

# Zoonoses as a Public Health Concern: Farmed Animal Health and Welfare Forum 2011

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Public Health  
Agency of Canada

Agence de la santé  
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Canada 



# Why are Zoonoses a concern to Public Health?

## **Exposure to diseases through animals**

- PHAC has a federal role in surveillance for diseases (zoonoses) that are transmitted from animals to humans and some of these diseases also impact on animal health and welfare.
- Farmed animal health outcomes and objectives are linked to human health outcomes through One-Health.
- Public health outcomes regarding infectious diseases and pathogens arising from the agro-environment require involvement of multiple agencies.

# Why are Zoonoses a concern to Public Health?

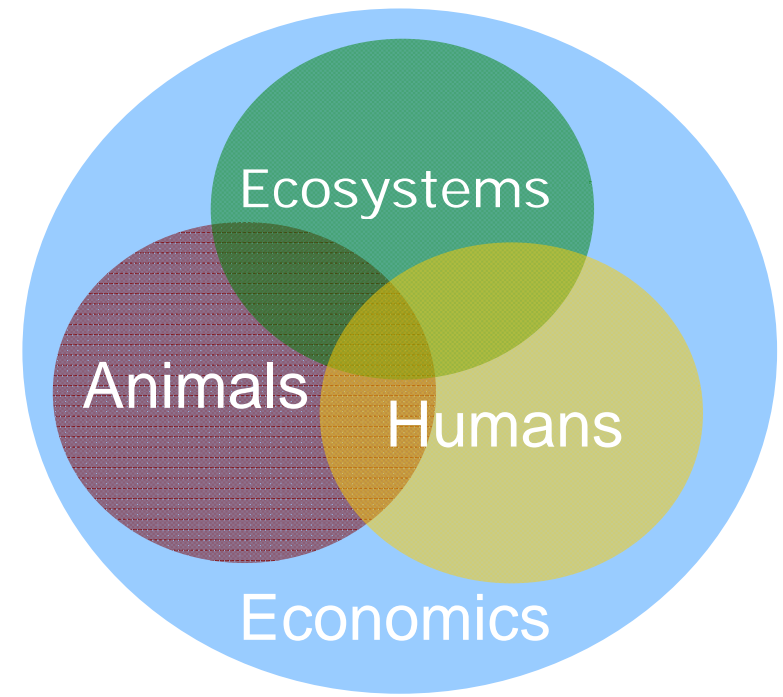
- High risk of zoonoses from livelihoods and diet
  - Most cases of West Nile in the 2007 epidemic occurred in rural communities in the Prairies
  - Farmers are at risk from Hantavirus transmitted from mice infesting barns
  - Swine workers at risk of triple-reassortant swine origin H3N2
  - Most Northern indigenous people subsist by hunting, fishing and trapping
  - Inuit consume uncooked meat and fish and other country foods



