There are also some private veterinary laboratories operating Ontario that primarily provide microbiology and specific serologic, molecular biology and clinical pathology testing of samples from animals. To date, data from these private laboratories have not been included in the OAHSN.

All diagnostic laboratories should have documented SOPs and QA for each procedure. The AHL has these and is accredited by: full ISO 9001:2000 registration, the Standards Council of Canada, the Canadian Association for Laboratory Accreditation, the American Association of Veterinary Laboratory Diagnosticians, and the Canadian Food Inspection Agency.

Ideally, all data describing all aspects of laboratory submissions, including: animal-type, official identification and geo-location, sampling-date, numbers and clinical history of the animals and herds-of-origin of submitted samples, tests conducted, test results, findings and diagnoses; should be recorded in searchable electronic databases using standardized coding to facilitate the creation of case-specific, standardized, ad-hoc and comparative summary reports and counts, over time. In Ontario, this is achieved for

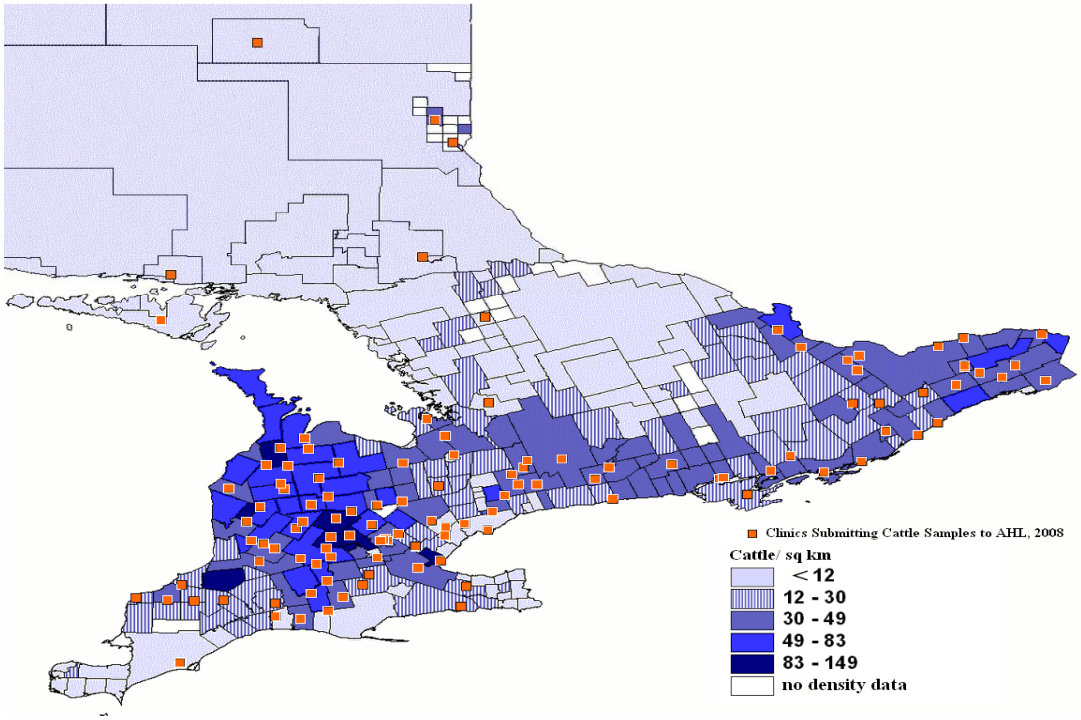
the most part by the AHL Laboratory Information Management System (LIMS) being searchable with data-mining software (WebI), by AHL and OMAFRA surveillance staff. As of February '09, OMAFRA and AHL continue to improve the ease and reliability of electronic mining of AHL animal health data for surveillance. Currently there is no access to such surveillance data from private laboratories.

