



UNIVERSITA' CAMPUS BIO-MEDICO DI ROMA

Master in Homeland Security

Infrastrutture Critiche: la Sicurezza Alimentare

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Roma, 14 Luglio 2011



LATEST NEWS

Nuclei militari di protezione (Nmp)

Sulle navi private operanti in aree a rischio piraterie potranno esserci a bordo **militari** con funzioni di agente di polizia giudiziaria. I servizi di **vigilanza privata**, invece, «possono essere svolti con l'impiego di particolari guardie giurate armate, a protezione delle merci e dei valori sulle navi mercantili e sulle navi da pesca battenti bandiera italiana negli spazi marittimi internazionali a rischio pirateria»

Via libera all'«affitto» di militari italiani su navi private in funzione antipirateria

La novità nel decreto sul rifinanziamento delle missioni all'estero



La petroliera «Savina Caylyn» che fu sequestrata al largo della Somalia (Ansa)

MILANO - Militari italiani sulle navi private, come ai tempi della filibusta. Per fronteggiare i nostri natanti che attraversano acque infestate dai pirati come quelle al largo della Somalia. Via libera quindi all'impiego di militari e contractor sulle navi italiane per fronteggiare il pericolo pirateria.

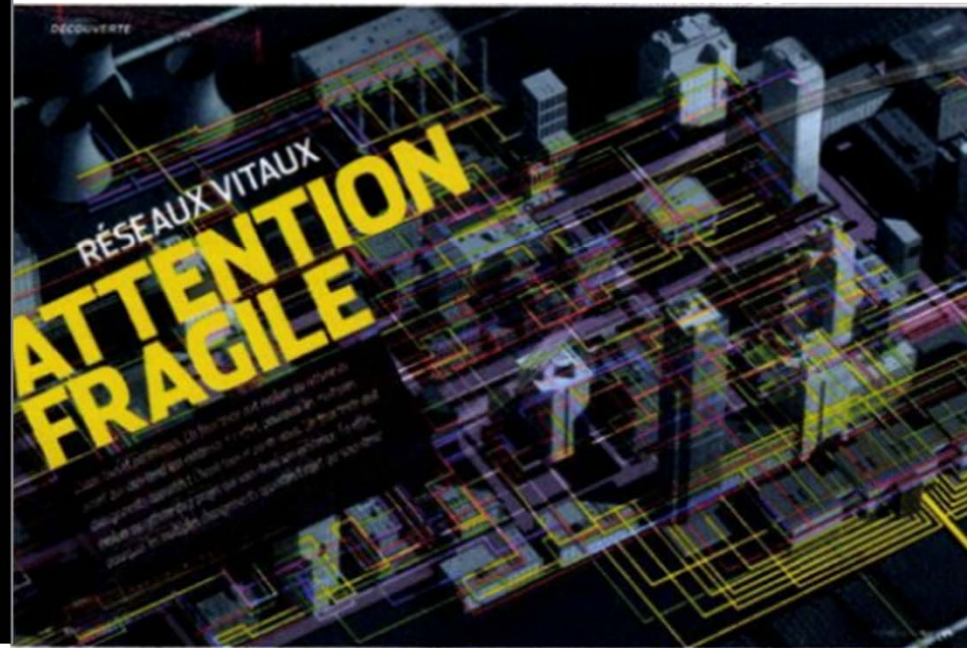
IL DECRETO - L'articolo 5 del decreto legge del governo sul rifinanziamento delle missioni militari all'estero, firmato martedì dal presidente della Repubblica Giorgio Napolitano autorizza il Ministero della Difesa a «stipulare con l'armatoria privata italiana convenzioni per la protezione delle navi battenti bandiera

italiana». L'imbarco dei militari, o in alternativa di servizi di vigilanza privata, è «a richiesta e con oneri a carico degli armatori».

Il decreto consente dunque l'imbarco su navi italiane di «Nuclei militari di protezione (Nmp) della Marina, che può così avvalersi anche di personale di altre Forze Armate e del relativo armamento previsto per l'espletamento del servizio». Al comandante di ciascun nucleo, spiega il secondo comma dell'articolo del decreto legge, e al personale da esso dipendente sono attribuite le funzioni di ufficiale e di agente di polizia giudiziaria. Gli armatori, spiega invece il terzo comma, «provvedono al ristoro dei corrispondenti oneri mediante versamenti all'entrata del bilancio dello Stato entro sessanta giorni». I servizi di vigilanza privata, invece, «possono essere svolti con l'impiego di particolari guardie giurate armate, a protezione delle merci e dei valori sulle navi mercantili e sulle navi da pesca battenti bandiera italiana negli spazi marittimi internazionali a rischio pirateria». Un nuovo decreto, che dovrà essere adottato entro sessanta giorni, stabilirà le



Luglio 2011 – n. 11126



Interessante analisi del problema delle grandi infrastrutture critiche e della loro fragilità sistemica (con interviste ai maggiori esperti mondiali)



LA SICUREZZA ALIMENTARE

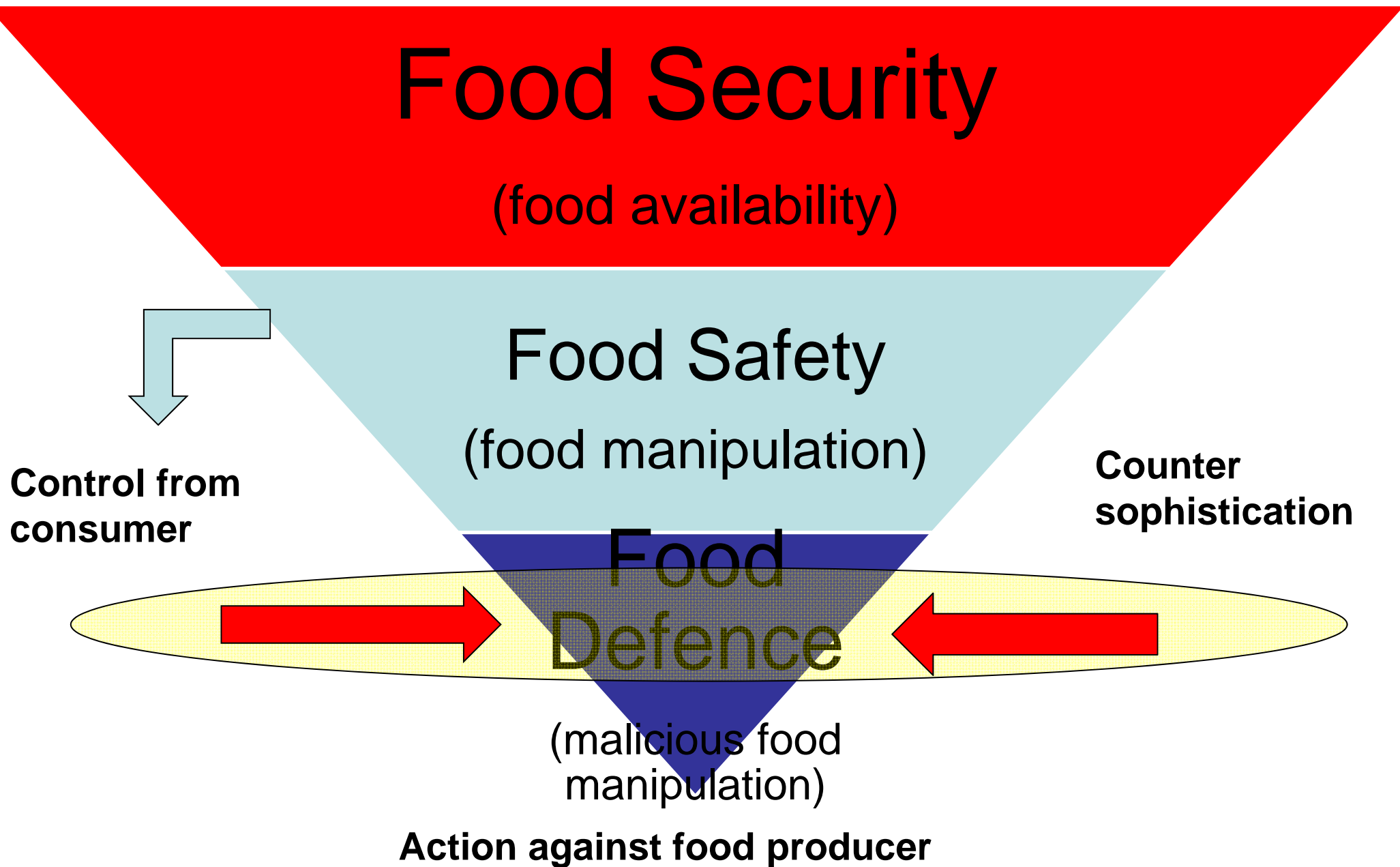


Food Safety and Food Security

Food safety refers to the extent to which food is safe to eat. It is related to the handling, preparation, and storage of food in ways to prevent illness, injury or death in the consumer

Food security is generally referred to the availability of food and one's access to it.

Food defence is “the security of food and drink and their supply chains from all forms of malicious attack including ideologically motive attack leading to contamination or supply failure” [UK CPNI and British Standard Institute (BSI)]



Food Defence

Il termine che comprende le attività associate alla protezione della filiera agroalimentare Nazionale da atti intenzionali o deliberati di contaminazione o manomissione (tampering)

U.S. Department of Homeland Security 2003:

“il settore agroalimentare costituisce una delle 17 infrastrutture critiche del Paese suscettibile di attacchi intenzionali”





Food Terrorism

“An act or threat of deliberate contamination of food for human consumption with chemical, biological or radionuclear agents for the purpose of causing injury or death to civilian populations and/or disrupting social, economic or political stability”(WHO 2002)

- Who could attack?

“Food terrorism threats are categorized as **internal** and **external**, and attackers are grouped into five categories: criminals, protesters, terrorists, subversives and rogue or disgruntled insiders”

E. Yoon, C.W. Shanklin (2007) *“Food terrorism: Perceptual Gaps Between Importance and Preventive Measures”* Journal of Foodservice Business Research.

Food Terrorism (2)

- Why the attack?
 - To generate disease and death
 - To induce fear and anxiety



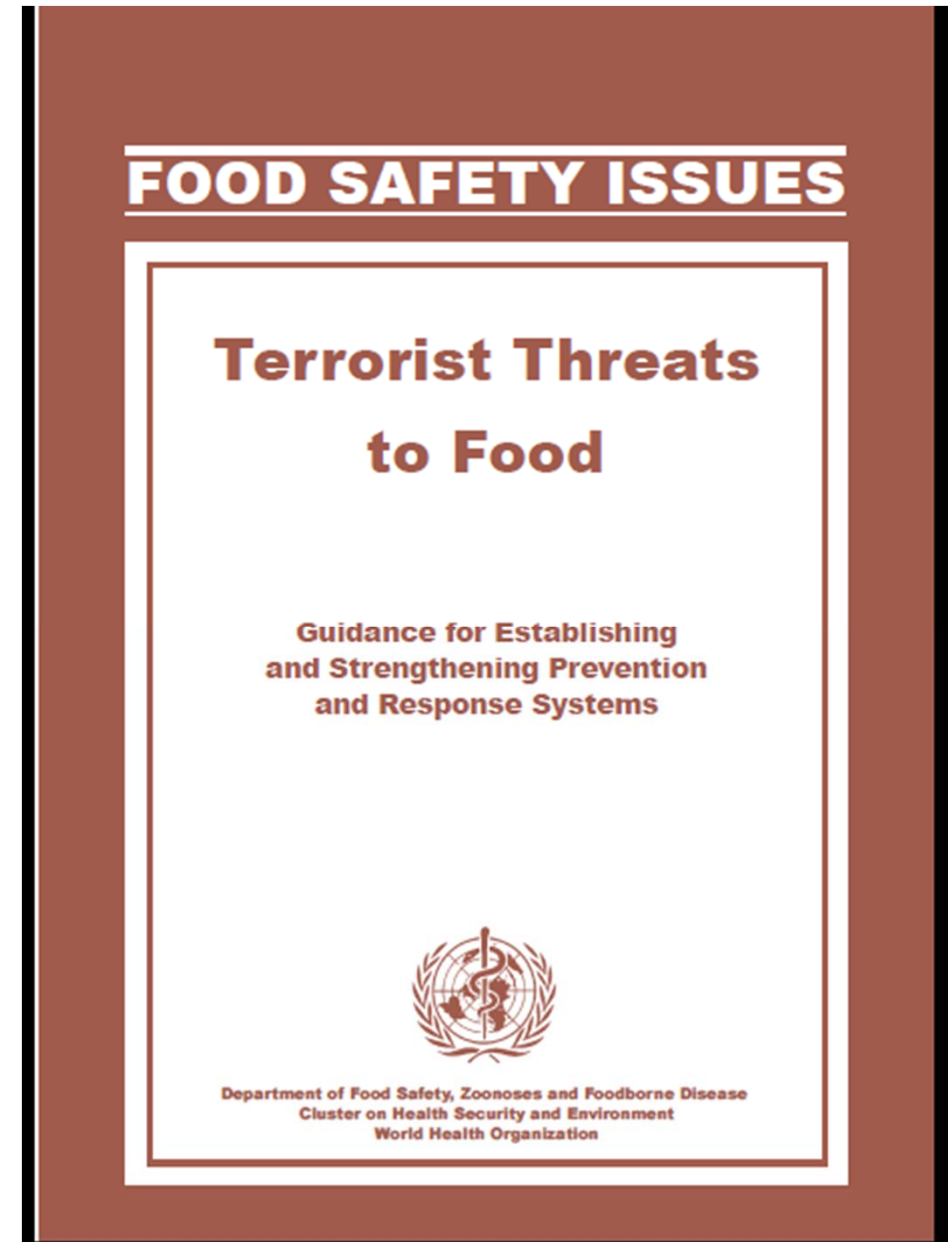
Indeed, also “symbolic” attacks are able to create

