Food Safety Trends

Michael Doyle

Center for Food Safety
College of Agricultural & Environmental Sciences
UNIVERSITY OF GEORGIA

Unprecedented Challenges in Producing and Serving Safe Foods

- Whole genome sequencing and foodborne disease surveillance
- Produce safety
- Imported foods
- Chemophobia/natural foods
- Food Safety Modernization Act

U.S. Foodborne Disease Surveillance System

- CDC and State Public Health Departments identify today many outbreaks that would have been undetected 5-10 years ago
- CDC monitoring ca. **30 - 60 outbreak** clusters **daily**
- **1200 to 1500** foodborne disease **outbreaks** are reported **annually**

PulseNet USA

- **National network** of federal (CDC, FDA, USDA), state and local public health laboratories
- **Standardized molecular typing** of foodborne disease-causing bacteria by pulsed-field gel electrophoresis (**PFGE**)
  - Transitioning to whole genome sequencing (**WGS**)
- Electronic sharing of DNA "fingerprints" with **central database of DNA "fingerprints"** at CDC

Gerner-Smidt et al. Foodborne Pathog Dis 2006; 3:9-19

Whole Genome Sequencing

- Robotic sequencing now in a few hours to 2 days can provide the full-length genetic code or whole genome sequence of a bacterial pathogen
- Can identify key stable genetic markers that can differentiate foodborne outbreak strains from less related pathogens

High-Throughput Genomic Sequencing of Foodborne Pathogen Isolates

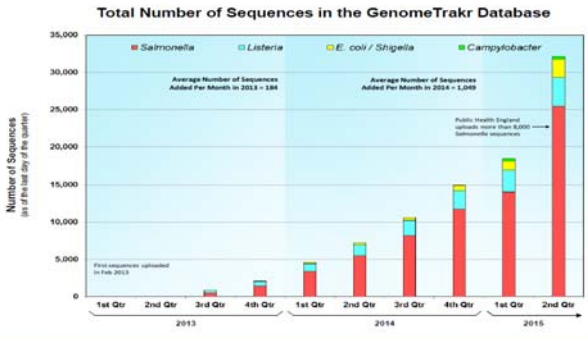
- Potential ramifications
  - Gene sequences of foodborne pathogens isolates obtained from processing facilities and ingredients/food products will be put into a central database like PulseNet
  - Gene sequences of foodborne pathogen isolates from patients associated with outbreaks or sporadic cases will be matched with isolates in database
  - Because of high degree of specialty of gene sequences, DNA match may be used as a "fingerprint" to implicate food processor

Subtyping Foodborne Pathogens by Whole Genome Sequencing (WGS)

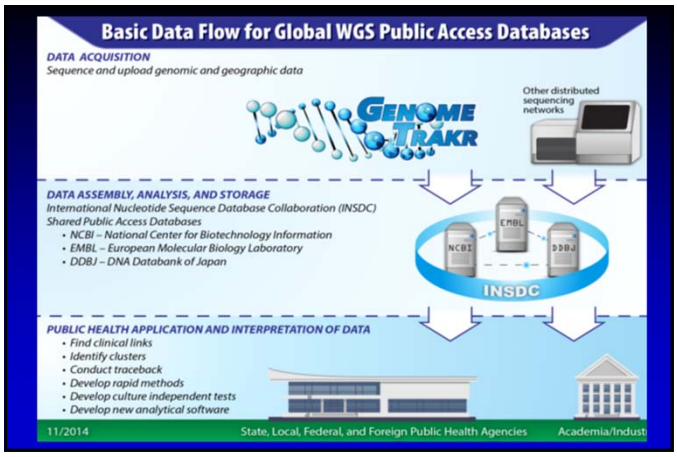
- Foodborne Disease Outbreak Detection
  - CDC – PulseNet (Clinical and some food isolates)
  - FDA – GenomeTrakr (Food and food processing plant isolates)
  - USDA-FSIS meat and poultry isolates are being WGS and put in PulseNet database

GenomeTrakr Database

- WGS database of foodborne bacterial pathogens based at the National Center for Biotechnology Information
- Sequenced more than 61,000 bacterial isolates (>40,000 *Salmonella,* 10,000 *Listeria,* 10,000 *E. coli/Shigella*, 1,000 *Campylobacter)* as of 2nd qtr 2016
  - Sequencing > 1,000 isolates monthly



Basic Data Flow for Global WGS Public Access Databases (PDF: 4.29MB)
(/downloads/Food/FoodScienceResearch/WholeGenomeSequencingProgramWGS/UCM422245.pdf



US *Listeria* Whole Genome Sequence Project

- Listeria WGS Project in 2013
  - Collaboration among CDC, FDA, USDA, and state health
  - Complete DNA sequence in real-time of health departments every clinical, food and environmental isolate of *Listeria monocytogenes* collected in the United States
  - In addition, CDC sequenced all retained human isolates of *L. monocytogenes* obtained prior to 2013

Listeriosis from Caramel Apples

- 35 cases
- 12 states
- 34 hospitalizations
- 7 deaths

Examples of Recent Listeriosis Outbreaks Unraveled by Whole Genome Sequencing

- Caramel Apples (Jan 2015; 35 cases, 7 deaths)
- Karovn Cheese, (Jun 2010-Sept 2015; 30 cases, 3 deaths)
  - 5 PFGE patterns ⟶ 1 WGS profile

Examples of Recent Listeriosis Outbreaks Unraveled by Whole Genome Sequencing

- Blue Bell Ice Cream (2 Clusters; Cluster 1, Jan 2014-Jan 2015, 5 cases, 3 deaths; Cluster 2, 2010-2014, 5 cases)
  - Several PFGE patterns ⟶ 2 WGS profiles
  - SC Dept. of Health & Environmental Control isolated from BB Scoops ice cream sampled at distribution center

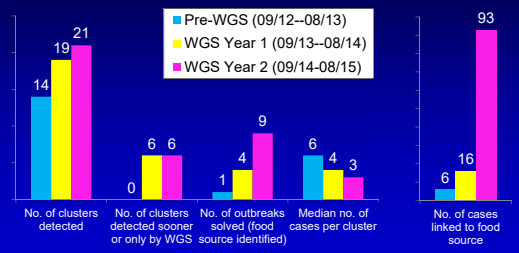
Learnings from Blue Bell Ice Cream Listeriosis Outbreak

