A Food Industry Update on Economically Motivated Adulteration

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IFPAC
Baltimore, MD
Jan 2011

Agenda

Part I - Update on the Food Industry Collaborative Effort

Part II - What is Cargill doing about detection/deterrence?
US Food Industry Effort

- Recognition that some individual companies had independent programs
- No collaboration across the industry
- No industry trade effort
- Need for a collaborative effort to allow trade to communicate a good story
- Turned to Grocery Manufacturer’s Assoc (GMA) for support
- GMA utilizing 3rd party consulting

GMA Economic Adulteration WG

- Increase awareness
- Stakeholder collaboration
- Roundtable meetings
- Information sharing: actual incidents, potential incidents, sharing analytical info/methods
- Alignment of analytical vendors
- Alignment of Industry/Academia/Gov’t
Study Objectives

- Develop a baseline of EMA cases
- Create a best practice inventory
- Assign risk-benefit cost
- Identify themes and motivational drivers
- Develop strategies to avoid and/or detect EMA
- Identify private/public partnership opportunities

What is Economic Adulteration?

Fraudulent, intentional substitution or addition of a substance in a product for the purpose of increasing the apparent value of the product or reducing the cost of its production, i.e., for economic gain

Source: FDA Public Meeting on Economically Motivated Adulteration (May 1, 2009)
EA Takes Many Forms

“Mislabling”
e.g., sunflower oil sold as olive oil

“Unapproved Enhancements”
e.g., melamine added to milk to enhance the protein value

“Substitution”
e.g., honey with beet sugar

“Concealment”
e.g., salmonella peanut contamination concealed by PCA

“Dilution”
e.g., watered down milk

“Non-disclosure”
e.g., sulfites in food to hide deterioration

Counterfeiters Are Getting Smarter

- Look-alikes: containing little or no active ingredient
- Rejects: which have been rejected by the manufacturers or regulatory authorities for quality reasons.
- Re-labeled: items, usually pharmaceuticals which have expired, are re-labeled to show a later date.
- Fake components: a product’s performance quality can be reduced considerably by fake inferior components
- Third shift or Overruns: EMs producing goods on behalf of customers over-produce the order, either through extra shifts or production overruns.
- Parallel trade: (“grey market”) involving cross-border trades in a product in parallel to a manufacturer’s official main distribution chain in that country.
- Parallel imports (“grey market imports”) goods brought into a country without the authorization of the patent holder after the goods had been lawfully brought into circulation elsewhere
- Grey Market or Diverted Goods: real products sent to markets where they were not intended.
- Refills: real, emptied packages are refilled with low-cost, low-quality, counterfeit products e.g. sodas, inkjet cartridges

- Increasing Infiltration into Supply chain:
  - Counterfeit and pirated products, previously distributed through informal markets, are infiltrating legitimate supply chains, with products now appearing on the shelves of established shops
- Disguising Origin points:
  - International free trade zones, where there are minimal regulations, are of increasing concern, as passing merchandise through such zones provides opportunities for parties to "sanitize" shipping documents in ways that disguise their original point of manufacture
- Using the Internet for logistics and distribution:
  - Utilizing readily available software and images on the Internet, counterfeiters are easily creating sophisticated and professional looking packages and websites. It has also provided counterfeiters with a new and powerful means to sell their products via auction sites and stand-alone e-commerce sites

Sources: SADTglobal.com, OECD - The Economic Impact of Counterfeiting and Piracy 2008
Identify Best Practices

Select Industries, Companies and Sample Best Practices

### CPG/Retail
- Sample Best Operational Practices
  1. Bar code Symbologies
  2. RFID tags
  3. Holograms and watermarks
  4. Anti-counterfeiting ink
  5. Near Infrared Spectroscopy (NIR)
  6. HPAE-PAD

### Pharmaceuticals
- Sample Best Operational Practices
  2. Comprehensive study that includes legislative recommendations, international collaboration definition, roles of supply chain partners and recommendations
  3. Neil Mermelstein, Editor Emeritus
  4. Bob Swientek, Editor-in-Chief

### Automotive
- Sample Best Operational Practices
  1. Trade association White Paper on Spices – Adulteration
  2. Risk assessment elements and a three-pronged approach to deal with the problem of adulteration in spices
  3. Cheryl Deem, Exec Director

### Media/Hi-Tech
- Sample Best Operational Practices
  1. Scientific research paper on Food Profiteering & Counterfeit Product Threat
  2. Causal analysis, impact and strategic recommendations for dealing with food safety
  3. Dr. John Spink, Director

### Notes:
1. Sample practices include ingredient testing best practices as well as packaging related best practices
2. HPAE-PAD = High pH anion exchange chromatography-pulsed amperometric detection