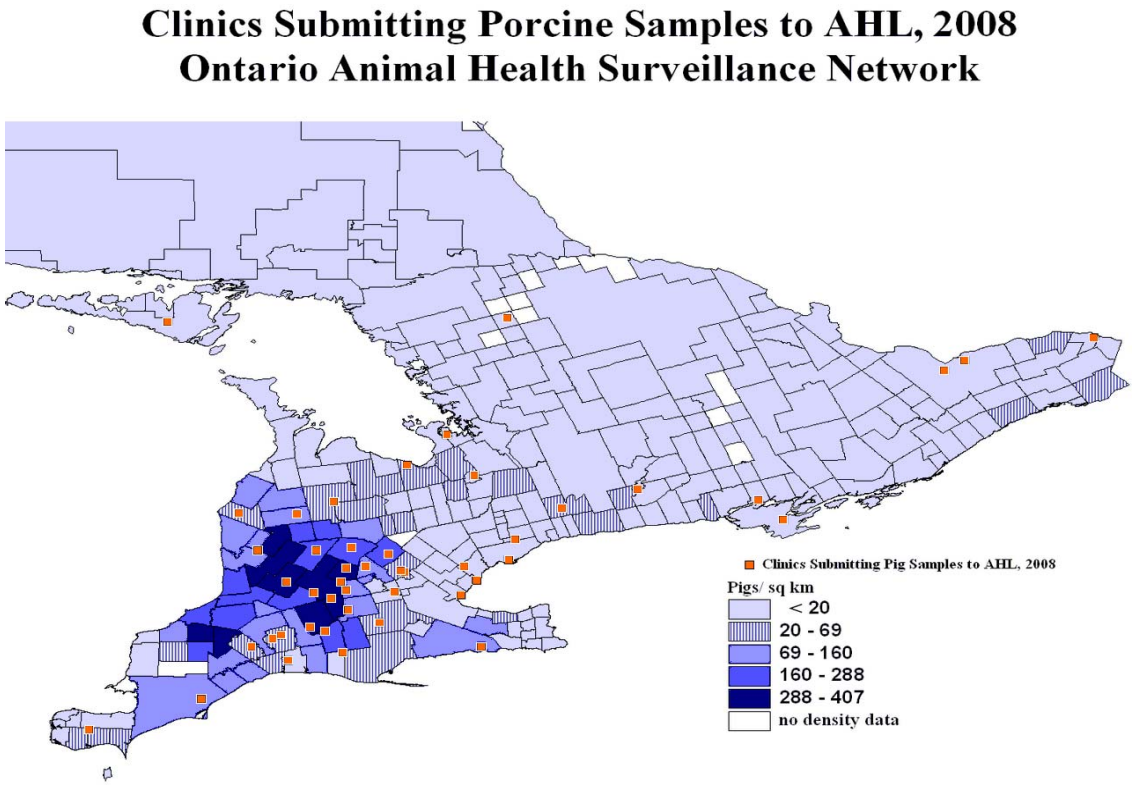
Individual laboratories should capture and store data in a manner that it can be rolled-up and safely transferred electronically to contribute to provincial, regional, national and international surveillance statistics and summary reports. Specifically for Ontario, the AHL (LIMS) is able to contribute key data fields to the Canadian Animal Health Surveillance Network (CAHSN) for selected federally-notifiable diseases.

Laboratory data systems should facilitate electronic flagging and alerting of specific conditions and results (e.g., named diseases) and situations (e.g., abnormal clustering in space or time of submissions, requested tests or specific results). As of February '09 this has been achieved to a limited degree. Discussions are underway in Canada to develop more sophisticated automated spatial-temporal cluster analyses.

To illustrate the geographic coverage of passive animal health surveillance through submissions to the AHL, the following series of maps show the locations of private veterinary clinics who submitted specimens to the AHL during 2008 relative to the population densities of cattle and swine at risk of disease respectively, based on 2006 agricultural census data.

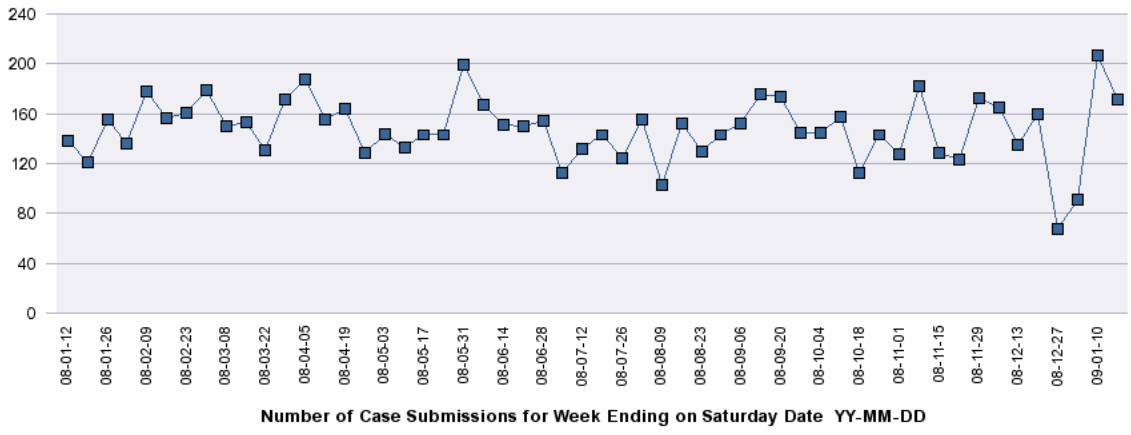
Clinics Submitting Bovine Samples to AHL, 2008
Ontario Animal Health Surveillance Network





Another example of OAHSN passive surveillance using AHL data is demonstrated in the following graph. It depicts the number of submissions per week to AHL involving bovine specimens. Epidemiologists at OMAFRA routinely monitor such graphs for each major livestock and poultry species, as they evolve over time, to detect unusual trends in submission numbers. If unusual trends or spikes appear, they then take a closer look at the data to identify the cause of change and follow-up to the extent possible under current legal and resource limitations. Note the drop in submission numbers during the week of the Christmas holiday.

Graph of number of bovine submissions to AHL per week, 2008



Abattoirs, Food Safety Systems and Deadstock

In Ontario, all commercial animal sales-yards, abattoirs, deadstock and rendering operations must be licensed with either the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), or the Canadian Food Inspection Agency (CFIA). This facilitates access to such premises by officials for visual inspection and some sampling under specified circumstances. In Ontario, all animals and carcasses slaughtered and dressed at all commercial abattoirs must be inspected by third-party inspectors, employed or contracted by OMAFRA or CFIA. All animals at ante-mortem or carcasses at post-mortem suspected as being diseased are referred for veterinary consultation. In federal establishments, a resident veterinarian conducts an inspection at ante- and post-mortem and makes the appropriate dispositions. In provincially licensed abattoirs, the inspector phones a staff veterinarian and, if deemed necessary, a locally appointed licensed veterinarian is brought in for final ante- or post-mortem dispositions. If required, samples are submitted to a veterinary diagnostic laboratory for confirmatory testing. Approximately 469 inspectors (299 federal, 170 provincial) and 200 veterinarians (80 federal, and 120 provincially appointed) serve full- or part-time in this role in Ontario.

