



New Zealand Food Safety
Ministry for Primary Industries
Manatū Ahu Matua

NZ Food Safety

LECTURE SERIES



Prologue



- Relatively recent recognition of campylobacteriosis as a major foodborne public health problem
- “Magic Study” 1997 (MoH) pointed to several **risk factors** but consumption of poultry meat the most important
- Public health outcry in early 2000’s as cases mounted
- NZFSA responded in earnest in 2006



Campylobacter in Poultry –
Risk Management Strategy
2007 - 2010

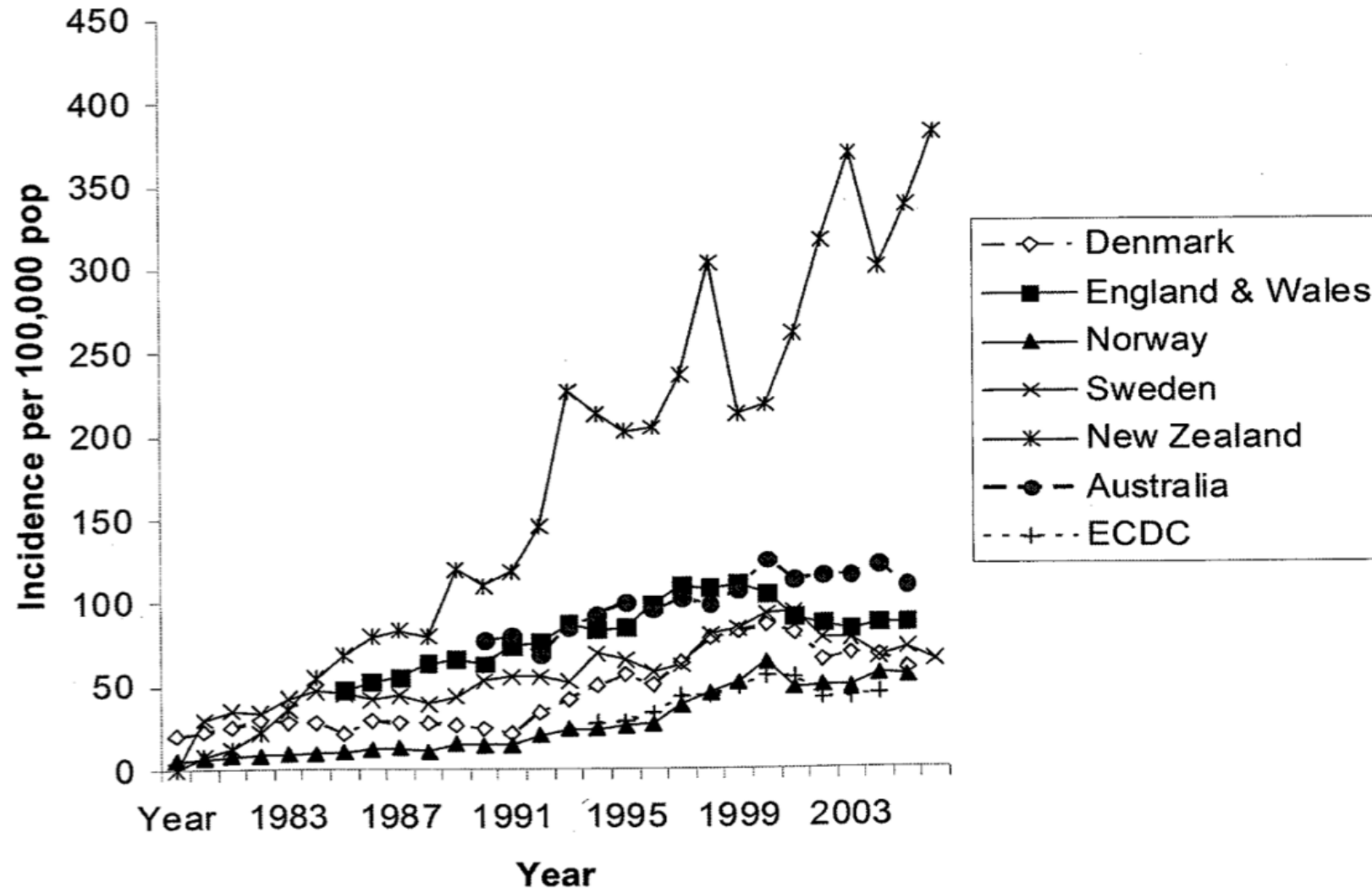
THE NEW ZEALAND
MEDICAL JOURNAL
Vol 119 No 1243 ISSN 1175 8716



**Regulation of chicken contamination urgently needed to
control New Zealand’s serious campylobacteriosis epidemic**

Michael Baker, Nick Wilson, Rosemary Ikram, Steve Chambers, Phil Shoemack,
Gregory Cook

An epidemic?

