PERICOLI MICROBIOLOGICI CORRELATI AL CONSUMO DI PRODOTTI VEGETALI

DARIO DE MEDICI

DIRETTORE REPARTO PERICOLI MICROBIOLOGICI CONNESSI CON GLI ALIMENTI

DIPARTIMENTO DI SANITÀ PUBBLICA VETERINARIA E SICUREZZA ALIMENTARE

ISTITUTO SUPERIORE DI SANITÀ

Nuovi pericoli e nuovi scenari epidemiologici nella sorveglianza delle Malattie Trasmesse da Alimenti

efsa European Food Safety Authority
ecdc

EFSA Journal 2015;13(1):3991

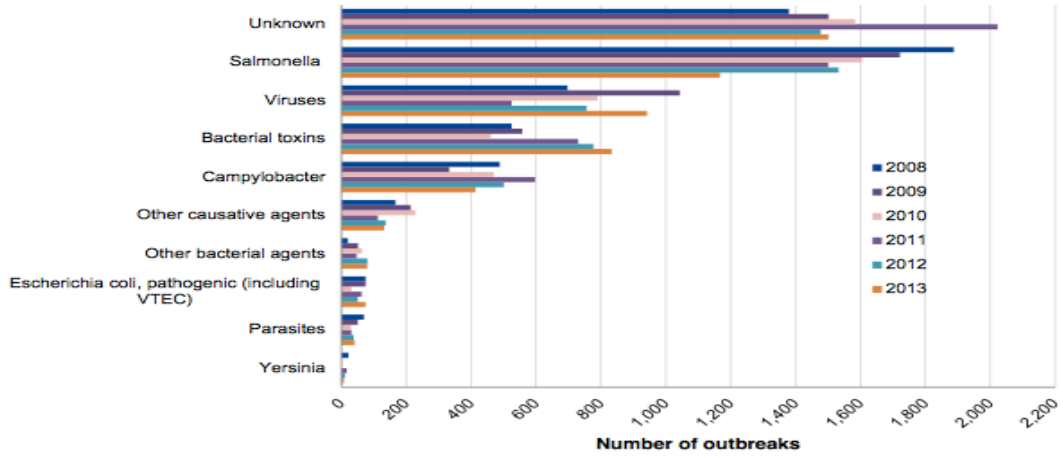
SCIENTIFIC REPORT OF EFSA AND ECDC

The European Union summary report on trends and sources of zoonoses, zoonotic agents and food-borne outbreaks in 2013[1]

European Food Safety Authority[2,3]
European Centre for Disease Prevention and Control[2,3]

European Food Safety Authority (EFSA), Parma, Italy
European Centre for Disease Prevention and Control (ECDC), Stockholm, Sweden

Figure 45. Distribution of all food-borne outbreaks per causative agent in the EU, 2013



Special Issue

Emerging Foodborne Diseases: An Evolving Public Health Challenge

Robert V. Tauxe
Centers for Disease Control and Prevention, Atlanta, Georgia, USA

Table 1. New pathogens that are foodborne and pathogens newly recognized as predominantly foodborne in the United States in the last 20 years

Campylobacter jejuni
Campylobacter fetus ssp. *fetus*
Cryptosporidium cayetanensis
Escherichia coli O157:H7 and related *E. coli* (e.g., O111:NM, O104:H21)
Listeria monocytogenes
Norwalk-like viruses
Nitzschia pungens (cause of amnesic shellfish poisoning)
Salmonella Enteritidis
Salmonella Typhimurium DT 104
Vibrio cholerae O1
Vibrio vulnificus
Vibrio parahaemolyticus
Yersinia enterocolitica

Veicoli alimentari classici

- *Salmonella Enteritidis*
- *Campylobacter*
- *Listeria monocytogenes*
- *Yersinia enterocolitica*
- *E.coli* 0157
- Virus Enterici
- *C. Botulinum*

Pistoia 15-16 Dicembre 2015

Azienda USL 3 Pistoia
Servizio Sanitario della Toscana

CEREFE Centro di Riferimento Regionale per la Formazione in Sanità Pubblica Veterinaria e Sicurezza Alimentare

CENTRO DI RIFERIMENTO REGIONALE SULLE TOSSINFEZIONI ALIMENTARI
Ce.R.R.T.A.

EFSA looks at public health risks from foods of non-animal origin

News Story
8 January 2013

EFSA has published the first scientific assessment in Europe on public health risks posed by pathogens that may contaminate food of non-animal origin. The scientific opinion compares the proportion of human cases reported in outbreaks of food-borne disease, from 2007 to 2011, related to food of non-animal origin with those associated with food of animal origin in Europe. EFSA experts also identified and ranked combinations of foods and pathogens most often linked to foodborne illness from foods of non-animal origin.

Foods of non-animal origin include a wide variety of fruit, vegetables, salads, seeds, nuts, cereals, herbs, and spices. They are an important part of our daily diet. According to the scientific opinion published today by the Panel on Biological Hazards, foods of animal origin continue to be the source of the majority of all documented and reported outbreaks (90%). However the number of outbreaks, human cases, and hospitalisations associated with food of non-animal origin has increased over this period.

efsa
European Food Safety Authority

EFSA Journal 2013;11(1):3025

SCIENTIFIC OPINION

Scientific Opinion on the risk posed by pathogens in food of non-animal origin. Part 1 (outbreak data analysis and risk ranking of food/pathogen combinations)[1]

EFSA Panel on Biological Hazards (BIOHAZ)[2, 3]

European Food Safety Authority (EFSA), Parma, Italy

Have these risks been increasing in recent years?

Over the time period considered, the number of reported outbreaks associated with foods of non-animal origin, cases, hospitalisations and deaths increased, but foods of animal origin continued to be the source of the majority of all documented and reported outbreaks (90%).

The Community Summary Report on Trends and Sources of Zoonoses, Zoonotic Agents, Antimicrobial Resistance and Foodborne Outbreaks in the European Union in 2006

December 2007

efsa European Food Safety Authority

ecdc

EFSA Journal 2012;10(3):2597

SCIENTIFIC REPORT OF EFSA AND ECDC

The European Union Summary Report on Trends and Sources of Zoonoses, Zoonotic Agents and Food-borne Outbreaks in 2010[1]

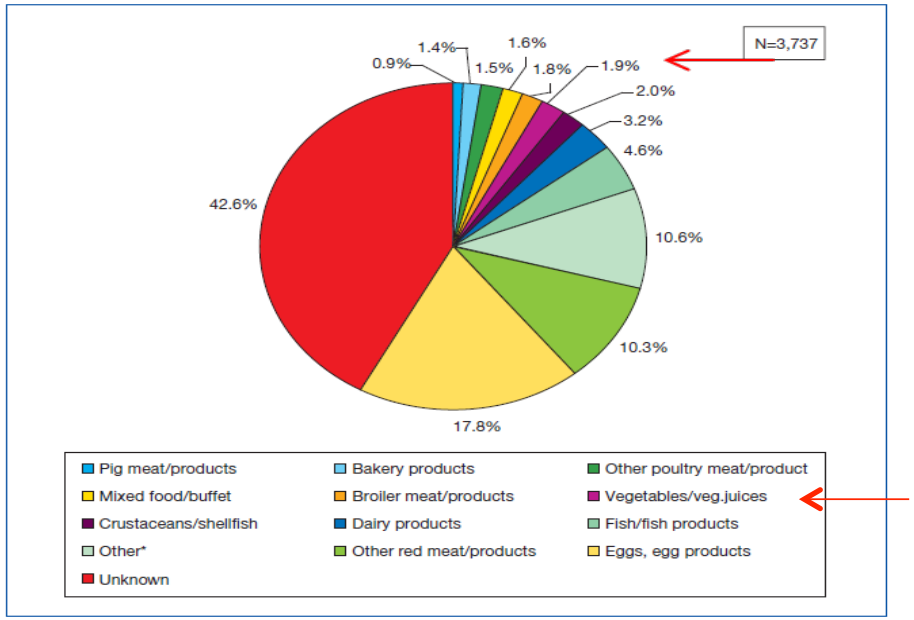
European Food Safety Authority[2, 3]

European Centre for Disease Prevention and Control[2, 3]

This scientific output, published 11 May 2012, replaces the earlier version published on 8 March 2012[4].

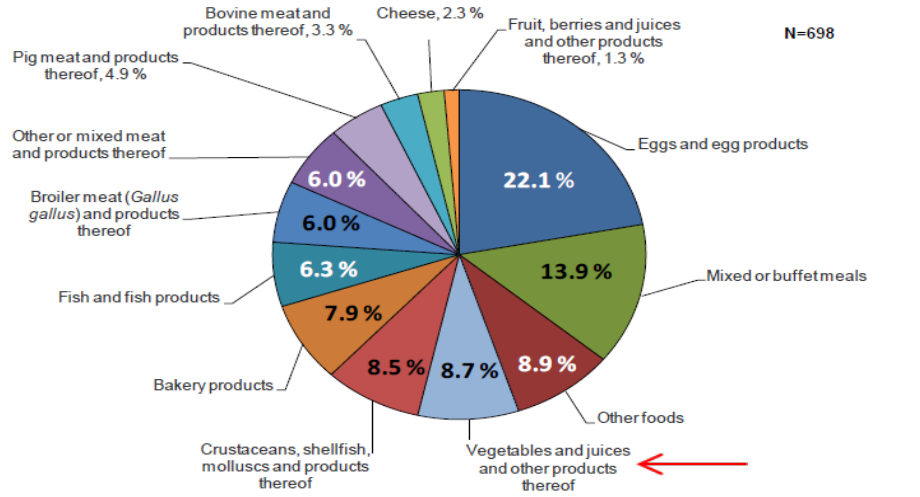
products in 3.2%, respectively Fig. OUT1.

Figure OUT1. Distribution of vehicle involved (in %), for individually reported outbreaks, 2006



Note: * Other, include the categories; Other foods (7.7%), Sweets/chocolate (0.4%), Tap/well water (0.4%), Fruits/Berries/fruit juices (0.4%), Cereal incl. rice & nuts (0.4%), Cheese (0.4%), Drinks, incl. Bottled water (0.2%), Milk (0.2%), Turkey meat/products (0.2%), Bovine meat/products (0.2%), Herbs/spices (0.1%), Sheep meat/products (0.1%)

Figure OUT4. Distribution of strong evidence outbreaks by food vehicle in the EU, 2010



Note: Data from 698 outbreaks are included: Austria (10), Belgium (16), Denmark (48), Estonia (2), Finland (24), France (75), Germany (40), Hungary (30), Ireland (3), Latvia (7), Lithuania (7), Netherlands (13), Poland (118), Portugal (4), Romania (19), Slovakia (20), Slovenia (3), Spain (196), Sweden (13) and United Kingdom (50).

Note: Other foodstuffs (N=62) include: dairy products (other than cheeses) (4), cereal products including rice and seeds/pulses (nuts, almonds) (11), milk (8), herbs and spices (1), sweets and chocolate (4), canned food products (1) and other foods (33).

Nuovi pericoli e nuovi scenari epidemiologici nella sorveglianza delle Malattie Trasmesse da Alimenti

efsa European Food Safety Authority
ecdc

EFSA Journal 2014;12(2):3547

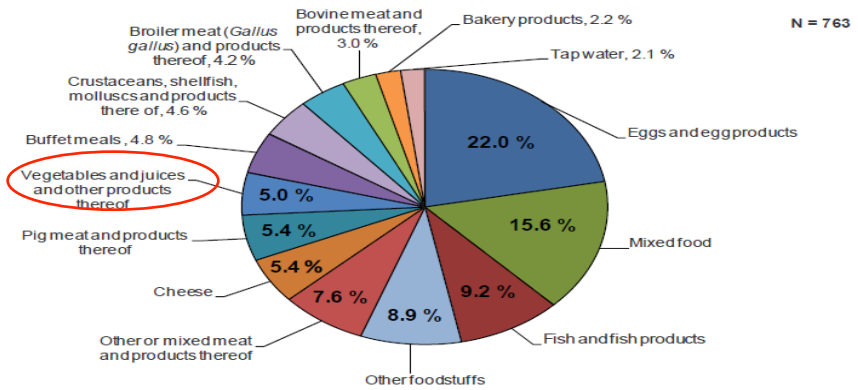
SCIENTIFIC REPORT OF EFSA AND ECDC

The European Union Summary Report on Trends and Sources of Zoonoses, Zoonotic Agents and Food-borne Outbreaks in 2012[1]

European Food Safety Authority[2, 3]
European Centre for Disease Prevention and Control[2, 3]
European Food Safety Authority (EFSA), Parma, Italy
European Centre for Disease Prevention and Control (ECDC), Stockholm, Sweden

This scientific output, published on 17 July 2014, replaces the earlier version published on 19 February 2014*.

Figure OUT5. Distribution of strong-evidence outbreaks by food vehicle in the EU, 2012



Note: Data from 763 outbreaks are included: Austria (3), Belgium (31), Denmark (64), Estonia (1), Finland (22), France (208), Germany (56), Greece (3), Hungary (10), Ireland (13), Latvia (1), Lithuania (5), Netherlands (12), Poland (78), Portugal (7), Romania (10), Slovakia (5), Slovenia (10), Spain (176), Sweden (8) and United Kingdom (40).
Other foodstuffs (N = 68) include: canned food products (1), cereal products including rice and seeds/pulses (nuts, almonds) (4), dairy products (other than cheeses) (4), drinks (1), fruit, berries and juices and other products thereof (6), herbs and spices (2), milk (7), sweets and chocolate (5) and other foods (38).

efsa European Food Safety Authority
ecdc

EFSA Journal 2015;13(1):3991

SCIENTIFIC REPORT OF EFSA AND ECDC

The European Union summary report on trends and sources of zoonoses, zoonotic agents and food-borne outbreaks in 2013[1]

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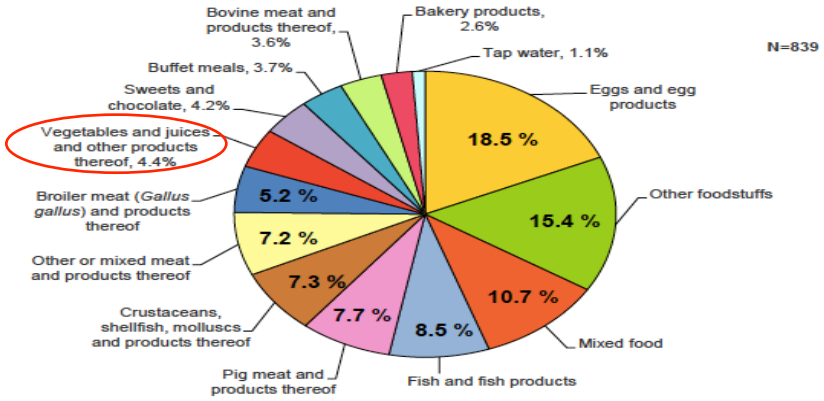


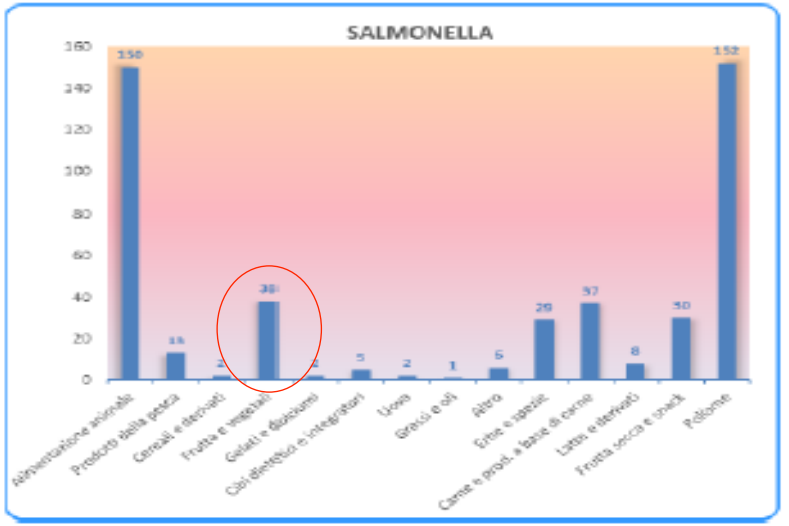
Data from 839 outbreaks are included: Austria (24), Belgium (23), Croatia (6), Denmark (40), Estonia (1), Finland (15), France (249), Germany (33), Greece (2), Hungary (9), Ireland (5), Latvia (1), Lithuania (18), Netherlands (8), Poland (125), Portugal (18), Romania (19), Slovakia (4), Spain (158), Sweden (16) and United Kingdom (65).
Other foodstuffs (N=129) include: canned food products (3), cereal products including rice and seeds/pulses (nuts, almonds) (7), cheese (11), dairy products (other than cheese) (7), drinks (3), fruit, berries and juices and other products thereof (10), herbs and spices (4), milk (11), and other foods (73).