- FDA Lm analysis of Blue Bell (>2500) ice cream samples revealed > 99% were Lm-positive, with most having Lm populations of <20/gm

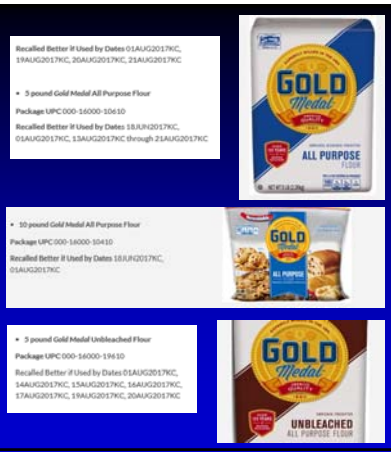
Learnings from Recent Listeriosis Outbreaks

- WGS of Lm from retail food samples matched WGS of Lm from PulseNet and GenomeTrakr databases
  - FDA has WGS profiles of Lm, *Salmonella* and EHEC isolates from food processing plants obtained at least 5 years ago
  - CDC has WGS profiles of Lm isolates from patients obtained at least 5 years ago

Listeria Cluster Metrics, Before and After WGS



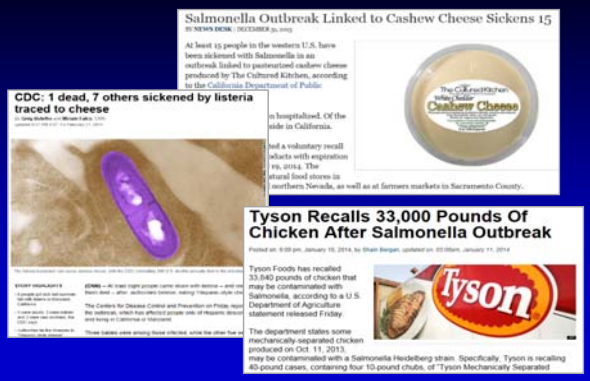
Courtesy: Brendan Jackson, Enteric Diseases Epidemiology Branch



Example of Recent Shiga toxin-producing *E. coli* Outbreak Unraveled by Whole Genome Sequencing

- General Mills Flour (Dec. 2015-Jul 2016; 62 cases of [O121 and 1 case of O26], 1 case HUS)
- **Raw** flour used for cookie dough or cake batter, and play dough for children
  - STEC O26 isolated from flour and patient
  - >40 million pounds of flour recalled (Production dates of Nov. 4, 2015-Feb. 10, 2016)

2014 PulseNet-Triggered or Enhanced Outbreak Investigations



Recalls of *Salmonella* Outbreak-Associated Raw Chicken Products

- Tyson Foods
  - **9 ill** from *S.* Heidelberg-contaminated mechanically separated chicken in January 2014
  - 33,840 pounds of product recalled
- Barber Foods (Omaha Steaks)
  - **9 ill** from *S.* Enteritidis-contaminated chicken kiev in July 2014
  - 1.7 million pounds of product recalled
- Aspen Foods
  - **3 ill** from *S.* Enteritidis-contaminated chicken cordon bleu in July 2015
  - 1.9 million pounds of product recalled

U.S. Food and Drug Administration's Food Facilities' Foodborne Pathogen Testing Program

- FDA inspectors during food facility inspections obtain 50 environmental samples (including drains) and assay for foodborne pathogens (including *L. monocytogenes* and *Salmonella)*; Swab-A-Thon
- All pathogen isolates are whole genome sequenced and submitted to the GenomeTrakr database
- A foodborne pathogen "profile" is established for pathogen-positive food industry facilities
  - Aids in outbreak investigations

US Centers for Disease Control and Prevention and US Food and Drug Administration Using WGS to:

1. Determine source of foodborne illness outbreak with increased speed and precision
2. Determine which illnesses are part of an outbreak and which are not
3. Determine which ingredient in a multi-ingredient food is the source of the outbreak
4. Differentiate sources of contamination, even within the same outbreak
5. Link small numbers of illnesses, including geographically diverse illnesses occurring across multiple states, that might have been identified as a common outbreak

Examples of Produce/Pathogen Combinations Not Previously Associated with Foodborne Outbreaks Until 2006 - 2015

- Bagged spinach (*E. coli* O157:H7)
- Pasteurized carrot juice (Botulism)
- Peanut butter (*Salmonella*)
- Puff rice and corn snack food/dried imported vegetable seasoning (*Salmonella*)
- Peanut paste (*Salmonella*)
- White and black ground pepper (*Salmonella*)
- Jalapeño peppers (*Salmonella*)
- Turkish pine nuts (*Salmonella*)
- Pistachios (*Salmonella*)
- Hazelnuts (*E. coli* O157:H7)
- Bagged organic spinach and Spring mix (*E. coli* O157:H7)
- Pomegranate seeds (Hepatitis A)
- Bagged salad mix (lettuce, cabbage, carrots) (*Cyclospora*)
- Caramel apples (*Listeria monocytogenes*)

Foodborne Disease Outbreaks Attributed to a Single Commodity by Leading Food Vehicles, 2006-2007

Year	Rank	Food Vehicle	% of Outbreaks
2006	**1**	**Produce**	**24**
	2	Meat	19
	2	Fish and Shellfish	19
	4	Poultry	14
2007	1	Meat	23
	2	**Produce**	**21**
	3	Poultry	17
	3	Fish and Shellfish	17

CDC, MMWR 58: 609-615 (2009)
MMWR 59: 573-979 (2010)

Foodborne Disease Outbreaks Attributed to a Single Commodity by Leading Food Vehicles, 2008-2010

Year	Rank	Food Vehicle	% of Outbreaks
2008	1	Produce	28
	2	Meat	23
	3	Poultry	15
	4	Fish and Shellfish	14
2009 - 2010	1	Produce	28
	2	Meat	24
	3	Fish and Shellfish	20
	4	Dairy	12

CDC, MMWR 60: 1197-1202 (2011)
MMWR 62: 41-47 (2013)

