Digging Deeper: Developing a National Integrated Enteric Disease Surveillance Program for Canada

Barb Marshall, MES, CPHI (C)
Frank Pollari, DVM, MPH, D.V.Sc.
Katarina Pintar, MSc., PhD.
David Leger, DVM, M Sc.
Andrea Nesbitt, MSc.
Public Health Agency of Canada

EH Surveillance Workshop
Feb. 26, 2013
Ottawa, Ontario



PROTECTING CANADIANS FROM ILLNESS

Public Health Agency of Canada | Agence de la santé publique du Canada

Canada

Objective

- Describe
  - Enteric Surveillance
  - C-EnterNet Background Design, Results, Future

M. Gilmour, NML

Infectious Disease Prevention and Control Branch Centre for Food-borne Environmental and Zoonotic Infectious Diseases

- Outbreak Management Division
- **Enteric Surveillance and Population Studies Division**
- Environmental Issues Division
- Zoonoses Division
- Creutzfeldt-Jakob Disease Surveillance
- Travel and Migration Health

Enteric Surveillance and Population Studies

- C-EnterNet
- CIPARS
- NESP
- Burden of Illness Studies
- Pharmacy Surveillance

Setting the Context: Surveillance Systems

Surveillance is a key **public health tool** to monitor and prevent human illness, including chronic & infectious diseases

- Detect outbreaks in a timely fashion
- Measure magnitude and burden of disease
- Monitor and evaluate trends for understanding of disease, risks and prevention targets
- Assess effectiveness of interventions

Surveillance is for **action**

- *not* just about collecting numbers and preparing reports

PHAC Surveillance Goals

1. Governance and Organization
2. Integrated Surveillance
3. Knowledge Management
4. Performance Measurement, Quality Assurance, Evaluation
5. Partnerships and Collaboration

    To effectively manage and maintain internal/external partnerships and engage them in collaborative surveillance activities that support public health action

Integrated surveillance

Requirements

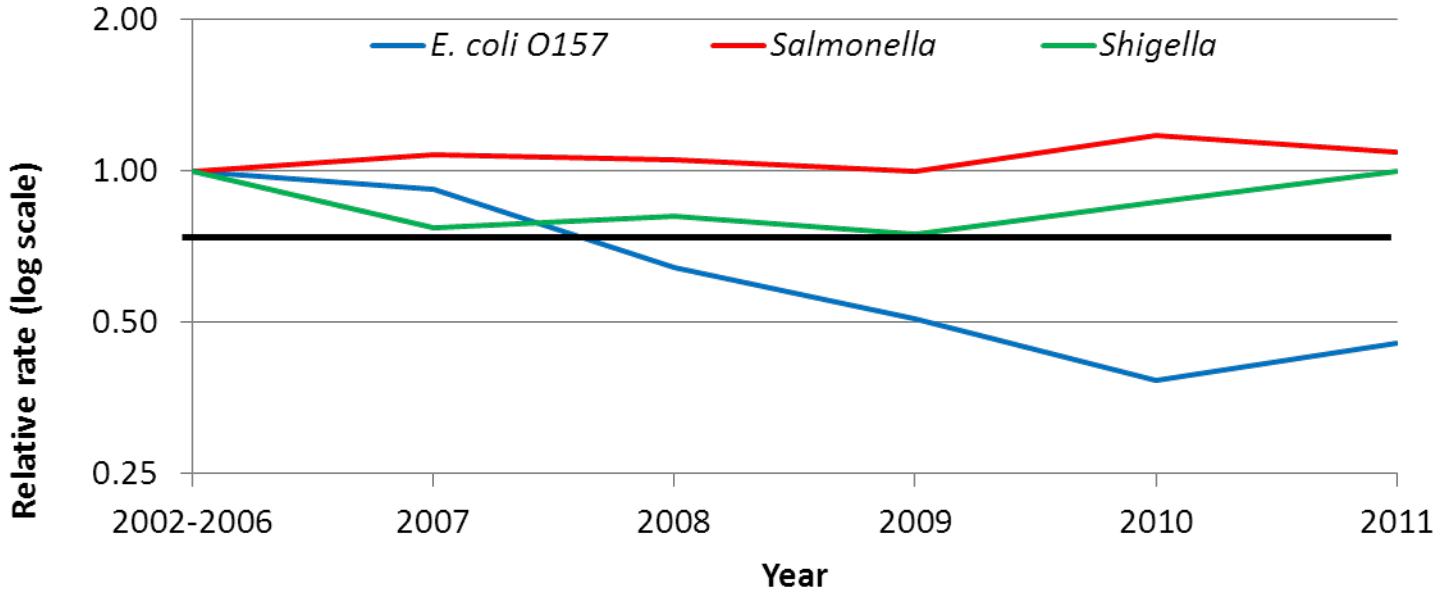
- Availability and comparison of data from animals, food and humans
- Lab and epi-based
- Often uses active and passive surveillance and sentinel sites