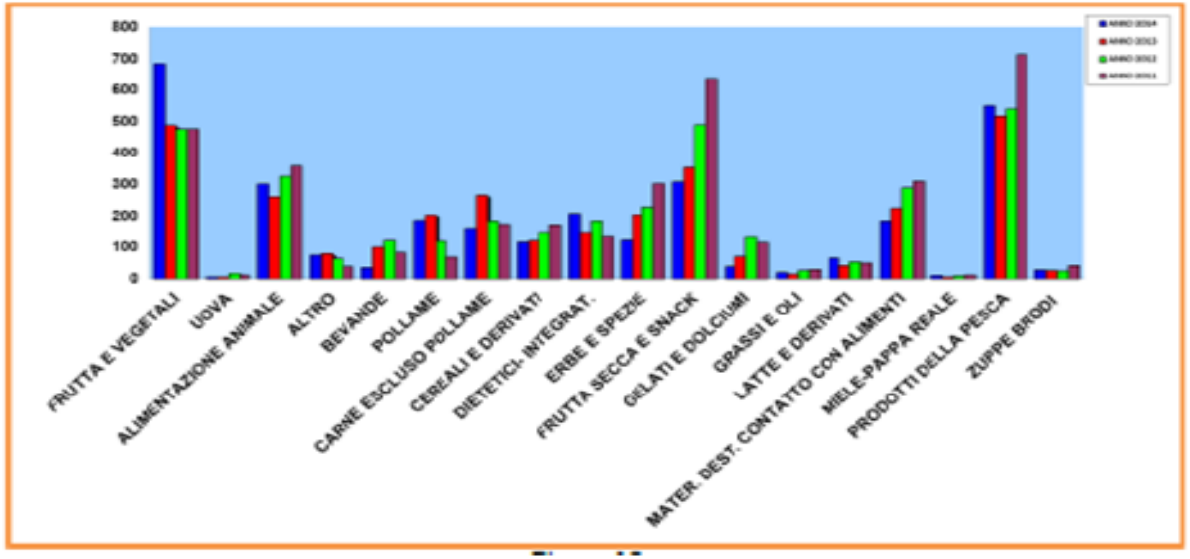
Nuovi pericoli e nuovi scenari epidemiologici nella sorveglianza delle Malattie Trasmesse da Alimenti

Notifiche RASFF

product category	2011	2012	2013	2014
animal by-products		7		5
bivalve molluscs and products thereof	6	4	19	9
cephalopods and products thereof	1	14	0	0
cereals and bakery products	1	3	1	2
cocoa and cocoa preparations, coffee and tea	2	4	0	1
compound feeds	3	0	2	1
confectionery	0	0	1	2
crustaceans and products thereof	4	2	2	4
dietetic foods, food supplements, fortified foods	0	0	2	4
eggs and egg products	4	8	1	2
fats and oils	0	0	0	1
feed additives	0	2	0	2
feed materials	120	119	138	134
feed premixtures	1	1	0	0
fish and fish products	2	3	3	1
food additives and flavourings	0	1	2	0
fruits and vegetables	100	72	59	39
gastropods	0	1	0	1
herbs and spices	63	43	27	34
ices and desserts			1	
meat and meat products (other than poultry)	38	69	63	40
milk and milk products	4	2	4	8
nuts, nut products and seeds	16	27	13	33
other food product / mixed		8	3	
pet food	39	20	21	49
poultry meat and poultry meat products	45	57	193	167
prepared dishes and snacks		3	2	5
soups, broths, sauces and condiments	1	1		
overall	**450**	**471**	**557**	**544**


Ministero della Salute
RELAZIONE SUL
SISTEMA DI ALLERTA EUROPEO
ANNO 2014


SALMONELLA
160
140
120
100
80
60
40
20
0
150
15
2
38
2
5
2
1
5
29
37
8
30
152
Alimentazione animale
Prodotti della pesca
Cereali e derivati
Frutta e vegetali
Gelati e dolciumi
Cibi dietetici e integratori
Uova
Grassi e oli
Altro
Erbe e spezie
Carne e prod. a base di carne
Latte e derivati
Frutta secca e snack
Pollame


800
700
600
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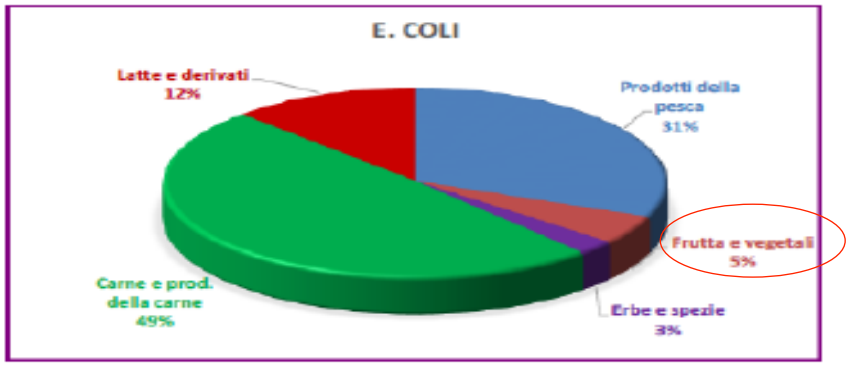
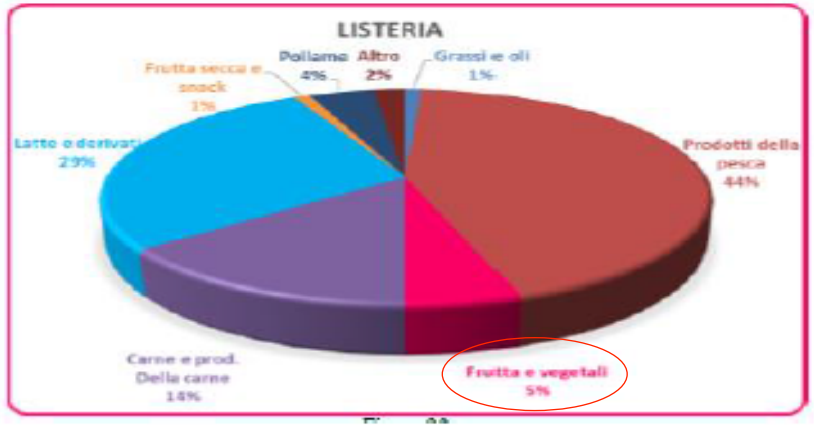
400
300
200
100
0
FRUTTA E VEGETALI
UOVA
ALIMENTAZIONE ANIMALE
ALTRO
BEVANDE
POLLAME
CARNE ESCLUSO POLLAME
CEREALI E DERIVATI
DIETETICI- INTEGRAT.
ERBE E SPEZIE
FRUTTA SECCA E SNACK
GELATI E DOLCIUMI
GRASSI E OLI
LATTE E DERIVATI
MATER. DEST. CONTATTO CON ALIMENTI
MIELE-PAPPA REALE
PRODOTTI DELLA PESCA
ZUPPE BRODI


E. COLI
Latte e derivati
12%
Prodotti della
pesca
31%
Frutta e vegetali
5%
Carne e prod.
della carne
49%
Erbe e spezie
3%


LISTERIA
Frutta secca e
snack
1%
Pollame
4%
Altro
2%
Grassi e oli
1%
Latte e derivati
29%
Prodotti della
pesca
44%
Carne e prod.
Della carne
14%
Frutta e vegetali
5%

Comprehensive REVIEWS in Food Science and Food Safety

2015

Microbial Hazards in Irrigation Water: Standards, Norms, and Testing to Manage Use of Water in Fresh Produce Primary Production

Mieke Uyttendaele, Lee-Ann Jaykus, Philip Amoah, Alessandro Chiodini, David Cunliffe, Liesbeth Jacxsens, Kevin Holvoet, Lise Korsten, Mathew Lau, Peter McClure, Gertjan Medema, Imca Sampers, and Pratima Rao Jasti

2012). Based upon EU Zoonoses Monitoring data from 2007 to 2011, Foods of Non-Animal Origin (FoNAO) were associated with 10% of outbreaks, 26% of cases, 35% of hospitalizations, and 46% of deaths (EFSA Panel on Biological Hazards (BIOHAZ) Panel 2012). Trends in outbreak data on FoNAO are, however,

accompanied by a rise in the number of produce-associated food-borne disease outbreaks. In the United States between 1998 and 2007, fresh produce was involved in 684 outbreaks, resulting in 26735 cases of illness. Proportionally, this equates to 14.8% of outbreaks and 22.8% of outbreak-related cases of all foodborne illnesses in the Untied States. Salads, vegetables, and fruits were linked to 345, 228 cases and 111 outbreaks, respectively (DeWaal and others 2009; Olaimat and Holley 2012). There has also been

MICROBIOLOGICAL RISK ASSESSMENT SERIES

Pre-publication version

Microbiological hazards in fresh fruits and vegetables

MEETING REPORT

3.2.1 Level 1 priorities: Leafy green vegetables

Leafy green vegetables were identified as the commodity group of highest concern from a microbiological safety perspective. This commodity grouping was considered to include all vegetables of a leafy nature and of which the leaf is the intended for consumption such as lettuce (all varieties), spinach, cabbages, chicory, leafy fresh herbs (e.g. cilantro, basil, parsley) and watercress. This commodity group does not include green onions which differ in morphology from the above-mentioned vegetables.

WHO

FAO FIAT PANIS

Food and Agriculture Organization of the United Nations
World Health Organization
2008

OPEN ACCESS Freely available online

PLoS one

Complexity of the International Agro-Food Trade Network and Its Impact on Food Safety

Mária Ercsey-Ravasz[1,2], Zoltán Toroczkai[1], Zoltán Lakner[3], József Baranyi[4]*

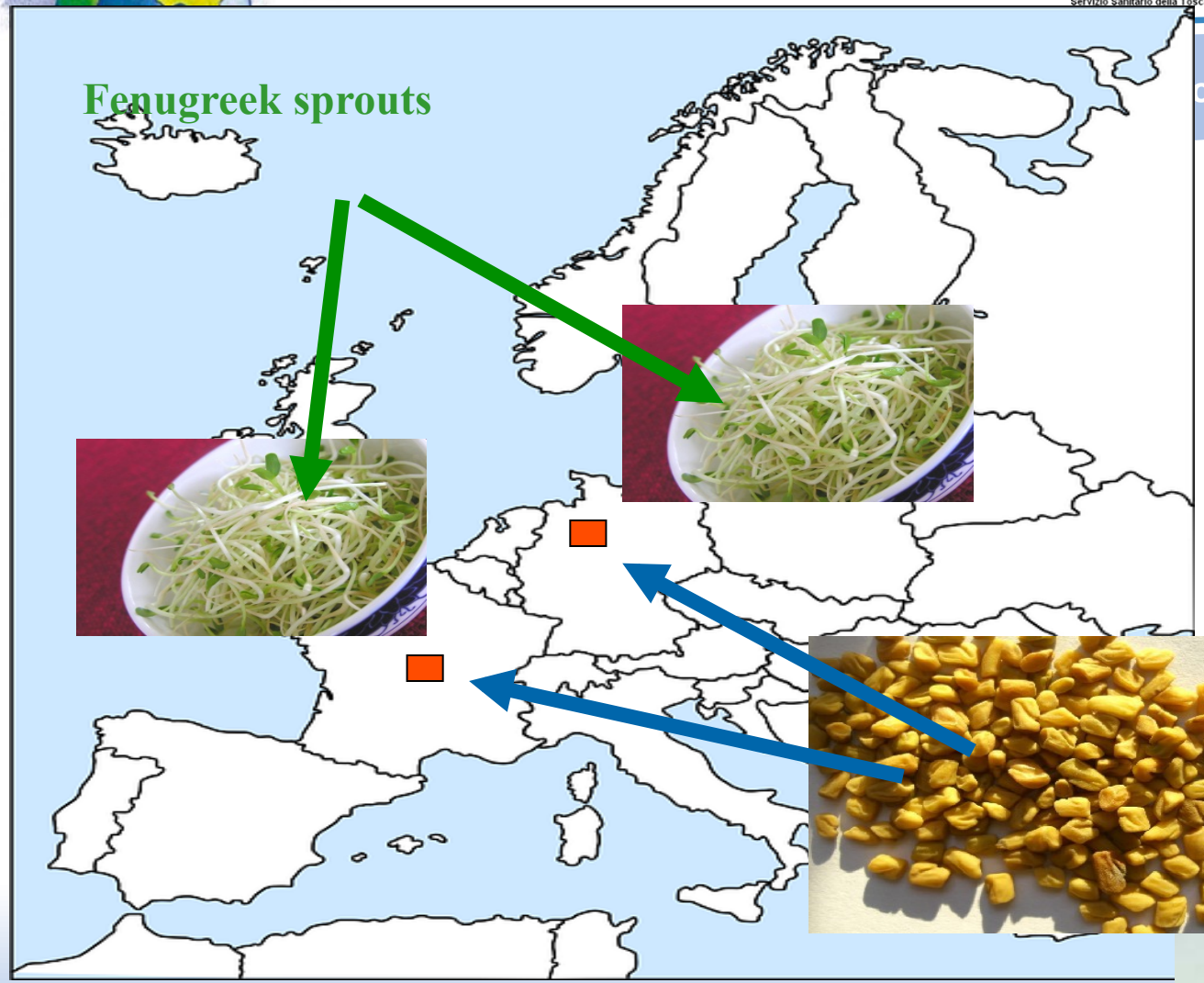
1 Interdisciplinary Center for Network Science and Applications (iCeNSA) and Department Physics, University of Notre Dame, Notre Dame, Indiana, United States of America, 2 Faculty of Physics, Babes-Bolyai University, RO-400084 Cluj-Napoca, Romania, 3 Department of Food Sciences, Budapest Corvinus University, Budapest, Hungary, 4 Institute of Food Research, Norwich Research Park, Norwich, United Kingdom

Introduction

By 2030, food demand is expected to increase by 50% [1] and thus the global food supply is playing an increasingly critical role in the economical and political landscape [2,3]. The latest deadly food poisoning outbreaks in 2011 (*Escherichia coli* in Germany [4], *Listeria monocytogenes* in the US [5]) and their economic, political and social effects clearly illustrated the importance of prompt tracing of the origin of specific food ingredients. This task is placing a huge pressure on regulation and surveillance.

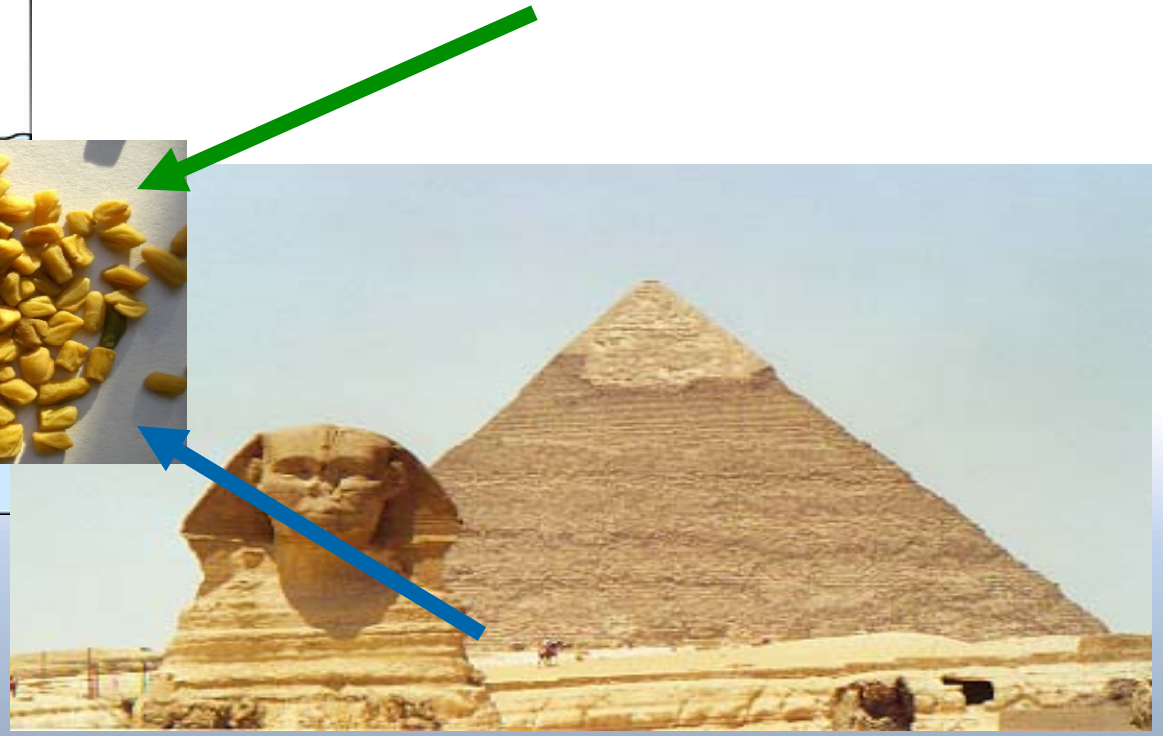
Emergenza E.coli in Germania

orveglianza



Semi di fieno greco importato dall'Egitto causa casi di sindrome Emolitico uremica dovuta a Escherichia coli O104: H4 in 13 Paesi EU

fenugreek (*Trigonella foenum-graecum*)



53 Morti e 4000 persone colpite da dissenteria emorragica

Diecembre 2015

Azienda USL 3 Pistoia — Servizio Sanitario della Toscana

CERERE — Centro di Riferimento Regionale per la Formazione in Sanità Pubblica Veterinaria e Sicurezza Alimentare

CENTRO DI RIFERIMENTO REGIONALE SULLE TOSSINFEZIONI ALIMENTARI Ce.R.R.T.A. — SST Servizio Sanitario della Toscana

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News › World news › United States

Listeria outbreak from cantaloupe melons kills 13 people in US

Bacterium traced back to cantaloupes from Colorado farm is blamed for infections in 72 people across 18 states

Reuters
guardian.co.uk, Wednesday 28 September 2011 04.26 BST
Article history

A produce seller stands next to Colorado cantaloupes that are not subject to the listeria recall affecting Rocky Ford brand melons from Jensen Farms in the US state. Photograph: Hyoung Chang/AP

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FOODBORNE ILLNESS OUTBREAKS

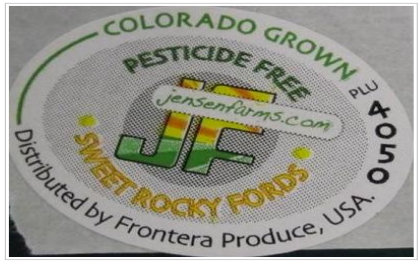
Cantaloupe Listeria Outbreak: 84 Sick, 15 Dead

BY MARY ROTHSCHILD | OCT 01, 2011

The outbreak of listeriosis that has spread from a cantaloupe farm in Colorado to 19 states has sickened at least 84 people and killed 15, the Centers for Disease Control and Prevention reported Friday.