Foodborne Disease Outbreaks by Food Category, 2011 and 2012

Year	Rank	Food Vehicle	% of Outbreaks
2011	1	Produce	31
	2	Fish	16
	3	Dairy	12
	4	Pork	8
	4	Chicken	8
2012	1	Produce	33
	2	Fish	16
	3	Dairy	10
	4	Chicken	9

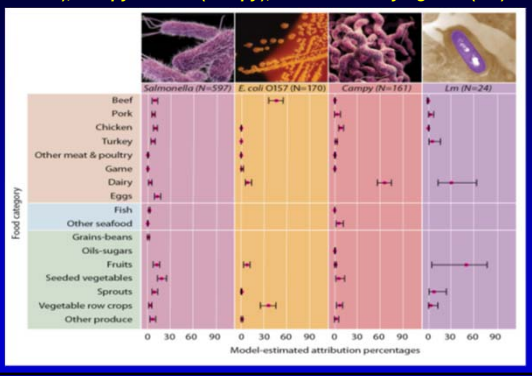
CDC Surveillance of Foodborne Disease Outbreaks, US, 2011 Annual Report
CDC Surveillance of Foodborne Disease Outbreaks, US, 2012 Annual Report

Foodborne Disease Outbreaks by Food Category, 2013

Year	Rank	Food Vehicle	% of Outbreaks
2013	1	Fish	24
	2	Produce	22
	2	Mollusks	11
	4	Dairy	10
	4	Chicken	10

CDC SURVEILLANCE OF FOODBORNE DISEASE OUTBREAKS, US 2013 ANNUAL REPORT

Figure 1. Model-estimated attribution percentages (and 90% credibility intervals) *Salmonella*, *Escherichia coli* O157 (*E. coli* O157), *Campylobacter* (*Campy*), *Listeria monocytogenes* (*Lm*).



USDA

1998-2008 Produce Outbreaks (Leafy Greens, Tomatoes and Melons) and Percent Due to Fresh-cut*

Produce	Number of Outbreaks	Number of Outbreaks Due to Fresh-cut	Percent due to Fresh-cut
Leafy Greens	25	14	56.0
Tomatoes	14	5	35.7
Melons	12	2	16.7
Total	51	21	41.2

* Fresh-cut produce: fresh produce that has been processed by peeling, slicing, chopping, shredding, coring, trimming, or mashing, with or without washing or other treatment, prior to being packaged for consumption. -FDA CFSAN

E. coli O157:H7 Outbreak Associated with Pre-packaged Lettuce (Sept - Oct 2005)

- 25 cases of *E. coli* O157:H7 infection (23 MN, 1 WI, 1 OR)
- Implicated vehicle – Bagged, triple-washed romaine lettuce
  - *E. coli* O157 isolated from two intact bags of lettuce from the implicated lot

E. coli O157:H7 Outbreak Associated with Bagged Fresh Spinach (Aug – Sept 2006)

- 205 cases of *E. coli* O157 infection in 26 states and Canada
  - 31 cases of HUS, 103 hospitalizations, 3 deaths
- Implicated vehicle – Bagged fresh spinach (Baby Spinach)
  - Outbreak *E. coli* O157 strain isolated from 13 bags of baby spinach in 11 states
  - Grown in Salinas Valley, California

U.S. Food and Drug Administration (Sept 28, 06) www.fda.gov/bbs/topics/NEWS/2006/NEW01466.html

California Food Emergency Response Team. Final Report, Investigation of an *Escherichia coli* O157:H7 Outbreak Associated with Dole Pre-Packaged Spinach (March 21, 2007)

Dole Bagged Salad Listeriosis Outbreak

- 33 cases of listeriosis in US and 14 cases in Canada between May 2015 – February 2016
- Linked to Dole processing facility in Springfield, OH
- OH Dept. of Agriculture isolated *Listeria monocytogenes* from retail package and it matched genetically (WGS & PFGE, CDC PulseNet) the Lm isolates from the patients

CDC January 28, 2016

Food Safety News

Breaking news for everyone's consumption

Dole knew of Listeria; feds launch criminal investigation

By Coral Beach | April 29, 2016

UPDATED CONTENT 6:37 p.m. EDT — The U.S. Department of Justice in investigating Dole in relation to the Listeria monocytogenes outbreak, according to a news release posted on the company's website.

"Dole has recently been contacted by the Department of Justice in connection with its own investigation, and we will be similarly cooperating with the DOJ to answer questions and address any concerns," according to the company statement. The statement came today after **Food Safety News** published information from the Food and Drug Administration's inspection reports on the Dole salad production facility in Springfield, OH.

Examples of Salmonellosis Outbreaks Associated with Cantaloupes

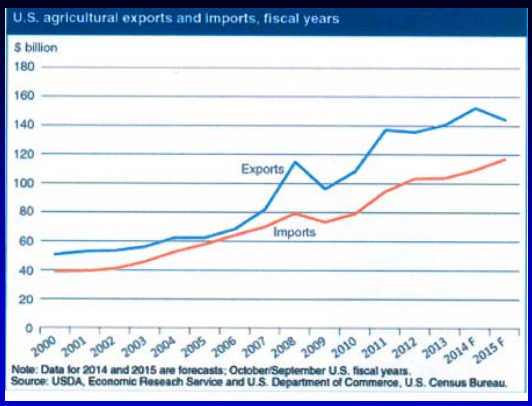
Year	Pathogen	Location	No. of Cases
1989-90	*S.* Chester	Multistate	295
1991	*S.* Poona	Multistate	> 400
1997	*S.* Saphra	California	24
1998	*S.* Oranienburg	Canada	22
2000	*S.* Poona	Multistate	46
2001	*S.* Poona	Multistate	50
2002	*S.* Poona	Multistate, Canada	58
2006	*S.* Oranienburg	10 States, Canada	41
2007	*S.* Litchfield	16 States, Canada	60
2008	*S.* Javiana		10
2011	*S.* Panama	10 States	20
2011	S. Uganda		25

Cantaloupe-associated Listeriosis Outbreak

- September-November 2011 a total of 146 cases of listeriosis, including **31 deaths** and **1 miscarriage**, in 28 states; mostly elderly
- Vehicle was Rocky-Ford brand **cantaloupes** grown by Jensen Farms, Granada, CO

United States Food Imports

- Approximately **15%** of food consumed in USA in **2006** was imported; approx. **17%** imported in **2009**; ca. **18%** imported in **2013**



usagnet

USDA: Ag Exports & Trade Balance are Declining
USAgNet - 01/28/2016

The value of U.S. agricultural exports and imports increased each year from fiscal years 2009-14, when the agricultural trade balance reached an all-time high of $43.1 billion.