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**Insights from Various Organizations**

| Trade association White paper on the anti-counterfeiting of medicines (2005) | Comprehensive study that includes legislative recommendations, international collaboration definition, roles of supply chain partners and recommendations | Christine-Lise Julou, Director
| Scientific paper Testing for Adulteration (2008) | Testing procedures and applicability, melamine case example, for detecting adulteration | Neil Mermelstein, Editor Emeritus, Bob Swientek, Editor-in-Chief
| Trade association White Paper on Spices – Adulteration | Risk assessment elements and a three-pronged approach to deal with the problem of adulteration in spices | Cheryl Deem, Exec Director
| Scientific research paper on Food Profiteering & Counterfeit Product Threat | Causal analysis, impact and strategic recommendations for dealing with food safety | Dr. John Spink, Director
| Scientific research paper on Economic Adulteration of High-Value Food Products: The Honey Case | Highlights the issue of economic adulteration of high-value food products and provides a context for discussion and analysis based on experiences with the U.S. honey industry | Dr. Gary Fairchilds, Professor Emeritus
| Intellectual Property Protection and Enforcement Manual | Industry body for suppliers and users of authentication technologies, systems and services dedicated to advancing the understanding and effective use of authenticating technologies and processes to the end user community and the public sector | Jim Rittenburg, Ph.D., Vice President
## Industry Cost of Inaction

### Estimated Cost of Inaction – Aggregate Industry Impact

<table>
<thead>
<tr>
<th>Incident</th>
<th>Adulterant</th>
<th>Cost of Inaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pet Food (US)</td>
<td>Melamine</td>
<td>$2.4 B</td>
</tr>
<tr>
<td>Toys (US)</td>
<td>Lead Paint</td>
<td>$0.9 B</td>
</tr>
<tr>
<td>Toothpaste (US)</td>
<td>Diethyl Glycol</td>
<td>$0.1 B</td>
</tr>
<tr>
<td><strong>Total 2007</strong></td>
<td></td>
<td><strong>$3.4 B</strong></td>
</tr>
<tr>
<td>Milk (China)</td>
<td>Melamine</td>
<td>$10 B</td>
</tr>
<tr>
<td>Peanut (US)</td>
<td>Salmonella</td>
<td>$1.5 B</td>
</tr>
<tr>
<td>Pharma (Global)</td>
<td>Heparin</td>
<td>$0.1 B</td>
</tr>
<tr>
<td><strong>Total 2008/2009</strong></td>
<td></td>
<td><strong>$11.6 B</strong></td>
</tr>
</tbody>
</table>

### Assumptions on yearly EA cases

<table>
<thead>
<tr>
<th>Impact of incident</th>
<th># of cases with comparable cost impact(1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>1</td>
</tr>
<tr>
<td>Medium</td>
<td>5</td>
</tr>
<tr>
<td>Low</td>
<td>10</td>
</tr>
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### Estimated yearly cost to the market

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<tr>
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<td>$4.5 B</td>
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<tr>
<td>Low</td>
<td>$7.9 B</td>
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<tbody>
<tr>
<td>High</td>
<td>$18.5 B</td>
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Notes: (1) Assumption on comparable cases considers that not all economic adulteration cases are reported publicly

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## Identification and Prioritization

### Robust Baseline of Past Incidents

- Company
- Food and Consumer Packaged Goods Industry
- Other Industries(1)

### Prior Incidents

- Company
- Food and Consumer Packaged Goods Industry
- Other Industries(1)

### Forecasting Tools

- Supplier Assessments
- Market Intelligence
- Consumer Preferences
- Government Intelligence

### Sources

Note: (1) Other industries may include pharma, chemicals, automotive, etc.
Source: A.T. Kearney analysis, 2009
Three Questions Guide an EMA Strategy

1. Identify and prioritize targeted products
2. Define detection strategies
3. Define deterrence strategies
4. Understand Local Value Systems
5. Develop Governance Plan
Deliverable – Report


Detection/Deterrence

- Cargill’s testing program for animal feed ingredients
  - NIR
  - Lateral Flow Device
  - Testing Program in China
NIR Spectral “Fingerprint”
no two are alike!

They looked similar, but are very different

high protein soybean ml
CP 49.1%

low protein Soybean ml
CP 45.1%

SBM spiked with Melamine - Full NIR Spectra after math treatment

Pure Melamine

0% melamine

see next slide for zoom view
NIR response @ 1468 nm attributed to the aromatic triazine structure in melamine

100% melamine
50% mel in SBM
25% mel in SBM
10% mel in SBM
0% mel in SBM

Global LIMS-OVSdb

USA/Canada
Mexico
Taiwan
Korea
Indonesia
China
Vietnam
Thailand
Malaysia
Philippines

Real time data basing of NIR results

Data Counter
4,200,000 (+1 every 4 sec)
Global NIR Testing Program

NIR calibration datasets
- Based on > 350,000 samples, increasing daily, around the clock
- Over 600,000 scans performed globally each year
- More than 80 NIR instruments
- Over 280 ingredients predicting up to 14 nutrients

Example: soybean meal calibration of > 8,000 samples representing SBM throughout the world

QuickTox™ Melamine Test

Example: melamine test for detecting melamine contamination
How LFDs work
Weigh
Add buffer
Shake
Pour into cheesecloth

Squeeze sample
Filter extract
Sample into cup
Test sample

Validation
Trucks lined-up waiting to be tested for contaminants

Langfang Plant

Nanjing

Proper sampling is critical
Contaminant Testing Process

Sample Preparation

ACCEPT
Contaminant Negative

REJECT
Contaminant Positive

NIR Testing for Contaminants

Nutrient Testing

Trucks are unloaded only upon laboratory tests indicating contaminant negative

Rapeseed meal being unloaded Nanjing Plant

Unloading after contaminant test - Langfang Plant
Thank You

Questions?