That's 12 more illnesses and two more deaths linked to Jensen Farms melons, with Arkansas and Alabama reporting their first patients. The confirmed cases so far since July 31:

Alabama: 1 illness
Arkansas: 1 illness
California: 1 illness
Colorado: 17 illnesses, 3 deaths
Illinois: 1 illness
Indiana: 2 illnesses
Kansas: 5 illnesses, 1 death
Maryland: 1 illness
Missouri: 3 illnesses, 1 death
Montana: 1 illness
Nebraska: 6 illnesses
New Mexico: 13 illnesses, 5 deaths
North Dakota: 1 illnesses
Oklahoma: 11 illnesses, 1 death
Texas: 14 illnesses, 2 deaths
Virginia: 1 illnesses
West Virginia: 1 illness
Wisconsin: 2 illnesses
Wyoming: 2 illnesses



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CDC 24/7: Saving Lives. Protecting People. Saving Money through Prevention.

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A-Z Index A B C D E F G H I J K L M N O P Q R S T U V W X Y Z #

Morbidity and Mortality Weekly Report (*MMWR*)

MMWR

Text size: S M L XL

Multistate Outbreak of Listeriosis Associated with Jensen Farms Cantaloupe --- United States, August--September 2011

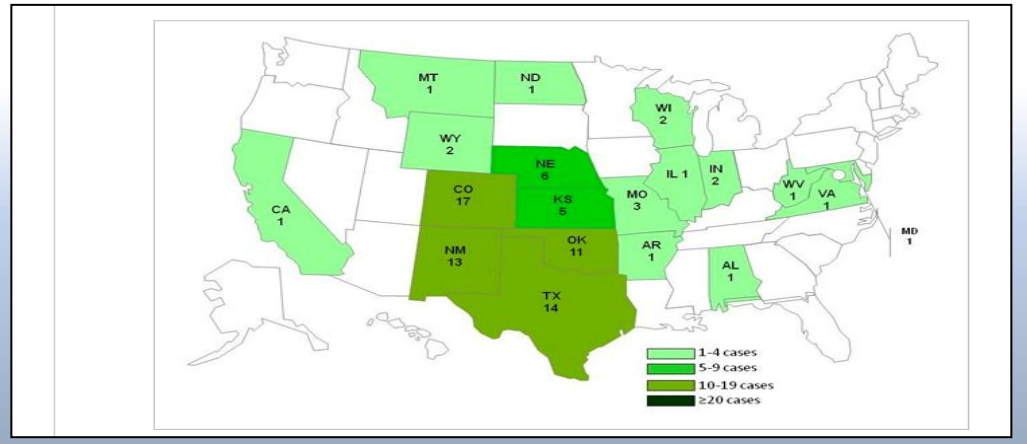
Weekly
October 7, 2011 / 60(39);1357-1358

On September 30, 2011, this report was posted as an MMWR *Early Release on the* MMWR *website (http://www.cdc.gov/mmwr).*

Listeriosis is caused by *Listeria monocytogenes*, a gram-positive bacillus common in the environment and acquired by humans primarily through consumption of contaminated food. Infection causes a spectrum of illness, ranging from febrile gastroenteritis to invasive disease, including sepsis and meningoencephalitis. Invasive listeriosis occurs predominantly in older adults and persons with impaired immune systems. Listeriosis in pregnant women is typically a mild "flu-like" illness, but can result in fetal loss, premature labor, or neonatal infection. Listeriosis is treated with antibiotics. On September 2, 2011, the Colorado Department of Public Health and Environment (CDPHE) notified CDC of seven cases of listeriosis reported since August 28. On average, Colorado reports two cases of listeriosis annually in August. By September 6, all seven Colorado patients interviewed with the Listeria Initiative* questionnaire reported eating cantaloupe in the month before illness began, and three reported eating cantaloupe marketed as "Rocky Ford."

A case was defined as illness with one of the outbreak strains isolated on or after August 1. Outbreak strains initially were defined as clinical isolates of *L. monocytogenes* with 1) specimen collection dates in August, and 2) a two-enzyme, pulsed-field gel electrophoresis (PFGE) pattern combination that occurred in two or more persons and matched any of the three pattern combinations found among Colorado residents in August. Analysis of Listeria Initiative data comparing the first 19 outbreak-associated cases in 2011 with 85 cases among persons aged ≥60 years with sporadic listeriosis identified during August of the years 2004--2010 indicated that cantaloupe consumption was strongly associated with illness caused by the outbreak strains: 19 of 19 (100%) versus 54 of 85 (64%); (odds ratio = 14.9; 95% CI = 2.4--∞). Initial tracebacks of cantaloupe purchased by patients converged on Jensen Farms in Colorado.

This outbreak has several unusual features. First, this is the first listeriosis outbreak associated with melon. Second, four widely differing PFGE pattern combinations and two serotypes (1/2a and 1/2b) have been associated with the outbreak. Third, this outbreak is unusually large; only two U.S. listeriosis outbreaks, one associated with frankfurters (108 cases) and one with Mexican-style cheese (142), have had more cases (*1,2*). Additional cases likely will be reported because of the long incubation period (usually 1--3 weeks, range: 3--70 days) and the time needed for diagnosis and confirmation. Fourth, this outbreak has the highest number of deaths of any U.S. foodborne outbreak since a listeriosis outbreak in 1998 (*1*).



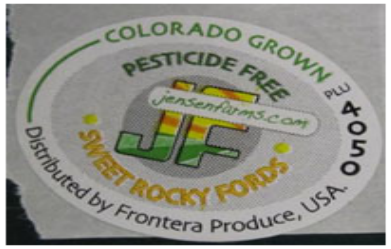
Nuovi pericoli e nuovi scenari epidemiologici nella sorveg
delle Malattie Trasmesse da Alimenti

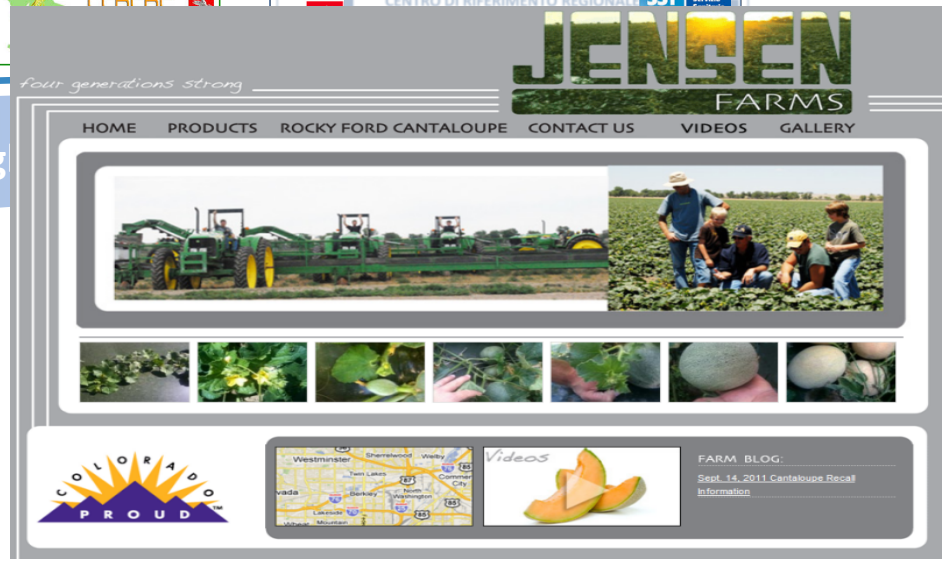
Top of Page

Advice to Consumers

Contaminated cantaloupes may make people sick.

- CDC recommends that consumers not eat Rocky Ford-brand cantaloupe from Jensen farms. This is especially important for older adults, persons with weakened immune systems, and pregnant women.
- Even if some of the cantaloupe has been eaten without anyone becoming ill, the rest of the cantaloupe should be disposed of immediately.
- The recalled cantaloupes may have sticker that looks like the image to the right. Not all of the recalled cantaloupes are labeled with a sticker. Consumers can consult the retailer if they have questions about the origin of a cantaloupe.
- When in doubt, throw it out (See disposal recommendations below)





Listeria outbreak expected to cause more deaths across US in coming weeks

Outbreak of listeria in cantaloupe melons from Colorado farm has caused at least 72 illnesses and up to 16 deaths so far

Associated Press in Washington
guardian.co.uk, Thursday 29 September 2011 10.34 BST
Article history

Workers in a field of rotting cantaloupe melons on the Jensen Farms in Colorado. Cantaloupe grown on the farm have been linked to a nationwide outbreak of listeria. Photograph: Ed Andrieski/AP

An outbreak of listeria in cantaloupe melons in the US may cause more illness and deaths in coming weeks, say health officials.

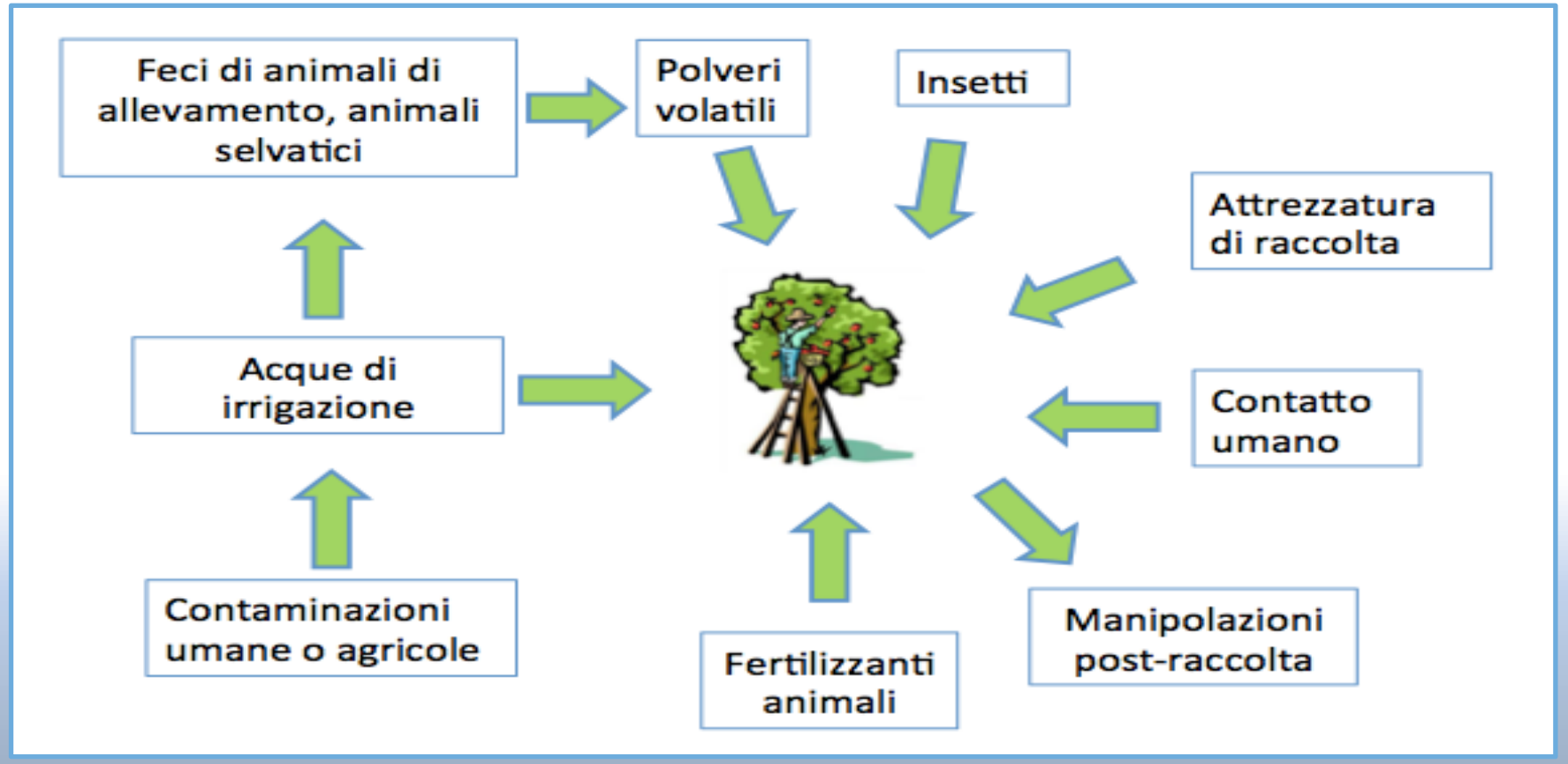
So far, the outbreak has caused at least 72 illnesses and up to 16 deaths, in 18 states, making it the deadliest food outbreak in the country in more than a decade.

The Colorado farm where the potentially deadly cantaloupes were traced to, Jensen Farms in Holly, says it shipped fruit to 25 states, and people with illnesses have been discovered in several states that were not on the shipping list.

For melons not part of this recall, FDA has this general advice for melon safety:

- Consumers and food preparers should wash their hands with warm water and soap for at least 20 seconds *before* and *after* handling any whole melon, such as cantaloupe, watermelon, or honeydew.
- Scrub the surface of melons, such as cantaloupes, with a clean produce brush and dry them with a clean cloth or paper towel before cutting.
- Cut melon should be promptly consumed or refrigerated at or less than 40 degrees F (32-34 degrees F is best) for no more than 7 days.
- Cut melons left at room temperature for more than 4 hours should be discarded.

Potenziali fonti di trasmissione di patogeni ai vegetali



Comprehensive REVIEWS in Food Science and Food Safety

Microbial Hazards in Irrigation Water: Standards, Norms, and Testing to Manage Use of Water in Fresh Produce Primary Production

Mieke Uyttendaele, Lee-Ann Jaykus, Philip Amoah, Alessandro Chiodini, David Cunliffe, Liesbeth Jacxsens, Kevin Holvoet, Lise Korsten, Mathew Lau, Peter McClure, Gertjan Medema, Imca Sampers, and Pratima Rao Jasti

Fresh produce can become contaminated with microbiological pathogens during production, at the processing/packing stage, and/or during preparation. Unfortunately, the importance of each of these different phases in the farm–to–fork continuum relative to pathogen contamination is unknown. However, it is clear that water is an important source of contamination, and over the years, there has been particular interest in the role of irrigation waters in this respect. Natural sources of water for irrigation include lakes and rivers, collected rainwater, desalinated sea water, and deep aquifers or shallow groundwater. The potential for microbial contamination of these water sources varies significantly depending on a variety of factors (Suslow and others 2003).

TABLE 4.5 Survival of human pathogens in different water sources

Pathogen	Notes	Temperature (°C)	Survival	Reference
E. coli O157	Sterile municipal water	8	91 days	Wang and Doyle (1998)
	Sterile municipal water	25	49 days	Wang and Doyle (1998)
	Sterile well water	15	1 log reduction in 70 days	Artiz and Killhem (2002)
	Well water	15	65 days	Artiz and Killhem (2002)
	Sterile well water	15	10 days	Artiz and Killhem (2002)
Salmonella	Sterile municipal water	23	2 log reduction after 45 days	Santo-Domingo *et al.* (2000)
	River water	23	3 log reduction after 45 days	Santo-Domingo *et al.* (2000)
	Sterile well water	18	152 days	Mitscherlich and Marth (1984)
Campylobacter	Sterile municipal water	4	8–28 days	Terzieva and McFeters (1991)
	Sterile municipal water	37	22 h	Terzieva and McFeters (1991)
Yersinia enterocolitica	Sterile spring water	4	446 days	Karapinar and Gonul (1991)
	River water	16	6 days	Chao *et al.* (1988)
	Groundwater	30	10 days	Chao *et al.* (1988)
Rotavirus	Groundwater	15	2 log reduction in 5 days	Gerba (1999)

Sopravvivenza dei microrganismi nel letame

- Funzione dell'umidità e temperatura
  - Alto livello di umidità
    - *E.coli* 0157:H7 (70 giorni a 5°C, 49 giorni a 30°C)

6 mesi di stoccaggio passivo è sufficiente a ridurre i microrganismi sotto il livello di rilevabilità. (Hutchison et al 2005)

Sopravvivenza

Letami solidi: *Campylobacter< Listeria<Salmonella<E.coli*

Letami liquidi: *Salmonella<Listeria=E.coli<Campylobacter*

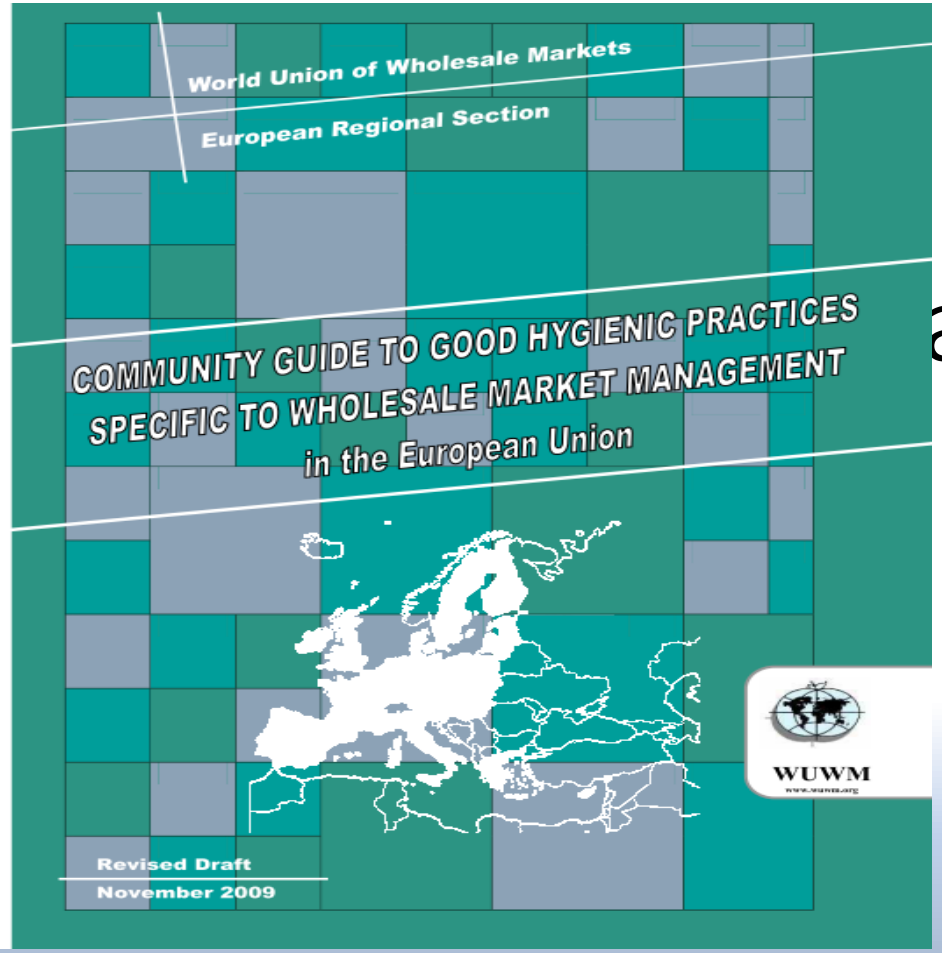
Sopravvivenza nella terra

- Habitat naturale per molti patogeni: *B.cereus, C. botulinum, C. perfringens, L. monocytogenes* e *Aeromonas*

- Dipende dal tipo di terra:
  - *E.coli*
    - Terra grassa o argillosa (25 settimane) terra sabbiosa (8 settimane)

  - *Salmonella* più resistente dell'E.coli
    - S.typhimurium ha una riduzione di 2 log a 20°C dopo 45 giorni

Nuovi pericoli e nuovi scenari epidemiologici nella sorveglianza delle Malattie Trasmesse da Alimenti



ale

Product	State	Level of sanitary Risk	Level of responsibility	
			For Wholesale Market Management	For other food businesses
Fruit & Vegetables	Fresh	Low	High	High
	Processed	High	Limited or none	High
Meat & meat products	Fresh	Very High	High	Very High
	Cutting	Very High	Limited or none	Very High
	Wrapped	High	High	High
Fish & fish products	Alive/Fresh	Very High	High	Very High
	Filleted	Very High	Limited or none	Very High
	Wrapped	High	High	High
Milk & dairy products	Fresh	High	High	Very High
	Processed	High	Limited or none	Very High
	Wrapped	High	High	High
Frozen products		Very High	Limited or none	Very High
Smoked/processed products		High	Limited or none	High

Nuovi
delle M

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Food

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Home > Food > Food Safety > Retail Food Protection

- Food Safety
- Retail Food Protection
- Industry and Regulatory Assistance and Training Resources
- Industry and Community Outreach
- Program Information Manual: Retail Food Protection Storage and Handling of Tomatoes
- Reducing Risk Factors at Retail and Food Service - Resources and Contacts
- Retail Food Protection: Employee Health and Personal Hygiene Handbook
- Retail Food Safety Program Information Manual on Date Marking of Cheese
- What is Reduced Oxygen Packaging and What are the Food Safety Concerns & Controls?