In FY 2015 the value of agricultural exports fell by 8.3 percent while imports grew by 4.5 percent, cutting the trade balance to $25.7 billion.

The forecast for FY 2016 is for this pattern to continue: lower exports and higher imports are expected to push the agricultural trade surplus below $10 billion for the first time since 2006.

Lower commodity prices account for some of the decline in the value of exports, but a stronger U.S. dollar also plays a role.

Unlike in 2009 when both exports and imports fell due to the global recession, in 2015 and 2016 imports are growing at the same time that exports are falling, reflecting the greater purchasing power of the U.S. dollar in international markets and the reduced purchasing power of foreign currencies to buy U.S. goods.

Food Safety News

Breaking news for everyone's consumption

Majority of FDA-registered food facilities now outside the U.S.

BY DAN FLYNN | MARCH 15, 2016

A majority of the food facilities required to register with the U.S. Food and Drug Administration are now located outside of the United States.

Registrar Corp., based in Hampton, VA, says a response it received from FDA under a Freedom of Information Act (FOIA) request shows 207,655 food facilities were registered as of Jan. 1, 2016. More than half – 120,822 – are outside of the United States.

All food facilities that manufacturer, process, pack or store food, beverages or dietary supplements for consumption in the U.S. are required to register with FDA. The new data shows 86,773 of them, just less than 42 percent, are in the U.S.

Food Safety News

Breaking news for everyone's consumption

More than a fourth of FDA import refusals are for fruits, vegetables

BY CORAL BEACH | MARCH 31, 2016

When combined, fruits and vegetables were the foods most frequently subject to import refusals by the FDA from 2009 to 2013, followed by fishery products/seafood and the spices/flavorings/salts category.

Mexico, India and China topped the list for the countries with the highest number of refusals during that time frame, according to a new report from the Economic Research Service of the U.S. Department of Agriculture.

Relative to the increased volume of food imports during those years, the overall number of refusals declined, but the Food and Drug Administration can't tell if that seemingly good news is a result of better food safety compliance by foreign suppliers or a reflection of the agency's strained budget, according to the report released Wednesday.

The FDA physically inspects about 1 percent of food shipments offered for import to the United States because that's all its budget can afford, officials reported. With such a low percentage of shipments being inspected, the FDA doesn't have enough data to extrapolate cause and effect scenarios.

Import Shares (Percentage) of Major Foods Consumer in United States, by selected food categories (2009, 2010)

Beef	9.8
Lamb	52.4
Fish (fresh or frozen)	**96.4**
Fruits	
Fresh	26.0
Canned	38.9
Dried	21.3
Juices	62.4
Orange	28.3
Apple	**85.2**

www.fas.usda.gov/gats

Import Shares (Percentage) of Major Foods Consumer in United States, by selected food categories (2009, 2010)

Tree nuts	41.1
Vegetables	
Fresh	20.0
Canned	14.6
Honey	63
Spices	**89.9**

www.fas.usda.gov/gats

USA Total Fruit Imports, 2012

Country	Million $	%
Mexico	3,513	28
Chile	1,518	12
China	**1,258**	**10**
Costa Rica	974	
Guatemala	866	
Canada	641	
Ecuador	526	
Thailand	**389**	
World Total	12,559	100

www.ers.usda.gov/data-products/us-food-imports.aspx#UVw\9KLvsWt

USA Total Vegetables (Fresh, Frozen, Dried, and Prepared) Imports, 2012

Country	Million $
Mexico	4,761
Canada	2,119
China	**538**
Peru	515
Spain	267
India	**258**
World Total	9,797

www.ers.usda.gov/data-products/us-food-imports.aspx#UVwl9KLvsWt

Share of U.S. Consumption of Selected Fresh Vegetables and Melons from Imports

Fresh Vegetables	1980	1990	2000	2007
		(Percent imported)		
Asparagus	10.8	29.8	58.3	**77.9**
Bell Peppers	26.5	19.7	22.2	**35.6**
Tomatoes	22.3	20.5	31.6	**38.5**
Cucumbers	36.0	33.7	42.6	**53.1**
Artichokes	20.6	25.7	47.9	**75.3**
Eggplant	33.9	36.0	37.7	**42.0**
Garlic	12.5	17.4	29.0	**55.5**
Squash	16.5	21.9	30.7	**42.0**
Cantaloupe	12.8	23.0	35.6	**34.0**
Honeydews	8.2	22.3	27.3	**29.3**
All Fresh	**8.3**	**10.1**	**14.1**	**18.6**

USDA-ERS, Vegetables and Melons Yearbook 2008

Microbiological Safety Issues Associated with Imported Foods

- **Sanitation practices** for food production and preparation are not universally equivalent throughout the world
- Importing foods can **move pathogens** from areas where pathogen is indigenous to locations where it seldom or does not exist
  - Example, *Cyclospora* in raspberries from Guatemala to U.S. and Canada

Examples of Food Safety Concerns Associated with Imported Produce

- Centuries old tradition of using **human excreta on farmland** is widespread in east Asia, especially in China and Vietnam
- **Irrigation water** contaminated with **untreated human and animal fecal waste**
- **Insanitary harvesting practices** of importing countries
  - Children infected with norovirus or hepatitis A accompany parents in produce field during harvest

Food Safety Issues Associated with Aquaculture

Aquaculture Production

- Aquaculture is the fastest growing form of food animal protein in the world.
- **Asia** accounts for **89%** of global **aquaculture** production.
  - **China alone is 62%**.
- **USA imports** greater than **90%** of its **seafood**, about **half** is from **aquaculture**.
- Most aquaculture imports are **shrimp**, then **salmon**, **tilapia** (**mostly China**), and **shellfish** [Scallops (mostly China), mussels, clams, and oysters (mostly China)].

