

**“Old bugs in new places”—**

# **The changing face of food safety microbiology**

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UKAFP, Cardiff 2017 26<sup>th</sup> September 2017

# UK Annual Figures

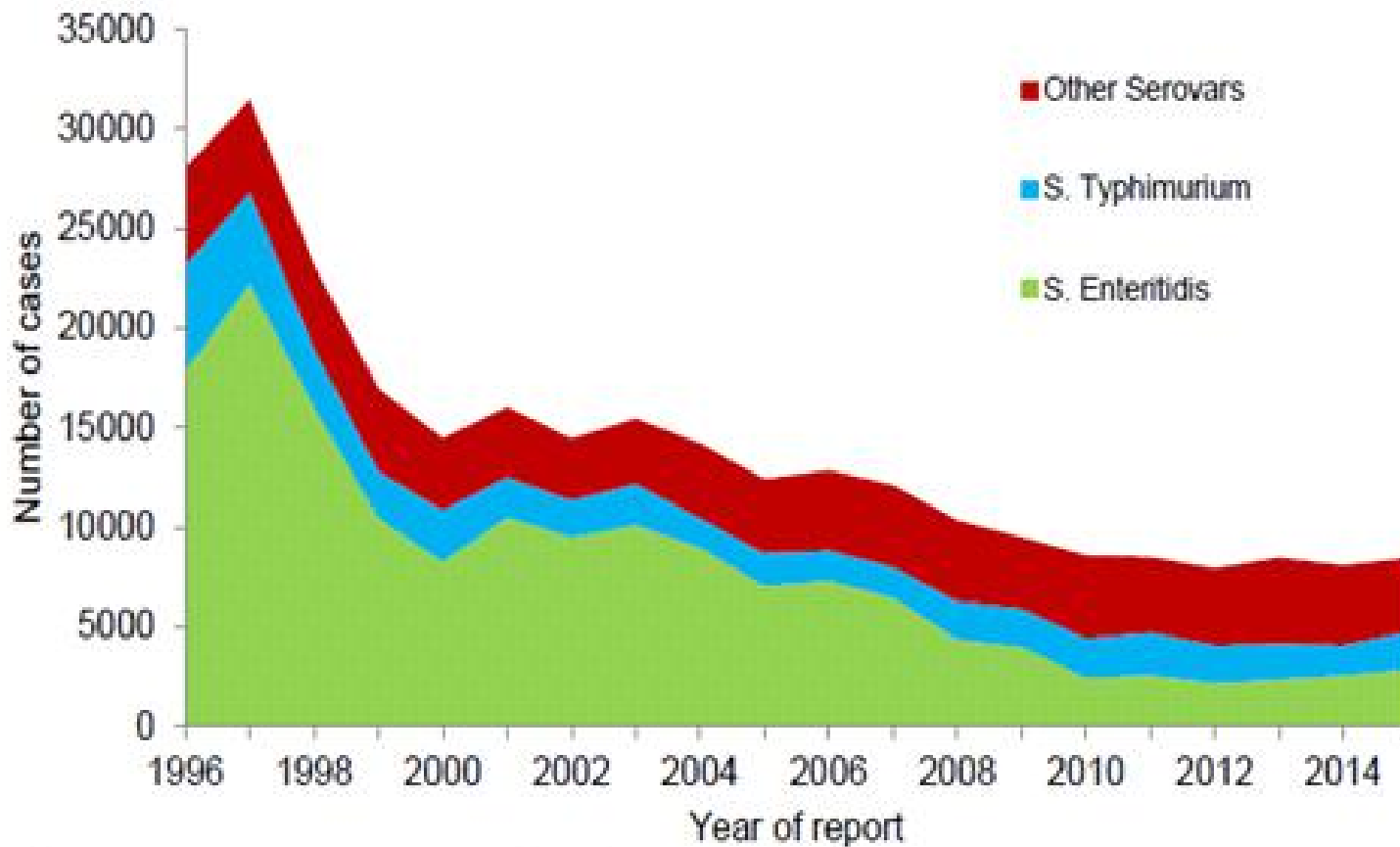
- UK
  - 25% people in UK suffer from an episode of Infectious Intestinal Disease (IID) each year
  - Estimated number of cases was 43% higher in 2009 than in 1996
  - About 50% of people with an IID were absent from work
- If we know all about it. Why do we get these figures?