In general, only healthy animals are shipped for processing. Nevertheless, changes to flow and condemnation patterns at abattoirs can signal important changes on farms, or help to quantify the impact of known changes. Also surveys and monitoring for subclinical infections or evidence of past exposure (e.g., changes in incidence of antibodies to specific diseases of concern among apparently healthy slaughter animals) are useful. In Ontario, OMAFRA collects and stores routine data from provincially inspected abattoirs in the Food Safety Decision Support System (FSDSS). A graduate student research project is currently in progress, applying spatial-temporal cluster analysis techniques to FSDSS data to assess the utility of such analyses of abattoir data for surveillance purposes. Also a surveillance project is underway testing for selected infections among Ontario hogs slaughtered at a large federally inspected abattoir in Ontario (Blackwell et al). These studies will likely lead to improvements in the collection and use of abattoir data.

A good example of integrating surveillance data is the linkage of animal health, food safety and product quality data in the dairy testing programs for somatic cell counts (SCC) and anti-microbial residues in milk. In Ontario, random milk samples from all dairy farms are tested for SCC and antimicrobial residues. This amounts to over 260,000 tests per year conducted at the University of Guelph for the Dairy Farmers of Ontario. In addition, over 90% of all tanker-truck loads are tested for antimicrobial residues before being off-loaded at dairies. Any suspect loads are held pending confirmatory and trace-back testing of all farm bulk-tanks that contributed to the suspect load. Dairy Farmers of Ontario milk quality staff follow-up with on farm investigations.

There are currently 21 licensed deadstock collectors in Ontario - 7 are actively engaged in providing on-farm dead animal removal services on a regular basis. In 2007, the following dead-animals were collected: 34,455 (dairy and beef); 25,567 calves; over 18,000 metric tonnes of dead swine; 431 small ruminants; and 2,188 horses. These businesses submit data to OMAFRA each month. OMAFRA is examining opportunities to monitor these data for unusual trends.

Live-Animal Markets, Fairs, Dispersals and Pooled Samples

In general, whenever and wherever animals are assembled in groups, mixed opportunities arise for both: a) disease transmission, and b) efficient examination/testing. Livestock markets and fairs are good examples of such groupings. For example, there are 30 livestock auctions markets licensed in Ontario. There is considerable room for improvement in both prevention of disease spread and in acquisition of valuable surveillance data at such hubs. Recording and understanding animal-movement-networks through such hubs is useful. Data describing sources, animal movement to, animal mixing at, and destinations from, such hubs (with or without testing at grouping); provides valuable information for tracing, risk assessment and management of disease spread. Targeted surveillance, involving examination and testing of animals at such groupings is an efficient means of locating or documenting freedom from, or acceptably low levels of animal disease hazards. There is room to improve this in Ontario.

Also, the use of pooled samples could be expanded. Samples collected at animal grouping points may be pooled, prior to testing, to improve the efficiency of testing. One example is the testing of bulk-tank milk samples, which are in fact samples from many animals, which have been "pooled" (in the bulk-tank), prior to testing. They have been used to monitor for selected conditions at the herd level. This concept should be applied to more conditions, using a broader range of pooled samples, to efficiently expand surveillance coverage.

Surveys

Some high quality surveys have been conducted as specific research projects in Ontario. However a well-planned, long-term, integrated, system of animal health surveys has yet to be funded or implemented in Ontario. Formal, statistically valid, targeted surveys can provide the best quality data when properly designed, implemented, and interpreted, taking the characteristics of the population-at-risk into account. Surveys should use sampling, tests and case-definitions of known sensitivity and specificity. They can be developed as baseline, investigation, ongoing or auditing tools. Such surveys are even more valuable when conducted in a systematic and strategic series as part of an ongoing integrated surveillance system. Such surveys also support trade and help to prioritize animal health programs, practices and research. They should be seriously considered as part of an integrated surveillance system within the animal health system.

Wildlife Data

The Canadian Cooperative Wildlife Health Centre (CCWHC) has wildlife researchers at each veterinary college in Canada, including Guelph. The Ontario Government (Ministries of Agriculture, Health, Environment and Natural Resources) provide some core or specific-project funding to the CCWHC. The resultant CCWHC activities help to monitor diseases in wildlife that are of concern to agriculture, public health and wildlife. One example is Ontario's participation in the national inter-agency wild bird avian influenza surveillance initiative. Data to assist in the understanding of the frequency of hazards in wildlife, and their distribution to domesticated animals, public health and other wildlife, have great value. Maintenance of the Ontario chapter of the

CCWHC, at least to current levels, is important to an integrated animal health surveillance system.