National Oceanic and Atmospheric Administration http://www.fishwatch.gov (accessed Jan. 26, 2015)

USA Total Fish and Shellfish Imports, 2012

Country	Million $
China	**2,633**
Canada	2,484
Thailand	**2,024**
Indonesia	**1,267**
Vietnam	**1,018**
World Total	13,912

www.ers.usda.gov/data-products/us-food-imports.aspx#UVw\9KLvsWt

Primary Types & Sources of U.S. Imported Fish and Seafood in 2014

- **Shrimp**: ca. **1.25 billion pounds**
  - Thailand, Ecuador, Indonesia, China, Vietnam, India
- **Salmon**: **658 million pounds**
  - Canada and Chile account for ca. 90% of all Atlantic salmon imports
- **Tilapia**: **509 million pounds**
  - China, Taiwan, Ecuador

USDA, ERS , 2015

U.S. Fish and Shellfish Import Trends

- Gains in seafood production will primarily come from farmed fish
  - **Aquaculture** accounted for 12% in 1984 and **50%** in **2009**; **predicted 62%** in **2030**
- **Tilapia** consumption approaching salmon consumption in USA
  - ca. 75% of tilapia was imported from China in 2014

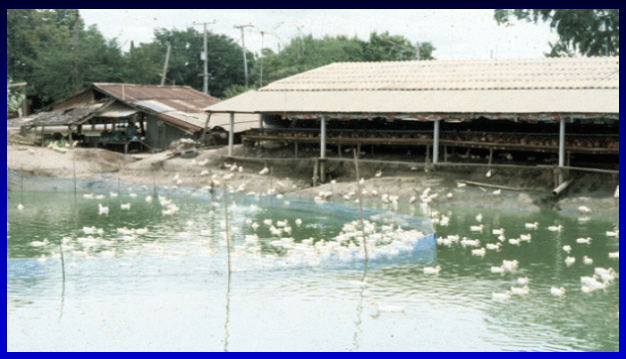
Fecal Waste Used in Aquaculture Production

- Raw domestic sewage and/or livestock manure are frequently used in fish farming in many Asian countries
  - Estimates **at least two-thirds** of the world production of **farmed fish** is grown in **ponds fertilized with animal manure or human sewage**
    - ca. 50% of fish and seafood is raised in ponds

Chicken/Shrimp Farming in Thailand

- Chicken/shrimp farming is only means of income for many small stakeholders
  - Chicken coops (e.g., 20,000 birds/farm) sit in rows suspended over ponds that hold shrimp
  - **Fecal waste from chickens is primary nutrients for pond flora on which shrimp feed**

BBC News, January 27, 2004



Examples of Prevalence of Salmonella in Seafood and Fish

Species	Country of Origin	Prevalence (%)
Seafood	Raw Imported (FDA surveillance; 1990-98)	10
	Raw Domestic (USA) (FDA surveillance; 1990-98)	2.8
	RTE Imported (e.g., cooked shrimp; 1990-98)	2.6
	Vietnam (1990-98)	30
Shrimp	Vietnam (2005)	24.5
	India (2003-2007)	5 - 59
Fish	Raw Imported (FDA surveillance; 1990-98)	12.2

J. Food Protect. 63:579-92 (2000)
Food Control 21:343-61 (2010)

Antibiotic Contaminants from Vietnamese Shrimp Farming

- **Ciprofloxacin** (500 mg) and **oxytetracycline** are used extensively (almost 100%) in Vietnamese shrimp farming to **kill** or inhibit the growth of **shrimp disease-causing bacteria** (e.g., *Vibrio*, *Pseudomonas*, *Aeromonas*) during shrimp larvae rearing
  - Extensive use of antibiotics has led to **high levels of residues in shrimp ponds** and the **surrounding environment,** with the resulting **proliferation of drug-resistant bacteria**

H. T. T. Thuy et al. Environ. Sci. Pollut. Res. 18:835-841 (2011)

Food Safety News

Breaking news for everyone's consumption

Barriers go up against shrimp and prawns from Malaysia

BY NEWS DESK | APRIL 01, 2016

American consumers are scooping up more shrimp than ever at lower prices, but it is not all good news because some aquaculture-grown shrimp and prawns from Malaysia contain residues from unapproved animal drugs and unsafe food additives.

The combination of the huge consumer demand in the U.S and the growing potential for unsafe product getting into the country caused the U.S. Food and Drug Administration (FDA) to issue an import alert yesterday on Malaysian shrimp and prawns.

An import alert means border agents will detain a food product without physical inspection.

Shrimp is among the most popular of the all the imported seafood being consumed in the United States. About 90 percent of the seafood being consumed by Americans is imported from about 140 counties around the globe, according to FDA.

Malaysia is usually among the top 10 suppliers of imported shrimp and prawns to the U.S. And, the expansion of the aquaculture industry there has come with more misuse of animal drugs and unsafe chemicals.

FDA says there is "clear scientific evidence" that these compounds are being used in "various stages of aquaculture" that can result in the presence of residues in the edible portion of the seafood.

There is also the potential for bacteria to be transferred to humans, reducing the effectiveness of antimicrobial drugs for the treatment of human disease. FDA is especially concerned about the potential for antibiotic residues from nitrofuran and chloramphenicol.

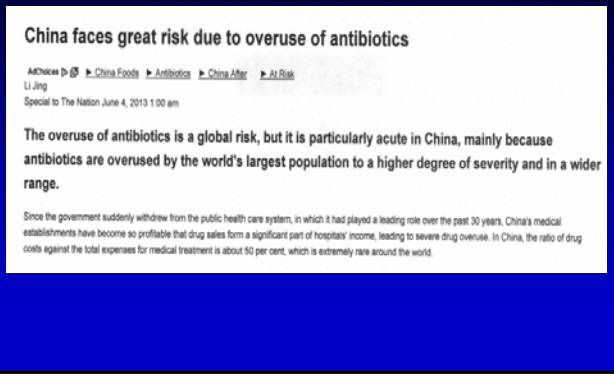
Multidrug-resistant *Salmonella* in China

- "Multidrug-resistant *Salmonella* of animal original constitute an even more serious problem in China than in developed countries of the world."
  - Cui et al. J. Antimicrob. Chemother. 63:87-94 (2009)
  - Xia et al. J. Clin. Microbiol. 47:401-409 (2009)
- "Findings . . . indicate that **multidrug-resistant *Salmonella*** now **contaminate 67% of domestic animals in China**, with **some strains resistant to 17 different antimicrobial agents**."
  - Chen et al. Chin. J. Vet. Med. 44:6-9 (2008)