Benefits

- Can identify links between human disease and food/animal sources
- Can assess effectiveness of food safety policies
- Can estimate burden of foodborne disease by food/animal category

National Enteric Surveillance Program (NESP)

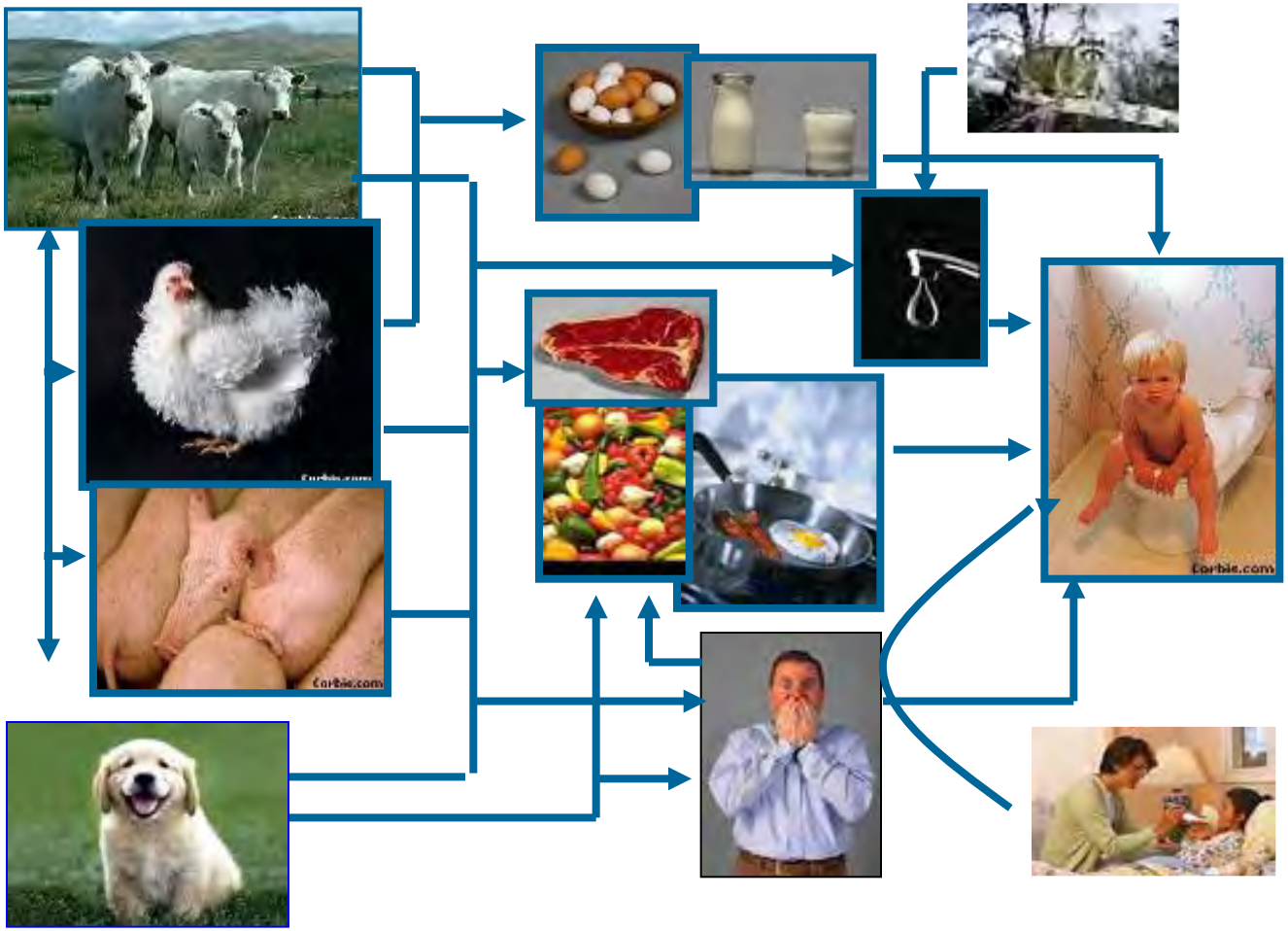
- NESP collects weekly data from provincial laboratories on enteric diseases for outbreak detection and reports national annual trends for food-borne pathogens and related subtypes.
- Annual reports can be found at www.nml-lnm.gc.ca



