

JIFSAN Good Aquacultural Practices Program

Aquaculture Product Safety and Consumer Health



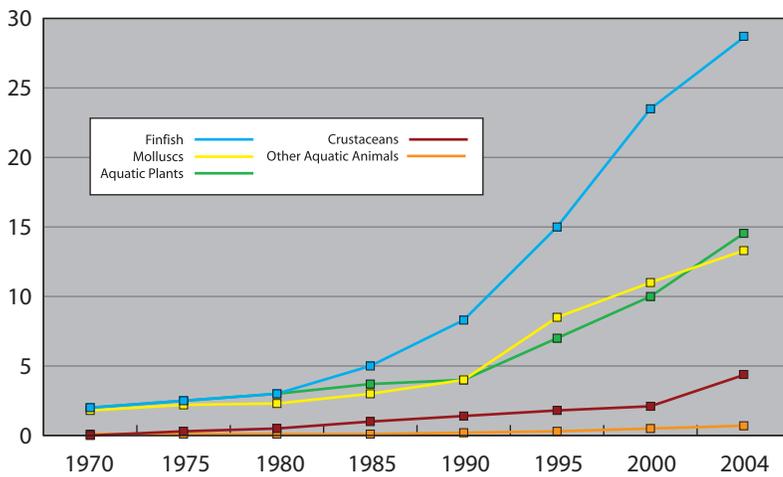
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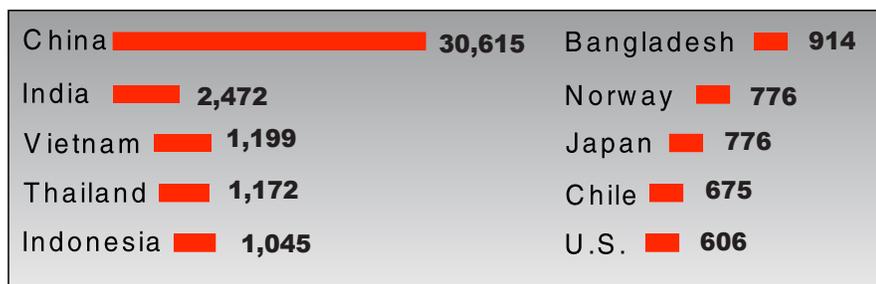
An Overview of Aquaculture Public Health Issues

With wild catch of seafood threatened in the face of increasing demand worldwide there has been a marked increase in the production of seafood by aquaculture. A wide variety of species of finfish and shellfish are now grown. With this increase comes more concern for the quality and safety of these fishery products.



China is the world’s biggest producer of aquacultured species. Worldwide aquaculture products provide more than 36% of the world’s total fishery supplies (FAO 2004).

Aquaculture Production: Major Producer Countries 2004



■ Quantity (thousand tonnes)

Source: FAO 2006

Public Health Issues

Aquaculture public health issues are highly focused, well known, and understood. Public health issues can be grouped as either environmentally induced (sub-divided into natural and anthropogenic), process induced, or distribution and consumer induced hazards (Garrett et al. 1997, 2000).

Chemical Contaminants

Environmentally induced hazards primarily for molluscan shellfish include chemicals such as Paralytic Shellfish Poisoning (PSP) domoic acid and other naturally occurring toxins. Anthropogenic hazards such as pesticides and polychlorinated biphenyls (PCBs), antibiotics (e.g., chloramphenicol, nitrofurzan, etc.) can affect all types of fishery products. Process and handling induced chemical hazards include contamination of product due to improper use of chemicals and pesticides during processing or improper labeling of products containing compounds such as bisulfites and other allergenic food additives (Garrett et al. 1997, 2000). Histamine can also form in scombrototoxic fish (e.g., tuna) if procedures are not in place during processing and handling

- to ensure proper temperature control.

Biological Concerns

- Hepatitis and norovirus can be found in raw molluscan shellfish and also in foods cross-contaminated during processing through sick workers and by improper employee sanitation practices. *Salmonella* spp. and *Listeria monocytogenes* are found in aquaculture ponds and on many raw fishery products. In addition, products can also be contaminated with these organisms during processing through poor sanitation and improper employee hygiene practices. *Vibrio*

spp. are naturally occurring pathogens found in the growing waters associated with molluscan shellfish, and *Vibrio* spp. can also contaminate the outside surface of other fishery products posing health problems for employees who handle and process these fishery products. Organisms such as *Clostridium botulinum* are a potential public health issue primarily for refrigerated fishery products stored and packaged under reduced oxygen conditions. *Staphylococcus aureus* can contaminate fishery products during processing due to improper employee hygiene practices. *S. aureus* can form a heat stable toxin during refrigerated storage of the finished product (Garrett et al. 1997; Jahncke and Schwarz 2002).

Potential Zoonotics

These are bacteria that can infect both the aquatic animal and humans. *Streptococcus iniae* has caused infections in the hands of fish processors in Canada (Weinstein et al. 1997), while workers in Israel were infected with *Vibrio* spp. from handling live tilapia (Bisharat and Raz 1996). *Mycobacterium marinum* found on both cultured and wild fishery products has caused severe wound infections in fishery workers (Jahncke and Schwarz 2002). *Edwardsiella tarda* and *Aeromonas* spp. can be found in aquaculture ponds and have been associated with infections in both fish and employees. *Leptospira* spp. can be transmitted to aquaculture operations through the urine of rodents (Jahncke and Schwarz 2002).

Suggested Aquaculture Management Approach

- Application of HACCP-based principles as a risk management tool for aquaculture, development of written Standard Operating Procedures (SOPs), implementation of Good Aquaculture Practices (GAQPs), employee training programs, and medical screening evaluations of new employees can minimize public health issues associated with aquaculture operations (Jahncke and Schwarz 2002).

Food Safety Implications

- Food safety is a global issue with both trade and public health consequences.

Consumer Perceptions

- Consumers expect safe/wholesome fishery products. Perceptions of food safety issues by consumers vary by country due to differences in available technology in food production, differences in harvest/handling and storage practices, cultural differences, education levels, dietary differences, etc. Food safety issues can adversely affect trade and create problems for the export of fishery products (Buzby 2005).

Consumer Perceptions in the U.S.

- Consumers in the U.S. are becoming increasingly concerned about foodborne bacteria. Highly publicized food safety issues lead to changes in

<ul style="list-style-type: none"> • Raw Materials – “Natural” 	
PSP	Domoic Acid
Other Toxins	
<ul style="list-style-type: none"> • Raw Materials – “Anthropogenic” 	
Pesticides and PCBs	Antibiotics
<ul style="list-style-type: none"> • Process/Handling 	
Histamine	Food Additives
Bisulfite	Other
Pesticides	

<h3>Biological Concerns</h3>	
<ul style="list-style-type: none"> • Hepatitis • Norovirus (Norwalk) • Clostridium botulinum • Staphylococcus aureus 	<ul style="list-style-type: none"> • Shigella • Vibrio spp. • Listeria monocytogenes • Salmonella
<h3>Zoonotics</h3>	
<ul style="list-style-type: none"> • Streptococcus iniae • Mycobacterium spp. • Vibrio spp. 	<ul style="list-style-type: none"> • Edwardsiella tarda • Aeromonas spp. • Leptospira spp.
<ul style="list-style-type: none"> • Others? 	

consumer food purchasing decisions. Chemical issues are also a major concern for consumers in the U.S., E.U. and Japan (Buzby 2005).

Food Safety Consequences

Foodborne illnesses from imported food products can result in increased governmental regulations and restrictions on imported food products.

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