- Public health impact
- Economic losses or trade disruption
- Social and economic damages



WHO - World Health Organization

“the malicious contamination of food for terrorist purposes is a real and current threat, and the deliberate contamination of food at one location could have global public health implications”
(WHO 2002)





Real-time F&D Incident Map

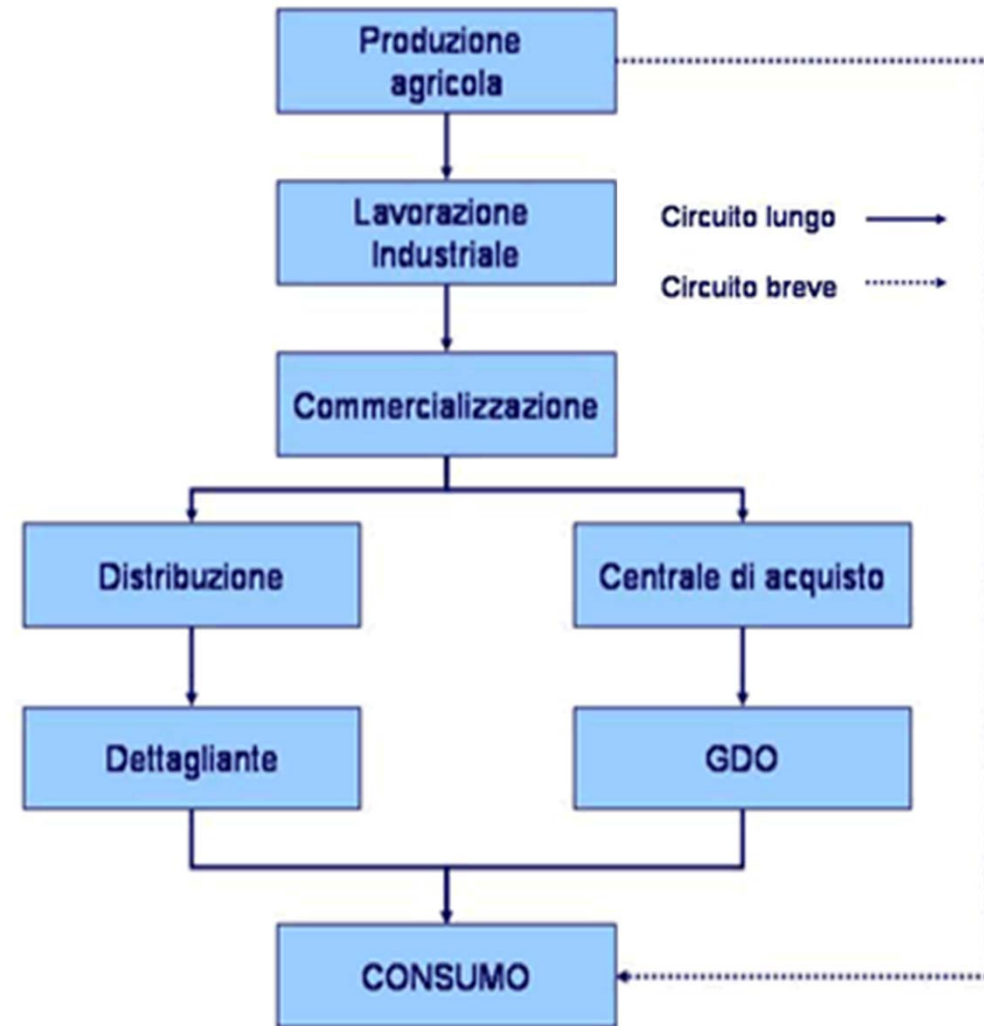


Legend: [Close legend](#)

- Alcohol - Counterfeit
- Alcohol - Spurious Or Other
- Botulism
- Cosmetics Issues
- Food - Adulterated
- Food - Animal Feed Issues
- Food - Contaminated
- Food - Counterfeit Product
- Food - Foreign Object
- Food - General Food Safety News
- Food - GM Contamination And Other Issues
- Food - Misbranded/Mislabeled
- Food - Products Seized By Authorities
- Food - Smuggling
- Food - Tampering
- Food - Undeclared Allergen
- Food Recalls
- Food Shortages
- Food Shortages - Riots Or Violence
- General News - Food - Medicine - Health
- Jewelry - Health Issues
- Medicine - Adulterated
- Medicine - Counterfeit Products
- Medicine - General News/ Other
- Medicine - Medical Products Or Devices
- Medicine - Misbranded/Mislabeled
- Medicine - Pharmaceutical Recalls
- Medicine - Smuggling
- Medicine - Tampering
- Melamine Adulteration
- Shortages Of Medicine
- Tobacco Issues
- Water Contamination - Adulteration - Other
- Water Shortages

La filiera agroalimentare

“Insieme articolato che comprende le principali attività, tecnologie, risorse ed organizzazioni che concorrono alla creazione, trasformazione, distribuzione, commercializzazione e fornitura (food supply chain) di un prodotto agroalimentare”





fornire un metodo per individuare attraverso quali sostanze, in quali fasi produttive e per quali motivi la filiera alimentare poteva mostrarsi particolarmente fragile



EUROPEAN COMMISSION
DIRECTORATE - GENERAL FOR JUSTICE, FREEDOM AND SECURITY

SecuFood
Security of European Food Supply Chain

SecuFood – Security of European Food supply chain aims at realizing an overview of strategies adopted in EU to prevent criminal, and particularly terrorist, attack against the food supply chain.

FINAL CONFERENCE
27th APRIL 2010 - h. 8:30
AUDITORIUM "BIAGIO D'ALBA" - ITALIAN MINISTRY OF HEALTH - VIALE GIORGIO RIBOTTA, 5 - ROME

WELCOME REMARKS BY THE ITALIAN MINISTER OF HEALTH, PROF. FERRUCCIO FAZIO

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With the support of the Prevention, Preparedness and Consequence Management of Terrorism and other Security-related Issues Programme
European Commission - Directorate-General Justice, Freedom and Security



SecuFood scope

Analyze, w.r.t. the food supply chain the:

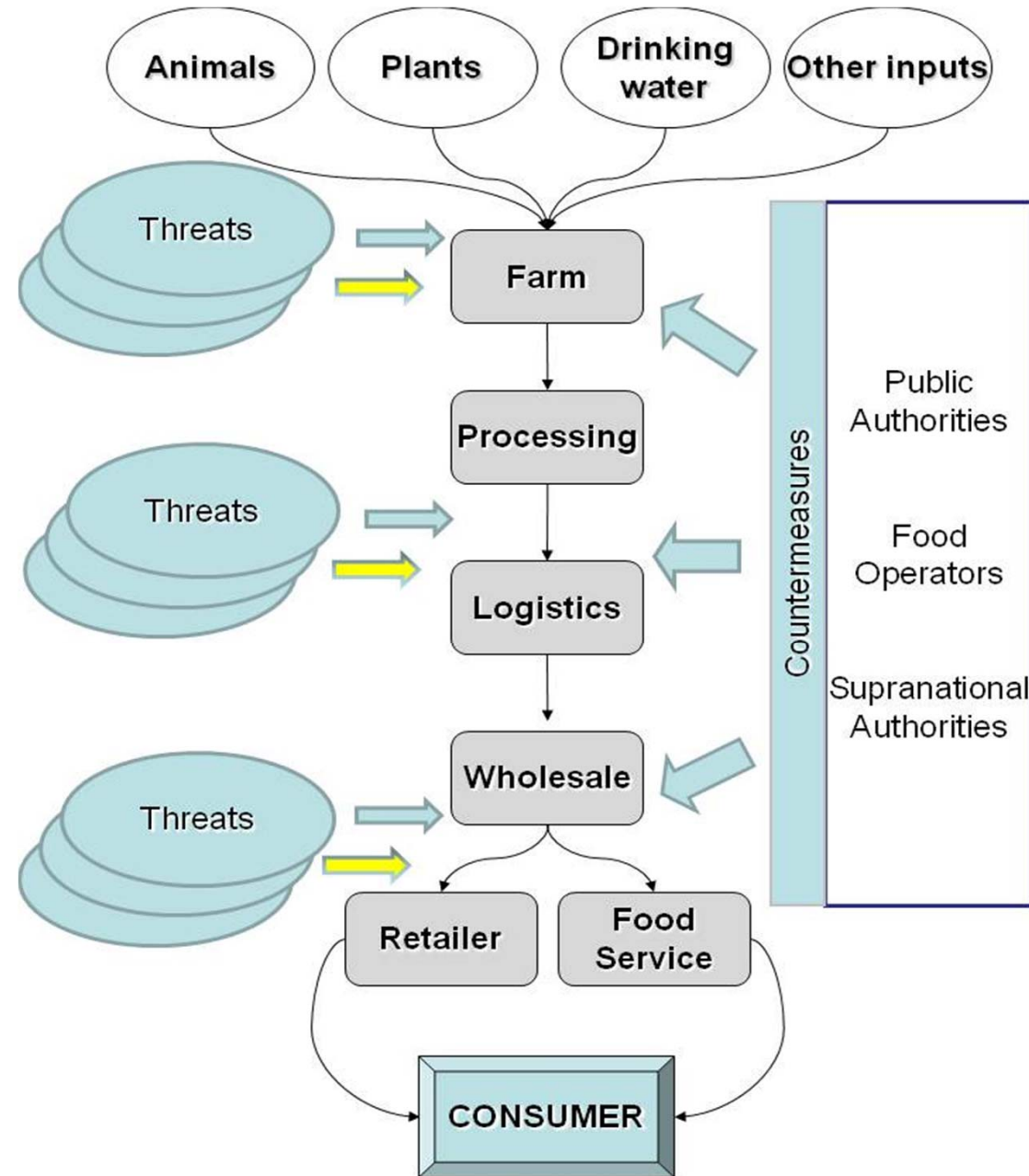
- Possible threats
- Existing countermeasures
 - Technological
 - Operational
 - Legal framework

To identify

- Best practice

And to perform

- Gap analysis



... to this end

- Survey of different legislations
- Study of the past incidents
- Analysis of the percept threats
- Estimation of the possible impact for the different threats
 - Decomposition of the food supply chain in its macro-steps
 - Identification of the threats
 - Estimation of possible impact (taking into account effectiveness of counter-measures)

SecuFood Scope (3)

It considered mainly five countries:

- Italy
- Spain
- United Kingdom
- Romania
- Denmark

Selected to be representative of Europe in terms of Mediterranean and continental countries, “new” and “old” EU countries, and with different food regimes

Survey of legislation framework

- All the analyzed countries have specific legislation and agencies devoted to Food Safety.
- All the EU countries are involved in early warning alert networks for food contamination.
- Italy (and partially Spain) has a specialized police corps to contrast Food adulteration
- Except partially for UK, there is no specific legislation about Food Defence
- There are several mandatory constraints on food operators to improve and guarantee Food Safety (e.g. HACCP), but no specific requirement about food defence



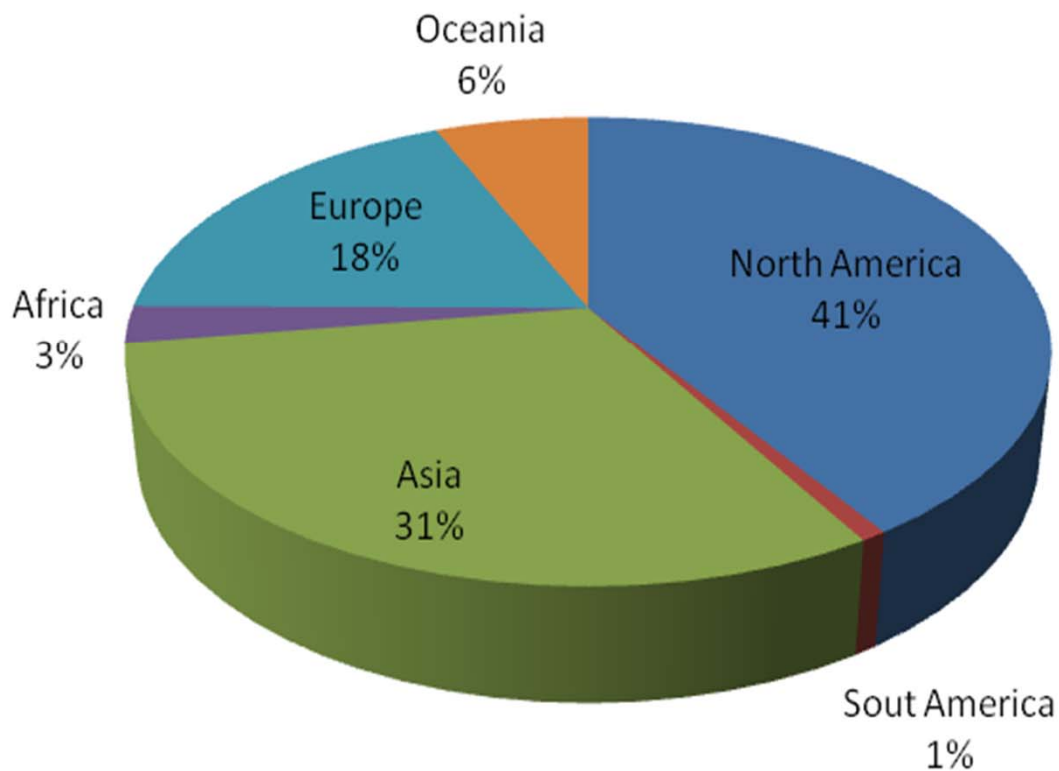
Incident analysis

Actually there are no evidence of terrorist attack against food supply chain (the only episode reported in literature is those appended in 1989 in Israel with contamination of grapefruits)

Even if, in the last years there were several “suspected” episodes many of them recognized as an attack against food supply chain (we collected data about 450 episodes from 1950 to 2008)

Incidents Analysis

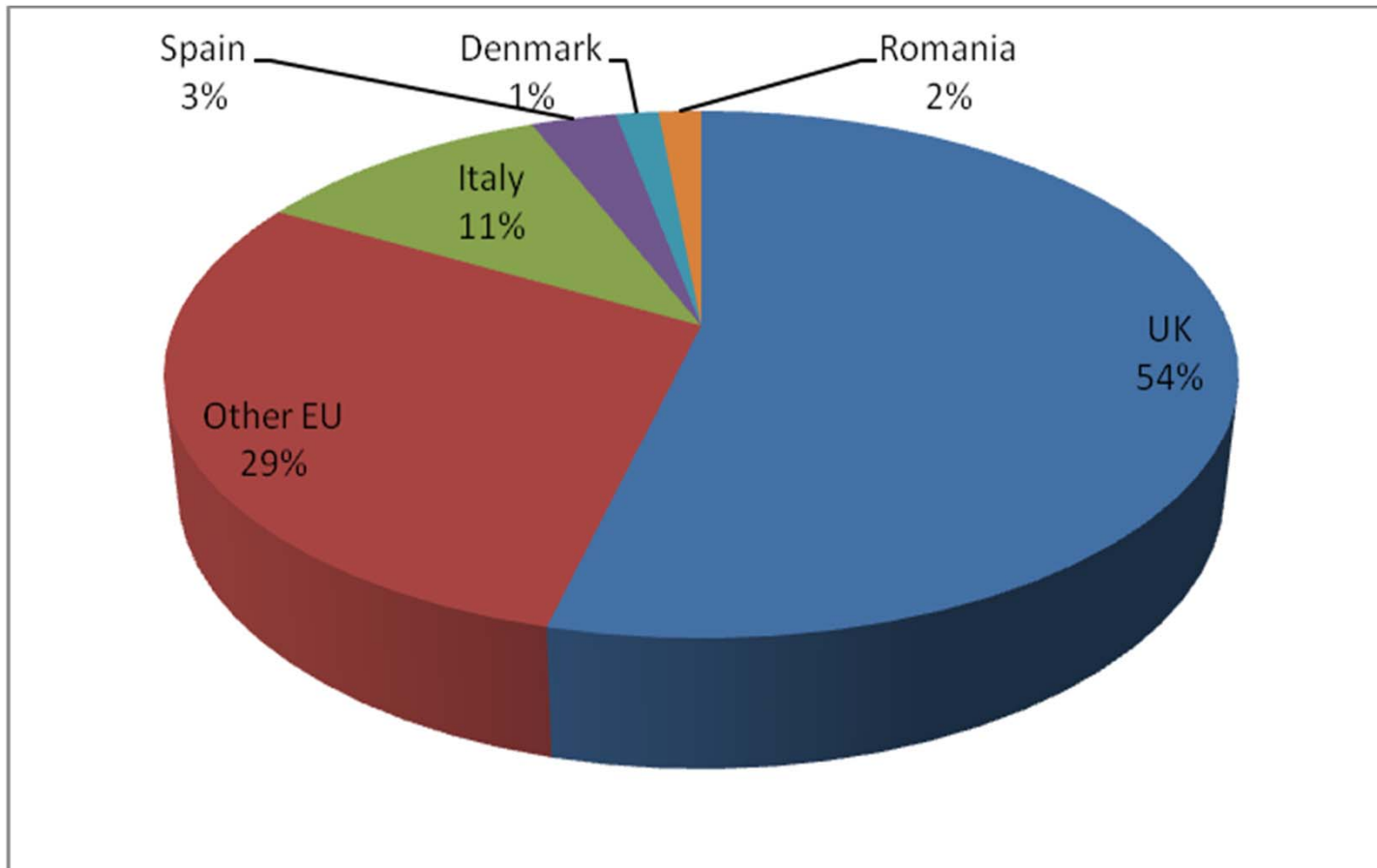
Geographical occurrence



USA	152
Other Asia	56
Japan	35
UK	35
China	30
Australia	23
Other EU	19
Africa	10
Canada	7
Italy	7
Other Europe	7
South America	3
New Zealand	2
Spain	2
Denmark	1
Romania	1

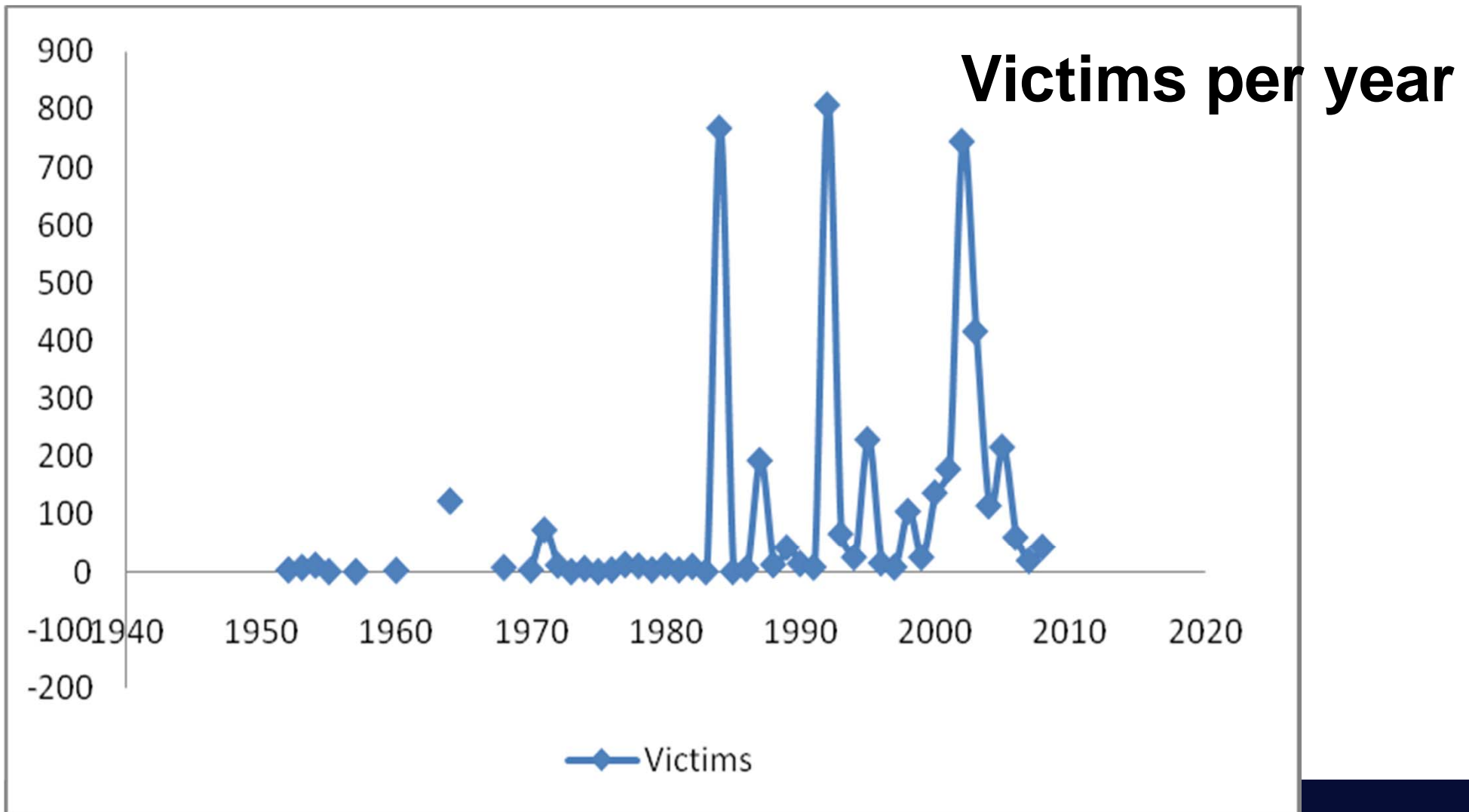
Incidents Analysis

Geographical occurrence (2)