Relative national incidence rates (compared to the 2002-2006 baseline period) of lab-confirmed cases of *Salmonella, Shigella* and *E. coli* O157 reported to NESP by year, 2007 to 2011

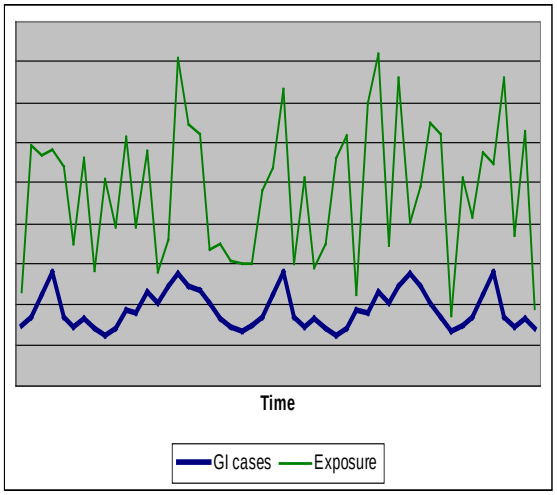
C-EnterNet Overview

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



C-EnterNet Overview

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



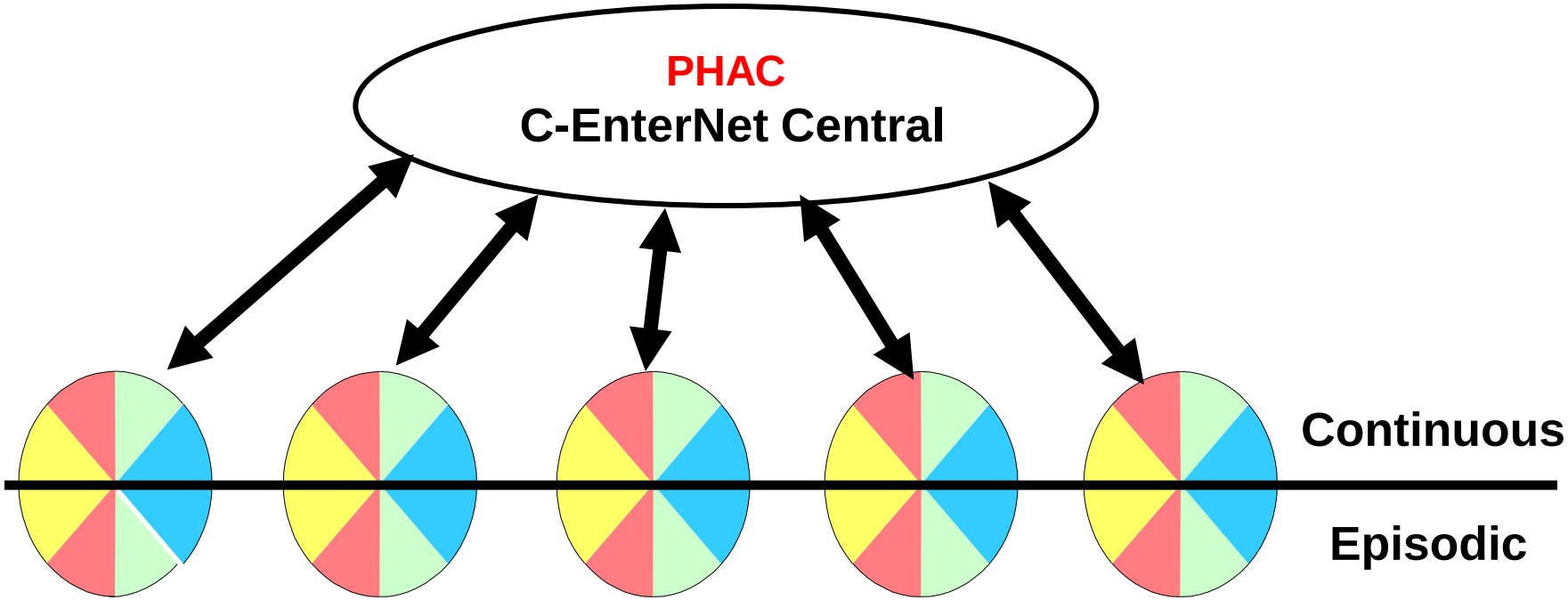
Core Objectives:

- 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 & animal contact and determine statistically significant risk factors for enteric illness

How are the data being gathered?