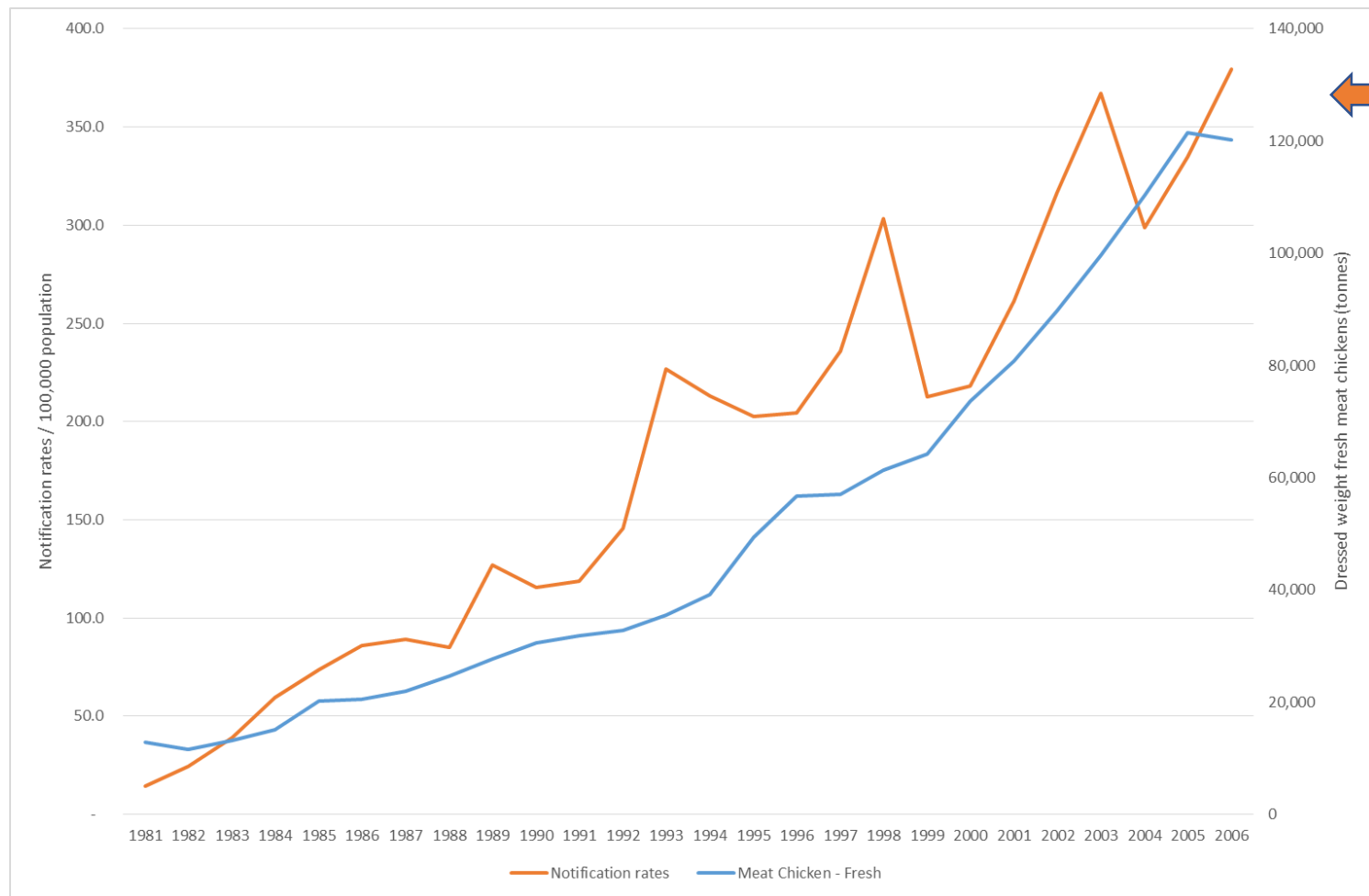


Possibilities and pathways



- Reservoirs in animals and birds
- Common contaminant of poultry meat and red meat
- Present in waterways and rural drinking water
- Companion animals
- Several possible pathways for human exposure
- Special risk factors? e.g. bbq. chicken

Association with poultry consumption



“Campy capital of the world!”