FDA Fact Sheet on Hand Hygiene in Retail & Food Service Establishments

Food Service Safety Facts

May 2003

The Food and Drug Administration (FDA) and the Centers for Disease Control and Prevention (CDC) are working together to control the transmission of pathogens that can result in foodborne illnesses. Transmission of pathogenic bacteria, viruses and parasites from raw food or from ill workers to food by way of improperly washed hands continues to be one of several major factors in the spread of foodborne illnesses.

FDA's Food Code contains the Federal recommendations for preventing foodborne illness in restaurants, grocery stores, institutions and vending locations. Local, state and federal regulators use the FDA Food Code as a model to help develop or update their own food safety rules and to be consistent with national food regulatory policy. The Food Code contains specific hand hygiene guidance for retail and food service workers describing when, where, and how to wash and sanitize hands. Hand sanitizers, meeting specific criteria described in section 2-301.16 of the Food Code, may be used **after proper hand washing** in retail and food service.

CAN ALCOHOL-BASED HAND GELS SERVE AS A SUITABLE ALTERNATIVE TO HANDWASHING FOR RETAIL and FOOD SERVICE WORKERS?

CDC recently issued "*CDC Guideline for Hand Hygiene in Healthcare Settings*" (Morbidity and Mortality Weekly Reports, October 25, 2002). The guidance document recommends alcohol-based hand gel as a suitable alternative to handwashing for health-care personnel in ***health-care settings***. These guidelines were not intended to apply to food establishments. This exclusion is based on the differences in controlling common nosocomial pathogens in health-care settings and common foodborne pathogens in retail and food service settings. Some significant differences between health-care settings and retail/ food service settings include:

CONCLUSION

Proper handwashing, as described in the Food Code continues to serve as a vital and necessary public health practice in retail and food service. Using alcohol gel in place of handwashing in retail and food service does not adequately reduce important foodborne pathogens on foodworkers' hands. Concern about the practice of using alcohol-based hand gels in place of hand washing with soap and water in a retail or food service setting can be summarized into the following points:

- Alcohols have very poor activity against bacterial spores, protozoan oocysts, and certain nonenveloped (nonlipophilic) viruses; and
- Ingredients used in alcohol-based hand gels for retail or food service must be approved food additives, and approved under the FDA monograph or as a New Drug Application (NDA); and
- Retail food and food service work involves high potential for wet hands and hands contaminated with proteinaceous material. Scientific research questions the efficacy of alcohol on moist hands and hands contaminated with proteinaceous material.

FDA and CDC continue to work together to review new data and assure the best public health measures are in place for retail and food service establishments

Al fine di ridurre la trasmissione di agenti patogeni trasmessi per aerosol l'utilizzo di carta monouso è consigliabile

Pistoi

Nuovi peri
delle Mala

Journal of Applied Microbiology

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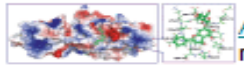

Accepted Articles (Accepted, unedited articles published online and citable. The final record will appear in future.)

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Original Articles

Evaluation of the potential for virus dispersal during hand drying: a comparison of three methods

Patrick T. Kimmitt and Keith F. Redway

Accepted manuscript online: 30 NOV 2015 09:44AM EST | DOI: 10.1111/jam.13014

Three hand drying methods were compared in this study; the use of two paper towels (Wepa Clou Comfort, Arnsberg, Germany) for 10 seconds, warm air drying (World Dryer Corporation, Berkeley, USA), model LE48 for 20 seconds and jet air drying (Dyson, Malemsbury, UK), model AB01 for 10 seconds. Drying times for the paper towel and warm air dryer were based on the mean times recorded during the observation of 292 members of the public in male and female washrooms in various London locations (Knights et al.1997). The 10-second drying time for the jet air dryer

Table 2 Counts of viral plaques on 90 mm agar plates of a bacterial lawn at a set height (0.71 m) and at different distances from hand-drying devices used to dry the hands of participants after contamination with a bacteriophage suspension. Data are presented as means with standard deviation in parentheses.

Distance from device (m)	Mean number of plaques (SD)		
	Paper towel	Warm air dryer	Jet air dryer
0.00	13.2 (8.4)	50.2 (26.1)	565.5 (427.1)
0.25	0.0 (0.0)	49.0 (31.3)	924.0 (194.6)
0.50	0.0 (0.0)	3.8 (2.3)	546.8 (428.5)
0.75	0.0 (0.0)	1.1 (1.4)	322.1 (319.4)
1.00	2.0 (2.8)	0.2 (0.4)	212.3 (224.5)
1.50	0.2 (0.4)	0.2 (0.4)	214.3 (190.8)
2.00	0.0 (0.0)	0.0 (0.0)	184.5 (215.0)
2.50	0.0 (0.0)	0.0 (0.0)	179.9 (205.1)
3.00	0.0 (0.0)	0.3 (0.6)	177.4 (243.5)
N	10	10	20
Mean total number (all distances)	15.4	103.7	3004.5

Contamination of Foods by Food Handlers: Experiments on Hepatitis A Virus Transfer to Food and Its Interruption

S. BIDAWID,[1]* J. M. FARBER,[1] AND S. A. SATTAR[2]

Health Canada, Food Directorate, Bureau of Microbial Hazards, Ottawa, Ontario, Canada K1A 0L2,[1] and Department of Biochemistry, Microbiology and Immunology, Faculty of Medicine, University of Ottawa, Ottawa, Ontario, Canada[2]

Received 16 November 1999/Accepted 10 April 2000

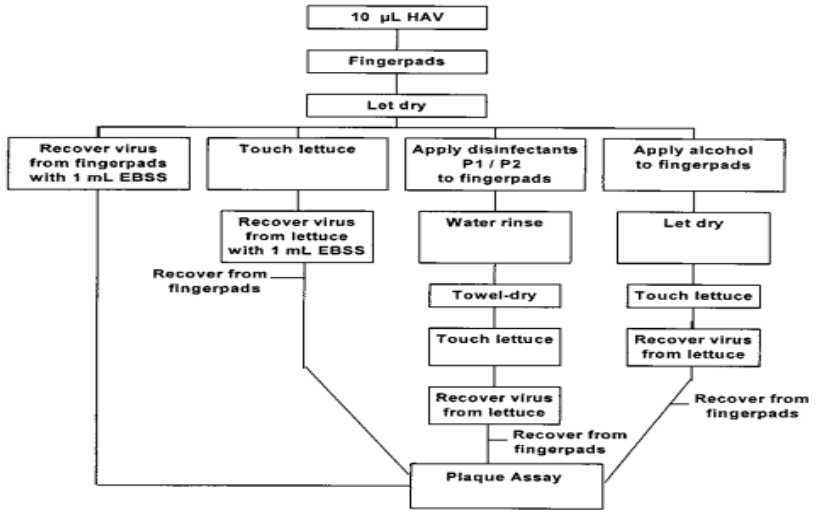


FIG. 1. Schematic illustration of the procedure used to determine the rates of HAV transfer from contaminated fingerpads of human volunteers to lettuce. Ten-microliter portions of HAV were inoculated onto demarcated areas on fingerpads of volunteers. After air drying, the contaminated fingerpads, before and after treatment with topical agents, were pressed gently on lettuce. The virus was then recovered from the fingerpads and the lettuce and plaque assayed in order to determine rates of virus transfer. P1 and P2 are topical disinfectants. The amount of virus remaining on the fingerpads was determined after the lettuce was touched.

TABLE 1. Recovery of HAV from contaminated fingerpads of human volunteers and rates of transfer to lettuce after contact with fingerpads

Surface[a]	Drying	Disinfection procedure[b]	Lettuce touched	% Virus recovery (mean ± SE) from:	
				Fingers	Lettuce
Finger	−	None	−	77.5 ± 6.9	
Lettuce	−	None	−		88.5 ± 3.7
Finger	+	None	−	70.5 ± 3.5	
Lettuce	+	None	−		75.8 ± 3.1
Finger	+	Water, towel	−	3.7 ± 0.6	
	+	None	+	53.4 ± 4.9	7.0 ± 0.6 (9.2 ± 0.9)[c]
	+	Water (15 ml), towel	+	6.2 ± 0.7	0
	+	Water (1 ml), towel	+	5.9 ± 0.8	0.23 ± 0.05 (0.31 ± 0.07)
	+	P1, water, towel	−	6.5 ± 1.2	
	+	P1, water, towel	+	2.0 ± 0.4	0.30 ± 0.06 (0.39 ± 0.08)
	+	P2, water, towel	−	4.1 ± 0.8	
	+	P2, water, towel	+	5.2 ± 0.8	0.26 ± 0.05 (0.34 ± 0.7)
	+	62% ethanol (gel), dry	−	64.3 ± 4.0	
	+	62% ethanol (gel), dry	+	45.7 ± 5.0	0.49 ± 0.07 (0.64 ± 0.09)
	+	75% ethanol, dry	−	24.1 ± 2.8	
	+	75% ethanol, dry	+	18.8 ± 3.5	0.35 ± 0.06 (0.46 ± 0.08)

[a] A 10-µl inoculum contained 1.29×10^5 PFU of HAV.
[b] P1 and P2 are topical disinfection agents (see text).
[c] The numbers in parentheses are mean percentages of HAV transferred from fingers to lettuce ± standard errors.

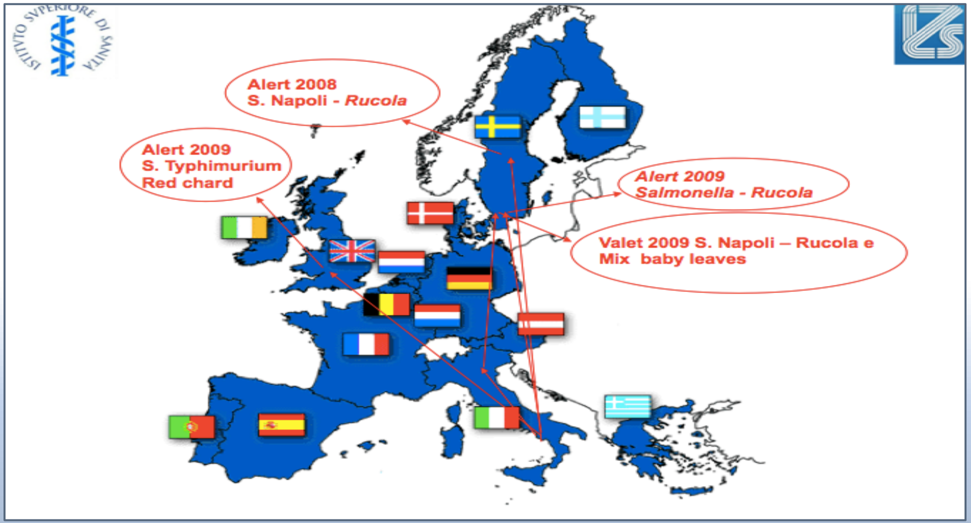
Salmonella Napoli in rucola prodotta nella Piana del Sele

S.Napoli in Italia e in Europa

Tabella 3. Distribuzione dei primi 10 sierotipi di *Salmonella* non tifoidea isolati dall'uomo nel 2010.

Sierotipo	N. ceppi	%	% in EU
TYPHIMURIUM	1955	38,7	22
4,5,12:i:-	997	19,7	1,5
ENTERITIDIS	577	11,4	45
DERBY	182	3,6	0,7
NAPOLI	181	3,6	
MUENCHEN	107	2,1	
INFANTIS	75	1,5	1,8
RISSEN	55	1,1	
NEWPORT	54	1,1	0,9
HADAR/PANAMA	49	1,0	
altri	771	15,3	
ND	358	6,61	
Totale	5410		

ENTER-NET Italia



ANTIBIOTIC-RESISTANCE

Salmonella Napoli isolata nella Piana del Sele insolitamente sensibile agli antibiotoci

	SXT	SUL	NAL	ENX	CIP	CT	AMP	CF	CEF	TET	GEN	KAN	CAZ	STR	CLO	AMC
Salmonella Napoli	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	S	S	S	S	S	S	R	S	S	S	S	S	S	S	R	S
	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	S	S	S	S	S	S	S	S	S	S	S	S	S	R	S	S

Dati gentilmente autorizzati per questa presentazione da IZSMe (Dr. F. Capuano)

Animali Selvaggi?

Contaminazioni delle acque di irrigazione da parte di animali selvatici

Uno studio pilota sugli uccelli è stato effettuato nel 2012 nell'ambito di un progetto del Min. della Salute per individuare eventuali potenziali serbatoi selvatici di contaminazione delle acque superficiali

Salmonella spp. è stata isolata in 3 su 56 uccelli catturai (5.3%).

- S. Typhimurium in 1 airone
- S. Livingstone in 1 capinera,
- S. Napoli in 1 usignolo di fiume.

Ann Ist Super Sanità 2014 | Vol. 50, No. 1: 96-98
DOI: 10.4415/ANN_14_01_14

First isolation of *Salmonella enterica* serovar Napoli from wild birds in Italy

Laura Mancini[a], Stefania Marcheggiani[a], Annamaria D'Angelo[a], Camilla Puccinelli[a], Filippo Chiudioni[a], Flavia Rossi[b], Elisabetta Delibato[c], Dario De Medici[c], Anna Maria Dionisi[d], Slawomir Owczarek[d] and Ida Luzzi[d]

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[c] Dipartimento di Sanità Pubblica Veterinaria e Sicurezza Alimentare, Istituto Superiore di Sanità, Rome, Italy
[d] Dipartimento di Malattie Infettive, Parassitarie ed Immunomediate, Istituto Superiore di Sanità, Rome, Italy

Nuovi pericoli e nuovi scenari epidemiologici nella sorveglianza delle Malattie Trasmesse da Alimenti

Table 1
Summary of microbiological results (n. positive samples) obtained, for fresh leafy (A) and Ready to Eat (B) vegetables, by various laboratories, using RT-PCRs and reference culturing ISO methods, in Italy. The reference culturing ISO methods were applied to RT-PCR positive samples for *Salmonella* spp., *L. monocytogenes* and thermotolerant *Campylobacter*. For *Y. enterocolitica* and *E. coli*, reference ISO methods were used in parallel to non validated RT-PCRs for all samples.