Other Research Literature and Reports

Scientific research literature, reports from other jurisdictions, and relevant electronic notice boards and media must be systematically monitored to learn of discoveries and changes that may be of importance. Core members of the OAHSN subscribe to pertinent computerized list-servers on the Internet, to track emerging animal health issues internationally (e.g., ProMED, EpiVet-L, FSNet, AgNet, and AnimalNet), and routinely receive international alerts electronically from the Office International des Epizooties (OIE) through the CFIA. Such information also helps to place Ontario surveillance data into context.

Information Integration and Communications

OAHSN information from all sources should be integrated and interpreted for use in systematic risk and decision analyses. Otherwise the data are of limited value. Such integration facilitates decision making to select the best next steps for the public good and overall improvement of: animal health and welfare, related public health, and environmental health. Failure to do so can lead to inappropriate decisions. The OAHSN is striving to improve this synthesis, integration, interpretation and use of data. Much of this responsibility rests with OMAFRA. Therefore, within the evolving animal health system, OMAFRA is currently considering options for supporting the OAHSN including additional staff for data integration and analyses.

OAHSN animal health information is formally communicated out through: Ceptor - Animal Health News by Animal Health and Welfare - OMAFRA (www.omafra.gov.on.ca/english/livestock/ceptor/news.html), and the Animal Health Laboratory Newsletter (www.labservices.uoguelph.ca/labserv/units/ahl/news_notes.cfm).

Rapid communications, sample shipment and information flow (including ease of access to information, laboratories and specialists, etc.) are important to surveillance. Ontario is essentially fully covered with telephone, cell phone, facsimile, postal and private courier services. Cable and wireless e-mail are available throughout most of the province. Therefore, the technical infrastructure is basically in place to facilitate such communications, but there is room for improvement in actual reporting of information into OAHSN and the sharing of information within OAHSN.

Fortunately and by design, many veterinary, food inspection, animal agriculture, service and research organizations are located in or near Guelph, Ontario, including, for example: OMAFRA headquarters, AHL, OVC, OAC, CVO, Canadian Food Inspection Agency (CFIA, regional headquarters), Public Health Agency of Canada, the Canadian Animal Health Institute, Dairy Farmers of Ontario, the CanWest Dairy Herd Improvement Corporation, Ontario Cattlemen's Association, Ontario Pork, Ontario Broiler Hatching Egg & Chick Commission, the Poultry Industry Council, etc. This co-location helps to facilitate face-to-face meetings and communication among partners.

Core members of the OAHSN also communicate with and participate directly in various national committees such as the Canadian Animal Health Surveillance Network

(CAHSN coordinated by the CFIA), and the Surveillance and Epidemiology Advisory Committee (SEAC) reporting to the Council of Chief Veterinary Officers (CCVO).

From time-to-time, on an as-needed basis, biosecurity alerts are issued by OMAFRA to relevant livestock industry groups warning of possible increased risk-of-exposure to hazards, and recommending enhancement of farm biosecurity.

Continuous Improvement

The OAHSN strives to continuously improve animal health surveillance in Ontario. Some examples of activities being contemplated to improve the OAHSN include: a) more explicit authority, governance, leadership, analyses and accountability of the OAHSN within a broader Ontario Animal Health System, including legislation, b) collection of more detailed quantitative data describing the types, numbers and locations of livestock at risk, and the flow of livestock through the agri-food system, c) computer simulation of disease spread and disease control, d) merging, analyzing and electronically monitoring numbers and case-count data from sales-yards, abattoirs and diagnostic laboratories, e) cross referencing and monitoring trends in drug residues and carcass dispositions, f) assessing the size and direction of error, if any, in data from various information sources, g) identifying ways of encouraging earlier veterinary consultation and earlier submission of samples for laboratory testing, to ensure early detection of major disease incursions, h) enhancing producer awareness of the important role they play in surveillance and improving their active participation, and i) ranking risks to prioritize resource allocations. See appendix 5 for a list of specific projects in progress.

Appendix 1: Definitions and Concepts

The following describe definitions and concepts used by the OAHSN. Other sources may use these terms in slightly different ways.

- ***Disease*** is the dysfunction resulting from damage to tissues or organs caused by disease hazards. Disease may be clinical with obvious signs of illness (e.g., lameness, shortness of breath, fever), or subclinical, without overt clinical signs but reduced production efficiency (e.g., reduced feed conversion or milk production).
- ***Disease hazards*** cause disease. They may be biological (e.g., pathogenic bacteria, viruses, parasites), chemical or nutritional (e.g., lead, dioxin, selenium deficiency), physical (e.g., trauma, extreme temperatures), genetic (e.g., porcine hyperthermia), or even radiological (e.g., isotopes released from a failure of a nuclear reactor). Some actions (or lack of actions) may be hazardous in that they facilitate realization of specific hazards (e.g., frequent direct and indirect interaction of animals, people or materials without proper biosecurity precautions).
- Various ***hosts of concern*** may be negatively impacted by various disease hazards. Examples include people, farmed animals, companion animals, wildlife, zoo animals and even insects (e.g., bees involved in crop pollination).
- So called ***zoonotic*** hazards cause disease in animals and people (e.g., rabies virus, anthrax, some influenza viruses, and *Salmonella* bacteria). Some hazards may be carried asymptomatically in some species but cause clinical disease in other species (e.g., verotoxigenic *E. coli* may be asymptomatically carried and shed by cattle but cause fatal disease in people).
- ***Decision analysis*** is a systematic process of documenting and weighing available options in terms of their respective costs, probabilities of success or failure, and benefits.
- ***Risk*** is a combination of the ***probability*** and negative ***impacts*** of something undesirable happening, caused by a hazard, as well as the ***uncertainty*** about the true probability and impact components of the risk. Diseases are examples of undesirable events that society would like to avoid or reduce, because of their negative impacts. Data that reduce the uncertainty of the probability or impact components of disease-risks have value to the management of risk.
- ***Risk analysis*** includes risk assessment, risk management and risk communication.
- ***Risk assessment*** is the systematic (preferably quantitative) assessment of the probability, impact and uncertainty components of risk, facilitating ranking of risks.
- ***Risk management*** is the review, comparison, selection and implementation of options to control risk to acceptable levels through the systematic reduction of the probability or impact components of risk, or both.
- ***Risk communication*** is the multi-directional communication and discussion of perceived or true risks, risk-assessment findings and risk-management options, so that appropriate decisions and actions may be taken.
- ***True health risks*** are the true risks to biological health of hosts of concern (e.g., diseases in people or animals)