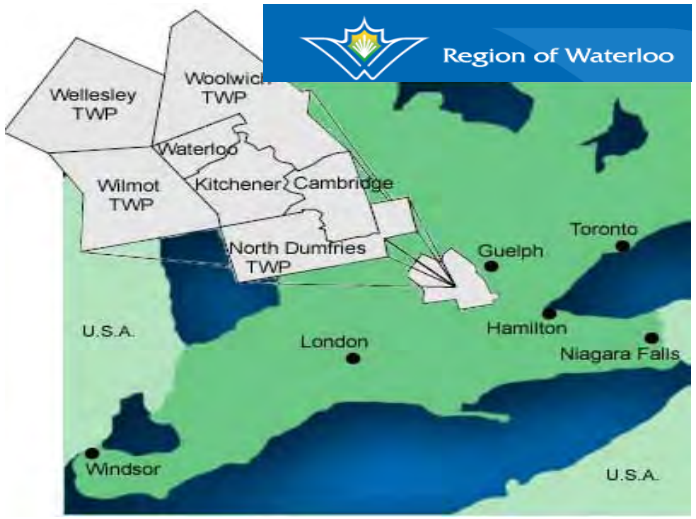
C-EnterNet Framework



Sentinel Sites across Canada

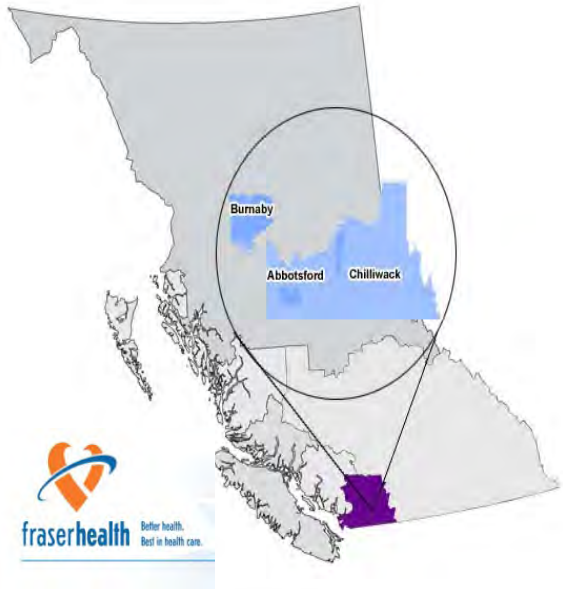
*similar to but broader than CDC FoodNet

Sentinel Sites



Site#1 Region of Waterloo, ON & Public Health Ontario – Toronto PHL

- Pilot site
- Full implementation: Human, Retail, Farm & Water
- Since June 2005



Site#2 Fraser Health Authority, BC & BCPHRL

- Partial implementation: Human, Retail, Water
- Since June 2010

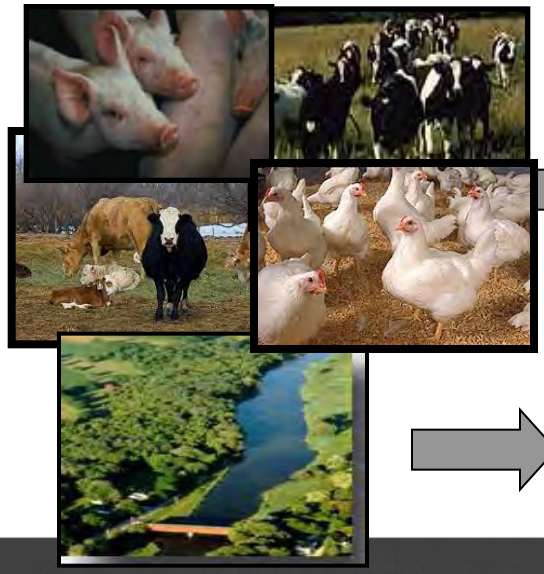
C-EnterNet Exposure Assessment

Human case information
and enhanced risk factor information
collected through standardized
questionnaires

Enhanced
Lab
Testing

Retail sampling
- •raw pork chops
- •ground beef
- •chicken breasts
- •produce e.g. lettuce, berries