Generating the evidence base: the (new) science of source attribution



- Where and how should government respond?
- Estimation of the relative contribution of different “sources” to the burden of human illness
- Monitoring and investigation of outbreaks
- Putting the evidence together to inform policy, regulation and industry guidelines



THE GLOBAL VIEW OF CAMPYLOBACTERIOSIS

REPORT OF AN EXPERT CONSULTATION

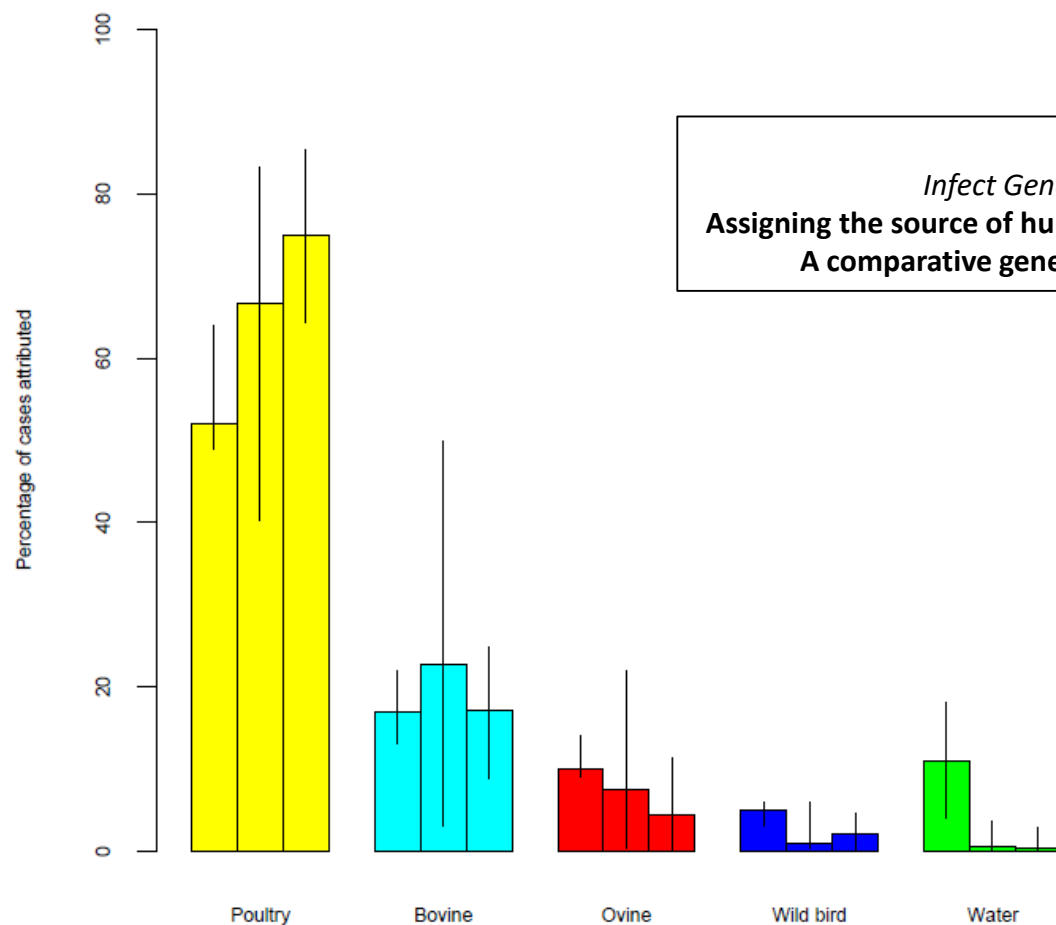
UTRECHT, NETHERLANDS, 6-29 JULY 2012



IN COLLABORATION WITH



Early source attribution outcomes



Mullner et al
Infect Genet Evol. 2009 9(6):1311-9
**Assigning the source of human campylobacteriosis in New Zealand:
A comparative genetic and epidemiological approach**

Implementing a Risk Management Strategy

- • NZFSA Risk Management Strategy 2007 - 2010 included:
 - numerous operational research studies throughout the food chain, with industry and academia
 - National Microbiological Database (NMD)
 - Biosecurity Manual and processing codes
 - risk modelling
 - regulatory performance target (2008)
 - consumer education
 - five-year public health improvement goal
- Subsequent strategies carrying these initiatives forward in MPI/NZFS include:
 - continuous improvement in poultry slaughterhouse process hygiene
 - updating the Animal Products Act
 - revised regulatory target (2013, 2016)
 - widening NMD programme (poultry, ducks, turkeys, end-of-lay)
 - improved consumer messaging

National Microbiological Database (NMD)