# New public health concerns surrounding farm animals

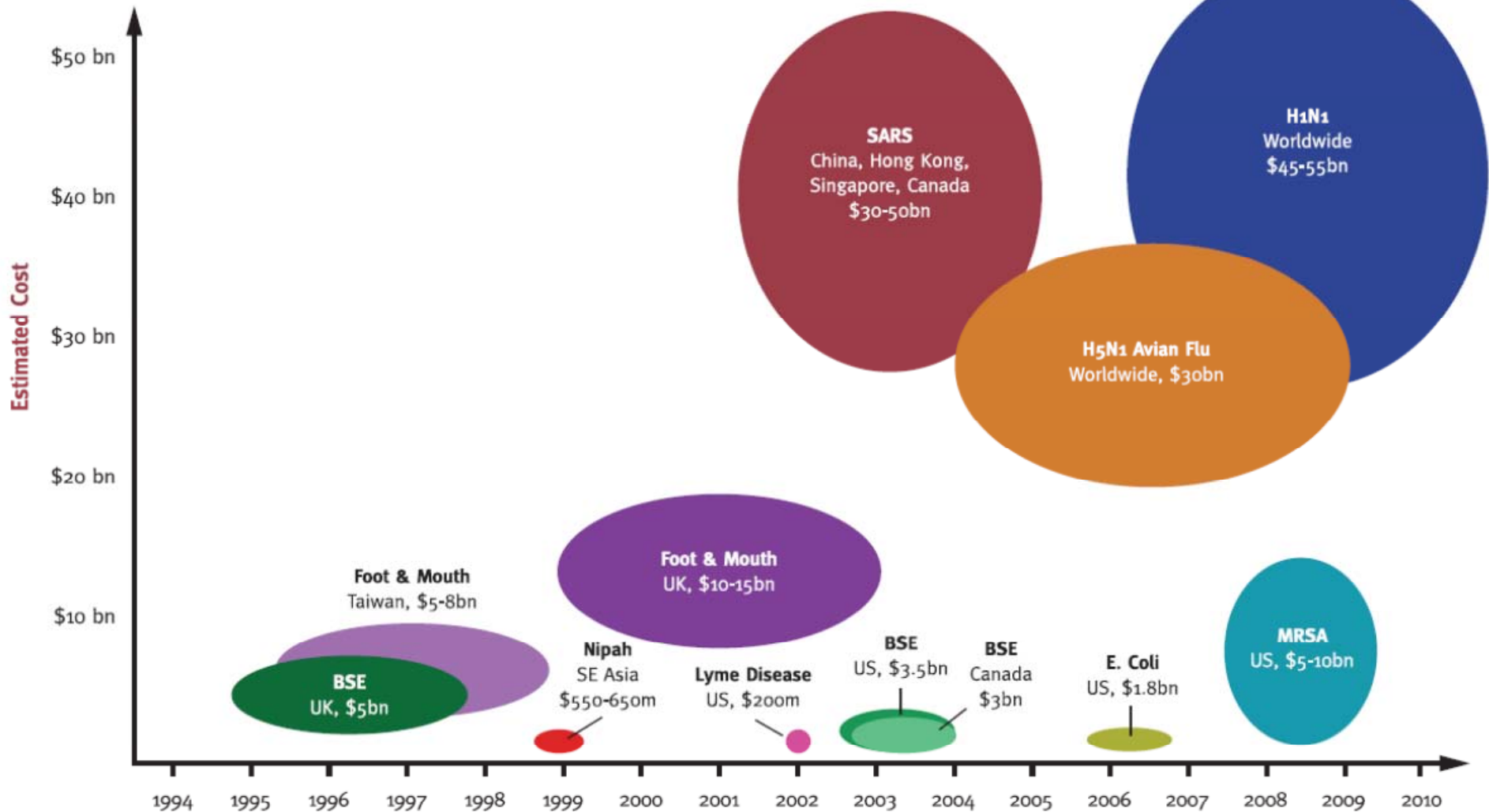
## U.S. Food & Drug Administration (FDA)

- Estimates 5,000 deaths
- 76 million cases of **food-borne disease** illness annually (*E. coli*, *Salmonella* ...)
- **Animal hormones** (groundwater aquifers and surface waters)
- **Anti-microbial resistance**



# Economic Impact of Emerging Infectious Disease

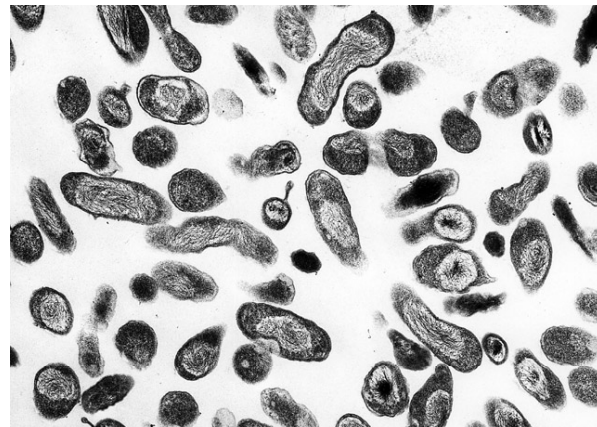
**Economic Impact of Selected Infectious Disease Outbreaks**



Figures are estimates and are presented as relative size.

# Diseases acquired from Cattle

- Anthrax
- Brucellosis
- Campylobacteriosis
- Cowpox
- Cryptosporidiosis
- Escherichia coli 0157:H7
- Tuberculosis
- BSE
- Giardiasis
- Salmonellosis
- Q- Fever
- etc.....



# Diseases acquired from Pigs

- Anthrax
- Botulism
- Brucella suis
- Cryptosporidiosis
- Influenza
- Leptospirosis
- Pasteurella aerogenes
- Salmonellosis
- Taenia solium (picture)
- Trichinella spiralis
- Yersinia enterocolitica
- etc.....