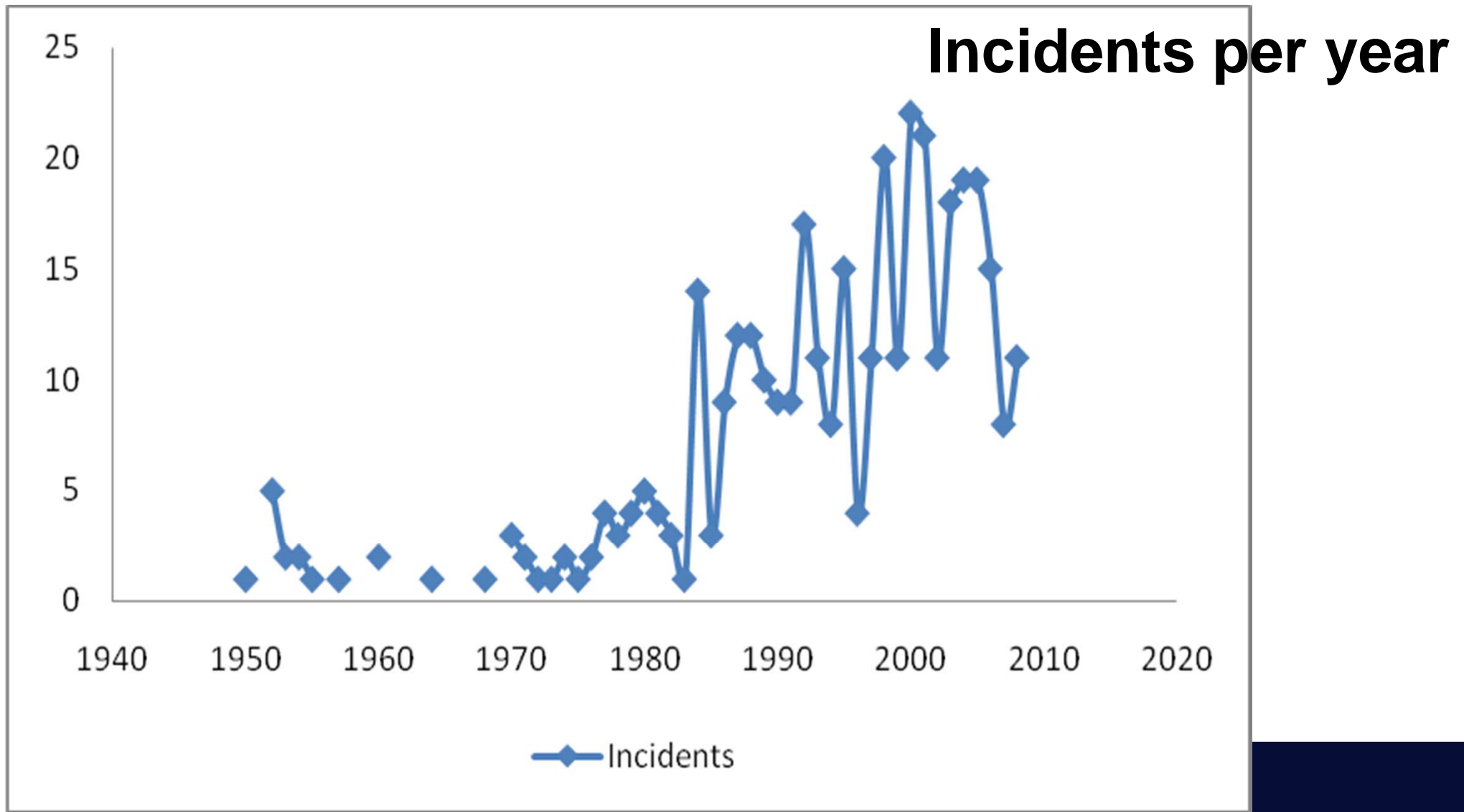


**Incidents in
Europe**

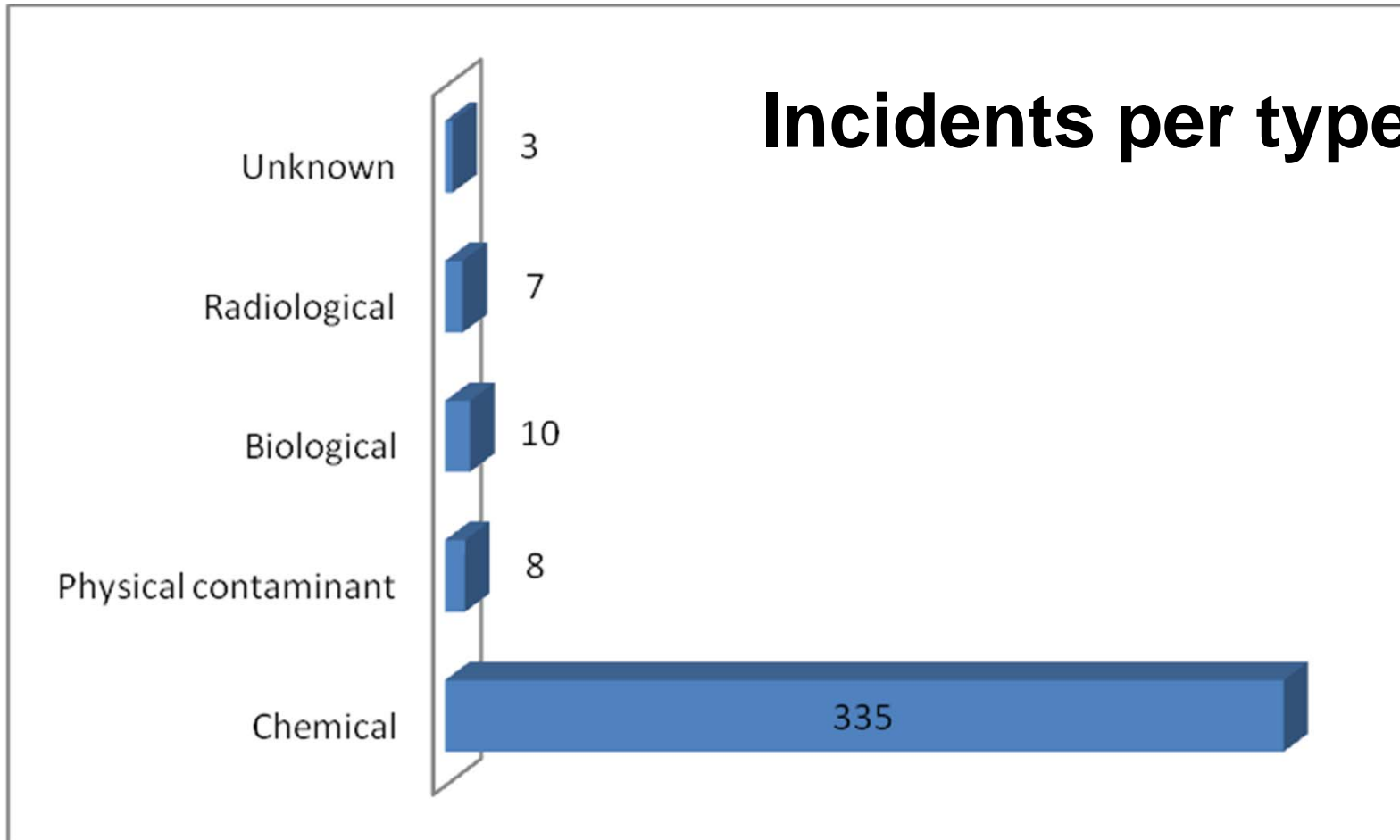
Time occurrence



Time occurrence

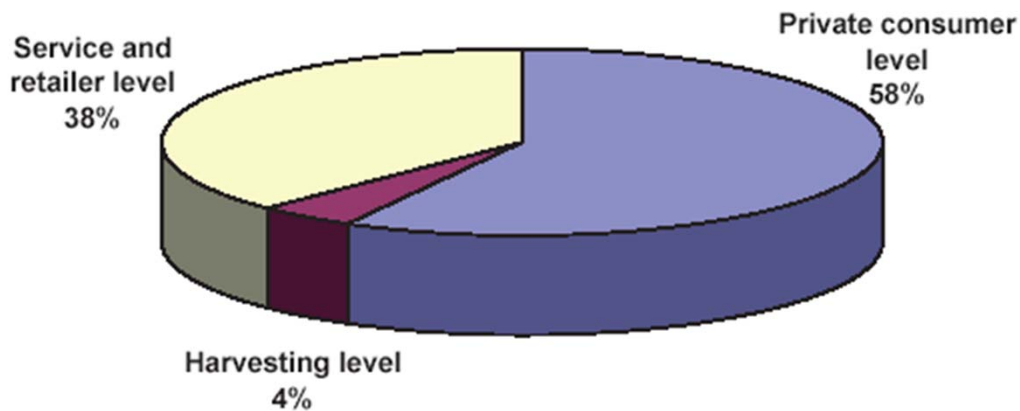


Contamination type occurrence

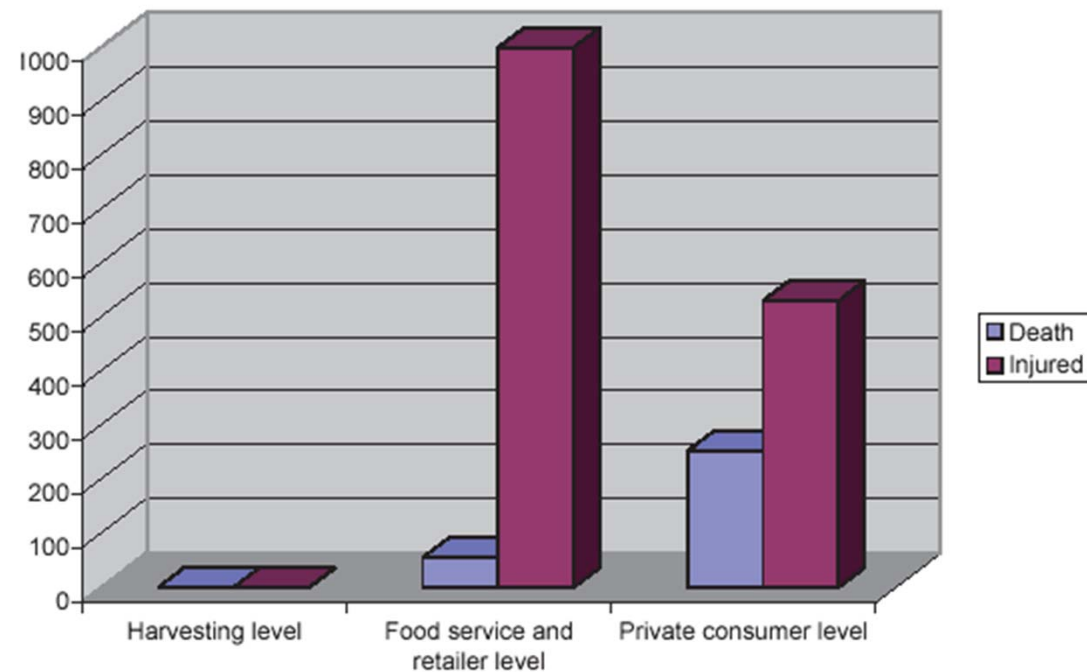


Incidenti per filiera 1950 - 2008

Classificazione degli incidenti per livello di filiera



Numero di vittime per livello di filiera





Risk perceived

- How is relevant for food operator and public authorities the terrorist/criminal threats ?

To answer to this question we supply a specific questionnaires to about 40 food operators and 10 public authorities involved in food safety and performed 15 interviews

SecuFood **SECUFOOD PROJECT**
Private Company questionnaire Page 1 of 3

Section 1 - Reference Information

Company Name		
Address		
Country		
Size	Annual Turnover	
	N° of employees	
International branch offices (where?)		
Belonging to a group of Companies (which?)		
Website		
Contact person(s)		
Department / Office /Structure		
Contact e.mail		

Section 2 - Company Activities

In which phases of the food chain the Company Intervene ?

<input type="checkbox"/> Primary production	<input type="checkbox"/> Transport network
<input type="checkbox"/> Importation	<input type="checkbox"/> Wholesale distribution

SecuFood **SECUFOOD PROJECT**
Public Administration questionnaire Page 1 of 4

Section 1 - Reference Information

Administration Name	
Department / Office /Structure	
Address	
Country	
Website	
Contact person(s)	
Contact e.mail	

Section 2 - Administration Activities

What role has your Administration with regards to the Food topic ?

In which safety/ security/ defence sectors your Administration Intervene ?

<input type="checkbox"/> Prevention strategies	<input type="checkbox"/> Evaluation systems
<input type="checkbox"/> Surveillance strategies	<input type="checkbox"/> Terrorist event detection
<input type="checkbox"/> Protection strategies	<input type="checkbox"/> Response and countermeasures
<input type="checkbox"/> Other (Specify) _____	

In which phases of the food chain your Administration Intervene ?