A		Validated methods*						Non validated methods**				
		Salmonella spp.		*Listeria monocytogenes*		Thermotolerant *Campylobacter*		*Yersinia enterocolitica*		*E. coli*	VTEC	Noro viruses
Lab.	FL	PCR	ISO	PCR	ISO	PCR	ISO	PCR[a]	ISO	PCR[b]	ISO	PCR
1	193	0	0	**1**	0	0	0	0	**8**[f]	0	0	0
2	141	0	0	0	0	**7**	**4**	0	0	0	0	**1**
3	145	0	0	0	0	0	0	0	0	0	0	0
4	146	**6**	**1**	**2**	0	0	0	0	0	0	0	0
5	117	0	0	**1**	**1**	0	0	0	0	0	0	0
6	60	0	0	0	0	0	0	0	0	0	0	0
7	171	**4**	**1**[c]	**3**	0	**4**	0	0	0	0	0	0
8	210	0	0	**6**	**4**	0	0	0	0	0	0	0
9	189	**2**	**2**[d]	**4**	**2**	**1**	0	0	0	0	0	0
Total	1372	**12**	**4**	**17**	**7**	**12**	**4**	**0**	**8**	**0**	**0**	**1**
	3.7%	0.9%	***n.a	1.2%	***n.a	0.9%	***n.a	0%	0.6%	0%	0%	0.1%

B		Validated methods*						Non validated methods**				
		Salmonella spp.		*Listeria monocytogenes*		Thermotolerant *Campylobacter*		*Yersinia enterocolitica*		*E. coli*	VTEC	Noro virus
Lab.	RTE	PCR	ISO	PCR	ISO	PCR	ISO	PCR[a]	ISO	PCR[b]	ISO	PCR
1	206	0	0	0	0	0	0	0	**2**[f]	0	0	0
2	161	**1**	0	0	0	**2**	**0**	0	**2**[g]	0	**3**[e]	0
3	155	0	0	0	0	0	0	0	0	0	0	0
4	160	**3**	0	0	0	**2**	0	0	0	0	0	0
5	110	0	0	0	0	0	0	0	0	0	0	0
6	58	0	0	0	0	**1**	0	0	0	0	0	0
7	98	**2**	0	**3**	**1**	**1**	0	0	0	0	0	0
8	108	0	0	**1**	**1**	0	0	0	0	0	0	0
9	104	0	0	0	0	0	0	0	0	0	0	0
Total	1160	**6**	**0**	**4**	**2**	**6**	**0**	**0**	**4**	**0**	**3**	**0**
	1.8%	0.5%	***n.a.	0.3%	***n.a.	0.5%	***n.a.	0%	0.3%	0%	0.2%	0%

Lab 1: Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia Romagna; Lab 2: Istituto Zooprofilattico Sperimentale del Lazio e della Toscana; Lab 3: Istituto Zooprofilattico Sperimentale del Mezzogiorno; Lab 4: Istituto Zooprofilattico Sperimentale del Piemonte, Liguria e Valle d'Aosta; Lab 5: Istituto Zooprofilattico Sperimentale della Puglia e della Basilicata; Lab 6: Istituto Zooprofilattico Sperimentale della Sardegna; Lab 7: Istituto Zooprofilattico Sperimentale della Sicilia; Lab 8: Istituto Zooprofilattico Sperimentale delle Venezie; Lab 9: Istituto Zooprofilattico Sperimentale dell'Umbria e delle Marche

Freschi (I gamma)

Pronti per il consumo (IV gamma)

CONTAMINAZIONE DI FRUTTA E VERDURA

MICRO-ORGANISMI

SUPERFICIALE

INTERNALIZZAZIONE

EFFETTO DEL LAVAGGIO E DEL TRATTAMENTO CON SANITIZZANTI

Microrganismi patogeni sulla superficie

- **Rischi minori:**
  se il frutto o l'ortaggio in questione deve essere sbucciato o pelato prima del consumo.
  Bisogna comunque tener presente che il processo di rimozione della superficie esterna può comportare una contaminazione della parte edibile.

- **Rischi maggiori:**
  I microrganismi che si trovano intrappolati nelle foglie più interne dei vegetali vengono rimossi molto difficilmente con le usuali tecniche di lavaggio

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Report: Largest Outbreak in German History Caused by Imported Strawberries

BY NEWS DESK | FEBRUARY 28, 2014

The largest recorded foodborne illness outbreak in German history was caused by frozen strawberries imported from China, according to a study published in the February issue of Eurosurveillance.

At least 11,000 cases of norovirus were reported by 390 institutions – mostly schools and childcare facilities – between Sept. 19 and Oct. 7, 2012.

Epidemiologists were able to quickly identify dishes containing strawberries prepared in regional kitchens of a single catering company as the source of most of the illnesses. They also further traced the strawberries to one 22-ton lot imported frozen from China.

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Outbreak of norovirus in Germany 'over'

By Joe Whitworth, 10-Oct-2012
Last updated on 10-Oct-2012 at 13:50 GMT

Related tags: RKI, BVL, Foodborne, Norovirus, Strawberry, China, BfR

German food safety chiefs have said that a norovirus outbreak that sickened more than 11,000 people is over.

Deep-frozen strawberries, imported from China, have been identified as the cause of the foodborne outbreak which reached its peak between 25-27 September and reportedly led to more than 30 people being hospitalised.

LA STAMPA SALUTE

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Epatite A e frutti di bosco surgelati: quasi 1.500 casi in Europa

Dal rapporto finale dell'EFSA, l'Autorità Europea per la Sicurezza Alimentare, emerge che l'ultimo focolaio di epatite A provocata dai frutti di bosco congelati ha cagionato 1.444 casi nei dodici Paesi europei, con l'Italia in testa con il suo 90 per cento di casi segnalati

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Alimentazione
- Dimagrire
- Vino
- Acqua
- Sicurezza alimentare
- Prodotti alimentari
- Caffè

ATTENZIONE A

Epatite A e frutti di bosco: 1.300 i casi in Italia

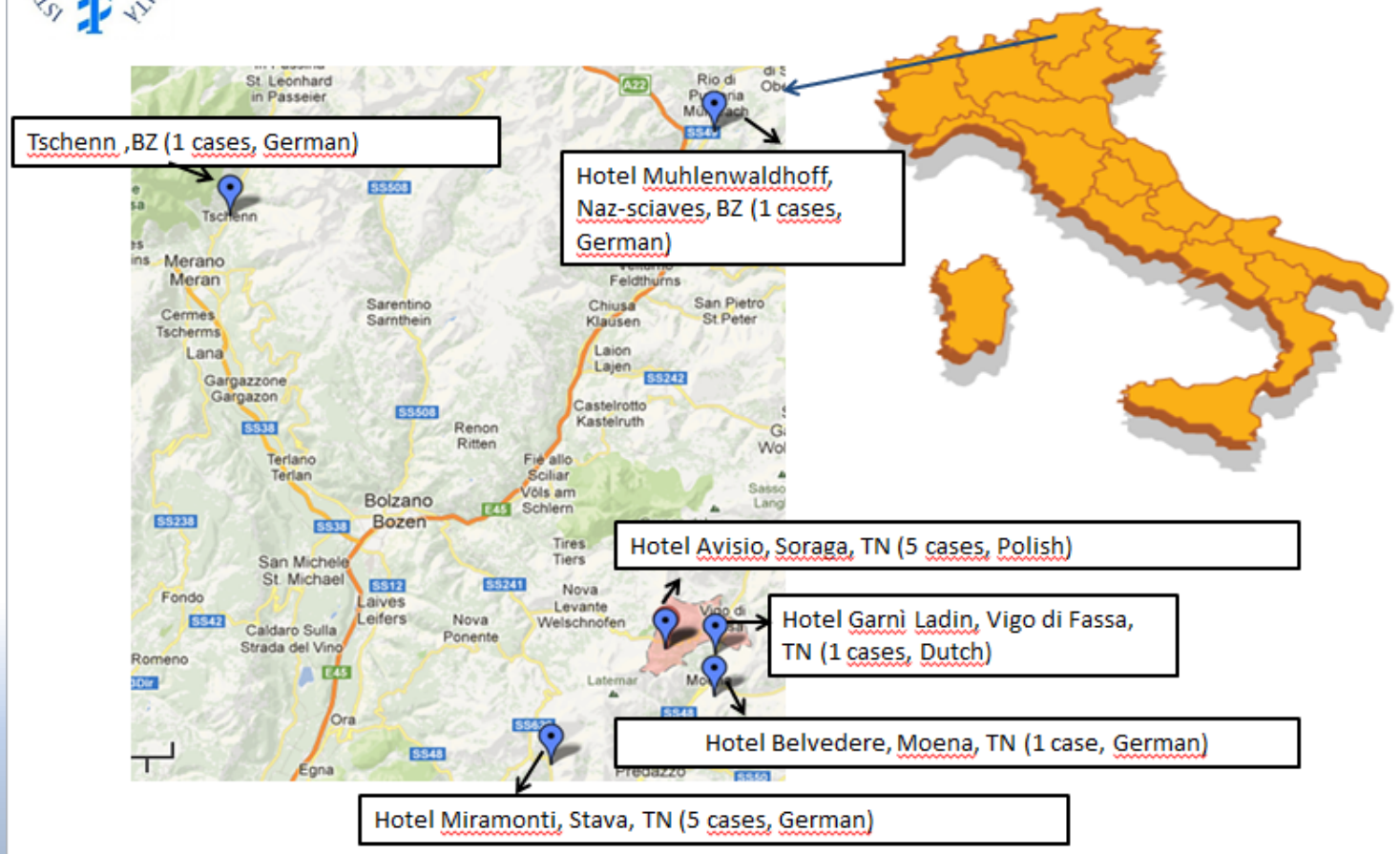
18 settembre 2014

Frutti di bosco surgelati ancora nel mirino per il virus dell'epatite A: sono 1.300 i casi in Italia e l'emergenza non è ancora rientrata. Continuano i controlli del Ministero della Salute che consiglia di consumare questo prodotto sempre dopo una bollitura di almeno due minuti. Ecco la lista dei prodotti ritirati.

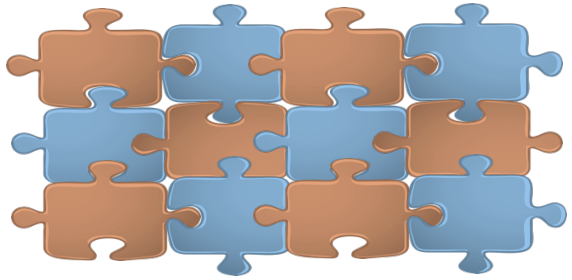
Nuovi pericoli e nuovi scenari epidemiologici nella sorveglianza delle Malattie Trasmesse da Alimenti

ISTITUTO SUPERIORE DI SANITÀ

Time 0: Alerts from EPIS-FWD and EWRS



A MULTIDISCIPLINARY TASK FORCE FOR THE NATIONAL INVESTIGATION OF HAV OUTBREAK



Ministero della Salute

Dipartimento della Sanità Pubblica e dell'Innovazione
Direzione Generale della Prevenzione
Ufficio V – Malattie Infettive e Profilassi Internazionale ex DG PREV
Dipartimento Sanità Pubblica Veterinaria della Sicurezza degli alimenti e degli Organi Collegiali
Direzione Generale dell'Igiene e della Sicurezza degli Alimenti e Nutrizione
Ufficio VIII – Piano Nazionale Integrato ed Allerta Alimenti

On 23 May 2013, the MoH designated a **multidisciplinary task force** to coordinate at national level the investigation of the 2013 HAV outbreak in Italy

THE TASK FORCE MEMBERS:

- public health and veterinary epidemiologists,
- virologists and food safety microbiologists
- national RASFFcontact point
- experts in trace-back activities

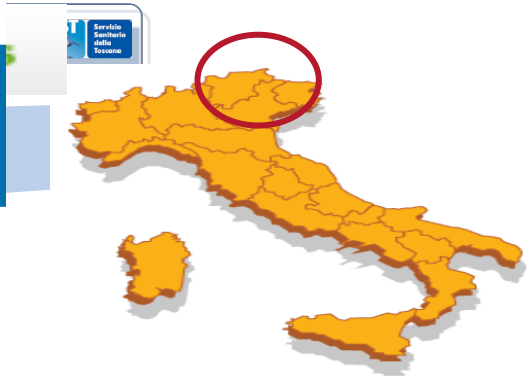
AIMS:

- Epidemiological investigation on human cases
- Microbiological testing of food specimens
- Genotyping of viruses isolated in human and food specimens
- Traceability of suspected lots or brands of potential vehicles in all cases

RAPID COMMUNICATIONS

Ongoing outbreak of hepatitis A in Italy: preliminary report as of 31 May 2013

C Rizzo (caterina.rizzo@iss.it)[1], V Alfonsi[1], R Bruni[2], L Busani[3], A R Ciccaglione[2], D De Medici[3], S Di Pasquale[3], M Equestre[2], M Escher, M C Montaño-Remacha[1,4], G Scavia[3], S Taffon[2], V Carraro[5], S Franchini[5], B Natter[6], M Augschiller[6], M E Tosti[1], the Central Task Force on Hepatitis A[7]



Serum samples were collected during the acute phase of the disease from five of the 38 cases, all from the Trento province. The sequence of the VP1/2A region of the HAV 1A virus obtained from all of them (with GenBank accession number KF182323) showed a 100% nucleotides homology with sequences of the isolates from the German and Dutch cases.

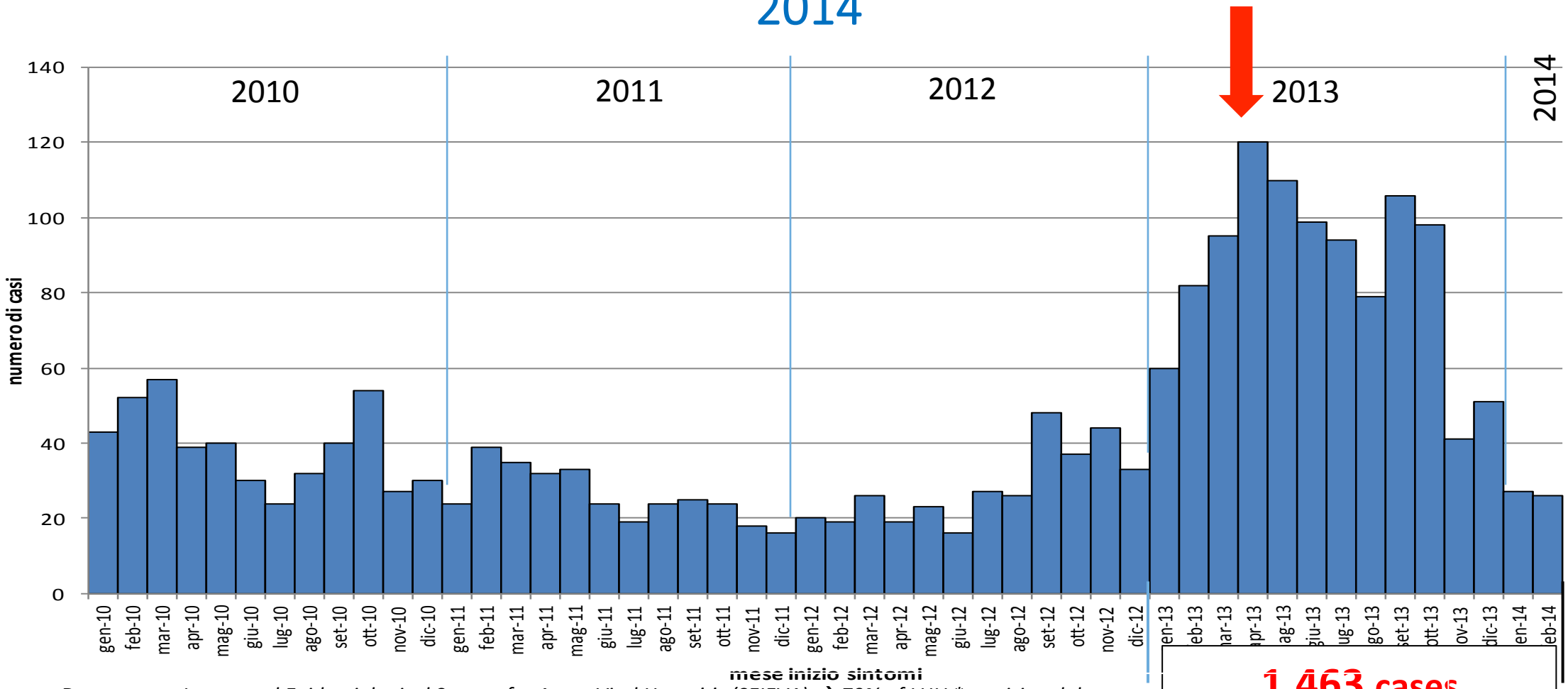
Part of the mixed berries (redcurrant, blackberries, raspberries, blueberries) that the cases indicated to have eaten within the period of time compatible with the onset of clinical symptoms were still available and were sampled. The analysis for HAV detection in the sample of mixed berries provided positive results. As a consequence, on 17 May, the Italian Ministry of Health (which is the food safety authority at national level) communicated these findings through the European Rapid Alert System for Food and Feed (RASFF). Following these

Outbreak HAV strain:

genotype 1A

GenBank accession number KF182323

Distribution of HAV cases by month of onset, Italy 1 Jan 2010- Feb 2014

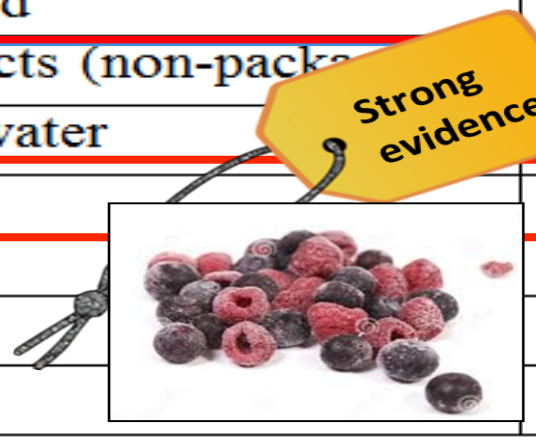


*Data source: Integrated Epidemiological System for Acute Viral Hepatitis (SEIEVA) → 70% of LHU *provisional data*