- ***True economic risks*** are the true risks to personal property, business, micro- or macro-economies.
- ***Perceived risks*** are risks perceived by stakeholders, which may or may not be true. They may influence stakeholder behaviour, regardless of their truth.
- ***Risks to confidence*** are true or perceived risks to the confidence some stakeholders have in other stakeholders, concerning the assessment, management or communication of risks. (e.g., loss of consumer confidence in the safety of food, loss of citizens' confidence in regulators' management of risks to society, loss of voter confidence in the government-of-the-day). Regulators must systematically consider and balance true and perceived risks to health, the economy and confidence.
- Accurate data describing the ***frequency and distribution*** of diseases and disease hazards in: space, time and host types; help to reduce the uncertainty and better assess the probability and impact components of risks.
- ***Surveillance*** of diseases and disease hazards, that obtains data describing their frequency and distribution, as well as significant changes to their frequency and distribution, is essential to health risk analysis and decision analysis. Thus, surveillance has great value to society.
- ***Animal health surveillance*** may be defined as the ongoing systematic collection, collation, analysis, and interpretation of animal-health-data, and the dissemination of resultant information to those who need to know, so that appropriate action may be taken. "Those who need to know" may be at the individual-producer-level, industry-commodity-level, regional, provincial, national or international levels, animal-health or public-health levels.
- ***Risk-based animal health surveillance*** employs principles of epidemiology and risk analysis to assure strategic, cost-effective, surveillance-data-collection and interpretation, that: a) accommodates the biological epidemiology and b) prioritizes the allocation of surveillance resources for greatest marginal return on investment according to the risk (probability, consequences and uncertainty), that hazards and diseases present to society (modified after Stark et al., 2006, BMC Health Services Res 6:20).
- ***Passive surveillance*** involves testing or data collection from things that have been observed, colleted or submitted for some other purpose such that the surveillance system has no direct control over the source or rate of observations. Such surveillance must passively accept what is available, whether it is truly representative of the population of concern, or not. For example, monitoring of counts and statistical analysis of laboratory results of routine diagnostic submissions to diagnostic laboratories is passive in the sense that authorities do not influence or select who submits what samples, from where, or how often. Notwithstanding this passive and usually biased sampling, such data are extremely useful for detecting new or emerging hazards and triggering active follow-up investigation of unusual findings.
- ***Active surveillance*** involves the deliberate and active collection of specific samples or data, usually using formal random sampling of calculated statistical power, to detect or learn about the frequency and distribution of disease or disease-causing-hazards. An example would be CFIA's formal random sampling and testing for

antibodies to Bluetongue virus in bovine serum samples once every 5 years in Canadian abattoirs.

- ***Targeted surveillance*** involves efforts to detect specific diseases or hazards in specific populations, ideally, according to risk and expected marginal return on investment. It may be passive or active. An example would be testing for *Salmonella* from samples actively collected at hatcheries for this purpose, or searching records specifically for BSE in a targeted manner among pathology samples that were passively submitted to the lab.
- ***Non-targeted surveillance*** involves looking for changes in health status from a range of non-specific causes. An example would be monitoring mortality rates, production levels, syndromes or general signs of illness, for significant changes that then may trigger follow-up investigations or targeted surveillance.
- More detailed ***follow-up investigations*** may be triggered by unusual or unexpected surveillance findings that exceed a threshold of concern (preferably a predefined and mutually agreed-upon threshold). Such follow-up investigations are used to rule-in-or-out truly serious situations that require deliberate actions to prevent further damage to a significant number of people, animals, premises or businesses. Such investigations may require significant resources and legal authority to collect and test samples from various appropriate sources.
- ***Test, sample, or individual-animal-level sensitivity*** is the proportion of truly positive samples that are test positive. Good test sensitivity means very few truly positive samples will be erroneously classified as negative (few false negatives). Whereas ***test, sample or individual-animal-level specificity*** is the proportion of truly negative samples that are test negative. Good test specificity means that very few truly negative samples will be erroneously declared positive (few false positives).
- ***Group or herd-level-sensitivity and specificity*** are directly analogous to test or animal-level-sensitivity and specificity, but at the group level. They are influenced by test sensitivity and specificity, the number tested within groups, and the threshold number of individual-test-positives among those sampled that is required to classify a group as positive or negative. They are important when disease classifications, decisions and actions are taken at the herd or group level. For example, a surveillance and disease control program may be able to afford the occasional erroneous culling of a false-positive individual animal, but less able to afford the erroneous culling or "black-listing" of an entire group or herd (false-positive herd), because of low herd-level specificity.
- ***Surveillance system sensitivity and specificity*** are directly analogous to the above described sensitivities and specificities, but apply at the system level of organization. For example, a trading partner will be interested in a surveillance system's ability to detect the presence of disease/hazards, or the confidence with which the system can demonstrate freedom from, or maintenance below a defined prevalence threshold, to acceptable levels of risk. Similarly, Ontario would not want to erroneously lose export trade because of false positives, due to poor surveillance-system-specificity.