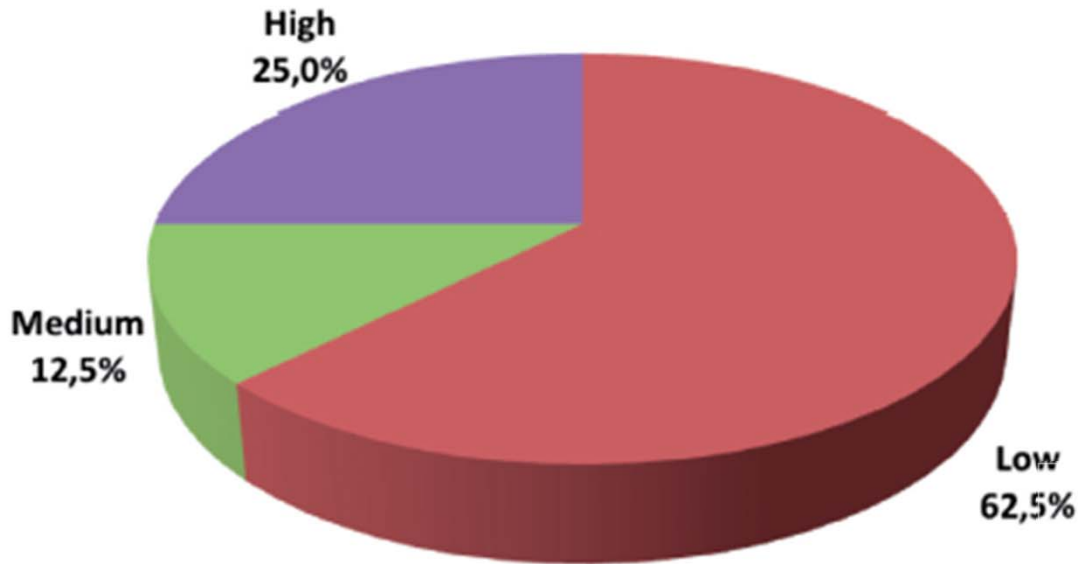
<input type="checkbox"/> Primary production	<input type="checkbox"/> Transport network
<input type="checkbox"/> Importation	<input type="checkbox"/> Wholesale distribution
<input type="checkbox"/> Processing / transformation	<input type="checkbox"/> Retailer distribution / Serving
<input type="checkbox"/> Packaging / Logistics	<input type="checkbox"/> Exportation
<input type="checkbox"/> Other (Specify) _____	

Which are the typologies of food controlled ?

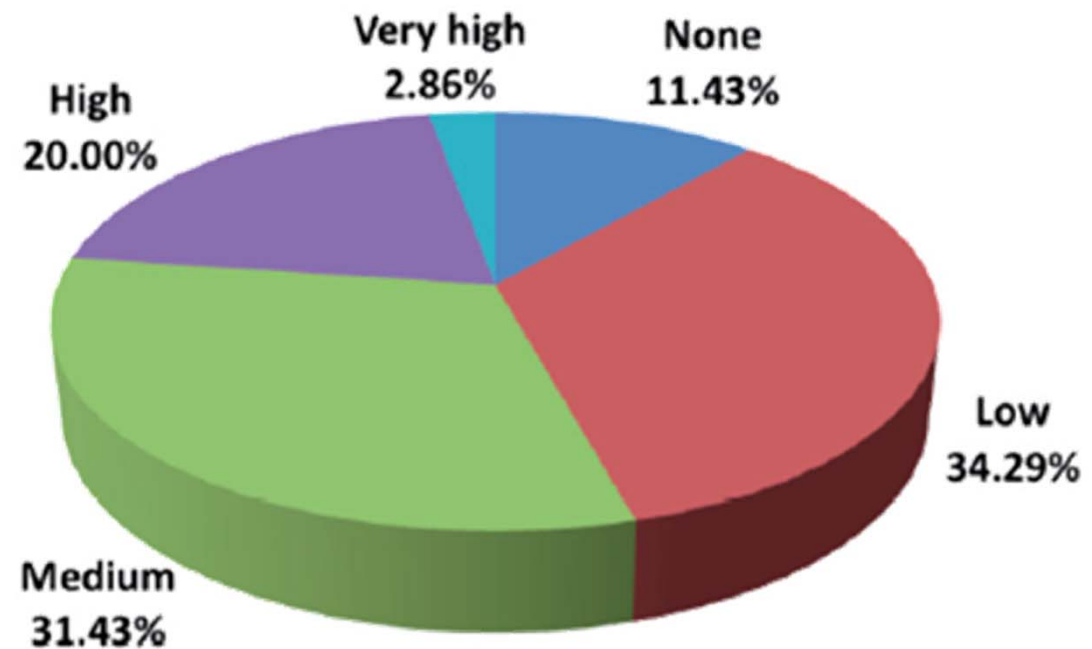
Which are the specific activities of your Administration for defence sectors / food chain phases ?

Livello di percezione del rischio

Autorità pubbliche

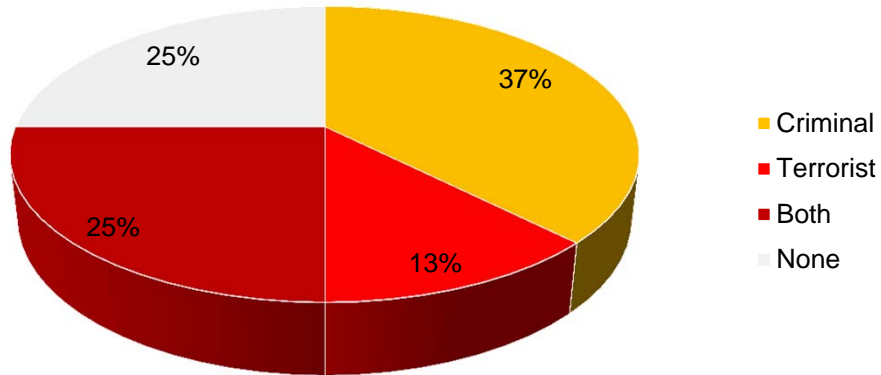


Operatori privati

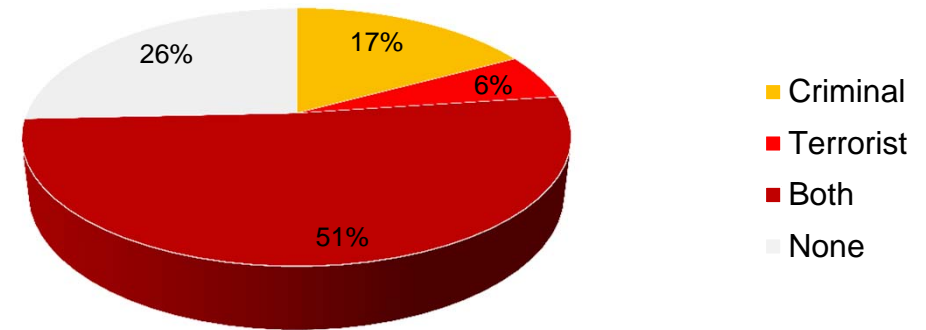


Food Defence Focalisation

Food defence focalisation public

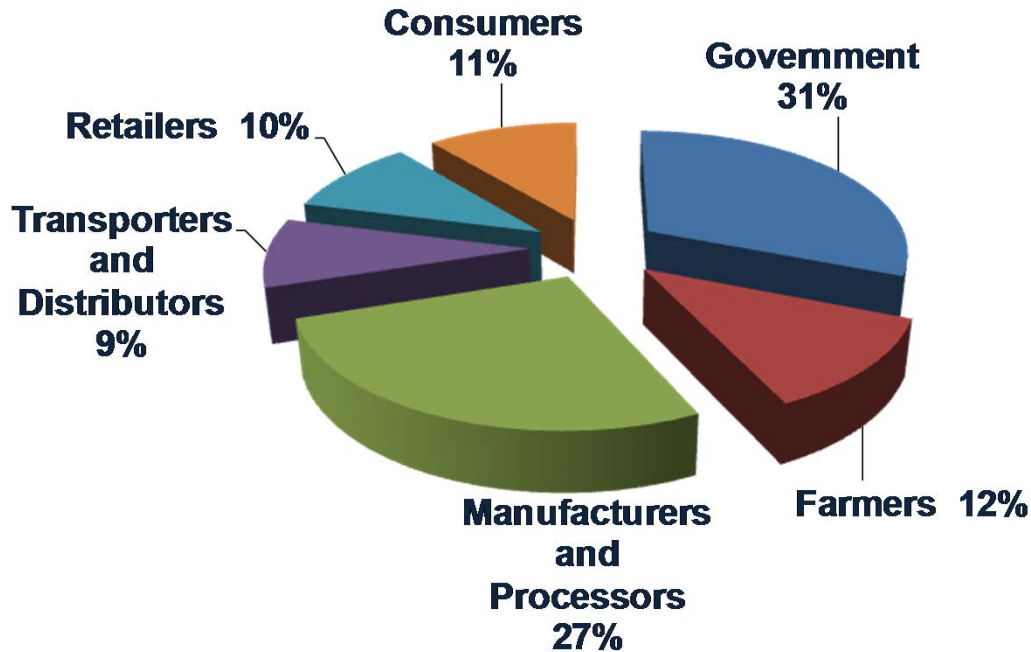


Food defence focalisation private

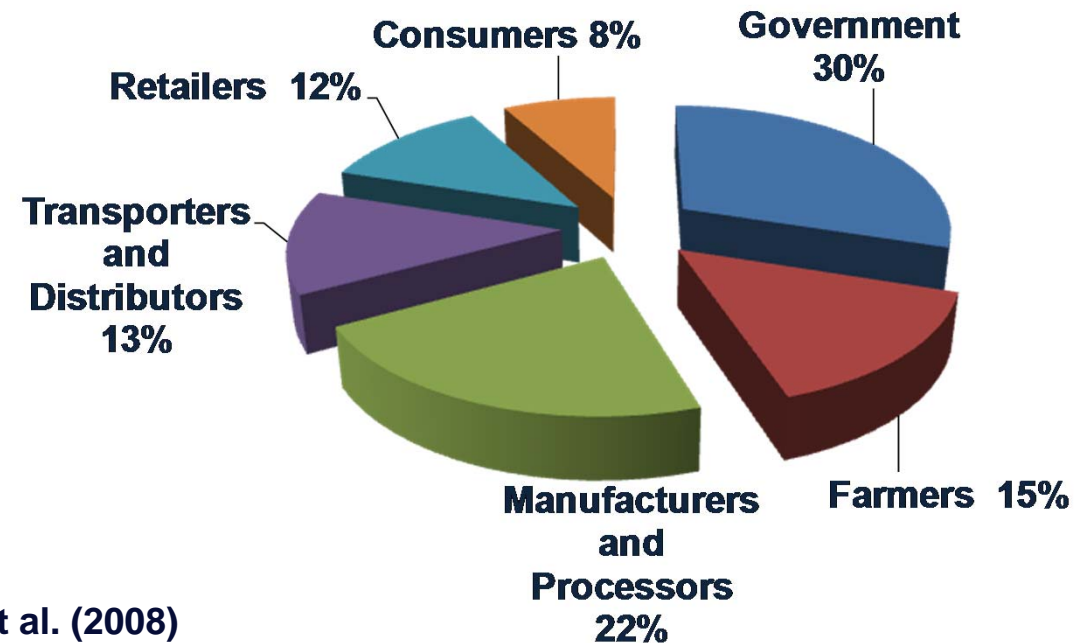


While public authorities consider separately the risk related to criminals w.r.t. terrorist (largely due to the presence of separate competence and structures), food operator adopt assume that food defense strategies should have an “all hazard” approach

Chi è responsabile della food defence?