1,463 cases

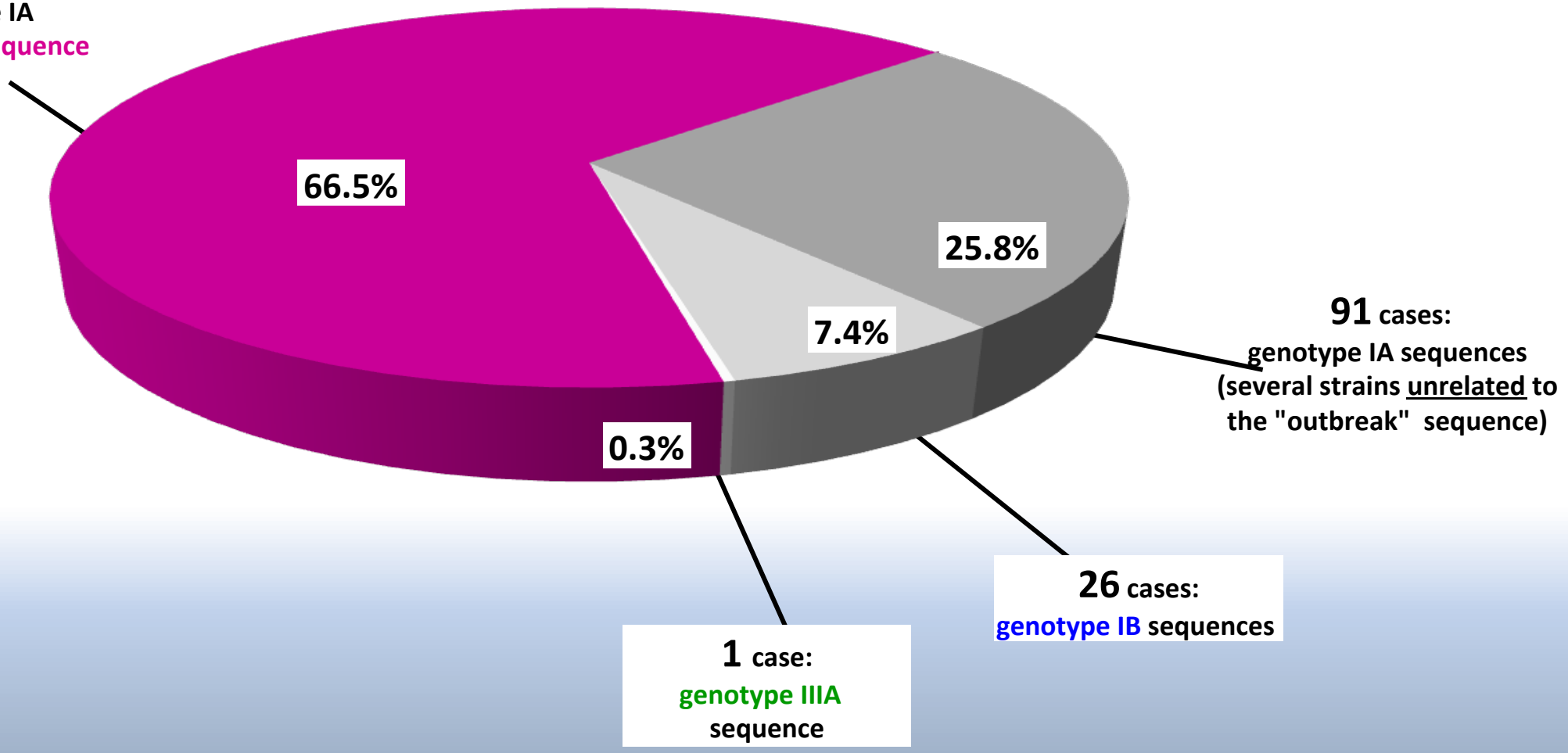
Results

Risk Factor	Odds Ratio crude (CI 95%)	Odds Ratio adjusted (CI 95%)
Vegetables		
Fennel	1.03 (0.66 - 1.62)	
Fresh salad	1.02 (0.57 - 1.73)	
Bag salad	0.93 (0.59 - 1.45)	
Radishes	0.77 (0.44 - 1.34)	
Carrots	0.70 (0.43 - 1.12)	
Celery	1.29 (0.80 - 2.07)	
Raw seafood	4.65 (2.70 - 8.00)	3.83 (2.16 - 6.79)
Milk products (non-packa	0.62 (0.37 - 1.02)	
Untreated water	.77 (0.39 - 1.50)	
Berries	4.42 (2.70 - 7.27)	4.22 (2.54 - 7.02)
Travel	2.34 (1.45 - 3.77)	1.98 (1.15 - 3.40)
Age	1.02 (0.93 - 1.13)	
Sex	0.83 (0.55 - 1.26)	



Nuovi pericoli e nuovi scenari epidemiologici nella sorveglianza delle Malattie Trasmesse da Alimenti

Genotype distribution of available sequences from Italian cases (n = 352)



Food samples

- 1310 samples of soft fruits were examined for HAV, including :

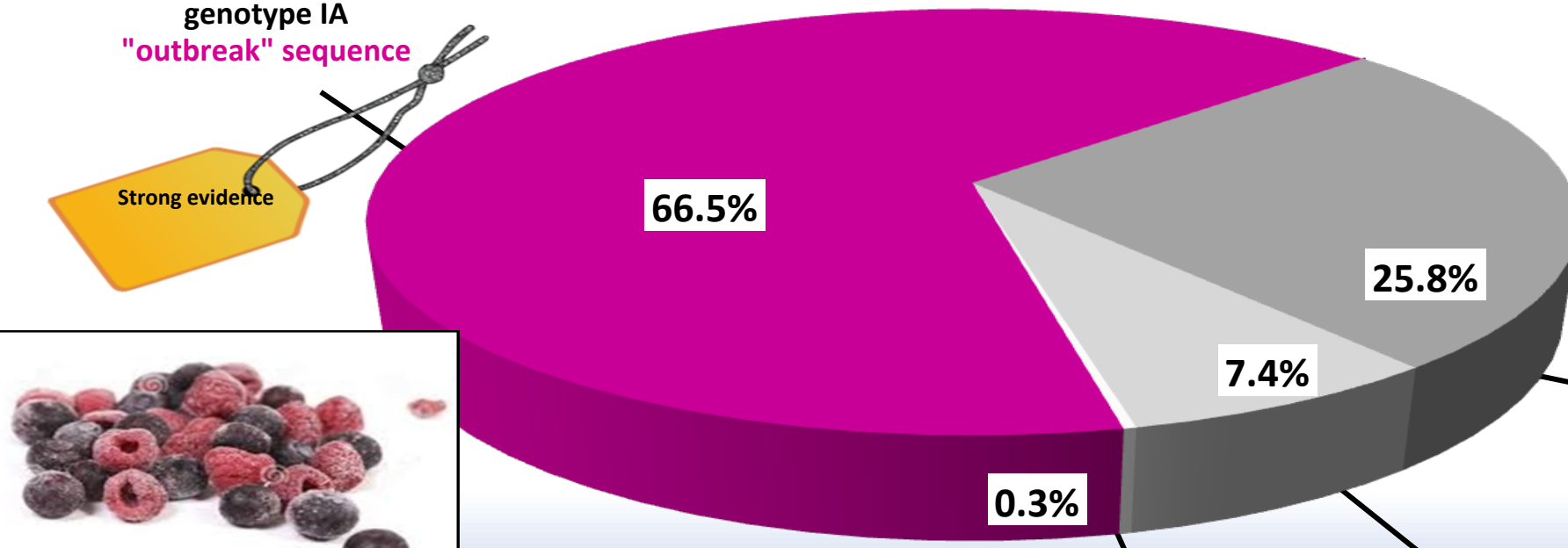
Type of frozen berry	Reason for sampling	
	Official control	HACCP/other reasons
Mixed berries	251	683
Strawberry	5	74
Raspberry	30	113
Bilberry/blueberry	17	38
Cranberry	1	9
Redcurrant	14	68
Blackberry	2	3
Other	2	
Total samples tested	**322**	**988**

- **15 lots positive for HAV**
- **45** suspected lots (epidemiologicamente correlati a casi epidemici)
- 11 different manufacturing companies mostly Italian
- recalls of the all the confirmed lots were done on the market

Genotype distribution of available sequences from Italian cases (n = 352)

234 cases:
genotype IA
"outbreak" sequence

Strong evidence



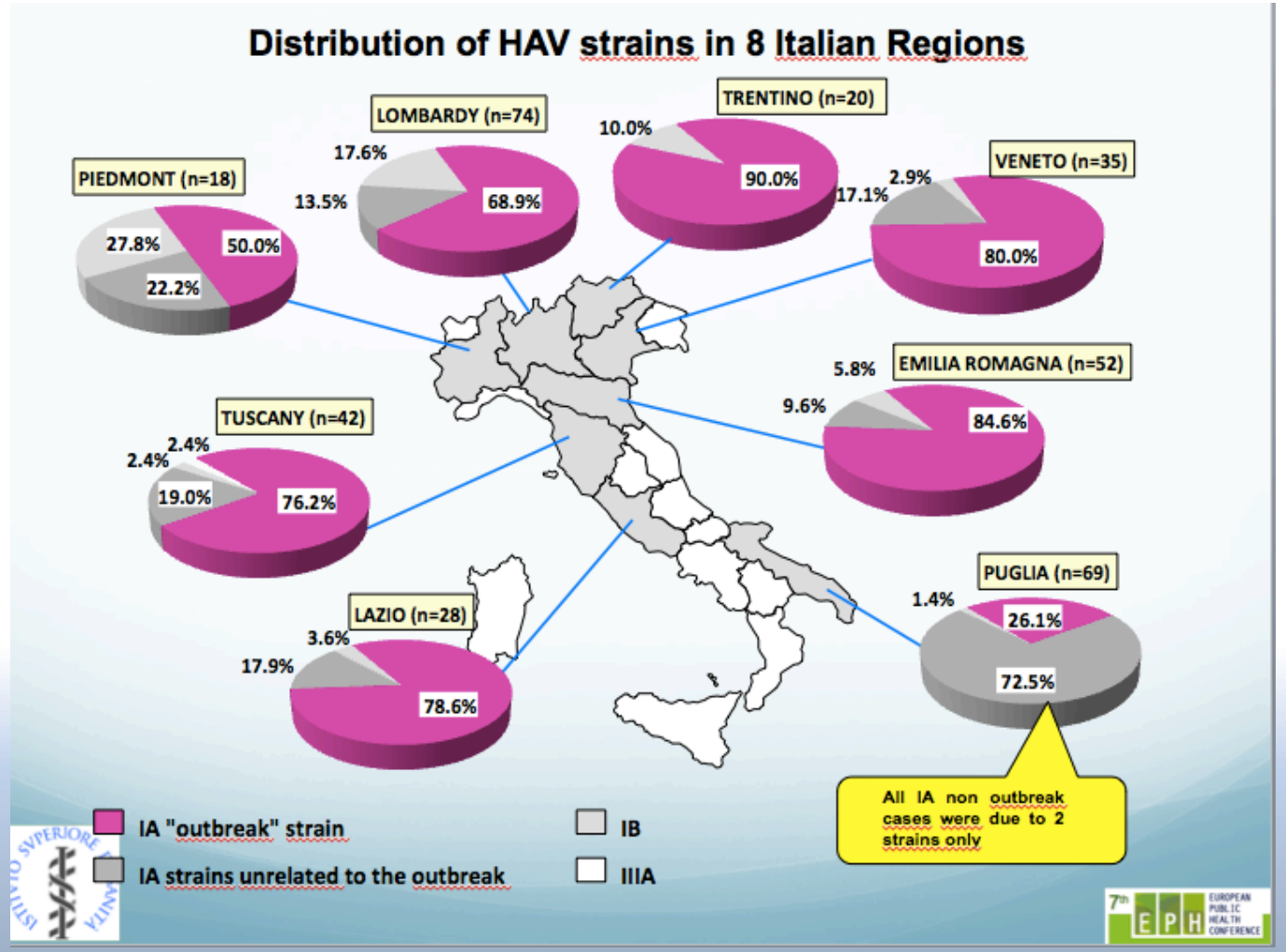
91 cases:
genotype IA sequences
(several strains unrelated to the "outbreak" sequence)

26 cases:
genotype IB sequences

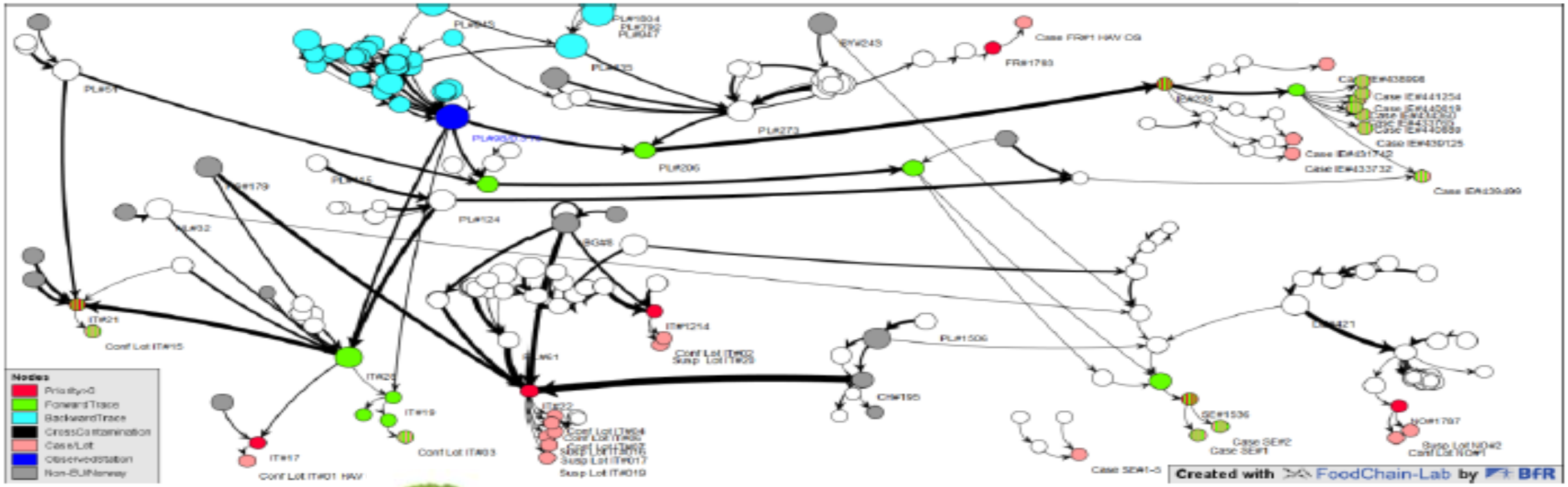
1 case:
genotype IIIA

1 frozen berry mix
outbreak sequence
(100% nt identity region VP1/2A) genotype IA

Nuovi pericoli e nuovi scenari epidemiologici nella sorveglianza delle Malattie Trasmesse da Alimenti



Origin of berries involved in the starting points



Hot-spot:

Poland (100% of the italian lots containing red currants)

Bulgaria (50% of the italian lots)

Data source: European Food Safety Authority, 2014. Tracing of food items in connection to the multinational hepatitis A virus outbreak in Europe. EFSA Journal 2014;12(9):3821, 186 pp. doi:10.2903/j.efsa.2014.3821

ISO Method for detecting viruses in Food

Action Taken

- Recall of the confirmed lots and advice to the population regarding the use of the leftover frozen mixed berries (e.g. advice in supermarket and shops)
- Guidelines for HACCP procedures for HAV testing in frozen berries at the processing level including sampling procedures
- Risk communication to the population through MoH and ISS website (leaflet, press releases, stakeholder - National Chef Association) concerning the consumption of frozen berries (i.e. cook frozen berries for 3' min).

RASFF Portal

Notification details - 2015.1419

norovirus (genogroup II) in frozen blueberries from France, with raw material from Ukraine

Reference:	2015.1419	Notification type:	food - alert - official control on the market
Notification date:	11/11/2015	Action taken:	recall from consumers
Last update:	20/11/2015	Distribution status:	distribution to other member countries
Notification from:	France (FR)	Product:	frozen blueberries
Classification	alert	Product category:	fruits and vegetables
Risk decision	serious	Published in RASFF Consumers' Portal	is published now

Follow-up :

Reference	Follow-up from	Date	Follow-up type	Info
fup1	Cyprus	20/11/2015	measures taken	

Hazards

Substance / Hazard	Category	Analytical result	Units	Sampling date
norovirus	pathogenic micro-organisms	genogroup II		07/10/2015

Countries/organisations concerned (D = distribution, O = origin)

Belgium (D) Cyprus (D) France (D/O) INFOSAN Luxembourg (D) Ukraine (O)

Pistoia 15-16 Dicembre 2015

Azienda USL 3 Pistoia
Servizio Sanitario della Toscana

CERERE Centro di Riferimento Regionale per la Formazione in Sanità Pubblica Veterinaria e Sicurezza Alimentare

CENTRO DI RIFERIMENTO REGIONALE SULLE TOSSINFEZIONI ALIMENTARI
Ce.R.R.T.A.

Nuovi pericoli e nuovi scenari epidemiologici nella sorveglianza delle Malattie Trasmesse da Alimenti

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Second brand of frozen mixed berries recalled, five hepatitis A cases linked to product confirmed

Updated 15 Feb 2015, 9:48am

A second brand of frozen mixed berries has been withdrawn from supermarket shelves across the country, as five cases of hepatitis A linked to the product are confirmed in New South Wales and Victoria.

One-kilogram bags of Nanna's frozen mixed berries were recalled on Saturday as a result of the health scare.

The recall has now been extended to Creative Gourmet mixed berries in 300 gram and 500 gram packets.

Health officials have confirmed three cases of hepatitis A linked to the product in Victoria and two in New South Wales.

Consumers have also been told not to eat fruit from the Nanna's one-kilogram packets with best

PHOTO: Nanna's mixed berries have been withdrawn Australia-wide over links to Hepatitis A. (ABC: Mark Doman)

RELATED STORY: Frozen mixed berries recalled over 'hepatitis A link'

MAP: NSW

Australian Government
Department of Health

Search the website

Home / For Consumers / Conditions and Diseases / Communicable Diseases Information /

Factsheet for Patients and Consumers - Hepatitis A and frozen berry products recall.

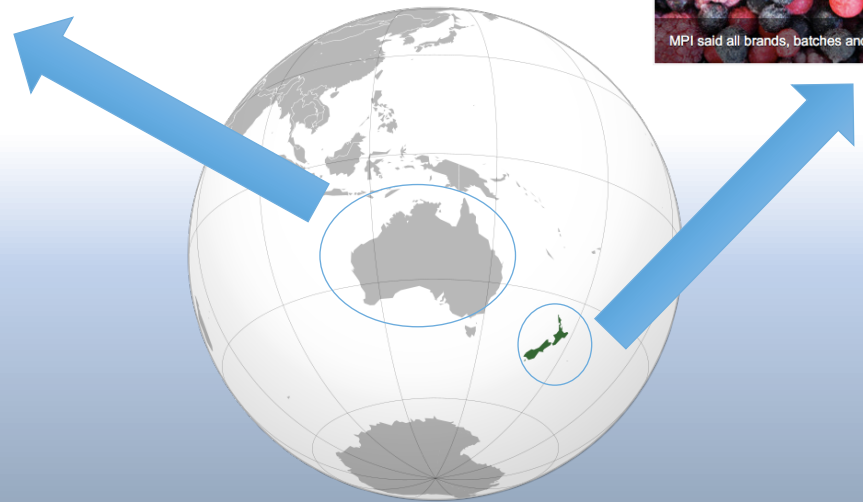
This factsheet provides information about Hepatitis A, the frozen berry products recall, and what to do if you become unwell.