Ref: UK FSA- IID 2 Study 2012

# Lets look at the “Old pathogens”

- Salmonella
- Listeria monocytogenes
- E.coli
- Viruses
  
- Now lets consider the new places--

# Salmonella—the stats



- From PHE Zoonoses Report for 2015- published June 2017

# Salmonella- new places

- Salmonella isn't just poultry or meat related
  - Fresh produce
    - 2016 USA- multi state outbreak- S.Thompson.
      - Mini-cucumbers. The 4<sup>th</sup> outbreak in the US linked to cucumbers since 2013 – with 1200 cases.
      - US FDA report 1% US cucumbers carry Salmonella
    - 2017 USA- multi state outbreak- S Anatum
      - Anaheim (med-hot) pepper. 32 cases in 9 states identified
    - 2017 USA- Multi state, multi serotype outbreak.
      - Papayas from Mexico- could be 4 outbreaks- different farms- around 230 illnesses
      - S.Thompson, Kiambu, Agona & Gaminara
      - S.Anatum
      - S.Newport, Infantis
      - S.Urbana

# Salmonella- new places

- Dry environments
  - ICMSF 6 1998- peanuts “ bacterial pathogens such as Salmonella are a minor concern as they can’t multiply”
  - Low dose causes problems
  - We can trace outbreaks from:
    - Peanuts, almond, cashew, hazelnut, pistachio, pine nut, coconut, walnut, sesame seed.
    - Processed nuts- peanut and other nut butters
  - Chocolate– many cases of 1-100 cells eaten causing illness

# Salmonella- it goes away or just cook it

- Chocolate- up to 100 fold reduction in 19 months
- Heating
  - in a broth at 62C, 10 fold reduction in 24 sec
  - In wheat flour 62C, 10 fold reduction in 14.6h

# Listeria

- We all know where Listeria hides?
- Soft cheeses, pates, cooked sliced meats, smoked fish.



# Biggest outbreak recorded in the USA?

- Sliced melon 2011
  - 147 cases, 30 deaths
- Then in USA
  - Caramel Apples 2014
    - 35 cases- 34 hospitalised, 1 foetal death
  - Ice Cream 2015 - 10 cases over 6 years
- And recent recalls
  - Sunflower seeds (USA)
  - Energy/granola bars (USA)
  - Frozen fruit & vegetables (USA)
    - May 2014 to June 2016—358 products , 42 brands

# Escherichia coli

- Common gut flora- fairly harmless
- But what about Shiga Toxin Producing E.coli (STEC)
  - Invades the gut
  - Damages the gut wall- bloody diarrhoea
  - Produces toxins- enter blood- damage kidneys
  - Range of other symptoms
- Not a pleasant organism

# Shiga Toxin Producing E.coli

- Recognised in the early 1990's
- Beef/milk related- E.coli O157:H7
- Issues
  - Other types of E.coli
    - O26, O103, O111, O145 and O104:H4
  - Europe Jan 2016 to June 17, 144 STEC notifications
    - 46 O157 reports
    - So 96 are non-O157 STEC

# ShigaToxin producing E.coli in new places

## – Other Foods

- USA 2006- O157- 276 ill, 3 dead—Spinach
- UK 2013- O157-22 ill ---Watercress
- USA 2009- O157- 77 ill--- frozen cookie dough
- Germany 2011- O104- 3950 ill, 53 dead,-fenugreek seed
- USA/ Canada 2016/7- O121—63 ill---Flour.
- UK 2005— O157- 157 cases,1 death-Ready to Eat meats