Enhanced
Lab
Testing



Animal / Farm sampling
- •Beef
- •Swine
- Dairy
- Poultry

Enhanced
Lab
Testing

Surface Water testing
- •5 sites
- •Physical parameters and pathogens

Enhanced
Lab
Testing

Integrated Surveillance

- Primary goal is linking source and human illness and ultimately attribution
  - Integrate laboratory and epi information
  - Integrate across sources
  - Incorporate other information sources

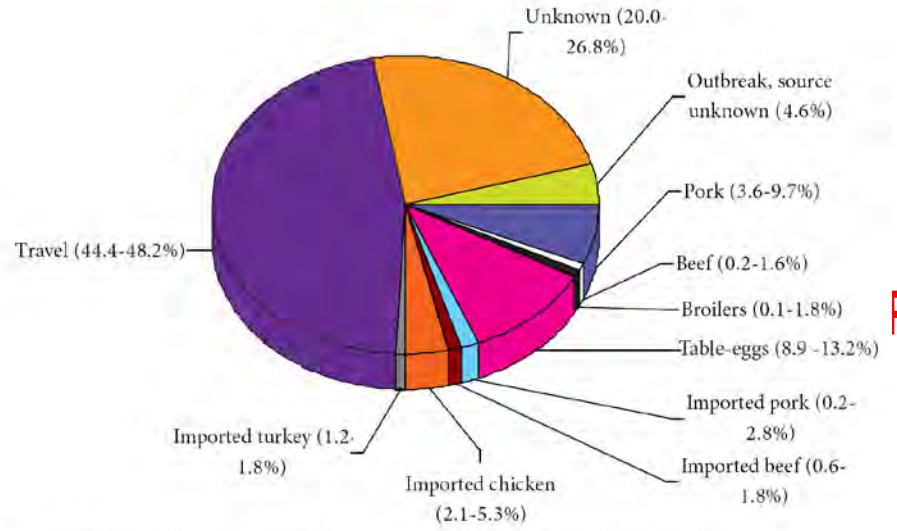


Figure 1.2. Estimated sources of 1,647 cases of human salmonellosis in Denmark, 2007
(See also Appendix A, Table A1)
Source: Danish Zoonosis Centre, National Food Institute, Technical University of Denmark

C-EnterNet Component Activities: What We're Doing

C-EnterNet Public Health Component

- Linking lab data & rich risk factor data
- Standardized Questionnaire
- Enhancing Capacity - training
- Collaborative projects/research
- Steering Committees

C-EnterNet Water Component

- **Ontario Sentinel Site**
  - » Continued systematic sampling on Grand River at 5 sites with Ont. Ministry of Environment
  - » Summer focus on recreational beaches

- **BC Sentinel Site**
  - » Sampling beaches : Cultus Lake , Albert Dyck Lake, and Barnet Marine Park, Burnaby
  - » Performed with CIPARS employee & BCRPHL hired a student for lab work
  - » Exploring other sampling - irrigation ditches

Schmidt PJ, Pintar KDM, Fazil AM, Flemming CA, Lanthier M, Laprade N, Sunohara M, Simhon A, Thomas JL, Topp E, Wilkes G, Lapen DR. "*Using Campylobacter spp. Data and Bayesian Microbial Risk Assessment to Examine Public Health Risks in Agricultural Watersheds Under Tile Drainage Management.*" Accepted September 2012, Water Research.

C-EnterNet Retail Component

- Sampling at the grocery store level helps to characterize the risk of exposure at the food handling & consumption levels
- Census of grocery store outlets in the sentinel sites
- Weekly & randomly select 3 or 4 stores to visit
- Samplers are C-EnterNet employees or Public Health Inspectors

C-EnterNet Agriculture Component

Ontario Site

Sampling in 4 commodities:

- swine operations (since 2005-2011)
- dairy operations (since 2006)
- beef operations (since 2007)
- broiler chicken operations (since 2007)
- egg layer operations (starting 2012)

Third party sampling to maintain confidentiality

(University of Guelph

- 3 fresh pooled pen manure samples- various age groups and 1 stored manure (manure pit)

BC Site

- currently under development (dairy and poultry)