Page last updated: 12 March 2015

What products have been recalled?

- Nanna's Mixed Berries (frozen) 1kg pack, with a best before date up to and including 22/11/16 have been recalled.

The product is packed in China, containing raspberries, strawberries and blackberries grown there. The blueberries in the product were initially thought to have come from Chile, however, Health is now advised that they were sourced from Canada.



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UPDATED WITH MPI RESPONSE

New Zealand Hepatitis A cases linked to frozen berries

By Joe Whitworth+
30-Nov-2015
Last updated on 01-Dec-2015 at 11:56 GMT

Post a comment


MPI said all brands, batches and sizes are subject to the risk. Picture: Istock

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Fruzio frozen berries recalled in Hepatitis A investigation

By Joe Whitworth+
07-Dec-2015

Post a comment

Fruzio Mixed Berry products recalled

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CERERE Centro di Riferimento Regionale per la Formazione in Sanità Pubblica Veterinaria e Sicurezza Alimentare

CENTRO DI RIFERIMENTO REGIONALE SULLE TOSSINFEZIONI ALIMENTARI
Ce.R.R.T.A.

Nuovi pericoli e nuovi scenari epidemio delle Malattie Trasmesse da Alimenti

House of Representatives

Primary Industries, Ministry—Food Safety, Advice

10. Hon DAMIEN O'CONNOR (Labour—West Coast - Tasman) to the **Minister for Food Safety**: Is she satisfied by all the advice she has received from the Ministry of Primary Industries on food safety?

Hon Damien O'Connor: Why did the Minister not act and ask retailers to remove products that are possibly contaminated, as happened in Australia 9 months ago?

Hon JO GOODHEW: The answer to this question may be a little longer than normal, but I want to make it clear to the House exactly what the complete answer to the member's question is. In Australia, some 9 months ago, there were 31 cases of hepatitis A. As is always the case when looking for evidence of where the disease may have been contracted, genotyping exists. In all 31 cases in Australia, the genotyping was the same and was able to be traced to a single product, which was able to be recalled. Here in New Zealand, three of the four cases have had the genotyping completed. The fourth is still under way. For the three cases that we have genotyping for, we know that they are from the same source —the fourth, maybe not; but maybe it is. What we know is that it is a different source to the Australian cases—[Interruption] I am giving a straight-up answer; it would pay the members to listen. [Interruption]

Nuc
dell

APPLIED AND ENVIRONMENTAL MICROBIOLOGY, Nov. 2000, p. 4679–4687
0099-2240/00/$04.00+0

Vol. 66, No. 11

Attachment of *Escherichia coli* O157:H7 to the Surfaces and Internal Structures of Apples as Detected by Confocal Scanning Laser Microscopy

SCOTT L. BURNETT, JINRU CHEN, AND LARRY R. BEUCHAT*
Center for Food Safety and Quality Enhancement, Department of Food Science and Technology, University of Georgia, Griffin, Georgia 30223-1797

Received 11 May 2000/Accepted 23 August 2000

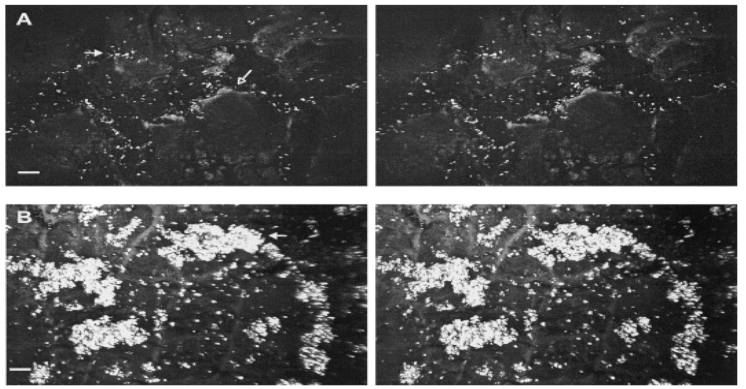
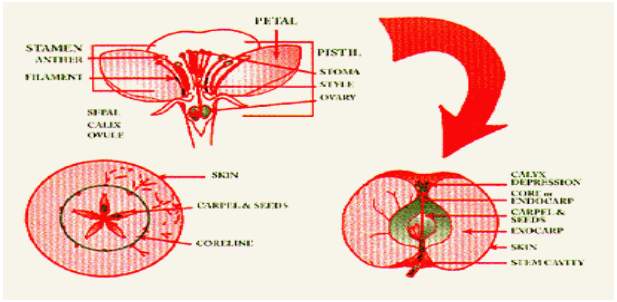


FIG. 2. CSLM stereo images showing attachment of *E. coli* O157:H7 on intact apple surface. (A) Cleft (16-μm depth) in the waxy cuticle (open arrow); most cells are attached within the cleft (closed arrow). (B) Clusters of cells (arrow) on intact cuticle 34 μm in height. Cells were inoculated under a negative temperature differential. Bar, 10 μm.



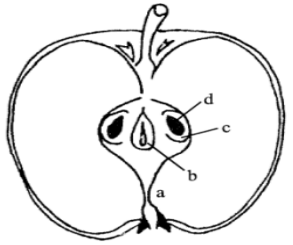


FIG. 1. Longitudinal cross section of a Red Delicious apple showing the floral tube (a), ventral cavity (b), seed locules (c), and seeds (d).

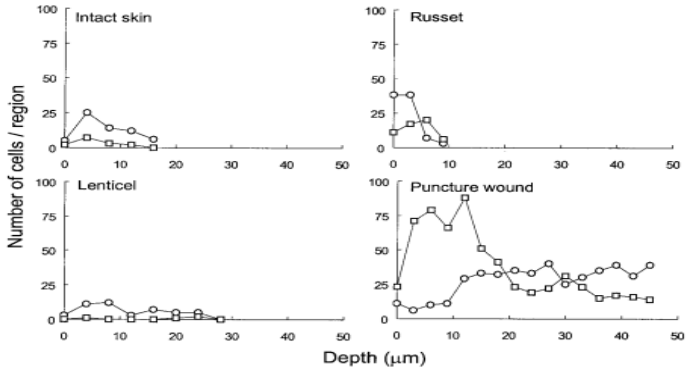
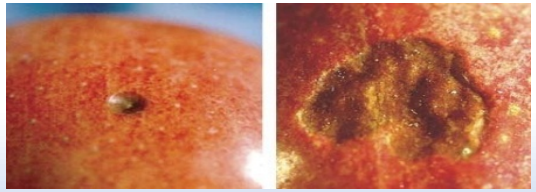


FIG. 3. Infiltration of fluorescent *E. coli* O157:H7 into external surface structure of apples as affected by negative (○) or positive (□) temperature differentials. The number of cells at various depths below the surface was determined by image thresholding and particle analysis in selected regions (213,000 μm²) of CSLM stacks.



Lenticelle

Internalizzazione dei patogeni attraverso gli stomi

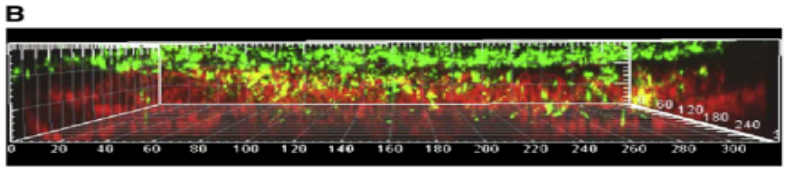


Immagine cofocale a tre dimensioni della foglia di rucola

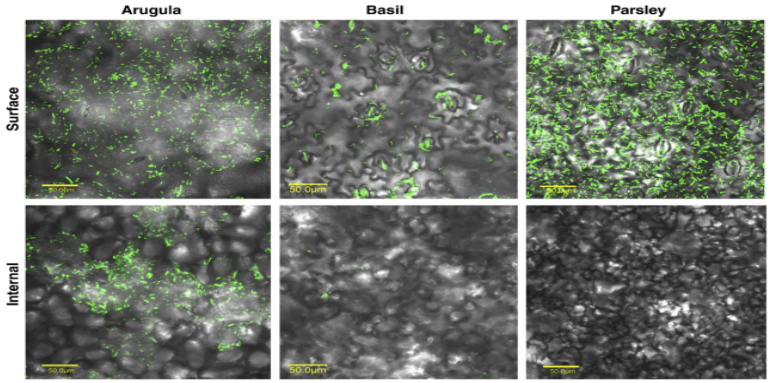
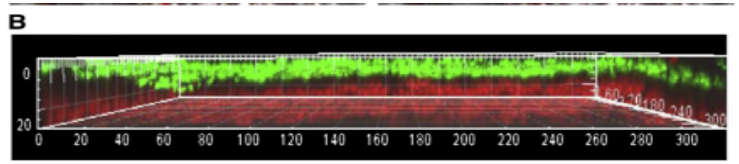


Fig. 2. Confocal microscopy images showing GFP-tagged bacteria residing on leaf surface and in internal leaf tissue following internalization assay. Internal leaf tissue images are composed of a stack of fluorescent images taken every 1.2 μm to a depth of 100 μm along a z section of the same field. All images were overlaid with differential interference contrast (DIC) images taken from the same location in each leaf. Bar denotes 50 μm.



wing depth distribution of *Salmonella* cells in parsley leaf following internalization assay. (A) GFP-labeled bacteria are ot

Immagine cofocale a tre dimensioni della foglia di basilico

D. Golberg et al. / International Journal of Food Microbiology 145 (2011) 250–257

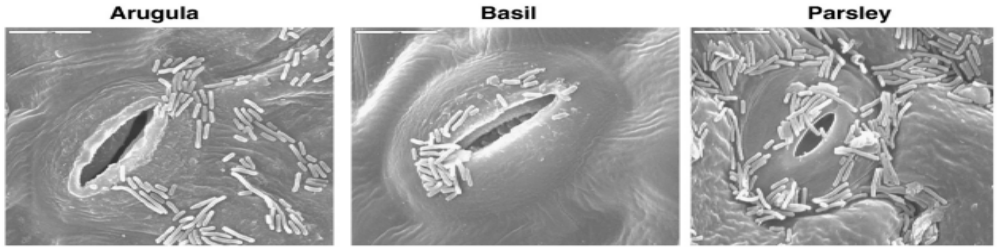
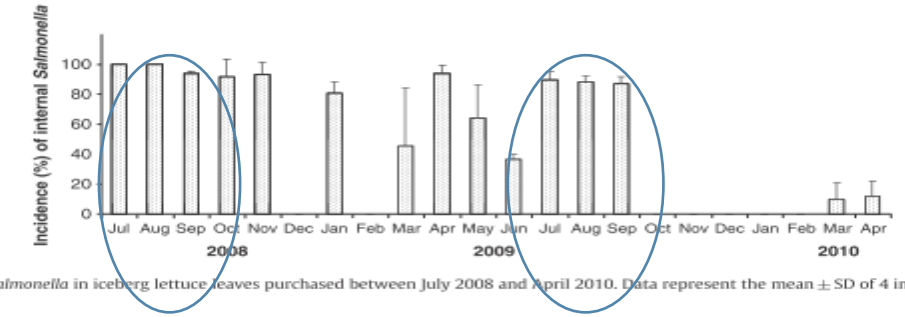


Fig. 5. Scanning electron microscopy images showing the topography of a single stomate region in the different leaves with multiple bacteria (apparently *Salmonella*) located ar
Bar denotes 10 μm.



Incidence of internal *Salmonella* in iceberg lettuce leaves purchased between July 2008 and April 2010. Data represent the mean ± SD of 4 independent experiments each in
ate.

Giugno- Settembre

Nuovi
delle N

APPLIED AND ENVIRONMENTAL MICROBIOLOGY, Oct. 2009, p. 6076–6086 Vol. 75, No. 19
0099-2240/09/$08.00+0 doi:10.1128/AEM.01084-09

Internalization of *Salmonella enterica* in Leaves Is Induced by Light and Involves Chemotaxis and Penetration through Open Stomata▽†

Yulia Kroupitski,[1,4] Dana Golberg,[1] Eduard Belausov,[2] Riky Pinto,[1] Dvora Swartzberg,[3] David Granot,[3] and Shlomo Sela[1]*

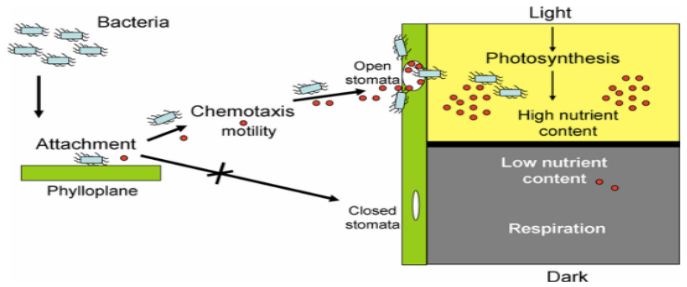


FIG. 8. A model summarizing our current understanding regarding *Salmonella* internalization through stomata. Red circles denote pl chemoattractant nutrients produced by stomatal guard cells and by parenchyma cells during photosynthesis.

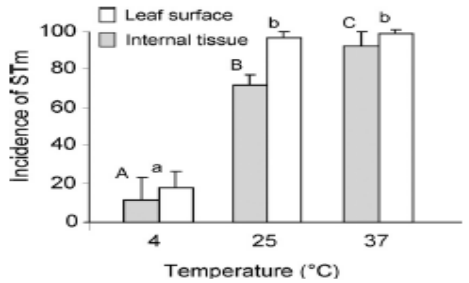


FIG. 6. Effect of temperature on the incidence of *Salmonella enterica* serovar Typhimurium (STm) in leaf tissue. Internalization experiments were performed in light (3.0 μE m^{-2} s^{-1}). The data represent the mean plus standard deviations (error bars) for two independent experiments, each performed in triplicate. Different letters indicate significant differences ($P < 0.05$) between the means of surface (capital letters) and internal (lowercase letters) fields containing bacteria by analysis of variance by the Tukey-Kramer multiple-comparison test.

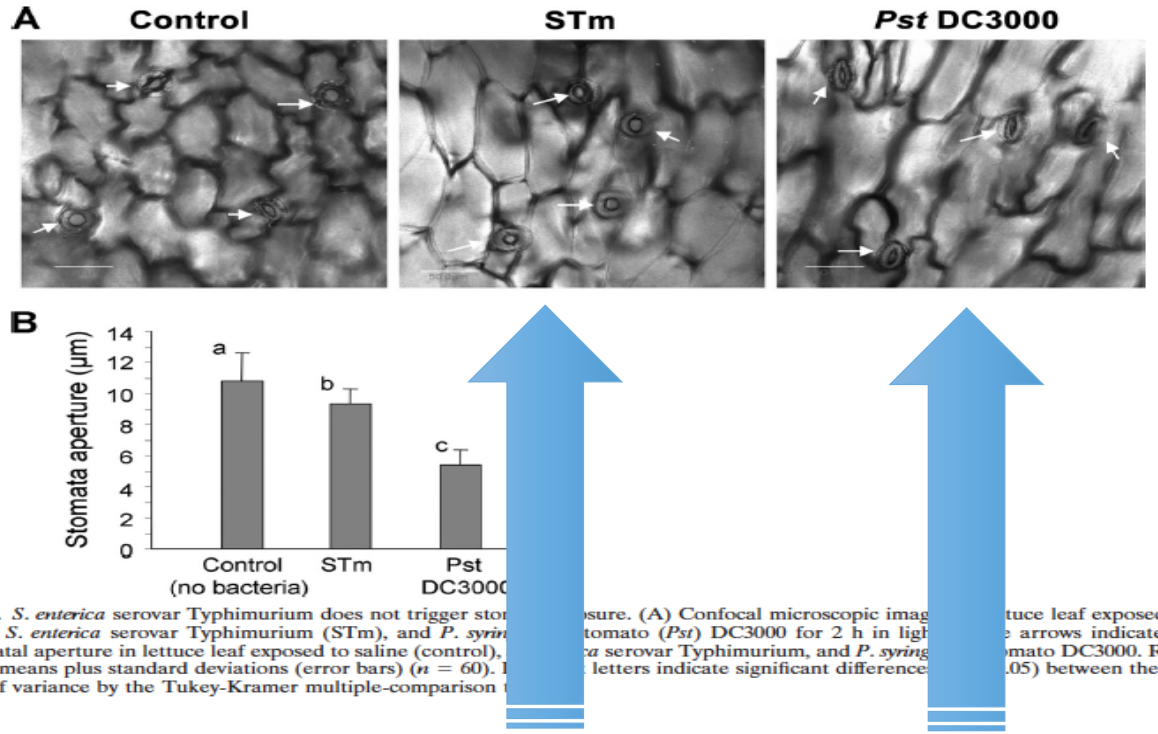


FIG. 5. *S. enterica* serovar Typhimurium does not trigger sto sure. (A) Confocal microscopic imag tuce leaf exposed to saline (control), *S. enterica* serovar Typhimurium (STm), and *P. syrin* tomato (*Pst*) DC3000 for 2 h in ligh arrows indicate stomata. (B) Stomatal aperture in lettuce leaf exposed to saline (control), a serovar Typhimurium, and *P. syring* mato DC3000. Results are shown as means plus standard deviations (error bars) ($n = 60$). letters indicate significant difference .05) between the means by analysis of variance by the Tukey-Kramer multiple-comparison

Salmonella Typhimurium

Pseudomonas syringae

Int. J. Environ. Res. Public Health **2015**, *12*, 8214-8227; doi:10.3390/ijerph120708214

OPEN ACCESS

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Environmental Research and Public Health
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www.mdpi.com/journal/ijerph

Communication

Possible Internalization of an Enterovirus in Hydroponically Grown Lettuce

Annalaura Carducci [1], Elisa Caponi [1], Adriana Ciurli [2] and Marco Verani [1,*]

and infectivity assay. In leaf samples, the lowest observed infective data were lower than the qRT-PCR detection limits, suggesting that free viral RNA or damaged viruses are eliminated rapidly while infectious particles remain stable for a longer time. The obtained

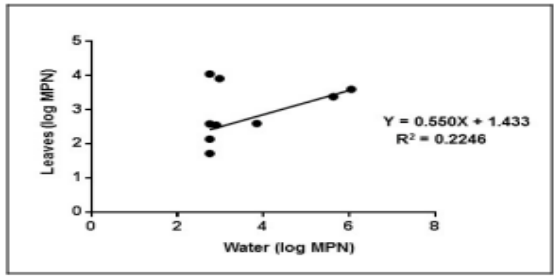

Figure 6. Linear regression analysis between water and leaves for cell culture MPN tests.