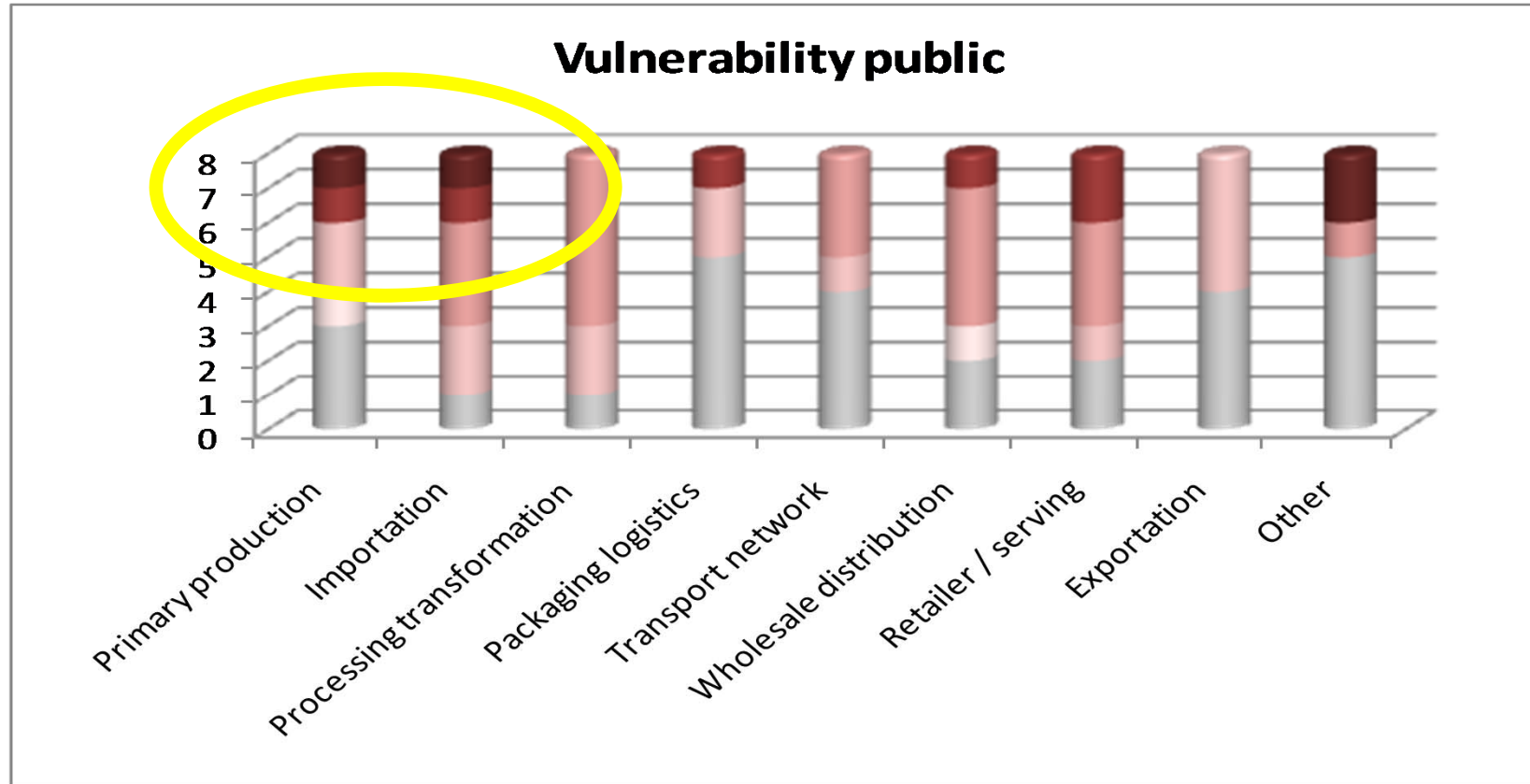


Chi pagherà le conseguenze della food defence?



Stinsons et al. (2008)

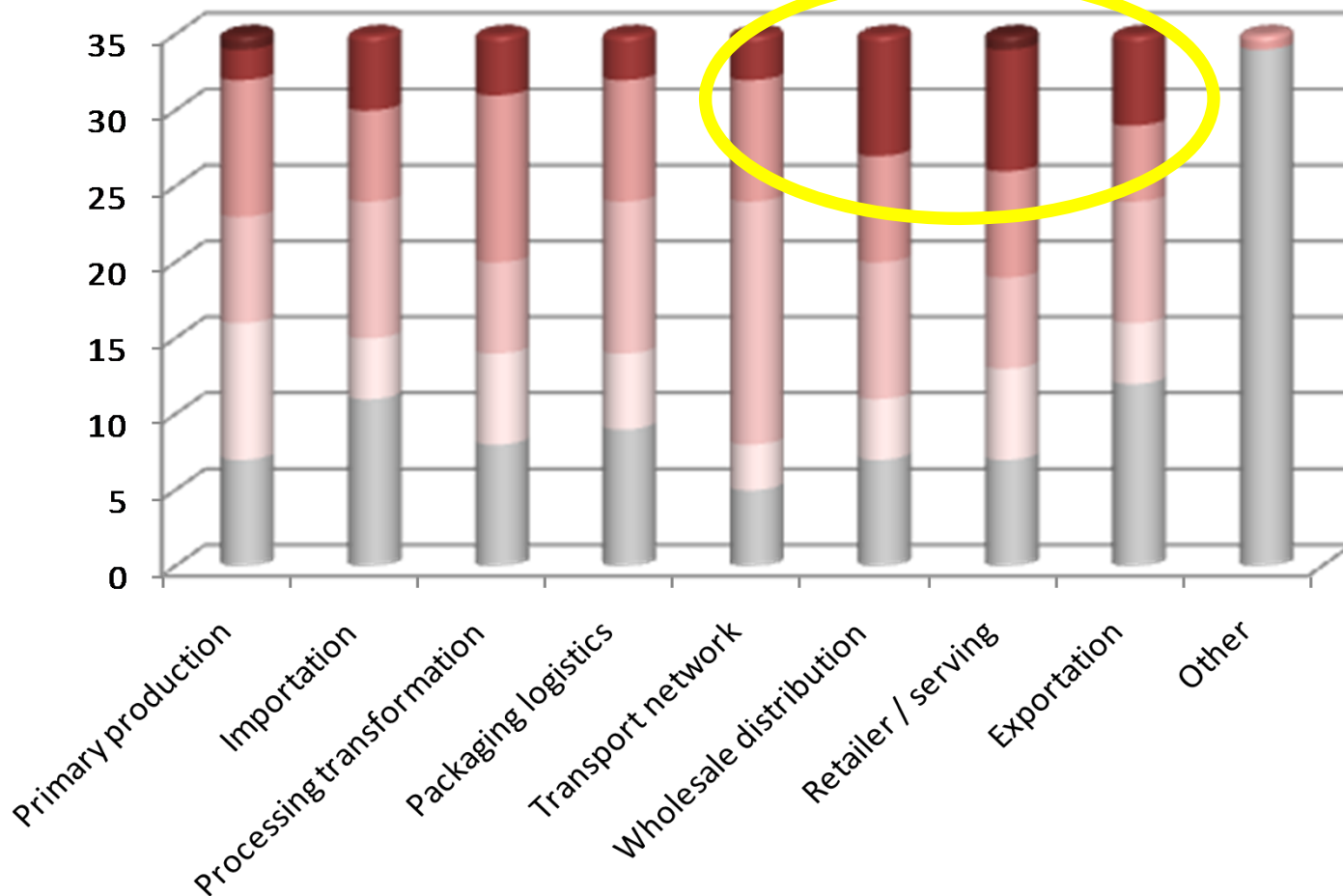
Vulnerability – public authorities



Strong attention on IMPORTATION and primary production

Vulnerability – food operator

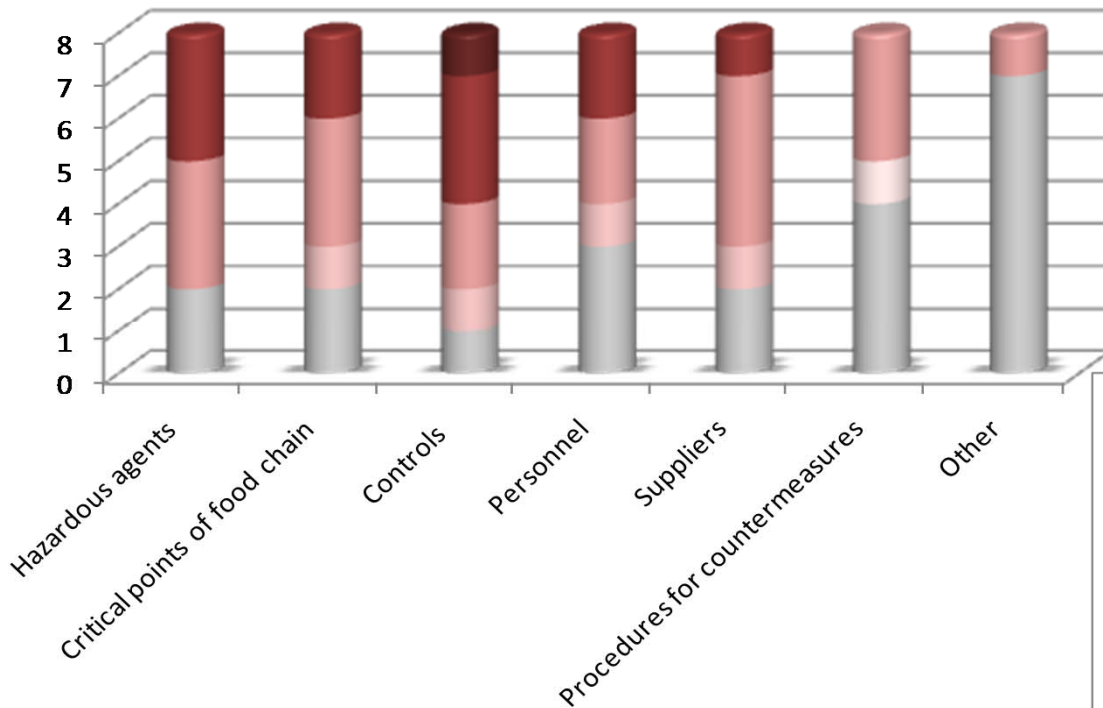
Vulnerability private



The large risk are assumed in the phase not directly controlled (i.e. Wholesale distribution and retailer)