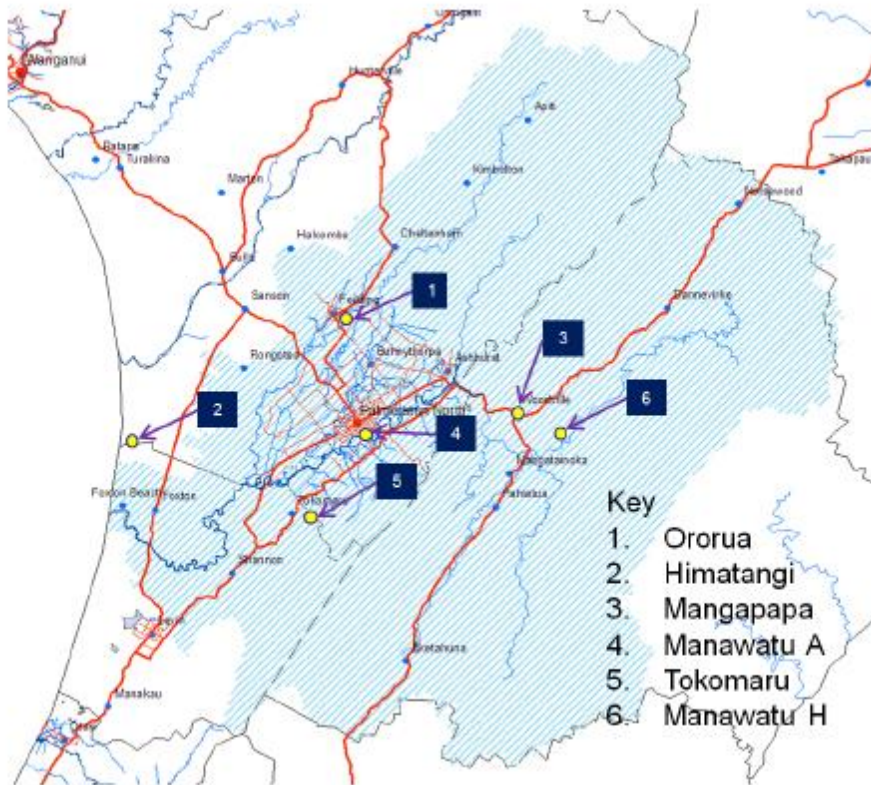
- World-leading monitoring system for poultry slaughterhouses
- “Ownership” shared by industry and NZFS
- Accredited laboratories, trained samplers, approved methods, verified by NZFS
- Provides long-run data essential for monitoring of performance and risk modelling
- Each slaughterhouse ranked anonymously against others
- NZFS can see all results
- Premises and national data summaries

Regulatory limit

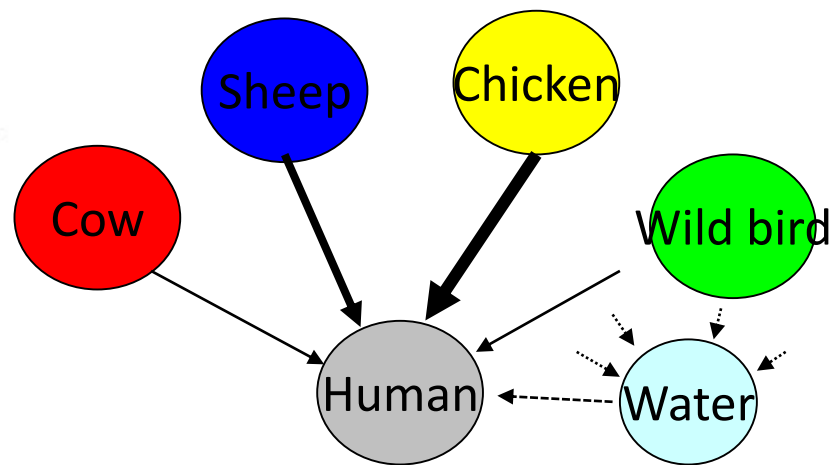
- • Unique regulatory tool world-wide
- Carcass rinses with 45 samples taken over a processing period of five days and:
 - high count limit (since dropped)
 - quarterly limit (since dropped)
 - moving window enumeration target (6/45 >6000 cfu/ccs) – CPT
 - moving window detection target (29/45 >220 cfu/ccs) (added 2013)
 - prevalence performance target - PPT (added 2016)
 - dispensation for low throughput premises
- Integrated industry and regulatory response to non-compliance, with possible escalation to premises closure