Lu et al. Foodborne Pathogens and Disease 8:45-53 (2011)

Antibiotic-resistant Microbes in China

- "The situation with respect to overuse of antibiotics and antibiotic resistance in China is severe."
  - Reynolds et al. Health Policy (2008)
- "**China** has the **world's most rapid growth rate of resistance**" (**22%** average **growth** in a study spanning 1994 to 2000)
  - Zhang et al. Global Health 2:6 (2006)



China faces great risk due to overuse of antibiotics

AdChoices ▶ China Foods ▶ Antibiotics ▶ China After ▶ At Risk

Li Jing
Special to The Nation June 4, 2013 1:00 am

The overuse of antibiotics is a global risk, but it is particularly acute in China, mainly because antibiotics are overused by the world's largest population to a higher degree of severity and in a wider range.

Since the government suddenly withdrew from the public health care system, in which it had played a leading role over the past 30 years, China's medical establishments have become so profitable that drug sales form a significant part of hospitals' income, leading to severe drug overuse. In China, the ratio of drug costs against the total expenses for medical treatment is about 50 per cent, which is extremely rare around the world.

U.S.News

China's Overuse of Antibiotics in Livestock May Threaten Human Health

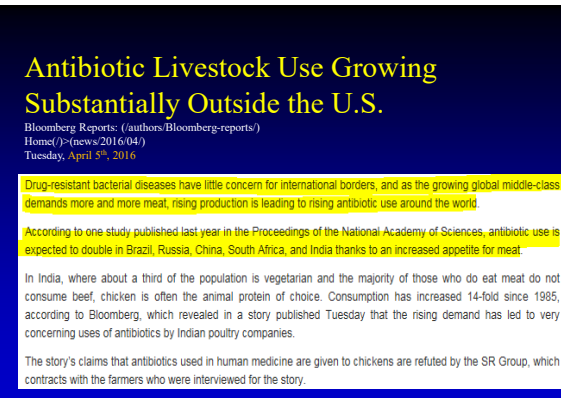
Much higher levels of antibiotic-resistance genes found at pig farms in study

HealthDay Feb. 11, 2013 | 4:00 p.m. EST + More

HealthDay

By Maureen Salamon
HealthDay Reporter

MONDAY, Feb. 11 (HealthDay News) -- Antibiotics used to fatten farm animals pose a steep threat to global health, spawning drug-resistance genes that end up in fertilizer, compost and groundwater and squash antibiotics' ability to fend off human diseases, suggests a new study from China.



Antibiotic Livestock Use Growing Substantially Outside the U.S.

Bloomberg Reports: (/authors/Bloomberg-reports/)
Home(/)>(news/2016/04/)
Tuesday, April 5th, 2016

Drug-resistant bacterial diseases have little concern for international borders, and as the growing global middle-class demands more and more meat, rising production is leading to rising antibiotic use around the world.

According to one study published last year in the Proceedings of the National Academy of Sciences, antibiotic use is expected to double in Brazil, Russia, China, South Africa, and India thanks to an increased appetite for meat.

In India, where about a third of the population is vegetarian and the majority of those who do eat meat do not consume beef, chicken is often the animal protein of choice. Consumption has increased 14-fold since 1985, according to Bloomberg, which revealed in a story published Tuesday that the rising demand has led to very concerning uses of antibiotics by Indian poultry companies.

The story's claims that antibiotics used in human medicine are given to chickens are refuted by the SR Group, which contracts with the farmers who were interviewed for the story.

Antibiotic Resistance Issue

- Many critical antibiotics for human therapy are becoming less effective/useful
- Need to restrict use, but prudently
- Complex problem with no simple solution(s); solutions are complex
  - Ban of their use in agriculture has led to some unintended adverse consequences
- Global problem that cannot be solved by USA and/or EU alone; need global commitment and involvement
  - **Global travel**
  - **Food imports**

'Superbugs' Kill India's Babies and Pose an Overseas Threat

The New York Times By GARDINER HARRIS DEC. 3, 2014

© Kuni Takahashi for The New York Times A mother nursing her newborn at a hospital in Haryana, where almost every baby born in hospitals in recent years has been injected with antibiotics.

Food Safety Chemical Issues Associated with Foods Produced in China

- Farmers rely on **heavy use** of **chemicals** to deal with **pest** pressures, and **antibiotics** are widely used to control **disease in livestock, poultry and aquaculture**
  - Use many **highly toxic pesticides**, including some that are banned in the USA
  - Farm **chemicals** are sometimes **mislabeled and inappropriately used**
  - Some farmers have **little understanding of correct chemical use**, resulting in excessive residues in harvested product

USDA-ERS www.ers.usda.gov/AmberWaves/November08/Features/FoodSafety.htm

Food Safety Chemical/Microbiological Issues Associated with Foods Produced in China

- **Industrialization and lax environment controls** contribute to **heavy metal contamination** of foods
- **Untreated human and animal wastes** are applied to **fields** directly and through contaminated **irrigation water**

USDA-ERS www.ers.usda.gov/AmberWaves/November08/Features/FoodSafety.htm

CHINA NEWS

China Details Vast Extent of Soil Pollution

About a Fifth of Nation's Arable Land Is Contaminated With Heavy Metals

By JOSH CHIN And BRIAN SPEGELE

Updated April 17, 2014 9:08 p.m. ET

In Dapu Village, an irrigation pond was polluted by a chemical factory. The majority of China's soil pollution comes from inorganic sources.

BEIJING—The extent of China's soil pollution, long guarded as a state secret, was laid out in an official report that confirmed deep-seated fears about contaminated farmland and the viability of the country's food supply.

China's Farmland Puts Consumers At Risk

- **19.4% of China's farmland** is contaminated with **heavy metals**, including mercury, lead, cadmium, arsenic and nickel
  - Mining and industrial wastes are primary sources
  - 16.1% of all of China's soils are contaminated
  - In April 2013 discovered unusually large amounts of cadmium in rice grown in Hunan

Wall Street Journal. China details vast extent of soil pollution. April 17, 2014
Science 344:346 (2014)

Breaking News on the Food and Drink Manufacturing Sector

Heinz baby food recall prompts global standards call

By Rod Addy+, 19-Aug-2014

Related topics: Food Safety, Ambient foods, Cereals and bakery preparations, Fruit, vegetable, nut ingredients

Heinz's recall of some infant cereal products in China after excessive quantities of lead were detected in ingredient samples has prompted calls for tough global food standards.