C-EnterNet Public Health Component

Data Highlights: Human Case Overview – 2010

		2009				2010				2008
		Sentinel Site 1 (ROW)		Sentinel Site 2 (FHA)		Sentinel Site 1 (ROW)		Sentinel Site 2 (FHA) (Apr - Dec 2010)		National Totals†
		# of Cases	Incidence Rate (per 100,000 person-years)	# of Cases	Incidence Rate (per 100,000 person-years)	# of Cases	Incidence Rate (per 100,000 person-years)	# of Cases	Incidence Rate* (per 100,000 person-years)	Incidence Rate (per 100,000 person-years)
Campylobacteriosis	Total	118	22.8	184	41.5	144	27.3	112	33.0	28.4
	Endemic	99	19.1			112	21.3	89	26.2	
	Travel	19	3.7			32	6.1	23	6.8	
	Outbreak	0	0.0			0	0.0	0	0.0	
Cryptosporidiosis	Total	20	3.9	14	3.2	23	4.4	5	1.5	2.4
	Endemic	17	3.3			13	2.5	2	0.6	
	Travel	3	0.6			10	1.9	3	0.9	
Salmonellosis	Total	117	22.6	129	29.1	129	24.5	96	28.3	18.2
	Endemic	82	15.8			82	15.6	56	16.5	
	Travel	35	6.8			39	7.4	32	9.4	
	Outbreak	0	0.0			8	1.5	8	2.4	

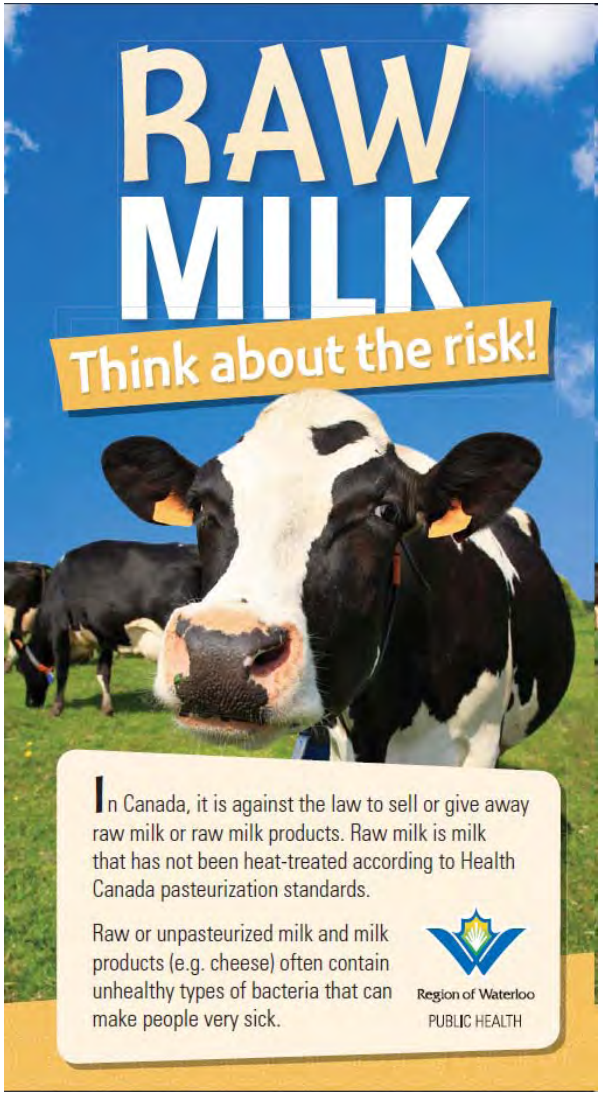
Knowledge to Action:
C-EnterNet Trends in Consumption of Raw Milk in ROW (2005-2010)

- C-EnterNet identified consumption of raw milk as a risk factor for *Campylobacter*
- Consumption of raw milk increased the risk of being *Campylobacter* case over 2 times

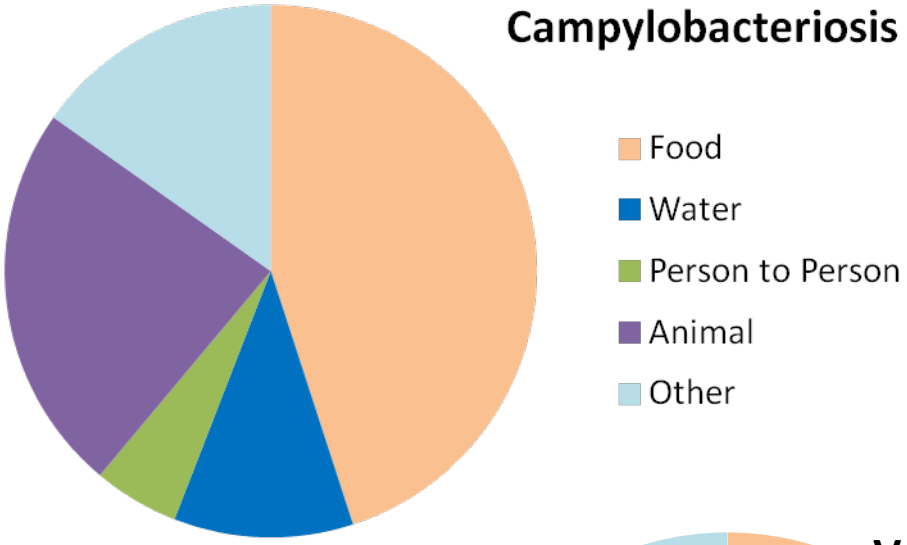
- Raw Milk Consumption: healthy people from same area <1% (17/2332) consumed raw milk (Nesbitt et al, 2008)