## « Livestock farm emissions raise risk of infectious disease” (Medical Post, Oct 18,2011)

« People living within one kilometre of goat or sheep farms are at increased risk of Q fever... people with asthma and chronic obstructive pulmonary disease (COPD) living near animal farms are at increased risk of infections » (European Respiratory Society)

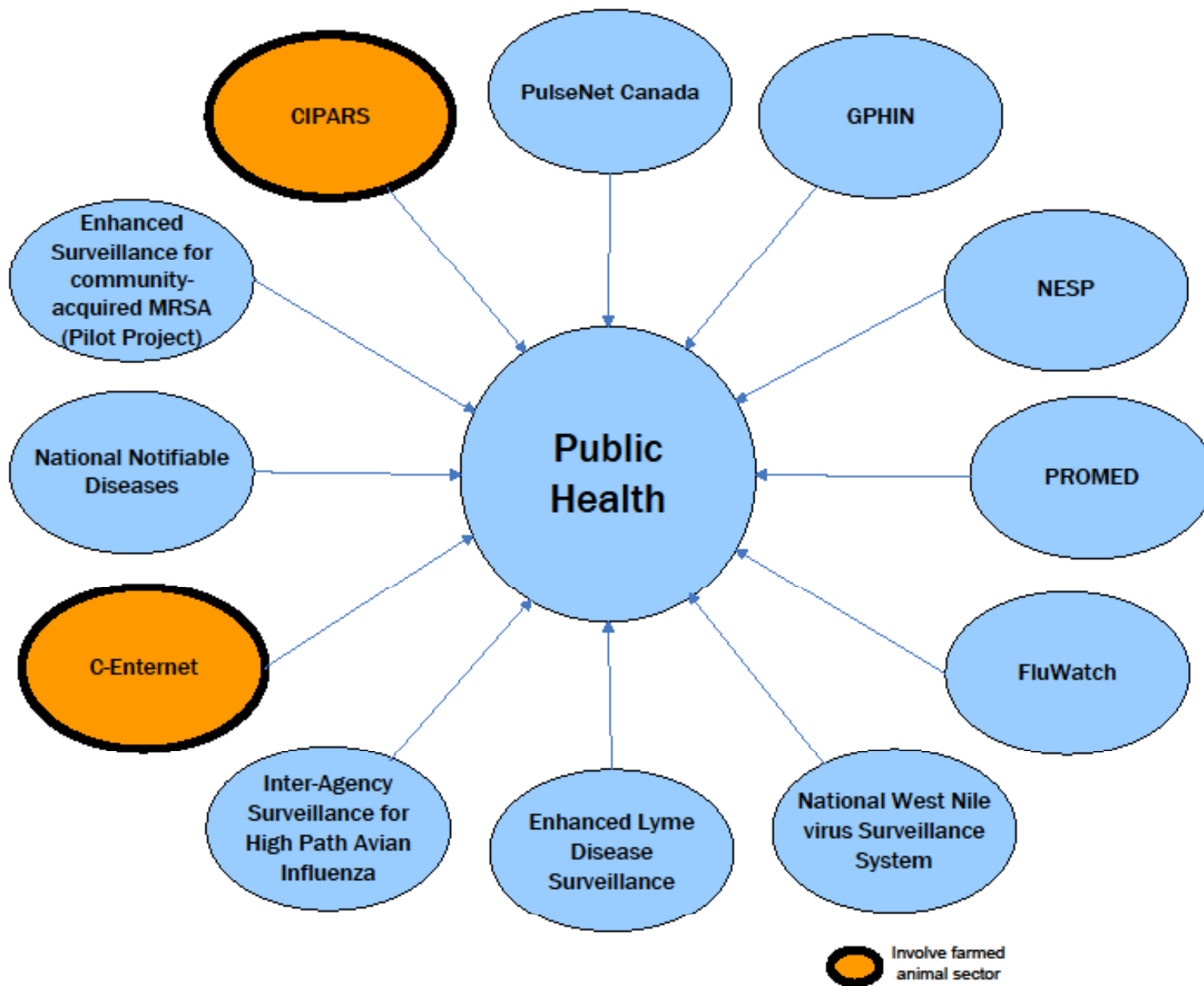






## PHAC's role on Zoonoses

- Public Health is committed to **engaging partners** to monitor, prevent, control and respond to zoonoses events.
- PHAC conducts a number of **surveillance activities that involve the agro-environment or livestock** and/or are linked to surveillance activities designed to control disease in livestock.
- PHAC is involved in a number of **prospective initiatives** with relevance to **surveillance in farmed animals**.
- PHAC is involved in a number of **prospective initiatives** with relevance to **surveillance in wildlife**.