"Heinz has become the latest victim of our globalised food supply chain," said Farzad Henareh, recall expert and European md at Stericycle ExpertSolutions. *"The situation it finds itself in is somewhat fortunate, as the contamination has been caught before causing any harm, but this could have led to an explosive reaction with global implications.*

"It's long been known that lengthy supply chains that cross multiple global borders lead to variations in quality control. China, in particular, is a repeat offender in this sense – it held eight per cent of the global share for food recalls in the second quarter of 2014 – so this situation does not come as a surprise.

Foodmanufacture.co.uk

CHINA DIRECT

Food safety chief: FDA struggling to cope with scale of adulteration

By RJ Whitehead, 07-Mar-2016
Last updated on 07-Mar-2016 at 09:19 GMT

Post a comment

Related tags: China, Adulteration, Food safety, Inspections, Antibiotics, Food, Diet, Nutrition, Health, Potatoes, Grain, Chocolate, Manufacturing

China's food authorities are unable to keep up with cases of chemical and drug adulteration, according to the head of its Food and Drug Administration.

Currently, the administration's drug evaluation centre has only 130 staff, which last year inspected more than 40,000 suspect batches of food products, with 255 found to be in violation of food safety standards.

International , followed a five-year study in Shanghai and found that 60% of urine samples taken from children aged 8-11 contained traces of the drugs.

Wang Hexing, the team's lead researcher, said that he believed the veterinary antibiotics mainly entered the human body through contaminated water and food.

Chemophobia/"Natural Foods“ and the Blogosphere

- Consumer movement, initially in Europe, to **remove food additives/"chemicals" from foods**
  - Using **"blogosphere"** to communicate, which includes **misinformation** that is not grounded in science-based data
- **“Processed foods”** are a target
  - Marion Nestle's (New York University) definition of "processed foods" is based on **number of food additives**, especially those with esoteric names

SOCIAL MEDIA

Big brands bend to Web critics

Timed right, activists can influence everything from ingredients to fees.

The Atlanta Journal-Constitution, December 15, 2013

Chemophobia/"Natural Foods"

- **Can have adverse public health consequences**
  - Remove **benzoate** from foods
    - Pressure from retailers on food manufacturers to remove benzoate from processed foods
    - **Benzoic acid** is a **naturally-occurring** antimicrobial in cranberries, blackberries, apricots, cherries, plums, cinnamon, cloves, coffee beans, honey

Chemophobia/"Natural Foods"

- Significance of removing **benzoate**
  - Frequently used in foods (e.g., beverages, dairy-based fillings in baked goods) to control molds and yeasts
  - Can also **inhibit growth of foodborne bacterial pathogens** such as ***Staphylococcus aureus*** and ***Listeria monocytogenes***

Chemophobia/"Natural Foods"

- Next to be removed from foods is **sorbate** (**naturally occurring** in certain berries such as European mountain ash berries)
- Significance of removing **sorbate**
  - Frequently used in foods to control molds and yeasts
  - Can also **inhibit growth of foodborne bacterial** pathogens such as ***Clostridium botulinum*** (e.g., process cheese) and is bactericidal to ***Salmonella***

Chemophobia/Preservative-free Foods

- Recent recalls or consumer complaints of **preservative-free** foods
  - Organic baby food (microbial spoilage)
  - String cheese (microbial spoilage)
  - Yogurt (microbial spoilage)
  - UHT-packaged juice-like beverage (microbial spoilage)

News Center In the news: COH BBRY ORCL KR KBR

Kraft Foods recalls 260 cases of Velveeta

Associated Press

June 19, 2014 1:52 PM ET

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NEW YORK (AP) - Kraft is recalling Velveeta cheese from Walmart stores in as many as 12 states, mostly in the Midwest, because the cheese lacks the proper amount of preservatives.

Insufficient levels of sorbic acid has led to the recall of 260 cases of Velveeta original pasteurized recipe cheese product because it could cause the cheese to spoil prematurely or cause food-borne illnesses.

Kraft Foods Group Inc. says the cheese was sent to three Walmart distribution centers and could have been shipped to as many as 12 states: Colorado, Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Nebraska, North Dakota, Ohio, South Dakota and Wisconsin.

The company says the code on the package is 021000611614.

"Natural" Bacon

Food Safety News

Kraft Heinz Recalls Oscar Mayer Turkey Bacon for Possible Spoilage Problem

FOX NEWS

Gerber recalls food pouches which may be spoiled

Published March 26, 2016 · FoxNews.com

Gerber voluntarily recalled four batches of baby food pouches Thursday due to potential for spoilage during transport and handling.

The company's announcement affected two batches of Gerber Organic 2ND FOODS Pouches: Pears, Carrots & Peas (UPC 15000074319) and two batches of Gerber Organic 2nd FOODS Pouches: Carrots, Apples & Mangoes (UPC 15000074395) with best by dates of July 12, 2016, July 13, 2016 and July 14, 2016.

The recalled products were distributed nationwide in stores and online.

More on this...

- Company issues voluntary recall for popular applesauce snack amid complaints of mold
- Nestle issues recall for DiGiorno, Lean Cuisine and Stouffer's products
- H-E-B recalls tuna due to possible contamination

Gerber. Start Healthy Stay Healthy.

Citric acid is sole preservative

Study Exposes Dangers of Chobani Yogurt Mold Outbreak

by Nahamet Newsdesk Yesterday

Comment

FOOD navigator-usa.com

Breaking News on Food & Beverage Development - North America

General Mills: Chobani's 'wilfully deceptive' ads assert that safe & legal ingredients in rival products are toxic and unsafe

By Elaine Watson+, 13-Jan-2016

Related topics: Dairy-based ingredients, Preservatives and acidulants, Sweeteners (intense, bulk, polyols), Regulation, Food labeling and marketing, Greek yogurt, Manufacturers, Dairy

The legal firestorm prompted by Chobani's provocative new ad campaign for its Simply 100 Greek yogurt range has intensified this week as General Mills has filed a lawsuit accusing Chobani of false advertising and unfair competition.