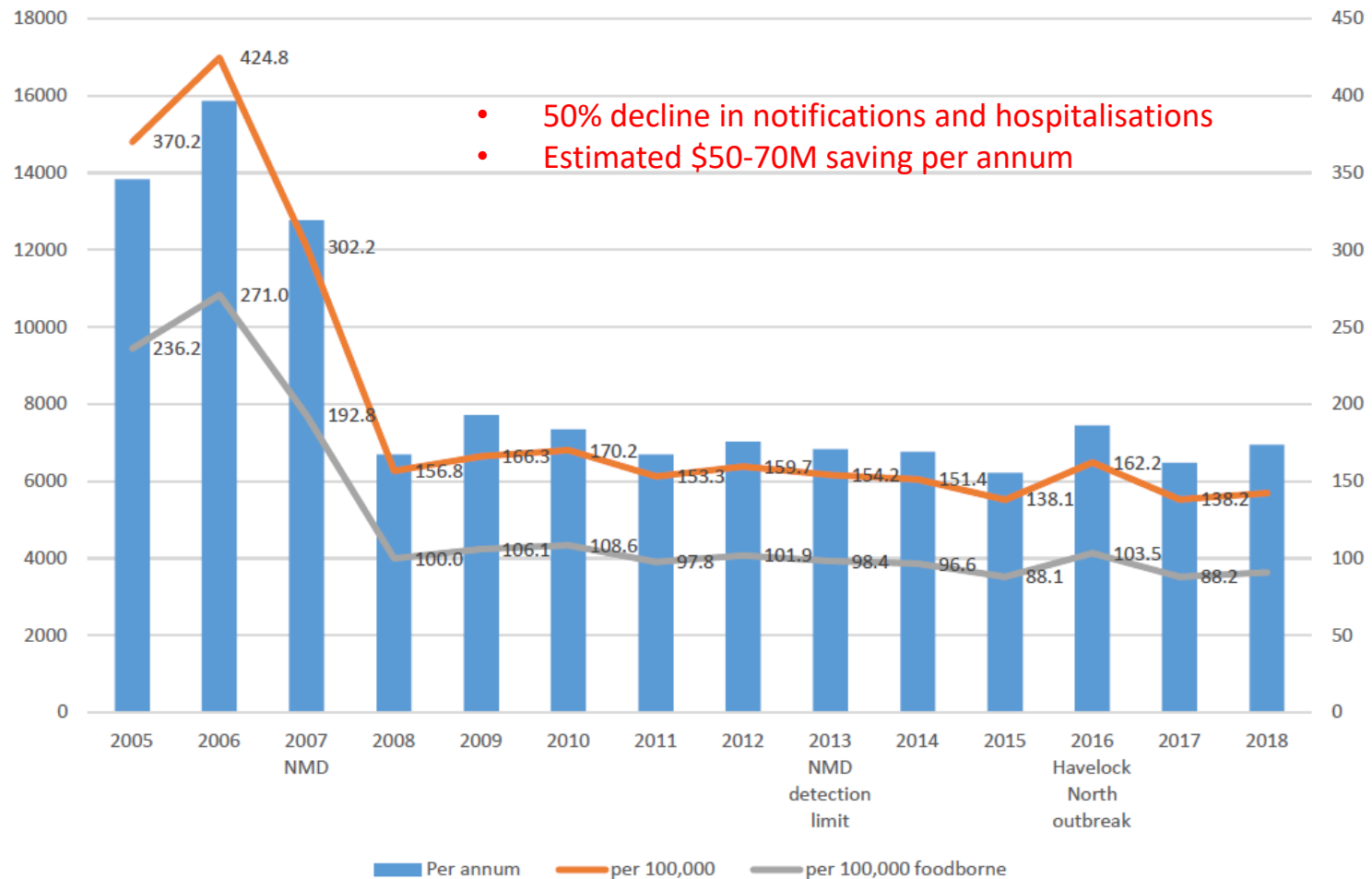
Massey University: Manawatu sentinel site 2005 - 2017



- Sampling from humans, animals and the environment
- Identifying strain types common to particular sources
- Reservoir attribution and genetic modelling of populations
- Work continuing with Prof. Nigel French