Public Health Action

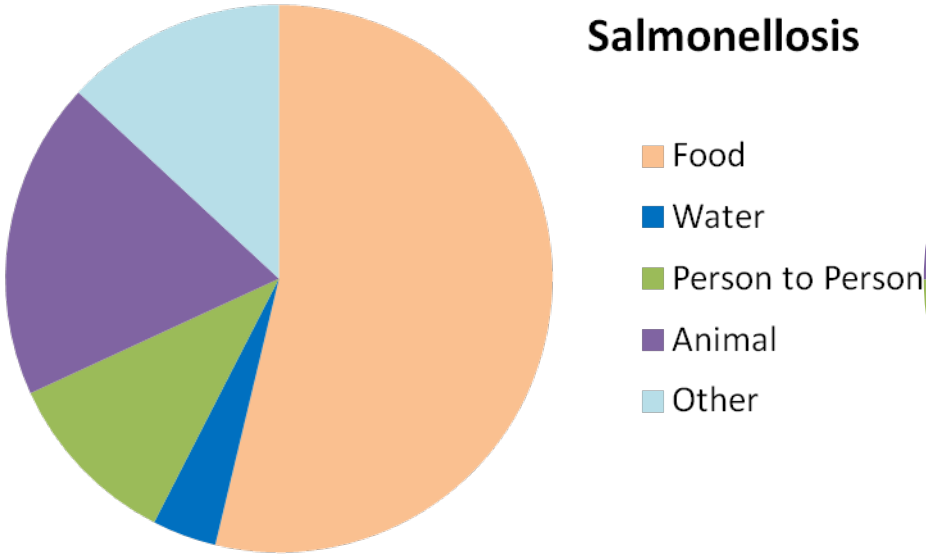
- PHAC C-EnterNet, U of G MPH & ROWPH collaboration
- Consultation with the community; and ON Ministry of Health raw milk messaging
- Fact sheets developed: educational tool for general public and raw milk distributors
- Linked with PHO and BCDC to share information

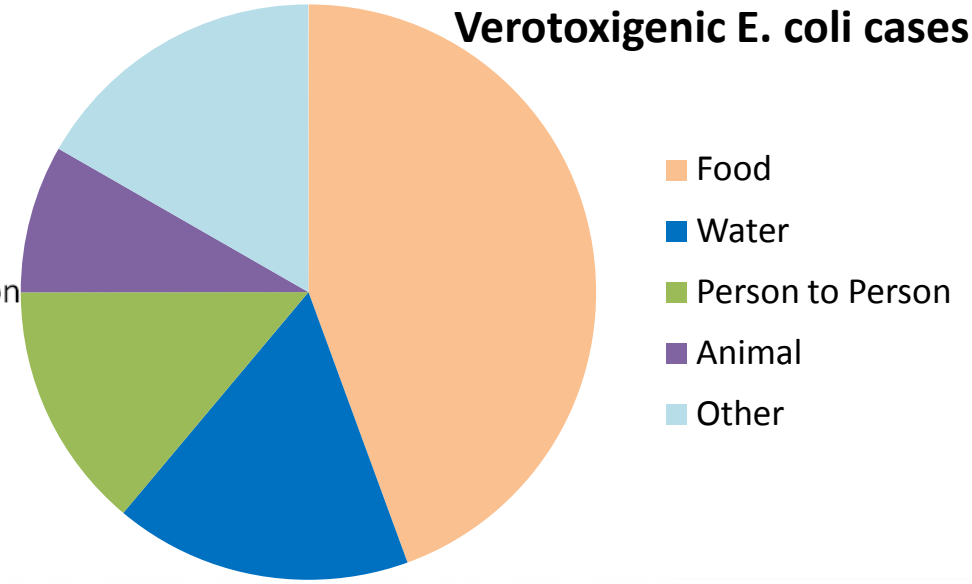


Evidence: C-EnterNet Case Information for Most Likely Source



Dumoulin D, Nesbitt A, Marshall B, Sittler N, Pollari F. "*Informing source attribution of enteric disease: An analysis of public health inspectors' opinions on the 'Most Likely Source of Infection'* ". Environmental Health Review. 2012