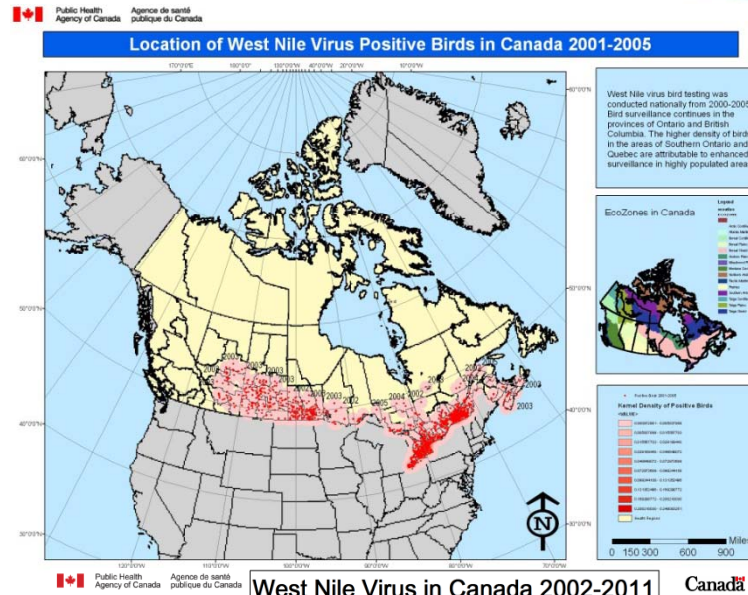


# The Role of Animal Sentinel Surveillance

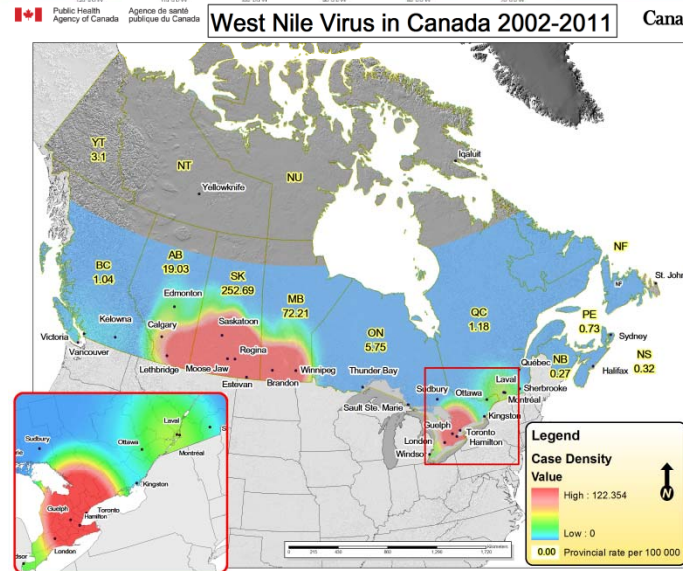
- Value of livestock animal sentinels:
  - Share environments with humans
  - Respond to many infectious agents in analogous ways to humans
  - Early indicator for human risk for diseases that do not cause high morbidity/mortality rates in wildlife or animal hosts
- Sentinel surveillance is an effective tool to identify potential Public Health risks, such as West Nile virus and avian influenza
- Links to food safety and biosecurity
- Public health concerns can affect production and consumer confidence