# Foodborne Viruses

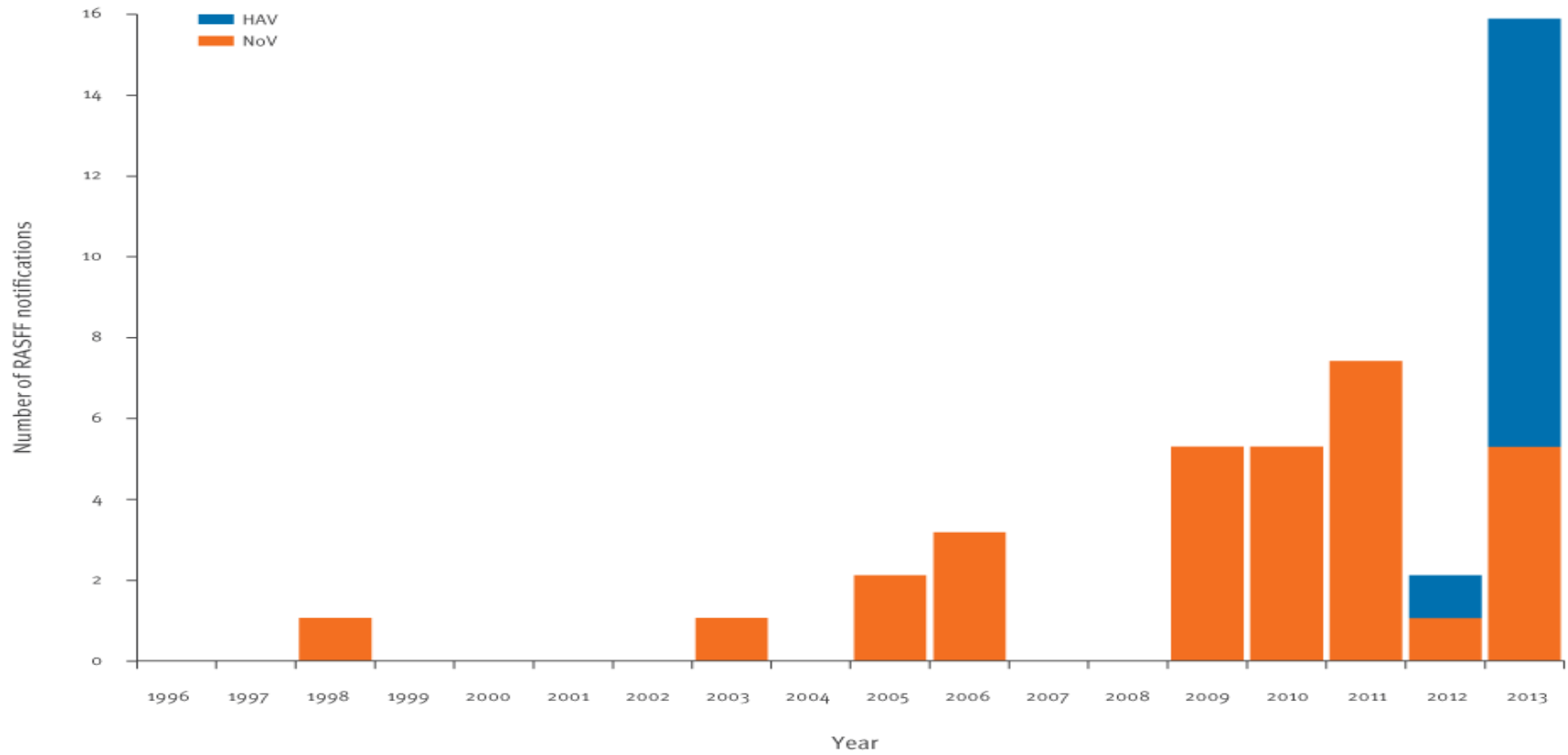
- Viruses aren't bacteria
  - Norovirus
  - Hepatitis A
  - Hepatitis E
- Previous issues
  - Person to person
  - Raw shellfish

# Viruses- new places

- Soft fruits

**FIGURE 2**

Distribution of number of RASFF notifications for norovirus and hepatitis A virus contamination in frozen berries, by year and implicated pathogen, EU/EEA, 1996–2013 (n=42)



HAV: hepatitis A virus; NoV: norovirus; RASFF: Rapid Alert System for Food and Feed.