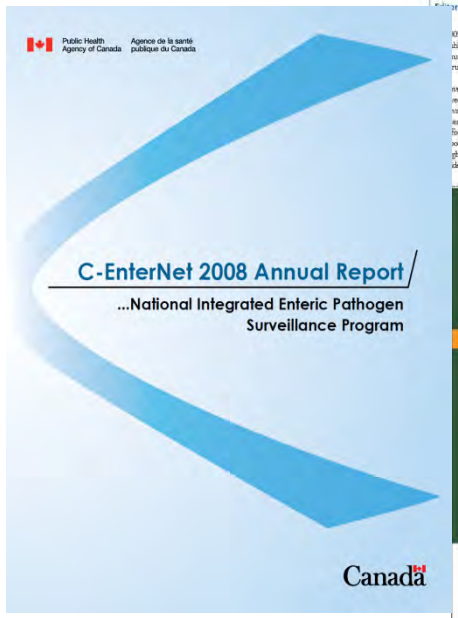


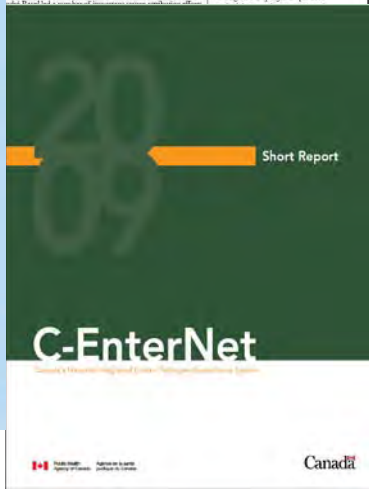


C-EnterNet Outputs

Knowledge Translation

- Reports, Publications & Presentations
- Success stories
  - Rec. Water & *Crypto*
  - Travel cases*
- "One pagers"





Episodic Research

- Healthy Control Study
- *Campylobacter* Exposure Study
- Non-O157 *E.coli*

*Ravel, A et. al. "Description and burden of travel-related cases caused by enteropathogens reported in a Canadian community" **Journal of Travel Medicine, 2011**

C-EnterNet Moving Forward

- Food safety remains a priority of the government
- Food-borne and waterborne diseases are complex and require multiple surveillance approaches
- Information about cases and exposures are required to target interventions and reduce illness
- C-EnterNet continues efforts to provide rich Canadian data to help inform food safety, water safety and public health action
- Addition of 3rd site is planned in 2013
- C-EnterNet – a platform
- Closer alignment and linkage to sampling, mandates and strategic imperatives within and external to PHAC e.g. - CIPARS, CFIA, HC, Sentinel Sites - Local and Prov. Health, NCCEH.

PHSA Laboratories

Public Health Microbiology & Reference Laboratory

fraserhealth

Better health.
Best in health care.

BC Centre for Disease Control

An agency of the Provincial Health Services Authority

Region of Waterloo

MINISTRY OF THE ENVIRONMENT
MINISTÈRE DE L'ENVIRONNEMENT

LifeLabs®

Formerly MDS Diagnostic Services

Public Health Ontario

PARTNERS FOR HEALTH

Santé publique Ontario

PARTENAIRES POUR LA SANTÉ

CANADIAN WATER NETWORK
RÉSEAU CANADIEN DE L'EAU

GRAND RIVER CONSERVATION AUTHORITY

Laboratory for Foodborne Zoonoses

CML HealthCare

Gamma-Dynacare

University of Waterloo

Ministry of Health and Long-Term Care

GRAND RIVER HOSPITAL

Ontario

Ministry of Agriculture, Food and Rural Affairs

UNIVERSITY of GUELPH

Agriculture and Agri-Food Canada

Agriculture et Agroalimentaire Canada

Health Canada

Santé Canada

Bureau of Microbial Hazards
BMH BDM
Bureau des dangers microbiens

NSAGI National Studies on Acute Gastrointestinal Illness

Public Health Agency of Canada

Agence de santé publique du Canada

Thank you!

frank.pollari@phac-aspc.gc.ca
barbara.marshall@phac-aspc.gc.ca

http://www.phac-aspc.gc.ca/c-enternet/index.html
http://www.phac-aspc.gc.ca/c-enternet/index_f.html