Appendix 2: Key Contacts of the OAHSN

Name & Affiliation	Training	Contact Information
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* primary contact within OMAFRA for OAHSN

** primary contact within AHL for OAHSN

Appendix 3: Guidelines for Case / Issue Follow-Up

The following summarizes "rules of engagement and disengagement" for follow-up by the Animal Health and Welfare Branch on cases or issues of concern to the OAHSN. They have been modified slightly from guidelines developed by Alberta Agriculture. Appropriate "follow-up" may range from: a) a simple phone call, to b) testing and case work-up on a specific farm, to c) conducting and analyzing a specific targeted survey, to d) movement controls and extensive work-up and surveys on multiple premises.

Cases will be considered for investigation by AHWB if they originate from:

1. Practicing veterinarians
2. Animal Health Laboratory
3. Surveillance initiatives and surveys
4. OMAFRA, OAHPP, MHLTC, MNR or CFIA

Cases will be investigated if they meet the following guidelines and are formally approved for investigation by the Director of AHWB:

1) Practicing Veterinarians
   a) Referred directly by the herd/flock veterinarian and carried out in conjunction with this veterinarian. The AHWB does not work directly with producers.
      i) Each case is considered with the referring practitioner to decide if the case meets AHWB engagement guidelines.
   b) Veterinarian has done a preliminary investigation
      i) Definition of problem
      ii) Farm visit
      iii) PM and/or diagnostic samples done depending on the type of problem

AND

   c) The disease problem is of concern to the AHWB and meets at least 3 of the following:
      (1) Suspect provincially notifiable disease (future regs)
      (2) Suspect emerging disease
      (3) Potentially affecting market access
      (4) Potentially affecting food safety
      (5) Potentially affecting public health
      (6) The herd/flock problem is significant. For example:
         (a) Unusual presentation
         (b) Higher than expected mortality or morbidity rate
         (c) Unusually high prevalence as determined by serology, culture, virology, PCR or other methods
      (7) Diagnosis has not or can not be reached in the private sector

Note: Characteristics listed in 1c may also be used to help prioritize OAHSN sponsored projects.

2) Animal Health Laboratory
   a) Any findings at the AHL considered by the AHWB to be unusual or unexpected, and meet 1c) above.

3) Surveillance Initiatives and Surveys
   a) Any findings from surveillance initiatives or surveys considered by the AHWB to be unusual or unexpected, and meet 1c) above.

4) OMAFRA, OMHLTC, OMNR, or CFIA
   a) Any animal health concerns identified in writing by management of OMAFRA, OAHPP, OMHLTC, OMNR or CFIA and meet 1c) above.

Disengagement Guidelines

Cases will be concluded when:

1) A diagnosis has been made that, in the opinion of the AHWB professionals, is conclusive.
2) The case is referred to other agencies or specialists.
3) Further diagnostic efforts by AHWB would be nonproductive.
4) The engagement guidelines are no longer met.

Appendix 4: Examples of Past Projects & Investigations

1993-95 Bovine Virus Diarrhea

An epidemic of BVD in 1993-94 led to widespread extension education activity and a marked increase in vaccination for BVDV by 1994-1995. BVD submissions rates to AHL have returned to within normal variability. New data systems at AHL make it easier for OMAFRA to monitor submission rates to AHL.

1995-99 Dairy Health Surveillance Piggybacked on Farm Financial Programs

In 1995-99, health and health management questions were added to the input forms of the Ontario Farm Management Analysis Project (OFMAP) for 200-500 dairy herds. These data were summarized for veterinarians to help their dairy clients "benchmark" their herd health as compared to provincial estimates for clinical mastitis, lameness, milk fever and calf mortality. Epidemiological analyses indicated that these disease events often cluster in herds, and certain management factors are associated with lower rates of these problems. These results were included in personalized reports for the participating producers and summarized in farm magazines, newspapers and the Veterinary Science newsletter "Ceptor - Animal health News".

1998-99 Production Loss in Layer Flocks

Diagnostic laboratory records were used in a case-control approach to investigate poultry production losses in 1998-99, identifying infectious bronchitis virus (IBV) as the likely cause. Recommendations were made to change local vaccination protocols in layers; biosecurity discussions at poultry industry meetings; increased awareness about IBV in layers; the need for ongoing genomic surveillance of IBV isolates; and follow-up exposure studies with the unique serotypes isolated. Subsequently, sentinel birds were used to provide more insight into Ontario IBV isolates.