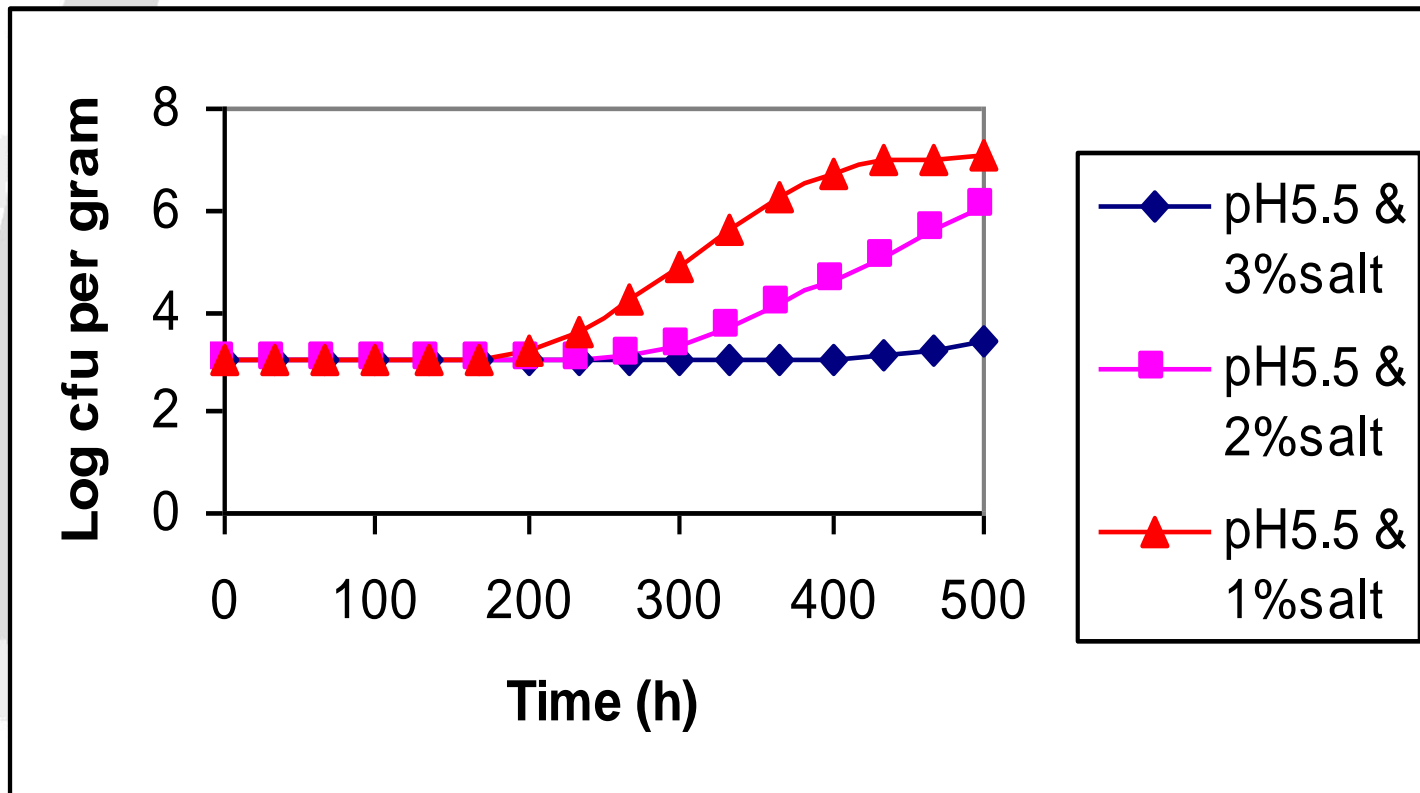
Data from Eurosurveillance 23/7/15

# Viruses

- Germany 2012- Norovirus- 12,000 cases
  - Frozen strawberries- China
- Spain 2016- Norovirus- 4136 cases- office water coolers
- USA 2017- Norovirus- 418 cases- Donuts

# Other “New Places”

- Our Food is changing-becoming “new”
- Reformulated foods
  - Low salt, low sugar, low fat, long shelf life, less cook (pink)





# Other “New Places”

- Consumers are changing
- Aging
  - Immunocompromised,
  - harbouring other illnesses
  - On prescription drugs

Listeria

	2015
Pregnancy associated	28
Other	161
Total	189 (65% >60yr old)

# Ice Cream USA

- 10 cases- 6 years (3 deaths)
- US FDA studied one factory
  - “1 factory showed that contaminated products were distributed widely to the public without any reported cases, except for 4 cases of severe illness in persons who were highly susceptible”
  - “This outbreak illustrated that the vast majority of the population did not become ill after ingesting a low level of *L. monocytogenes* but raises the question of listeriosis cases in highly susceptible persons “

# Some thoughts on This case

- Nov 14 and March 15
- 2320 samples ice cream tested by FDA in US
- 2307 (99%) positive for *L. monocytogenes*
- Mean contamination up to 600cfu/serving (<10/g)
- But 0.1% servings could be >7000cfu (80/g)
- Should we put more thought into who we are feeding-

# Overall thoughts

- Microorganisms will take every opportunity to inhabit, be carried by or live on anything
- Our views on microbial hazards in foods are changing
  - New & unusual foods are implicated with our old friends
- We are changing the habitat they see
  - New products, processes and recipes
- We are changing
  - affecting our interaction with microorganisms
- We have to be aware and defend against attack from our “enemy” in “New Places”

# Food Microbiology- Defence against the Bugs

- **“In cases of Defence ‘tis best to weigh the Enemy more mighty than he seems.”**

**W. Shakespeare: Henry V**