Assessment and communication of the toxicological risk/safety of consuming shrimps and prawns of aquaculture origin

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Overview

• Project commissioned by Seafood Importers and Processors Alliance **to assess**
  • risk from shrimp imported to Europe
    ▪ media claims associated with consuming imported shrimp
    ▪ public information regarding consuming shrimp
    ▪ whether media claims are justified and whether public information is accurate
Background

- Public have negative perceptions concerning farmed tropical shrimp
- Do these perceptions reflect the evidence from shrimp production?
- Is the media responsible for creating or continuing negative public perceptions?
- How does potential consumption of shrimp and prawn relate to advised safe levels of intake of contaminants?
Evidence of public health risks

• Evidence obtained from the EU’s Rapid Alert System for Food and Feed (RASFF)

• Provides detailed notifications of batches of imported goods that have failed EU regulations
RASFF database

• Notifications characterised into 7 categories; bacteria, antimicrobials, additives, heavy metals, persistent organic pollutants (POPs), spoilage and traceability
• Country of origin identified
• Characterised into “farmed” or “wild” where possible, according to FAO Fishstat production figures – not possible for all species in all countries
Media search

- Nexis search on “shrimp” in headlines of European newspapers in 4 languages
- All stories related to shrimp value chains and trade collated

<table>
<thead>
<tr>
<th>ID</th>
<th>Title</th>
<th>Source</th>
<th>Words</th>
<th>Hits</th>
<th>Date</th>
<th>Preview</th>
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</thead>
<tbody>
<tr>
<td>226</td>
<td>Des crevettes élevées chinoises sont exportées vers le marché de l’UE</td>
<td>Xinhua News Agency - French, Actualité Nationale</td>
<td>118</td>
<td>1</td>
<td>20 décembre 2004</td>
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<tr>
<td>227</td>
<td>Saisie de 12 tonnes de crevettes congelées volées</td>
<td>Agence France Presse</td>
<td>187</td>
<td>1</td>
<td>10 décembre 2004</td>
<td></td>
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<tr>
<td>228</td>
<td>Crevette : tensions entre Américains et Chinois dues à la chute des prix (PAPIER D’ANGLE)</td>
<td>Agence France Presse, Par Françoise MEDGYESI</td>
<td>557</td>
<td>1</td>
<td>5 décembre 2004</td>
<td></td>
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<tr>
<td>229</td>
<td>Madagascar. La crevette malgache méritait un laboratoire. REPORTAGE. La crevette aurait été interdite d’exportation sans la création d’un laboratoire de sécurité alimentaire.; ANTANANARIVO, reportage de notre envoyé spécial.</td>
<td>La Croix</td>
<td>785</td>
<td>1</td>
<td>7 septembre 2004</td>
<td></td>
</tr>
</tbody>
</table>
Media analysis

- Use “Frame Analysis” to categorise stories into 5 themes according to importance for responsible value chains
  - Public health, Social responsibility, Environmental impact, Economics and Traceability
- Characterise stories as positive, negative or neutral
- Compare to current public information on the internet
Risk assessment of shrimp

• RASFF lists level of harmful substance in each sample from each batch tested
• What proportion of crustacean imports fail RASFF?
• Risk assessment can only be made on consignments that have failed – not those available to consumers
• Risk based on Acceptable Daily Intake (ADI)
• Calculate consumption level of contaminated material needed to reach ADI
RASFF results 1998-2006

- Trend of bacteria to antimicrobial contamination
- More additives and heavy metals appearing from 2003
RASFF results 2007-2015

- Fewer alerts overall
- Fewer bacterial, antimicrobials and additives alerts, but more spoilage
Bangladesh and India both have important aquaculture industries – India, wild fisheries
Export markets also important
Relatively high level of alerts in wild (IN), cultured (BD) and produce of unknown origin (IN)
Improving picture after EC Decision 2009/727/EC
• Thailand steadily growing farming industry until EMS, China rapidly changed from wild to farming focus
• Production in both, until recently, increasingly export oriented
• Number of alerts reduced quickly after 2002
Europe has a slowly declining shrimp fishery and small amount of farming.