# Use of Sentinel Surveillance Data

West Nile virus positive wild birds in Canada, 2001-2005



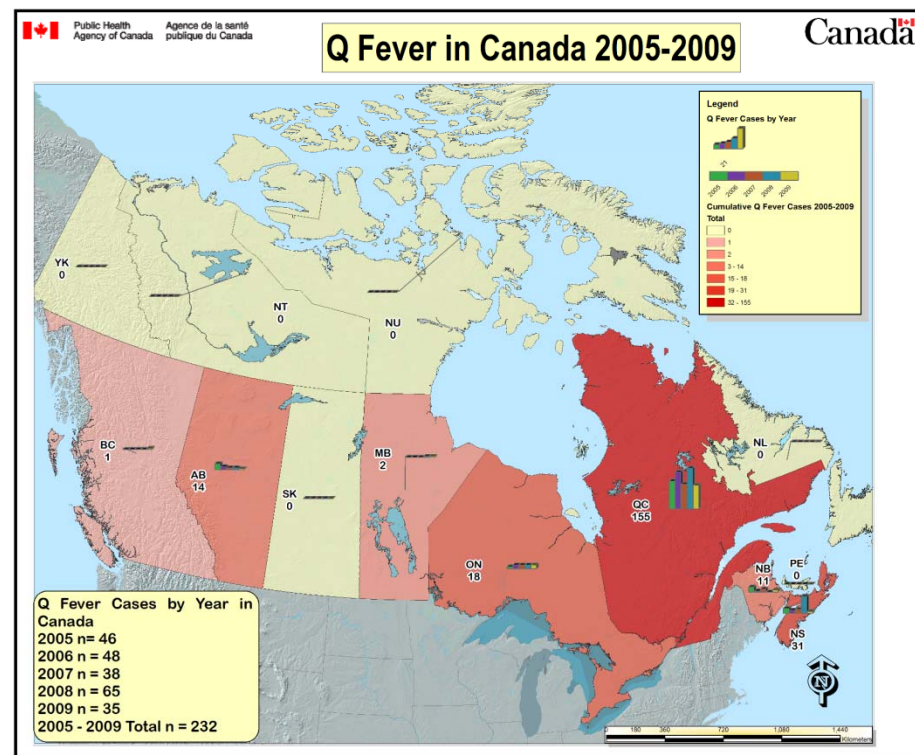
West Nile virus human disease in Canada, 2002-2010



*Risk areas identified by wild bird surveillance reflect areas with human West Nile virus cases*

# The Role of Animal Sentinel Surveillance

Other diseases that impact animal and/or public health that would benefit from sentinel surveillance to identify human risk, e.g. Q fever, arboviruses, zoonotic influenzas.



## PHAC Role in Human Influenza Surveillance

The logo for FluWatch, featuring the word "Flu" in blue and "Watch" in yellow, both in a bold, italicized sans-serif font.

*FluWatch* home

Surveillance & Outbreak Response Division and CIRID

- FluWatch
- P/T Reports
- FluWatch Sentinel Physician Network
- Respiratory Virus Detection Surveillance System (RVDSS)
- Immunization Monitoring Program Active (IMPACT)



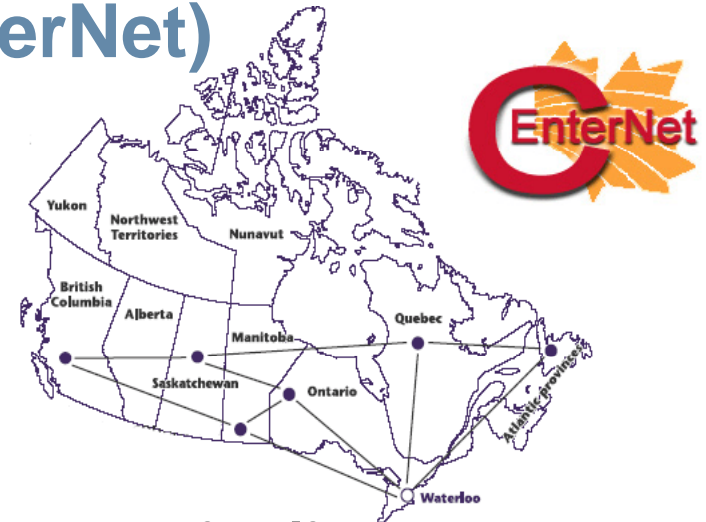
## Key Activities

**The key animal health surveillance activities or prospective initiatives underway at PHAC are:**

- Surveillance for Avian Influenza
- One Health – Science to Policy Initiative - Food Safety and Antimicrobial Resistance (AMR)
- C-EnterNet On Farm Surveillance
- Canadian Integrated Program for Antimicrobial Resistance Surveillance
- Sentinel Animal Surveillance for Arboviral Zoonoses
- Targeted Animal Surveillance for Potential Swine Influenza Zoonoses (prospective)