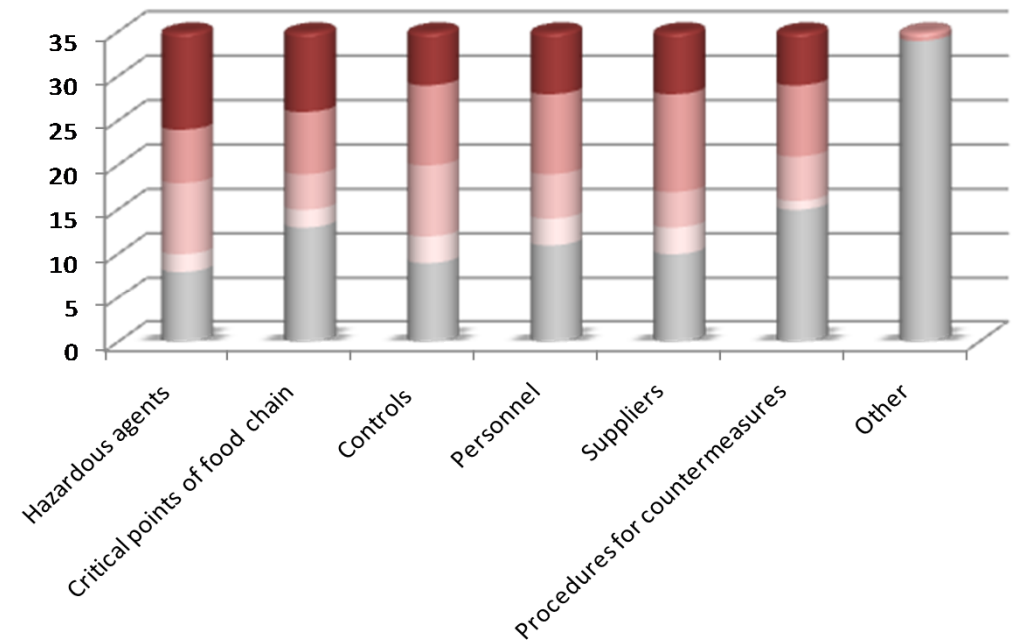
Most relevant risk/issue

Most relevant risks / issues public



The management of 'Hazardous agents' is a critical point

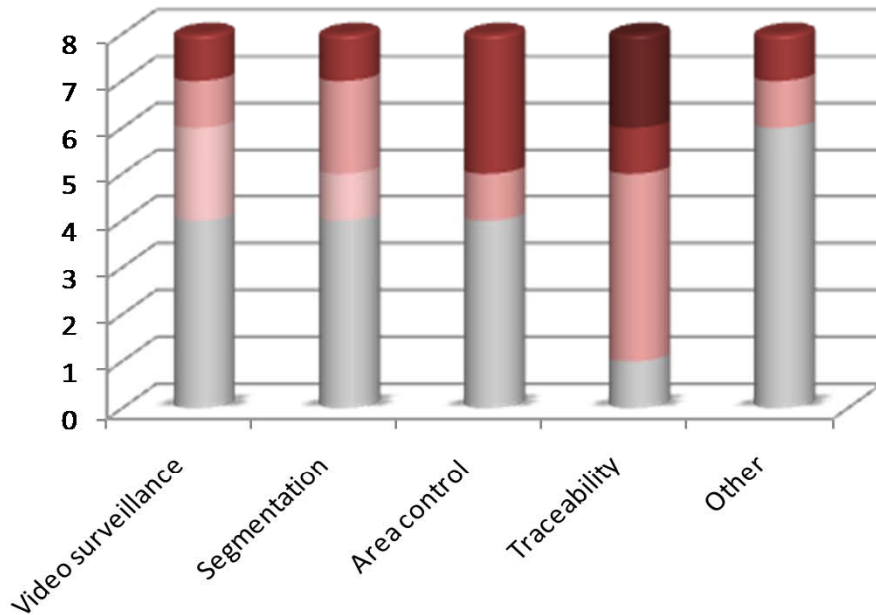
Most relevant risks / issues private



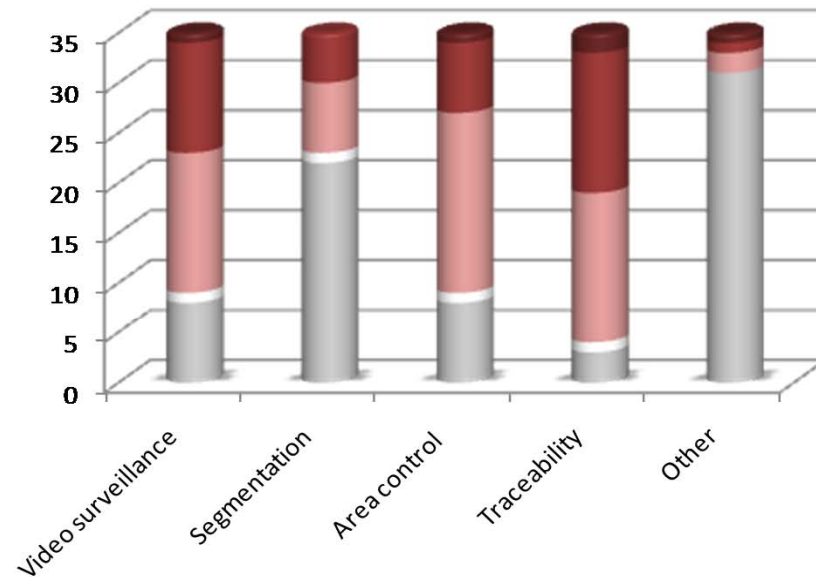
“Controls” is the most important issue for public authorities

Useful technologies

Useful Technologies public

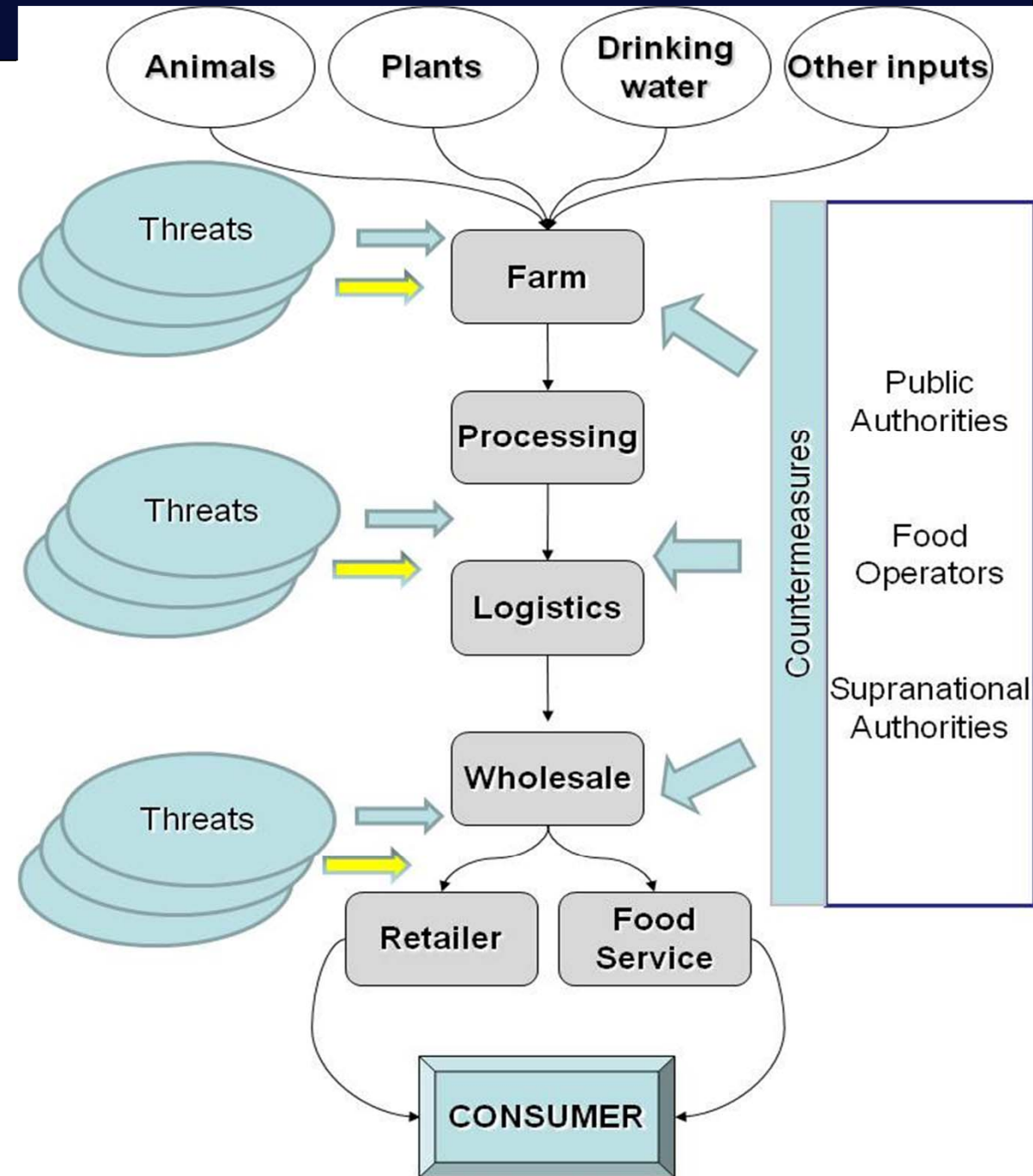


Useful Technologies private



Public authorities pose great attention on traceability

Supply Chain workflow



Agents

Biological	Chemical	Bio-Chemical	Physical
Bacillus anthracis	ammonia	Abrin	Bone fragment
Brucella spp.	Arsenic	Aconitine	Fixh bone
Burkholderia mallei (Glanders)	Arsine	Aflatoxins	Glass
Burkholderia pseudomallei (Meliooidosis)	Benzene Ethylene glycol Perfluoroisobutylene (PHIB)	Amantina	Plastic
Campilobacter jejuni	Cadmium	Clostridium botulinum toxins/organism	Small stones
Coccidioides immitis	Cannabinoids	Ricin	Splinter
Coxiella burnetti	Clostridium perfringens epsilon toxin	Saxitoxin	
Escherichia coli	Cyanide spp.	Staphylococcus aureus enterotoxin B	
Francisella tularensis	Chlorine	Tetrodotoxin	
Listeria monocytogenes	Chromium	Trichothecene mycotoxins	
Salmonella enteritidis	Diphenylcyanoarsine		
Salmonella Typhi (Typhoid fever)	Diphenylchloroarsine		
Shigella spp.	Diphosgene Lewisite		
Vibrio cholerae (Cholera)	Ethylidichloroarsine		
Vibrio vulnificus	Fentanyl and other opioids		
Yersinia enterocolitica	LSD		
Yersinia pestis	Mercury		
	Methylidichloroarsine		
	mustard spp		
	phenodichloroarsine		
	Phosgene adamite		
	Phosgene oxime		
	Phosphine		
	Quinuclidinyl Benzilate		
	Red phosphorus		
	Sarim spp.		
	Shigatoxin		
	Soman		
	Tabun		
	Thallium		
	Titanium tetrachloride		
	VX		
	White phosphorus		
	Zinc oxide		

Risk assessment

On the base of the food supply chain workflow and considering the identified contaminating agents we developed an ORM approach to identify the most dangerous threats.

ORM Matrix

Risk Assessment Matrix

←————— Consequences —————→

	Insignificant	Minor	Moderate	Major	Catastrophic	
Likelihood	Almost Certain	M	H	H	E	E
	Likely	L	M	H	H	E
	Possible	L	L	M	H	H
	Unlikely	T	L	L	M	H
	Rare	T	T	L	L	M

Likelihood

- Access probability: is the probability that the terrorist could access to the substance, power, etc, that provoke damage. (The easier the access, the probability of using it for an attack is higher).
- Vulnerability: is the probability that the infrastructure is susceptible to attack.

$$\text{Likelihood} = P(\text{Access}) \times \text{Vulnerability}$$

Likelihood Analysis

← P. Access →

	Rare	Unlikely	Possible	Likely	Almost Certain
Almost Certain	P	L	L	AC	AC
Likely	U	P	L	L	AC
Possible	U	U	P	L	L
Unlikely	R	U	U	P	L
Rare	R	R	U	U	P

Vulnerability ↑

R: Rare
U: Unlikely
P: Possible
L: Likely
AC: Almost Certain

Consequences

- Effects: the side effects that the attack can cause. This case study is going to measure both the physical and psychological consequences.
- Persons affected: number of people affected physically or psychologically or both at the same time.