Exports outstrip production – (re-export)

Alerts are comparatively high – all in wild or unknown.
Total alerts compared to EU imports

- Data shows number of alerts have gradually declined since 2002 peak
- Between 5 and 10 alerts per 100,000 tonnes of imported shrimp products
• Peak of public health related newspaper articles in 2002
• Matches RASFF alerts
• Later articles more concerned with social responsibility
### Risk assessment of failed consignments

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>ADI – mg/kg/bw</th>
<th>Production</th>
<th>Mean RASFF mg</th>
<th>Upper RASFF mg</th>
<th>Max intake based on mean RASFF 70kg adult /day</th>
<th>Max intake based on upper RASFF 70kg adult /day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulphite</td>
<td>0.7/day</td>
<td>Farmed</td>
<td>169</td>
<td>435</td>
<td>290g</td>
<td>113g</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wild</td>
<td>304</td>
<td>2327</td>
<td>161g</td>
<td>21.1g</td>
</tr>
<tr>
<td>Oxytetracyclin</td>
<td>0.03/day</td>
<td>Farmed</td>
<td>0.214</td>
<td>2.07</td>
<td>9.82kg</td>
<td>1.02kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wild</td>
<td>No Alerts</td>
<td>No Alerts</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Cd</td>
<td>0.025/mn</td>
<td>Farmed</td>
<td>1.14</td>
<td>1.8</td>
<td>51.2g</td>
<td>32.4g</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wild</td>
<td>1.31</td>
<td>2.5</td>
<td>44.7g</td>
<td>23.3g</td>
</tr>
<tr>
<td>Nitrofurans</td>
<td>N/A</td>
<td>Farmed</td>
<td>0.159</td>
<td>11</td>
<td>0.945g</td>
<td>0.0136g</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wild</td>
<td>0.134</td>
<td>1</td>
<td>0.012g</td>
<td>0.150g</td>
</tr>
<tr>
<td>chloramphenicol</td>
<td>N/A</td>
<td>Farmed</td>
<td>0.0182</td>
<td>0.91</td>
<td>24.8g</td>
<td>0.495g</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wild</td>
<td>0.0534</td>
<td>1.4</td>
<td>8.43g</td>
<td>0.321g</td>
</tr>
</tbody>
</table>

- Generally, farmed product appears safer than wild
- It is a complex picture and these figures only show the material from RASFF – not all shrimp and prawns
Media analysis results 2

- Stories about human health and social responsibility tend to be negative
- Other aspects may be more balanced
- Emphasis is different in different countries
First 50 sites after Googling “farmed shrimp”
Do not reflect the mainstream media
General includes aspects including human health, environment and social responsibility
Positive sites tend to be from NGOs supporting standards to improve shrimp culture
Many websites highlighting human safety referred to this report (http://www.consumerreports.org/cro/magazine/2015/06/shrimp-safety/index.htm)

Found traces of many bacteria and antibiotic residues in several samples of shrimp at major US retailers
Only one website tried to contextualise the information.

“The Consumer Reports study found bacteria in 60 percent of the raw shrimp it sampled. Is this number troubling?”

Dr. Fitzsimmons, University of Arizona: “In some cases, yes, but in most cases, no. The majority of bacteria reported in the story were E. coli and Vibrio. Both of these bacteria are ubiquitous. E. coli is found on virtually all our food and surfaces where humans are present. And Vibrios are ubiquitous in marine environments. In fact, I would be more concerned if these bacteria were absent, as I would wonder what had killed them.”

[https://www.bestfoodfacts.org/shrimp-safety-consumer-reports/]
“Should consumers be worried about the safety of shrimp?”

Dr. Fitzsimmons: “Consumers shouldn’t be any more worried about shrimp than any other food stuff. But, of course, we should be aware of safety with any food and should handle it and cook it accordingly.”
Conclusions

- RASFF alerts for shrimp imports to Europe have declined
- Some countries are more likely to trigger alerts than others
- Mainstream media generally reflects what is happening regarding RASFF alerts
- The internet and blogosphere have a multiplying effect on the worst cases
- The industry needs to communicate the positive case better
Pangasius V shrimp

• One species-one country-relatively standardised culture system and highly consolidated (Pangasius)

• Media claims for Pangasius affected by its low cost and substitution within an established sector

• Both affected by changes in detectability of contaminants and assessment of health risks
• Watch out for final reporting of this work on Global Aquaculture Advocate and in the peer-reviewed literature