# National Integrated Enteric Disease Surveillance Program (C-EnterNet)

**C-EnterNet** is an integrated, sentinel surveillance program designed to monitor human enteric illness and to inform food & water safety policy



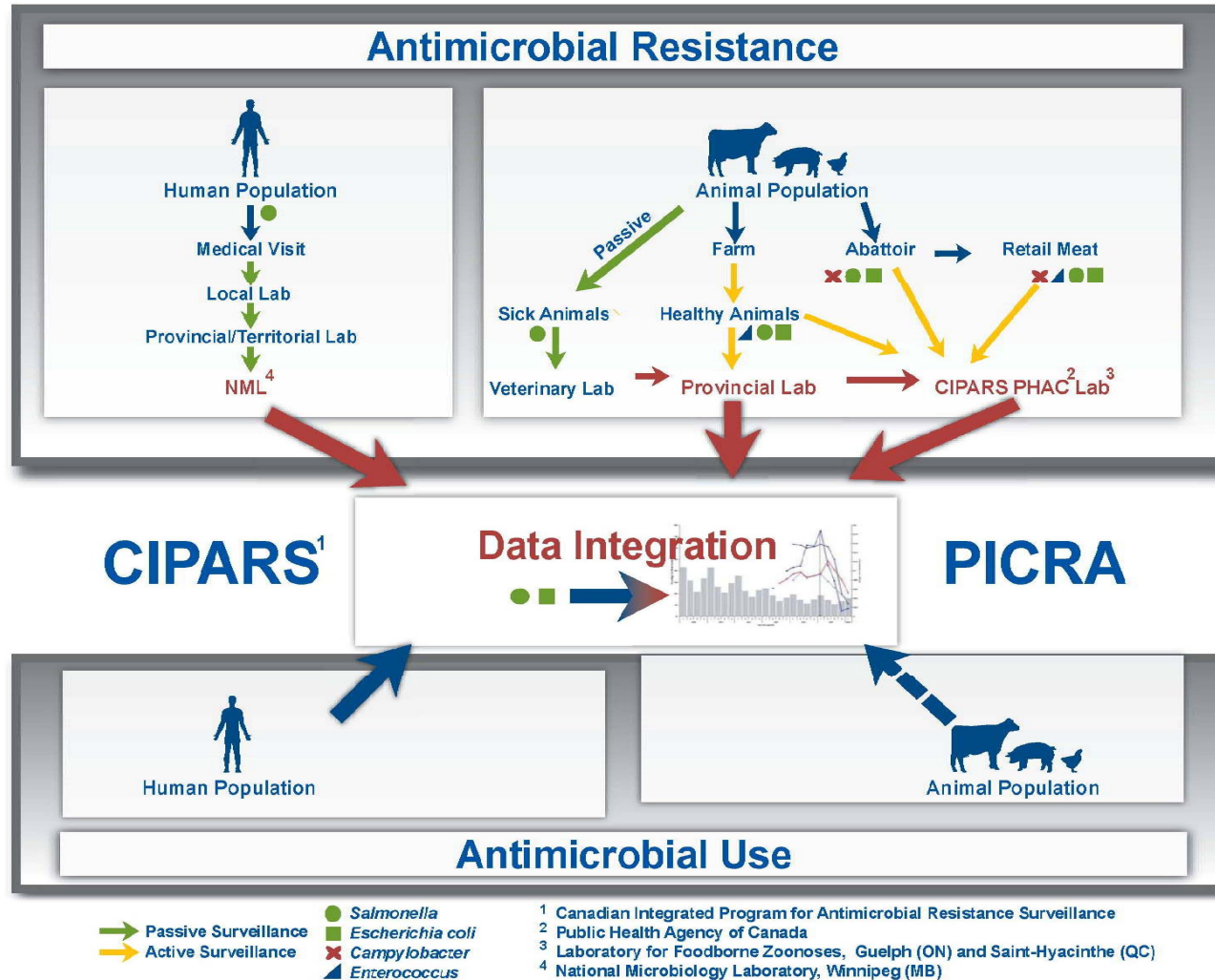
## OBJECTIVES:

- Detect changes in trends of **human enteric disease** incidence and **pathogen exposure** levels from food, animal and water sources
- **Source Attribution** – determine the proportion of human cases that are due to water, food & animals