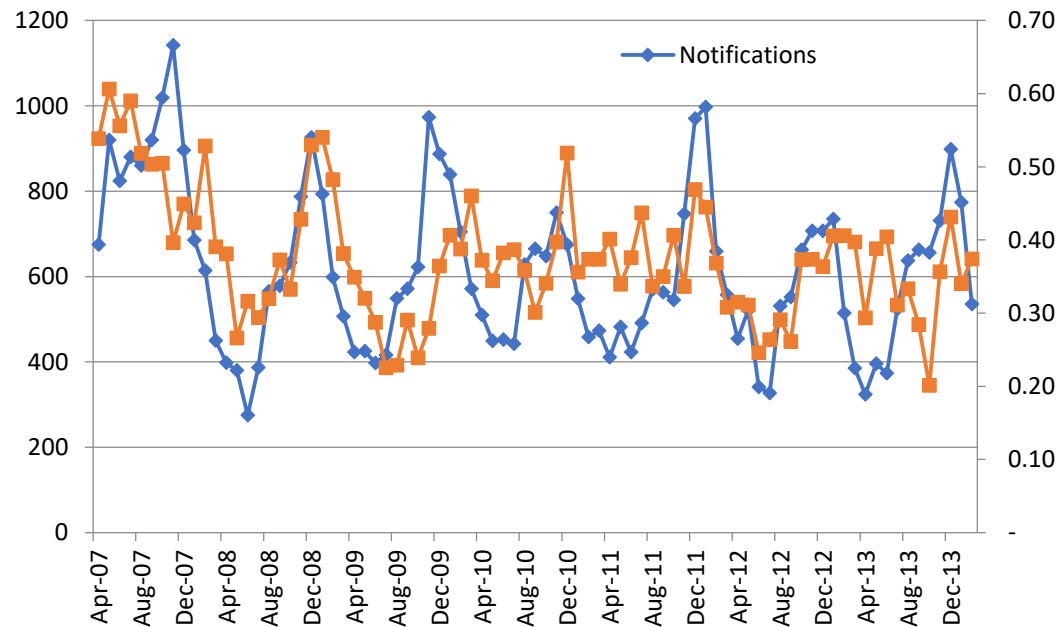
Risk management outcome



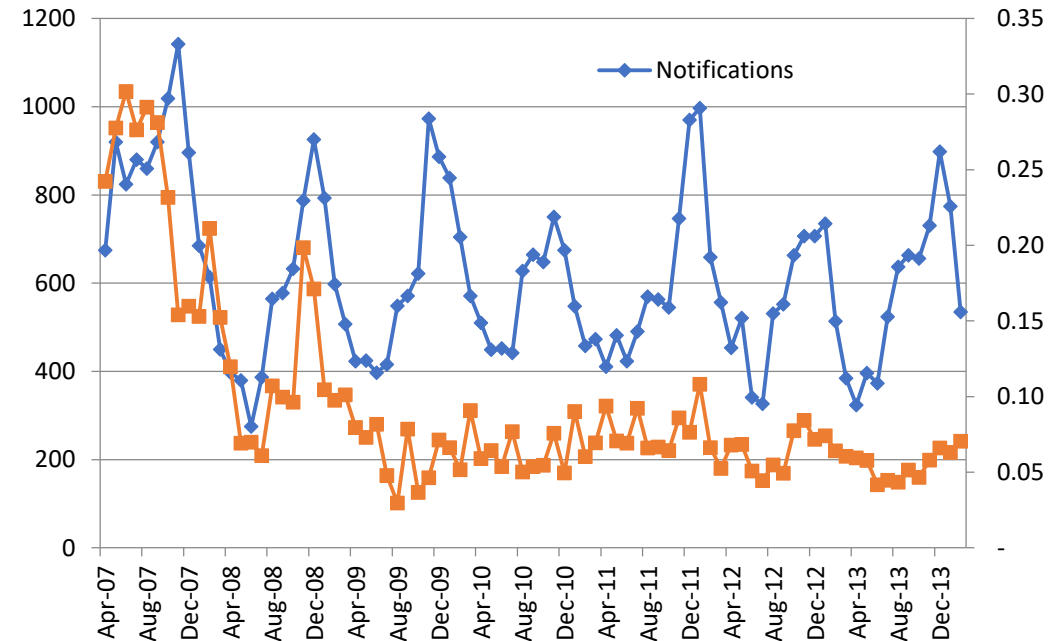
Association of notifications and contamination of carcasses