Chobani's campaign - which flags up the use of so-called 'bad stuff' in rival products and implies that Simply 100 is a better, healthier, choice – includes a print ad featuring a picture of Yoplait Greek 100, which opens with the question: *"Did You Know Not All Yogurts Are Equally Good for You? You think you are doing something good for yourself and your family…By buying yogurt instead of bad stuff…And then you find that the bad stuff…is in your yogurt!"*

Next to a picture of Yoplait Greek 100 it says: *Look, there's potassium sorbate as a preservative in Yoplait Greek 100. Potassium sorbate? Really? That stuff is used to kill bugs."* It goes on to highlight Dannon's use of the artificial sweetener sucralose in Dannon Light & Fit Greek, which has already prompted a legal spat).

Gen Mills: Potassium sorbate is not used to 'kill bugs'

According to General Mills, which owns the Yoplait brand, a TV commercial (see below) created as part of the new Simply 100 campaign *"goes so far as to convey that, because Yoplait Greek 100 is laced with a pesticide, it is so dangerous and unfit to eat that consumers should discard it as garbage."*

And the Simply 100 website goes further, claims General Mills, which filed a civil action* in Minnesota on Sunday for false advertising under the Lanham Act, violations of the Minnesota Deceptive Trade Practices Act, and for common law unfair competition.

"Chobani's unambiguous assertion in its Simply 100 Website that Yoplait Greek 100 is unhealthy, unsafe, and unfit for human consumption because it contains potassium sorbate which is listed as a pesticide by the EPA, is false by implication and highly misleading."

Yogurt Wars: Chobani Ordered to Halt Ads Bashing Rivals' Products

by LUCY BAYLY

A federal judge on Friday ordered Greek yogurt maker Chobani to stop airing ads that implied rival products were "unsafe or harmful" and contained chemicals used to kill bugs or keep swimming pools clean.

A fridge stocked full with Chobani Greek Yogurt. John Minchillo / AP for Chobani

Judge David Hurd of the U.S. District Court for Northern New York ordered Chobani to halt the campaign, saying the ads were misleading.

The ruling came in response to separate lawsuits filed earlier this month by General Mills, which makes Yoplait Greek 100, and Dannon, which produces Light & Fit Greek yogurt.

In its lawsuit, General Mills challenged Chobani's TV, print and online ad campaign that showed a woman tossing a container of Yoplait into a garbage can after being told by an announcer that it contained ""Potassium sorbate. ... That stuff is used to kill bugs."

Sniping Over Chobani Ads Criticizing Rivals Heads to Court

The foodmaker said the ads gave users the impression that Yoplait yogurt is not all natural since it is "laced with a pesticide" and "so dangerous and unfit to eat that consumers should discard it as garbage."

For its part, Dannon objected to the fact that the Chobani campaign led consumers to believe that Dannon Light & Fit contains chlorine in a formulation that is similar to what "might be used in swimming pools as a disinfectant."

DAIRY reporter.com

Breaking News on Dairy Processing & Markets

Raw foods on the rise as clean-label consumers crave more

By Niamh Michail+, 25-Apr-2016

Related topics: Manufacturers

From snack bars to spreads, chocolate to cheese, the trend for raw ingredients in processed foods is spreading across Europe, says Mintel, as consumer attention goes beyond the ingredient list to look at clean-label processing methods.

"The process 'behind the finished product' is moving into focus and becoming a premium attribute not only for the health-obsessed, but increasingly also for consumers generally looking for higher quality," says Mintel food and drink analyst Julia Buech.

This could be seen as a natural transition from the clean label movement as consumers grow increasingly wary of additives, allergens and chemicals in food but also ken to preserve natural nutrients.

"The concept is based on the understanding that the extreme heat of conventional cooking destroys many of the food's beneficial enzymes and renders its nutrients mostly unusable. In raw-labelled foods, none of the ingredients have been heated to a temperature above 48°C in order to preserve enzymes and nutrients."

Chemophobia/"Natural Foods"

- **Learnings**
  - Removing certain food preservatives can have **unintended consequences** with regard to the **microbiological safety** of a product
  - Can substantially **reduce shelf life** of many foods
  - Will undoubtably lead to increased **food waste**
  - Base use of microbial inhibitors on **public health implications and sound science**

Some Industry Challenges in Implementing Food Safety Modernization Act Rules

- Developing and applying relevant, useful **food safety plans**
- Adopting **advanced** food safety **interventions**
- **Validating** food safety **interventions/control points**

Industry Challenges in Providing Safe Foods

- **Whole genome sequencing** of foodborne pathogens is revolutionizing **outbreak detection** and traceback globally
  - Will likely be more outbreaks detected with small numbers of cases (3-10)
    - Average number of cases in listeriosis outbreaks is now 3
  - More companies and specific food vehicles will be identified; processing food facilities will be WGS fingerprint profiled
  - Pathogens obtained from retail food samples will implicate food processors in foodborne outbreaks

Industry Challenges in Providing Safe Foods

- **Need for "bullet-proofing" fresh produce from foodborne pathogen contamination**
  - **Produce** is a leading vehicle of foodborne illness, with **fresh-cut leafy greens** and **melons** of particular concern
    - **Cantaloupe** is prone to pathogen contamination, and many commonly used sanitizers are not fully effective in mitigating pathogen contamination, especially at the stem scar

Industry Challenges in Providing Safe Foods

- **Aquaculture farming** will become a dominant global food production practice.
  - Excessive use of **antimicrobials** critical to human therapy for disease control and use of **raw animal manure and human feces** as primary nutrient source has global ramifications regarding antimicrobial-resistant microbes and pathogen contamination.

Industry Challenges in Providing Safe Foods

- **Unintended consumer uses of foods** will continue to increase with growing consumer interest in **raw or undercooked, natural (no preservatives) foods** that can be prepared quickly. This is being accelerated by the use of **social media disseminating misinformation**.

Industry Challenges in Providing Safe Foods

- **"Natural" foods** that do not contain antimicrobial preservatives may be a disaster in the making, depending on the food's ability to support the growth of pathogens and spoilage microbes and storage temperature and time
  - Consumer abuse is unavoidable