1999 Modeling the Impact of Redistributing Test-Positive Heifers in Ontario

Export contracts for dairy heifers can be conditional on negative test results for endemic diseases such as bovine virus diarrhea, paratuberculosis and neosporosis. The contracts may lead to the retention and often redistribution of test-positive animals within Ontario. A computer simulation was created to assess the long-term risk to Ontario dairy herds following redistribution to non-source herds. Results indicated that there can be a significant impact to the dairy industry when a relatively small proportion of test-positive animals are redistributed in the provincial herd subsequent to export testing and when biosecurity is not maintained.

2001 Pilot Project to Assess Antimicrobial Resistance in Ontario Livestock

The study documented patterns of bacterial resistance to antimicrobials commonly used in veterinary and human medicine among approximately 500 isolates from food animal veterinary cases submitted to the Animal Health Laboratory, University of Guelph. Similarly, antimicrobial resistance profiles of over 300 isolates obtained from fecal samples of broiler chickens, market hogs, and beef collected at provincially inspected abattoirs from across Ontario were documented. Antimicrobials used were consistent with those used in the National Antimicrobial Resistance Monitoring System (NARMS) of the United States and a similar system, DANMAP, in Denmark. Antimicrobial sensitivity testing was in accordance with NCCLS guidelines.

The results of the study indicate:

- That antimicrobial resistance of *Salmonella* and *E. coli* serotypes occurs in food-producing animals in Ontario and the bacteria are often resistant to multiple antimicrobials.
- There are significant differences in antimicrobial resistance amongst isolates from the healthy abattoir specimens and from clinical cases of the same species.
- There are significant differences in antimicrobial resistance among the various species of food-producing animals.
- *Salmonella* Typhimurium var copenhagen phage type DT104 was the most frequently isolated antimicrobial-resistant *Salmonella* serotype.
- Salmonella were recovered from 7.2% of intestinal contents from healthy chickens, cattle and swine in Ontario abattoirs.

2002 Salmonella Surveillance

Salmonella data are followed generally, including the occurrence of any widely multiresistant clones of strains such as *S.* Typhimurium DT104. In 2002, *S.* Typhimurium accounted for 13% of all the *Salmonella* isolates cultured by the AHL. Extension education messages about farm biosecurity, sanitation, and the public health risk to those in direct contact with infected animals have appeared in animal health newsletters (Ceptor - Veterinary Science - OMAFRA; Animal Health Laboratory Newsletter - Laboratory Services Division, University of Guelph).

2002 Bovine Tuberculosis in an Ontario Dairy Herd

A dairy herd in the Peterborough area was diagnosed with bovine tuberculosis in 2002. OMAFRA published a disease alert to all large animal practitioners. OMAFRA, the CFIA, Health Canada and the Ontario Ministry of Health and Long Term Care (MOHLTC) co-operated in the investigation to minimize the risk of any human or animal exposure to contaminated product. The outbreak was confined to a single farm, and no human cases were reported.

2003 *Salmonella* Newport in Ontario Dairy Herds

In the summer of 2003, members of the OAHSN, in conjunction with private veterinarians and Health Canada, were involved in 3 *Salmonella* Newport investigations. Once the serotype of Newport was confirmed, the Provincial Veterinarian and the local Public Health Unit were notified. The following risk management actions were taken: 1) notification to the private practitioner of the culture results; 2) notification to the Dairy Farmers of Ontario to ensure that milk from affected cows was withheld; 3) assisting in the location of animals that had left the farms; 4) follow up cultures to determine the distribution and prevalence of the disease within the affected herd; 5) alerting all large animal practitioners to the presence of this emerging pathogen and recommending biosecurity procedures.

2002-03 West Nile Virus in Ontario Horses

OMAFRA conducted a serologic study of Ontario horses to estimate the prevalence of exposure to West Nile virus (WNV). Results indicated an overall seroprevalence of 6%. The prevalence was highest in the southwest and southern regions of the province, and at certain racetracks. This information was used to target particular regions and sectors of the horse industry for WNV prevention and education in 2003. OMAF also worked closely with Ontario's 17 public health units, sharing information regarding the current number of positive birds, horses and humans in specific regions.

2004 to 2009 Influenza

Various strains of influenza viruses can cause serious diseases in animals and people. In April 2004, OMAFRA sent an OAHSN representative to western Canada to assist and learn about the control of an outbreak of highly pathogenic avian influenza (an H7N3) that was subsequently eradicated from the Fraser Valley in British Columbia (BC). During the fall of 2004, OAHSN participated with federal, provincial and industry officials in the design, running and evaluation of an avian influenza simulation exercise in Ontario. International animal health and public health officials are particularly interested in the evolution and tracking of an Asian strain of H5N2 influenza that by that time had been responsible for many outbreaks of highly pathogenic avian influenza in poultry, in Asia and eastern Europe, and the deaths of at least 70 people who had had direct contact with sick birds. OAHSN members monitor list servers reporting international tracking of influenza. Less virulent strains of animal influenzas are also tracked by OAHSN. For example, over a period of several years, a relatively benign H3N2 strain of influenza moved through swine north from the southern United States, up through the USA, into western Canada, and across Canada to arrive in Ontario swine in the spring of 2005. A follow-up serological survey of 50 OAHSN sentinel swine herds in Ontario showed a significant proportion of Ontario sentinel swine herds had been exposed in the H3N2 virus in 2005. OAHSN members have participated CCWHC national surveys for influenza among wild birds, each year from 2006-2009. Those surveys have identified various strains of influenza in migratory wild birds including a low pathogenic North American strain of H5N2. OAHSN personnel monitored the progress of control efforts of an outbreak of H5N3 in poultry in British Columbia in 2009.