Notifications and % positive carcasses

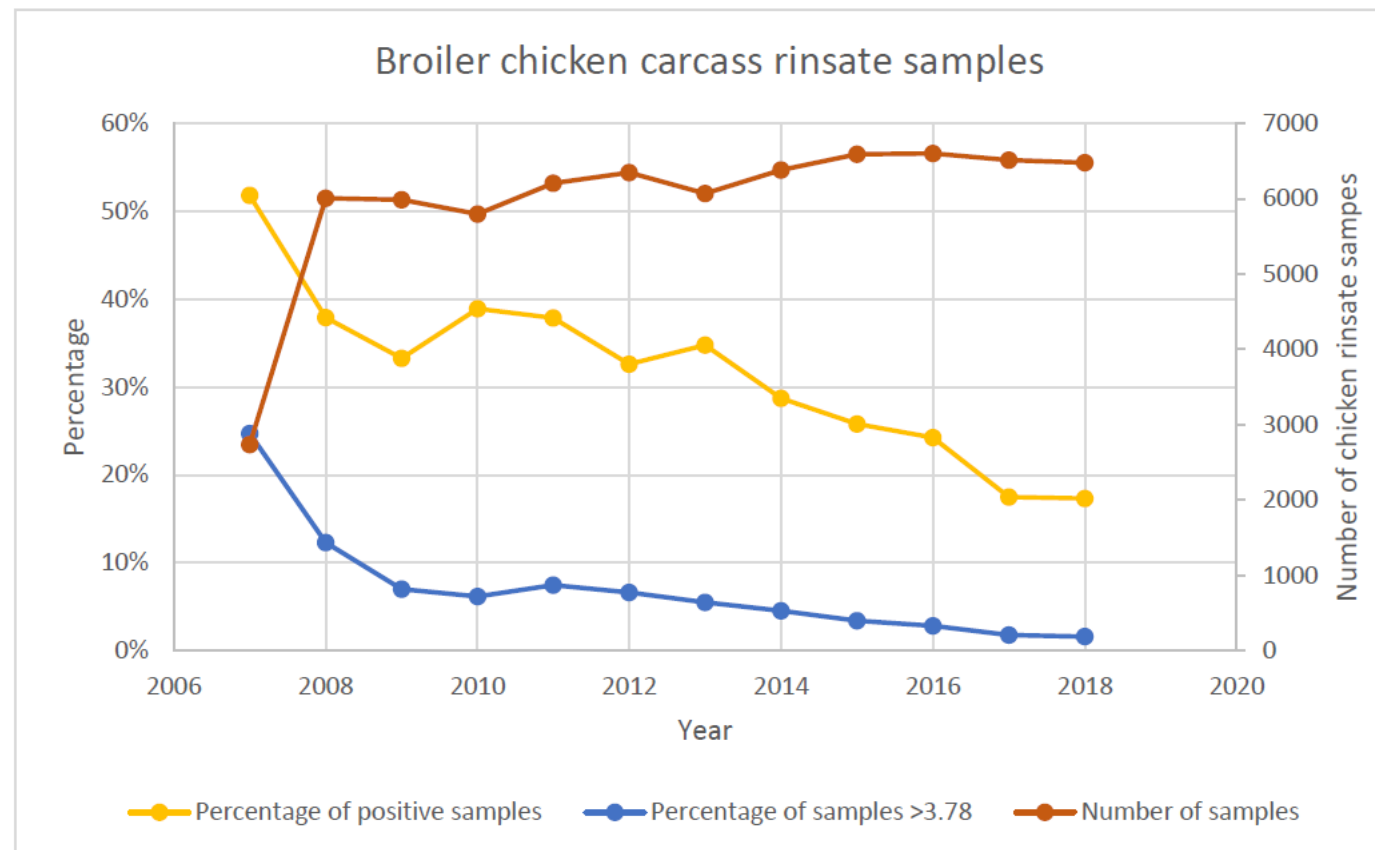


Notifications and % carcasses > 3.78 log₁₀ cfu



Contamination of broilers: “Review of *Campylobacter* regulatory limits for meat chickens” NZFS Discussion paper No. 2019/06

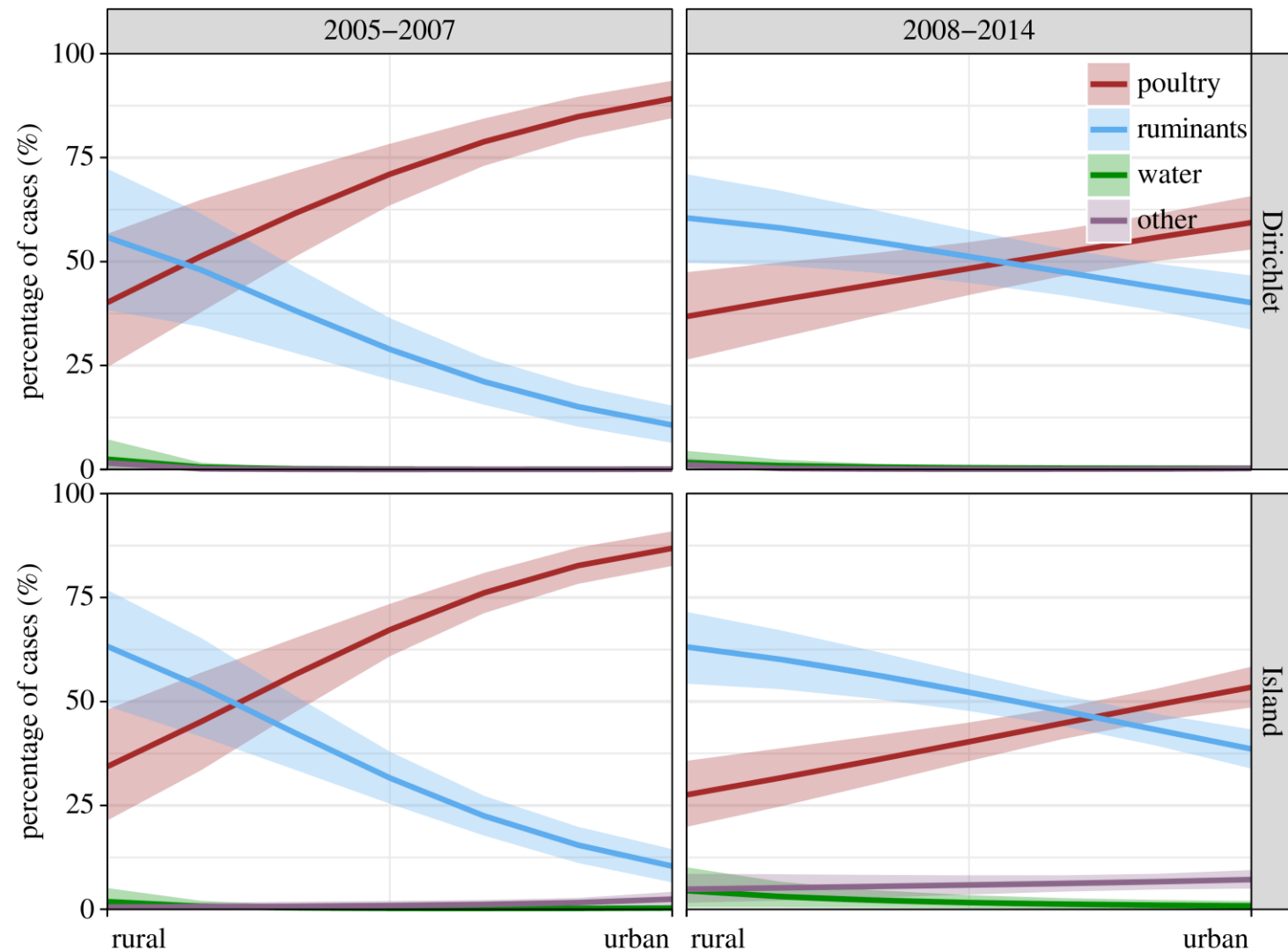
Figure 1: Percentage of chicken carcass samples where *Campylobacter* has been detected or exceeds the enumeration limit.