Figure 1. Hydroponic growth tank.

leaves even when the results were negative in the corresponding water sample. This could be due to adsorption of the virus onto the surfaces of the tanks but could also be attributed to plants protecting internalized viruses (Figure 6).

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Internalization and Dissemination of Human Norovirus and Animal Caliciviruses in Hydroponically Grown Romaine Lettuce

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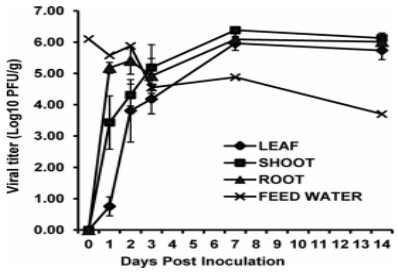

FIG 2 Internalization of TV in romaine lettuce grown hydroponically. Feed water was inoculated with TV stock to a starting titer on day 0 of 1.25×10^6 PFU/ml. The titer of the feed water was monitored throughout the 14-day study period and is reported as PFU/ml. At days 1, 2, 3, 7, and 14, roots, shoots, and leaves of romaine lettuce were harvested, homogenized with liquid nitrogen and mortar and pestle, and resuspended in 5 ml of sterile PBS. Sample homogenate was then subjected to centrifugation at 1,000 × *g* for 30 min, and the supernatant was tested for infectious viral particles by plaque assay. Viral titer is reported as PFU/g. Data points were the averages of three replicates. Error bars represent ±1 standard deviation.

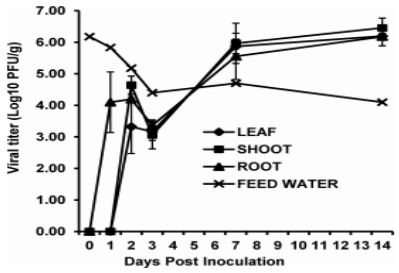

FIG 3 Chlorine treatment of lettuce tissue after TV internalization and dissemination. Feed water was inoculated with TV stock to a starting titer on day 0 of 1.25×10^6 PFU/ml. At days 1, 2, 3, 7, and 14, roots, shoots, and leaves of romaine lettuce were harvested and submerged in 50 ml of chlorine solution (1,000 ppm) for 5 min. Plant tissues were washed with 50 ml of tap water for 5 min by gentle agitation. Following tap water wash, samples were homogenized with liquid nitrogen and mortar and pestle and resuspended in 5 ml of sterile PBS. The residual chlorine was neutralized by 0.25 M sodium thiosulfate. Sample homogenate was then subjected to centrifugation at 1,000 × *g* for 30 min, and the supernatant was tested for infectious viral particles by plaque assay. Viral titer is reported as PFU/g. Data points were the averages of three replicates. Error bars represent ±1 standard deviation.

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Evidence of the Internalization of Animal Caliciviruses via the Roots of Growing Strawberry Plants and Dissemination to the Fruit

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Short Communication

Potential internalisation of caliciviruses in lettuce

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Table 1
Number of positive samples found in plants after irrigation with water contaminated with canine calicivirus or human norovirus (G2).

Trials (number of seedling samples or plants)	Total amount of virus (PCR-U)	Virus positive/ total no. of samples
Canine calicivirus		
1. Seedlings (22) with		
a) intact roots (19)	10^6	1/17
	10^9	1/2
b) cut roots (3)	10^9	1/3
2. Leaves from plants with intact roots (4)		
a) hydroponic culture (2)	10^8	2/6
	10^{10}	3/6
b) soil culture (2)	10^8	1/6
	10^{10}	0/6
3. Lettuce in soil (10)		
a) with intact roots (8)		
Leaves (4)	10^9	0/24
	10^{10}	2/4
Vascular liquid (4)	10^9	8/22
	10^{10}	0/10
b) with cut roots (2)		
Leaves (1)	10^9	2/5
Vascular liquid (1)	10^9	1/7

Trials (number of seedling samples or plants)	Total amount of virus (PCR-U)	Virus positive/ total no. of samples
Norovirus G2		
4. Seedlings (12)		
a) watered for 5 days (4)	1.7×10^5 daily	0/4
b) watered for up to 11 days (8)	5×10^5 daily	0/8
5. Lettuce with soil (1)		
watered day 1, 3 and 5	8.5×10^6/watering	0/10
6. Lettuce free of soil, hydroponic culture (6)		
a) intact roots (3)		
Leaves	8.5×10^6	0/4
Leaves	8.5×10^7	0/7
Juice	8.5×10^7	0/7
b) damaged roots (3)		
Leaves	8.5×10^6	0/4
Leaves	8.5×10^7	0/7
Juice	8.5×10^7	0/7

Basandosi su questi risultati , la contaminazione virale attraverso le radici non può essere esclusa ma apparentemente non rappresenta un importante via di trasmissione dei virus alla lattuga.

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Salmonella outbreak linked to alfalfa sprouts

By **Saundra Young**, CNN
December 24, 2010 -- Updated 1035 GMT (1835 HKT)

A preliminary investigation of the salmonella outbreak shows a possible link to alfalfa sprouts.

STORY HIGHLIGHTS

- CDC says 89 people have been sickened
- Sandwich chain part of investigation
- Jimmy John's says sprouts tested negative
- Still, Illinois stores pull sprouts from menu

(CNN) -- A salmonella outbreak linked to alfalfa sprouts has sickened 89 people in 15 states and the District of Columbia, the Centers for Disease Control and Prevention reported Thursday.

About 23% of those sickened were hospitalized, but no deaths have been reported, according to the CDC.

Health officials say the first cases identified date to November 1. The preliminary investigation shows a possible link to alfalfa sprouts.

"Preliminary results of this investigation indicate a link to eating alfalfa sprouts at a national sandwich chain," the CDC said in a statement.

In Illinois, where the bulk of cases have been identified, the state Department of Public Health says many of 50 sickened residents reported eating alfalfa sprouts at locations of Jimmy John's.

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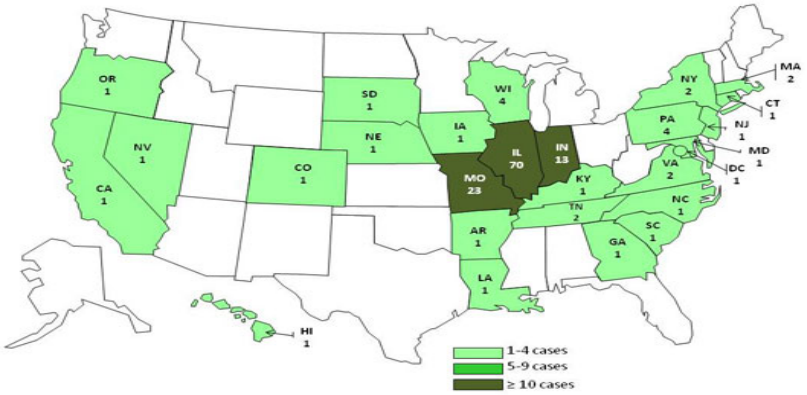
Investigation of a Multistate Outbreak of Human *Salmonella* I 4,[5],12:i:- Infections Linked to Alfalfa Sprouts

- **Case Count Map**
- Epi Curve

Persons infected with the outbreak strain of *Salmonella* I4,[5],12:i:-, by state



From November 1, 2010, through February 9, 2011, 140 individuals infected with the outbreak strain of *Salmonella* serotype I 4,[5],12:i:-, whose illnesses began (onset dates) since November 1, were reported from 26 states and the District of Columbia. The number of ill persons identified in each state and the District of Columbia with the outbreak strain is as follows: Arkansas (1), California (1), Colorado (1), Connecticut (1), District of Columbia (1), Georgia (1), Hawaii (1), Iowa (1), Illinois (70), Indiana (13), Kentucky (1), Louisiana (1), Massachusetts (2), Maryland (1), Missouri (23), Nebraska (1), Nevada (1), New Jersey (1), New York (2), North Carolina (1), Oregon (1), Pennsylvania (4), South Carolina (1), South Dakota (1), Tennessee (2), Virginia (2), and Wisconsin (4). Among 138 persons for whom information is available, reported illness onset dates range from November 1 to January 18, 2011. Case-patients range in age from 1 to 85 years-old, with a median age of 28 years-old. Eighty-seven patients (or 63%) are female. Among persons with available information, 24% reported being hospitalized. No deaths were reported. Because the pulsed-field gel electrophoresis (PFGE) pattern associated with this particular *Salmonella* serotype commonly occurs in the United States, some of the cases identified may not be related to this outbreak.

Investigation of a Multistate Outbreak of Human *Salmonella* I 4,[5],12:i:- Infections Linked to Alfalfa Sprouts

- Case Count Map
- **Epi Curve**

Infections with the outbreak strain of *Salmonella* I 4,[5],12:i:-, by known or estimated illness onset* (n=138 for whom information was reported as of 2/9/2011)

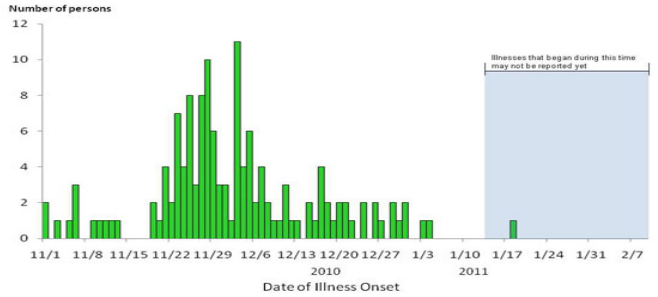


FIGURE 2. *Photographs of representative dark brown, wrinkled alfalfa seeds (A) and lighter tan, smooth alfalfa seeds (B).*

TABLE 1. *Weight and percentage germination of smooth and wrinkled alfalfa seeds*

Seed type	Weight (g)[a]	Germination (%)[b]
Smooth	0.025 ± 0.002 A[c]	93 ± 4 A
Wrinkled	0.022 ± 0.001 B	56 ± 16 B

[a] Average weight of 10 alfalfa seeds. Eight groups of 10 seeds each were weighed for each seed lot and the values were combined for five seed lots.
[b] Percent germination of 400 seeds, with 80 seeds tested per type per seed lot.
[c] Mean values within columns that are not followed by the same letter are significantly different (Student's *t* test; $P < 0.01$).

TABLE 2. *Percentage of smooth and wrinkled alfalfa seeds carrying culturable naturally occurring aerobic bacterial flora before and after sanitation with 0.2% $Ca(OCl)_2$*

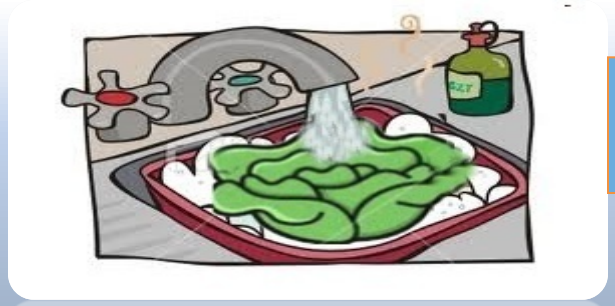
Seed type	Unsanitized[a]	+0.2% $Ca(OCl)_2$[b]	P[c]
Smooth	41 ± 31	2.2 ± 1.6	0.025
Wrinkled	60 ± 38	22 ± 15	0.046
P[d]	0.21	0.020	

[a] Ninety-six seeds tested per lot; the mean and standard deviation from five lots is shown.
[b] A total of 192 seeds tested per lot; the mean and standard deviation from five lots are shown.
[c] Student's *t* test, unsanitized seeds versus $Ca(OCl)_2$-treated seeds.
[d] Student's *t* test, smooth versus wrinkled seeds.

Sopravvivenza dei germi patogeni nei vegetali

- Sopravvivenza di *Y. enterocolitica* , S. Napoli, S Typhimurium e HAV nei vegetali alla temperatura di refrigerazione
- Efficacia dei processi di lavaggio e/o sanificazione nei confronto di batteri e virus:

- acqua
- ipoclorito di sodio (220 ppm)



lavaggio domestico

- ipoclorito di sodio (60 ppm)

trasformazione IV gamma

Sopravvivenza della Yersinia enterocolitica e della Salmonella alle basse temperature

Yersinia enterocolitica

CT ± SD									
Tempo (h)	10^2			10^3			10^4		
0	27,82	±	0,13	22,30	±	0,03	25,83	±	0,04
24	30,78	±	0,06	28,96	±	0,13	25,54	±	0,16
48	33,06	±	0,92	29,83	±	0,04	25,17	±	0,30
72	25,57	±	0,18	25,46	±	0,74	22,25	±	0,58
96	28,68	±	0,09	26,84	±	0,46	23,23	±	0,03
120	25,09	±	0,09	28,32	±	0,68	26,15	±	0,58
144	30,09	±	0,10	29,24	±	0,02	25,26	±	0,10

Y. enterocolitica patogena sopravvive a 4 °C, **fino al 6° giorno** dalla contaminazione, per tutte le concentrazioni testate

Salmonella Napoli

CT ± SD									
Tempo (h)	10^5			10^3			10		
0	22,84	±	0,12	23,70	±	0,23	24,03	±	0,10
36	22,42	±	0,05	23,87	±	0,05	24,85	±	0,02
84	23,56	±	0,47	24,41	±	0,03	26,35	±	0,12
134	23,89	±	0,04	28,86	±	0,08	24,93	±	0,01

Salmonella Typhimurium

CT ± SD									
Tempo (h)	10^5			10^3			10		
0	24,09	±	0,89	24,15	±	0,01	23,83	±	0,20
36	24,49	±	0,17	24,16	±	0,64	24,65	±	0,01
84	25,00	±	0,11	24,93	±	0,15	25,95	±	0,10
134	25,35	±	0,17	25,00	±	0,16	24,00	±	0,02

S. Napoli e *S.* Typhimurium sopravviveno a 4 °C **fino al 7° giorno** dalla contaminazione per tutte le concentrazioni testate

Finocchi sperimentalmente contaminati con acqua contenente 5 log TCID50/ml di HAV e conservati a 4°C

Time (in days)	Qualitative Determination				Quantitative determination	
	RT-PCR		RT-Nested PCR		Log $TCID_{50}$/ml ± SD [(a)]	
	not washed	washed	Not washed	Washed	Not washed	washed
0	+	+	+	+	4,32±0,18	3,37±0,28
2	+	+	+	+	3,58±0,07	2,51±0,13
4	+	–	+	+	2,37±0,11	1,56±0,21
7	–	–	+	–	<1	*n.d.*
9	–	–	–	–	*n.d.*	*n.d.*

(a): mean of three determinations ± standard deviation
n.d.: not determined

Lattuga sperimentalmente contaminata con acqua contenente 5 log TCID50/ml di HAV e conservata a 4°C

Time (in days)	*Qualitative Determination*				*Quantitative determination*	
	RT-PCR		*RT-Nested PCR*		*Log $TCID_{50}$/ml ± SD [(a)]*	
	not washed	*Washed*	*Not washed*	*Washed*	*Not washed*	*washed*
0	+	+	+	+	4,48±0,22	4,38±0,14
2	+	+	+	+	4,44±0,19	3,82±0,89
4	+	+	+	+	3,48±0,15	2,23±0,15
7	+	+	+	+	2,45±0,10	2,29±0,20
9	+	+/– [(b)]	+	+	2,46±0,17	2,41±0,81

(a): mean of three determinations ± standard deviation
(b): two of the three determinations showed positive results

Efficacia dei trattamenti di sanificazione

Ufc/ml	LAVAGGIO CON ACQUA		LAVAGGIO CON IPOCLORITO DI SODIO (220 ppm)		LAVAGGIO CON IPOCLORITO DI SODIO (60 ppm)	
	0 h	**48 h**	**0 h**	**48 h**	**0 h**	**48 h**
10	No Ct	37,80 ± 0,12	No Ct	No Ct	No Ct	37,82 ± 0,75
10^2	No Ct	28,85 ± 0,39	No Ct	34,25 ± 0,37	No Ct	28,45 ± 0,31
10^3	No Ct	27,47 ± 0,28	No Ct	29,25 ± 0,30	No Ct	29,62 ± 0,08
10^4	No Ct	27,94 ± 0,24	No Ct	28,62 ± 0,09	No Ct	28,31 ± 0,20
10^5	31,61 ± 0,44	24,06 ± 0,11	No Ct	24,31 ± 0,17	No Ct	24,45 ± 0,24

Y. enterocolitica **patogena**

resiste ai vari trattamenti di sanificazione

per le diverse concentrazioni testate

Un abbattimento di circa due logaritmi con un trattamento con 220 ppm di cloro

Conclusioni

- I vegetali possono essere contaminati da microrganismi patogeni e creare importanti episodi epidemici
- L'acqua di irrigazione è la più importante fonte di contaminazione
- I microrganismi patogeni possono sopravvive per lungo tempo sulle superfici di vegetali a foglia larga, specialmente se subiscono un processo di internalizzazione.
- I trattamenti di sanificazione dei vegetali comunemente utilizzati in ambito domestico e in ambito industriale non garantiscono la sicurezza d'uso dei vegetali per la presenza di microrganismi patogeni