2004, 2006, 2007, 2008 Infectious Laryngotracheitis (ILT)

Infectious Laryngotracheitis (ILT) was detected in separate outbreaks involving a few Ontario poultry flocks in 2004, 2006, 2007 and 2008. OMAFRA and the OAHSN collaborated with the Chicken Farmers of Ontario (CFO) and the Ontario Association of Poultry Practitioners (OAPP) in the investigations of the cases, and the AHL pursued further diagnostic testing to identify the strains of the virus involved. The CFIA was notified under the Health of Animals Act regulations, since ILT is an Immediately Notifiable disease. Notification and disease management steps taken included: advisories from the poultry industry boards to their producers to enhance their biosecurity and work with their veterinarian on any suspected disease; biosecurity advisories from OMAFRA to service industries, government Ministries and agencies and veterinarians; enhanced surveillance through OMAFRA-subsidized diagnostic testing at the AHL; consulting with the OAPP on the most appropriate measures and communicating these to industry and veterinarians. In each incident, the outbreaks were limited to on one or a few flocks.

Appendix 5: Examples of Current & Future Initiatives

Influenza Lab Surge Capacity A joint OMAFRA/ AHL/ CFIA project will be completed by the spring of 2009, which greatly enhances AHL's surge capacity to test samples for influenza virus. Such surges in sample numbers would occur in the event of an outbreak. The project has developed sample collection and lab SOPs for testing using laboratory robotics and special sample vials with 2D bar codes on the bottom of each vial. The protocol involves scanning of vial numbers at CFIA field Emergency Operations Centers, collecting samples on farms, PCR testing at AHL using robotics and scanning equipment, and electronic merging of AHL test results with CFIA field data, using scanned vial identification.
FSDSS Data Cluster Analyses All animals slaughtered at Ontario abattoirs undergo ante- and post-mortem examination, and carcass deposition data are collected electronically on all carcasses in the OMAFRA Food Safety Decision Support Systems (FSDSS). In this project, FSDSS carcass deposition data from 2001-2007 are being analyzed using advanced spatial and temporal cluster analyses techniques as part of a PhD project at the Ontario Veterinary College. These analyses will help to identify more robust methods of using FSDSS data to provide animal health and food safety surveillance information. The PhD is expected to be completed by 2011.
Swine Practice Farm Call Surveillance To investigate the potential application of farm call surveillance in Ontario, similar to the system used in Alberta, a two-phase pilot study using swine practice data in Ontario is scheduled to be completed by researchers at the Ontario Veterinary College in late 2009. These studies are investigating veterinary practitioner participation, data quality and data continuity and will make recommendations for implementation of longer term systems in Ontario.
Mixed Practice Farm Call Syndromic Surveillance Using OMAFRA and AHSI funding (to 2013) and preliminary information learned from the swine practice farm call surveillance pilot studies, OMAFRA personnel are gradually expanding veterinary farm call surveillance in Ontario into selected bovine, equine and small ruminant veterinary practices. The project target is to capture and monitor core generic descriptive epidemiological data on veterinary farm calls made to 80% of farmed animals in Ontario, in a central database, within 100 hours of farm visits.
Scrapie Surveillance Scrapie is a transmissible spongiform encephalopathy (TSE) of sheep. The CFIA and the sheep industry have asked OMAFRA to assist with scrapie surveillance in Ontario, to support trade. To that end in the latter part of 2008, OMAFRA implemented a system of sheep obex sample collection at provincially inspected abattoirs and at the major Ontario stock yard processing sheep. It is anticipated that this initiative will continue on into 2009.

CWD Surveillance

Chronic wasting disease (CWD) is a TSE of deer and other cervids (wild and captive). In 2008, to support industry, OMAFRA increased funding for CWD testing and surveillance among farmed cervid samples collected at Ontario abattoirs and on farms. It is anticipated that this increased support for CWD surveillance will continue in 2009.

Wild Bird Influenza Surveillance

Surveillance of diseases among wildlife is important because some diseases can be transmitted from wildlife to farmed animals or people or vice versa. One example is avian influenza. OMAFRA has financially supported influenza surveillance among wild dead birds as part of the national wild bird influenza surveillance surveys from 2006-2008. It is anticipated that some support will continue in 2009 including continued financial support of the Guelph call centre of the Canadian Cooperative Wildlife Health Centre where members of the public can phone in to report dead wild birds for possible collection and testing by CCWHC. OMAFRA also supports this surveillance by supporting some of its inspection staff to pick up and submit dead wild birds that have been reported to the CCWHC by the public.

Animal Health Strategic Investment

The 2008 budget of the Government of Ontario announced that a 5-year Animal Health Strategic Investment (AHSI) would be made through the AHL to support the development of new tests, surveillance and emergency plans. Core members of the OAHSN at OMAFRA and AHL have worked together to develop a plan for the management of that investment. A call for proposals for test development, and surveillance projects went out in February 2009.