Consequences = Effects x Persons Affected

ORM Matrix

Risk Assessment Matrix

		Consequences				
		Insignificant	Minor	Moderate	Major	Catastrophic
Likelihood	Almost Certain	M	H	H	E	E
	Likely	L	M	H	H	E
	Possible	L	L	M	H	H
	Unlikely	T	L	L	M	H
	Rare	T	T	L	L	M

Catastrophic: 10% population death, system loss

Major: death, severe injury, severe system damage

Moderate: system damage, require medical attention

Minor: minor system damage, no relevant illness

Insignificant: possible minor injury

Likelihood Analysis - Yoghurt

production phase

P. Access

	Rare	Unlikely	Possible	Likely	Almost Certain	
Vulnerability	Almost Certain					
	Likely		<i>Tetrodotoxin</i> <i>Thallium</i> <i>Fentanyl</i>	<i>Saxitoxin</i> <i>Cadmium</i> <i>BZ</i>	<i>Aflatoxin</i> <i>Mercury</i>	<i>Abrin</i> <i>Ricin</i>
	Possible		<i>Nitrogen Mustard</i> <i>Diphosgene</i> <i>Lewisite</i>	<i>Safrol</i>	<i>Chromium VI</i> <i>Phosphorus</i> <i>Titanium</i>	<i>Arsenic</i>
	Unlikely				Tetrahydrocannabinoids	Nicotine
	Rare		Coxiella Burnetii Francisella Tularensis		Bacillus Anthracis Listeria Monocytogenes E-Coli Salmonella Brucella	



Risk Assessment Matrix - Yoghurt

Production phase

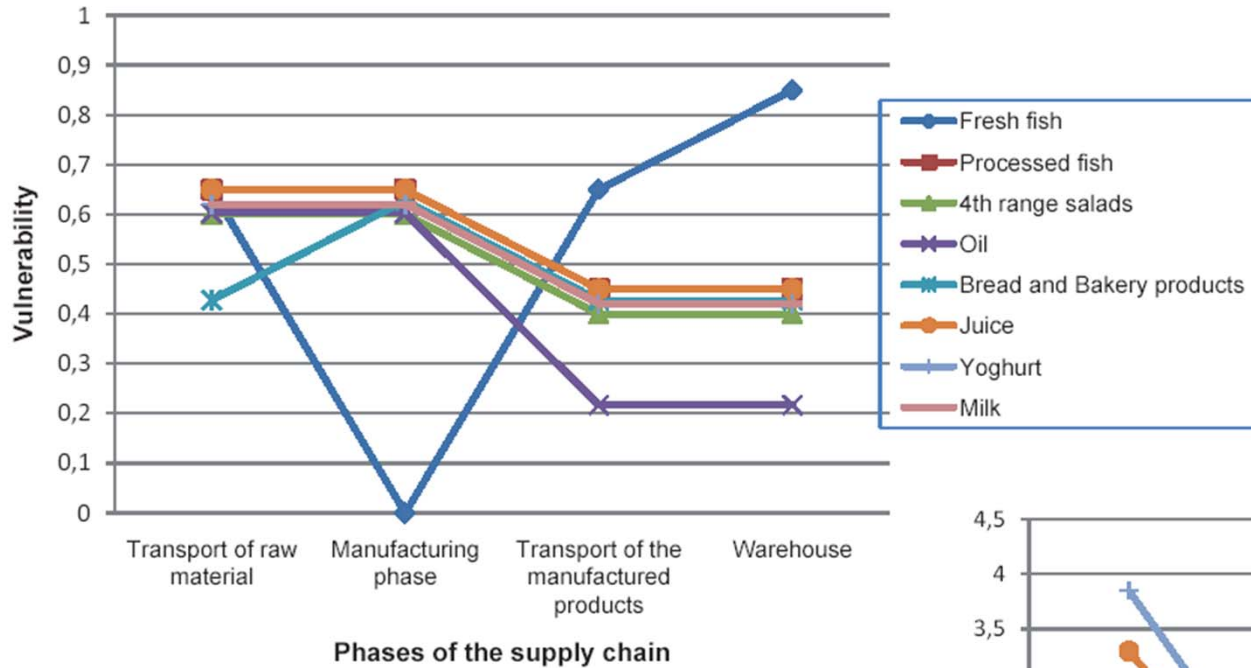
Consequences

		Consequences				
		Insignificant	Minor	Moderate	Major	Catastrophic
Likelihood	Almost Certain				<i>Ricin</i>	<i>Abrin</i>
	Likely		<i>Titanium</i>		<i>Aflatoxin</i> <i>Cadmium</i>	<i>Arsenic</i> <i>Mercury</i> <i>Chromium VI</i> <i>Saxitoxin</i> <i>Nicotine</i> <i>Phosphorus</i>
	Possible		<i>Safrol</i> <i>Tetrahydrocannabinoids</i>	<i>Thallium</i>		<i>Tetrodotoxin</i>
	Unlikely		<i>Nitrogen mustard</i> <i>Diphosgene</i> <i>Lewisite</i>	E-Coli Brucella	Salmonella	Bacillus Anthracis Listeria Monocytogenes
	Rare			Coxiella Burnetii		Francisella Tularensis

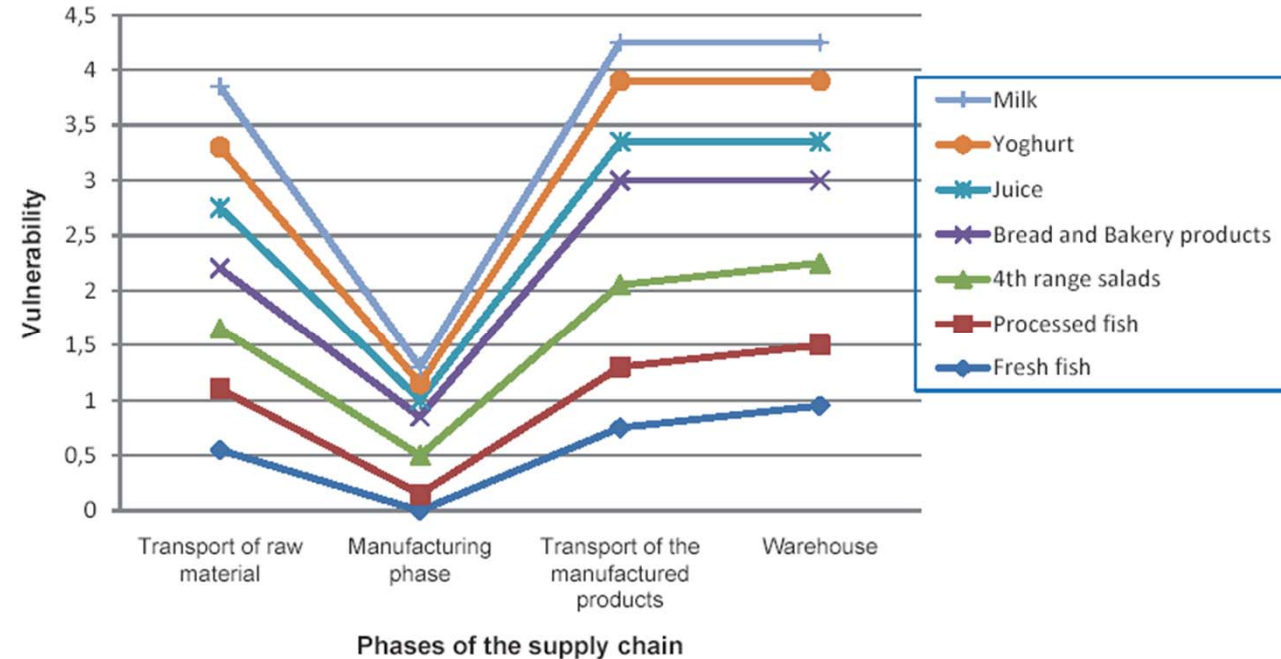
Extreme
 High
 Medium
 Low
 Tolerable

Vulnerabilità della filiera

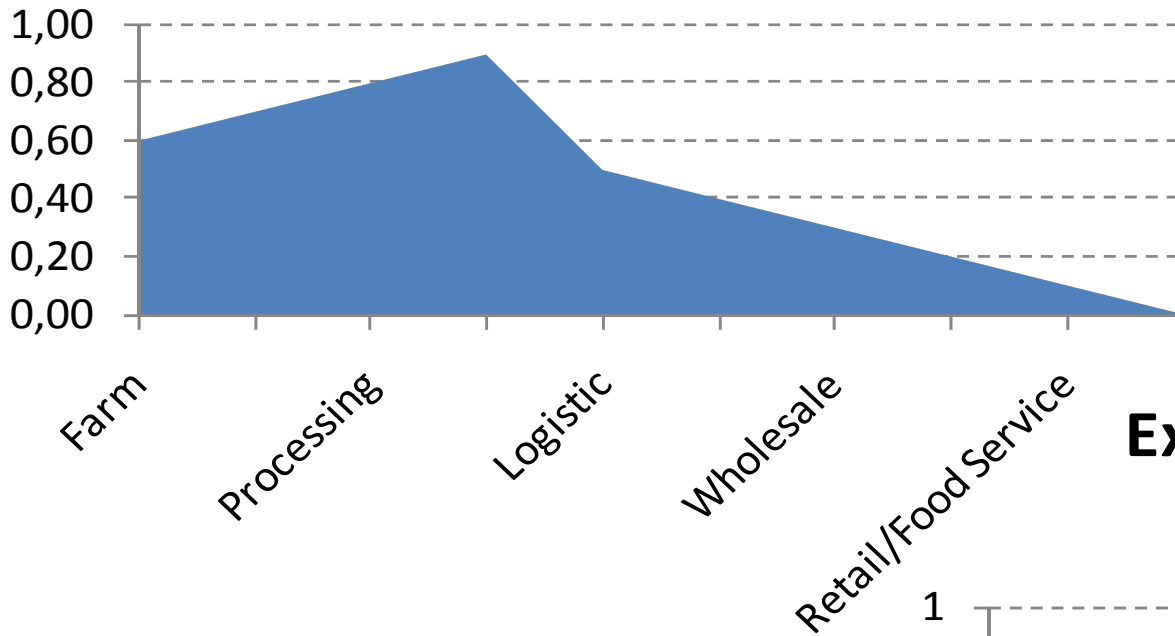
Chimica



Biologica

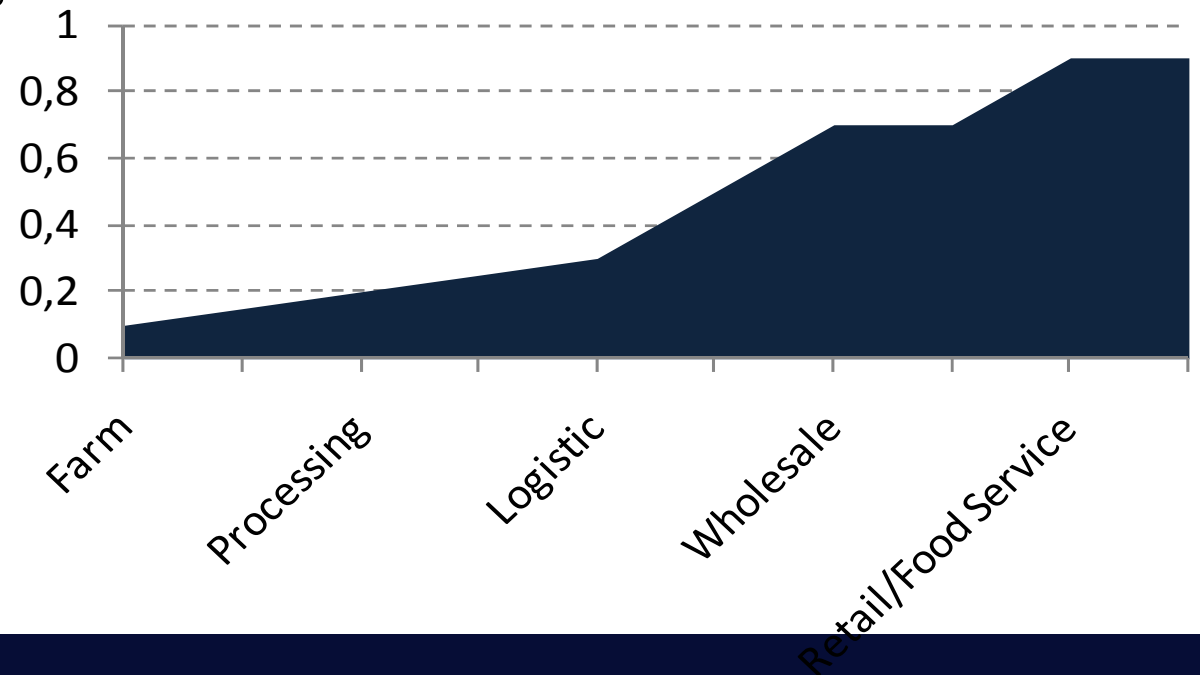


Exposition to large contamination



To produce a huge impact the most effective phase is immediately after the processing phase

Exposition to "symbolic" contamination



More the attacks is close to the consumer, less are the controls and hence it is high the probability of success.

Attenzione a miti e mode

“Deliberate food and water contamination remains the easiest way to distribute biological or chemical agents for the purpose of terrorism” (Khan, Swerdlow and Juranek, 2001, p.3).



Undertaking a major attack on the food supply chain is much more difficult than at first it may be believed (CPNI, 2008)

"Terrorists are less likely to use chemical and biological weapons than conventional explosives, at least partly because chemical and biological agents are difficult to weaponize and the results are unpredictable." (GAO 1999a, 18)

vulnerability-driven approach ignores fundamental questions of **intention** and **capability** (Dalziel, 2012)

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