**Critical need to strengthen source attribution efforts in Canada and determine statistically significant risk factors for enteric illness**



# Canadian Integrated Program on Antimicrobial Resistance Surveillance



# National and International Projects

- Inter-Agency Wild Bird Influenza Survey & Chronic Wasting Disease
- Current Avian influenza (H5N1) affected areas
- West Nile virus & Lyme disease surveillance
- Canada-USA-Mexico tri-lateral collaborations for North American Rabies Management Plan
- Canada-USA-Mexico tri-lateral collaborations for continental surveillance for avian influenza
- Modelling on vector-borne infections & zoonoses

Live and Dead Bird Locations - 2011

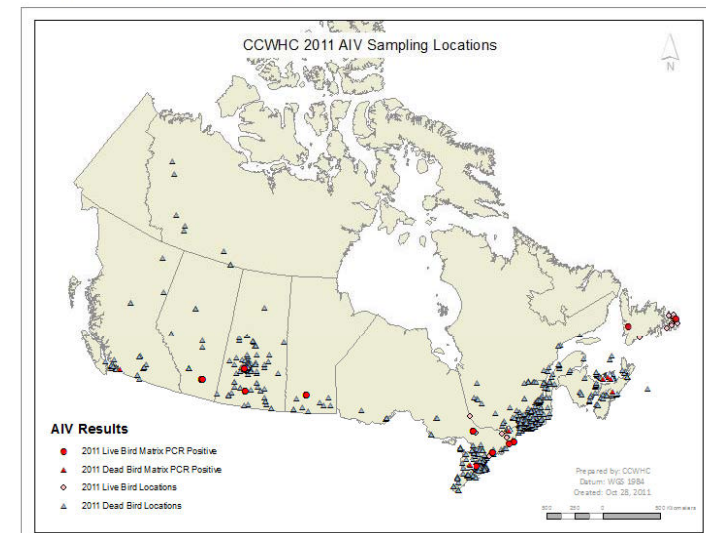
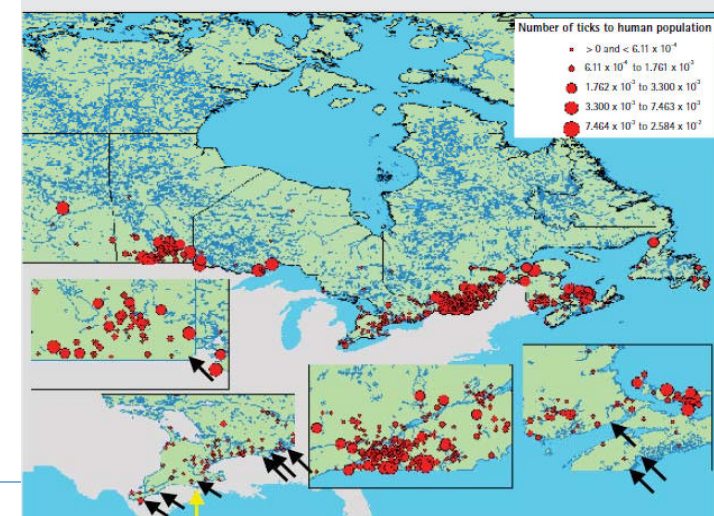


Figure 7. Known endemic areas for *Ixodes scapularis* in Canada





# Moving Forward – One Health Approach

- Surveillance systems / early warning systems should have the precision, specificity and flexibility to detect new and emerging infectious disease threats
- Surveillance systems should move towards being more integrated and comprehensive – incorporating data from animal, human and ecosystem health domains
  - Inclusion of companion animal and wildlife data into surveillance systems
  - Better inclusion of ecosystem health information
- In addition to surveillance, future One Health activities may include the areas of research, education and communication

# Key Issues for Public Health

## **Recognizing that:**

- Some important zoonoses do not significantly impact livestock production e.g. swine influenza
- There is concern in the industry of consequences of surveillance impacts this (e.g. Alberta farm affected by pH1N1)
- There are potential loss of livelihoods from zoonoses that affect domestic animals and associated mental health consequences for farm families

## **Opportunities exist to:**

- Minimize impacts of public health issues on livestock trade
- Develop future partnerships in surveillance
- Address constraints such as security of surveillance information in transfer to and use by public health (USCDC have developed some processes for this)