Insights from new source attribution models (Liao *et al.*, 2019)



- Human and reservoir data 2005 - 2014
- Marked differences in sources of rural vs. urban cases
- Differences over time
- Difference between models



NZFS human health improvement target



- Performance target set at 10% reduction in food-borne campylobacteriosis: 2015 - 2020
- Adjustment for Havelock North water-borne event
- Trending in and out of target year by year
- Subject to attribution factor bias?

Antimicrobial resistance



- Relatively low levels of AMR in NZ poultry strains
- Newly emergent *C. jejuni* ST-6964 found in poultry at the Manawatu sentinel site in 2014
- Whole genome sequencing; strain new to NZ
- Resistant to tetracycline and fluoroquinolone
- Rapid spread to humans throughout NZ (now 10%)
- Has not seemingly resulted in more human cases
- Health impact related to use / choice of antibiotics

New Zealand Veterinary Journal 58(5), 229-236, 2010

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Scientific Article

Low levels of antibacterial drug resistance expressed by Gram-negative bacteria isolated from poultry carcasses in New Zealand

EJ Pleydell[§], L Rogers*, E Kwan* and NP French*



Risk models

- • Several models have been developed by NZFS using long-run poultry NMD data and control measure pilots
- Are specific control measures associated with measurable decreases in risks to human health?
- Can we predict future reductions in foodborne campylobacteriosis consequential to quantified reductions in the level of contamination on fresh poultry?
- Need to work closely with industry on pragmatic interventions

Modelling of broiler contamination and human food-borne campylobacteriosis



- Prevalence of contamination and concentration levels work together to generate risks to consumers
- Predicted notification rates per 100 000 population reduce as contamination decreases

	20% ccs. positive but $< 3.78 \log_{10}$ cfu	15% ccs. positive but $< 3.78 \log_{10}$ cfu	10% ccs. positive but $< 3.78 \log_{10}$ cfu
2% ccs. $> 3.78 \log_{10}$ cfu	40	32	24
1% ccs. $> 3.78 \log_{10}$ cfu	36	28	20

Source-assigned case control study (SACNZ) 2017 - 2019



- Source-assigned study nested in a larger study
- Funded by NZFS with a cross-sector design and contracting team (NZFS, ESR and Massey mEpiLab)
- Controls from the New Zealand Health Survey cohort
- Estimate the proportion of human illnesses attributed to individual exposures, pathways, risk factors and individual source reservoirs
- To inform future policy, risk management and risk communication

Rethinking food-borne campylobacteriosis in NZ



- Notification rates are still high on an international basis
- Following early success in halving rates, further reduction through improved hygiene in poultry premises has been modest
- The new SACNZ study points to poultry remaining the main source of human illness
- How should industry, NZFS and others work together to bring about a further reduction in foodborne campylobacteriosis?
- What are public health expectations in regard to striking a new aspirational performance target?

A refreshed NZFS *Campylobacter* risk management strategy and work plan

- • Changes in policy and regulatory requirements will be based on science, and risk assessment to the extent practical
- Changes to the regulatory performance target for poultry?
- New social science on food handling / cooking and consumer education, based on risk factors identified in the SANZ?
- A refocus on biosecurity?
- Benchmarking of new diagnostic methods with culture for accurate performance monitoring

NZFS is committed to refreshing the *Campylobacter* Risk Management Strategy and setting a new aspirational performance target for foodborne campylobacteriosis

The team at NZFS



- Food Regulation: Marion Castle, Elaine D'Sa, Simon Holst, Philippa Child
- Science and Risk Assessment: Steve Hathaway, Peter van der Logt, Roger Cook, Tanya Soboleva
- Food Assurance: Gail Duncan, Sharon Wagener
- Verification Services: Peter Brown, Hayley Stevenson
- Market Access: Judi Lee

Thank you

