

# Antimicrobial Drug Use in Animals as a Driver of Resistance

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Antimicrobial resistance is a “One  
Health” issue

# How Antimicrobials are Used in Animals

- **Therapy** - treatment of infection in single animals
  - e.g. individual cow, dog or horse
  - By prescription and some older antimicrobials available OTC



# How Antimicrobials are Used

- **Group Treatment in Food Animals**
  - Therapy (e.g. broilers with *E. coli* infection)
  - Prophylaxis (e.g. feedlot calves on arrival; egg injection)
  - Growth promotion (e.g. pigs in grower phase; broilers; calves)
  - OTC and prescription



# Extra-Label Drug Use in Veterinary Medicine

- Common practice
- Need arises from limits in availability of approved, effective “claims”
- Often insufficient incentive for drug companies to seek new label claims
- Food safety - focus on residues
- Very little attention to antimicrobial resistance arising from off-label:
  - Drugs very important to treatment of human infection
  - Mass medication, routine use

# Resistance in Foodborne Pathogens

- MDR Salmonella
- Campylobacter - fluoroquinolone-resistance
- Vancomycin Resistant Enterococci (VRE)?
- MRSA
- CMY-2, extended spectrum beta-lactamases
- Increasing attention on *E. coli*, commensals

# Health Impacts of Resistance



- Antimicrobial effectiveness



- Use of more expensive & valuable antimicrobials



- Infection severity and number of infections (in humans)

How big is the problem? → Quantitative Risk Assessment

None “definitive”; inherently uncertain, complex

# Quantitative Risk Assessments

<b>Drug / Bug (# assessments)</b>	<b>Clinical Outcome in Humans</b>	<b>Risk Estimate (Range)</b>
Fluoroquinolones / <i>Campylobacter</i>	Treatment of fluoroquinolone-resistant campylobacteriosis with fluoroquinolone	5,230 – 15,330
Macrolides / <i>Campylobacter</i>	Adverse event (e.g. treatment failure)	0.04-3.62 adverse events in U.S. per annum
Streptogramins / <i>Enterococcus</i>	Synercid treatment failure	Reduced by 1.85 cases over 5 years by ban on virginiamycin





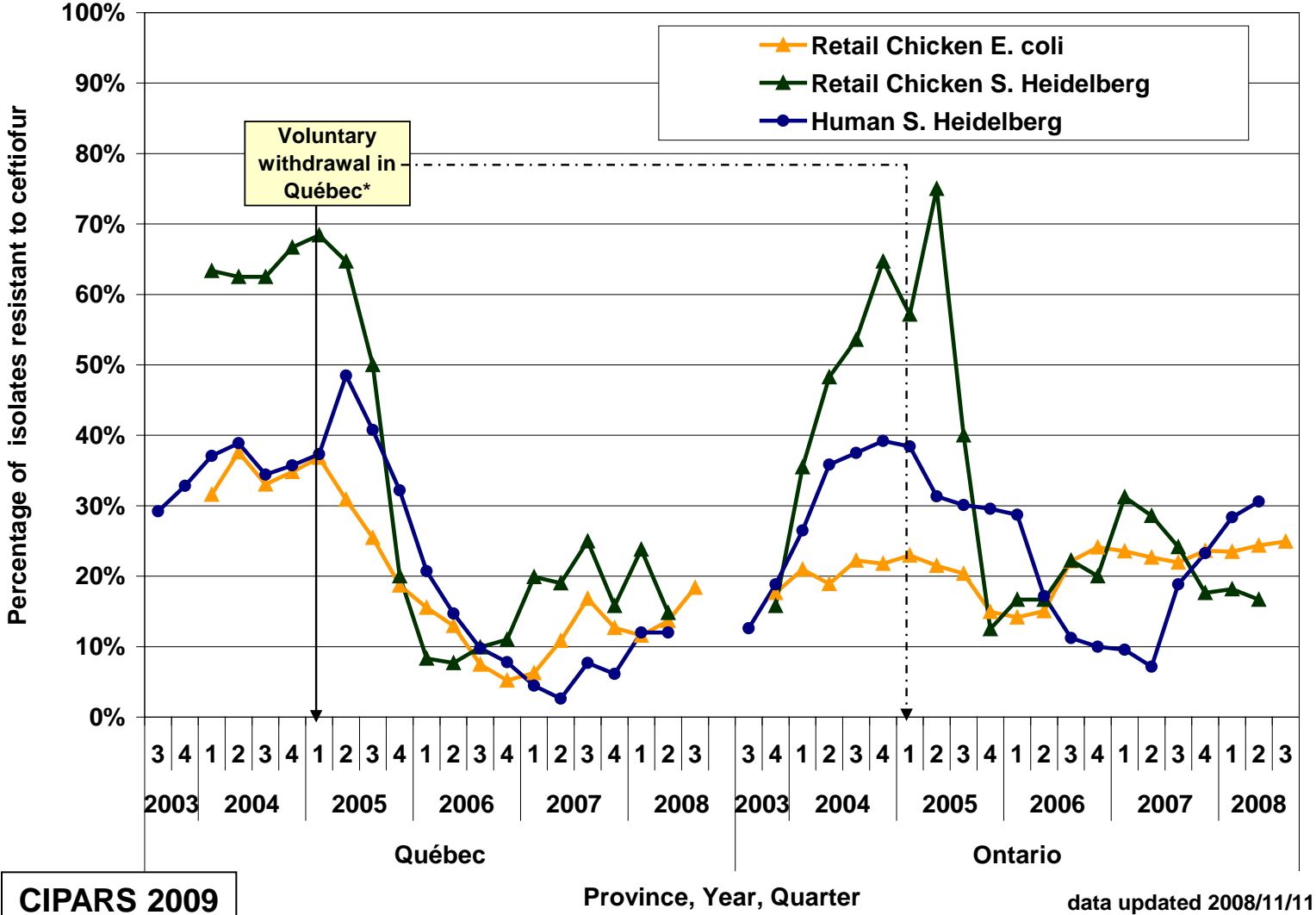
## Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS)

*...working towards the preservation  
of effective antimicrobials for humans  
and animals...*

Annual Report

# 2008

# Ceftiofur Resistance in Chicken and Human *S. Heidelberg* and Chicken *E. coli*



# Interventions

- **Regulatory changes**
  - Improved regulatory oversight
  - Bans (e.g. growth promoters)
  - Restrictions on use
- **Monitoring / Surveillance**
  - e.g. CIPARS
  - Antimicrobial use (AMU) and resistance (ARO)
- **Voluntary Measures**
  - Prudent use programs (vets, animal industry)

# ARO Screening in Animals

- Rarely used and rarely recommended
- Potential application to large companion animal medical centres / pet-facilitated therapy situations
- Food animals – has been used in Denmark (import screening)
- In future – could be used if ARO of trade importance emerged

# ARO / AMU Surveillance

- **Absolutely essential**
  - **Advancing knowledge on resistance selection and spread**
  - **Support AM use policies**
  - **Assess interventions**
- **Integrated surveillance of antimicrobial use and resistance in animals, food, environment and humans is essential and should be enhanced and strengthened in Canada at provincial and national levels and coordinated with international partners**