Food Fraud

- Dilution
- Substitution
- Counterfeiting
- Over runs
- Unapproved additions
- Mislabeling
- Tampering
- Theft
- Diversion
- Grey market
Economically Motivated Adulteration

Replacement
- With cheaper materials
- From differing geographies
- To evade trade restrictions
- Value adding claims

Addition
- Of cheaper components
- Masking agents
- Enhancing agents
- To cover theft

Removal
- Of valuable components
- Of definitive agents
- Of product
Leading EMA Incidents by Type of Adulteration
(1980 to date)

- Substitution, Dilution: 65.0%
- Unapproved Additive: 13.4%
- Mislabelling: 6.9%
- counterfeit: 8.5%
- Transshipment, Origin Masking: 4.9%
- Intentional Distribution of Potential Haz. Materials: 0.7%
- Other: 0.7%
Intentional Adulteration

Economically driven
Motivation is ‘GAIN’

Food Fraud

Food Quality

Food Defence

Ideologically driven
Motivation is ‘HARM’

Food Safety

Unintentional / Accidental Adulteration

Science based
Food borne illness
GFSI Position on Mitigating the Public Health Risk of Food Fraud – July 2014

**Food Safety Management System**

- **Food Safety**
  - HACCP
    - Hazards
    - Prevention of unintentional/accidental adulteration
      - Science based
      - Food borne illness
  - TACCP
    - Threats
    - Prevention of intentional adulteration
      - Ideologically motivated
  - VACCP
    - Vulnerabilities
    - Prevention of intentional adulteration
      - Economically motivated

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BRC Global Standards
<table>
<thead>
<tr>
<th>Food Quality</th>
<th>Food Fraud(^{(1)})</th>
<th>Motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Gain: Economic</td>
</tr>
<tr>
<td>Food Safety</td>
<td>Food Defense</td>
<td>Harm: Public Health, Economic, or Terror</td>
</tr>
<tr>
<td>Unintentional</td>
<td>Intentional</td>
<td></td>
</tr>
</tbody>
</table>

The Food Protection Matrix (Spink & Moyer, 2011a).
### GFSI Position on Mitigating the Public Health Risk of Food Fraud

<table>
<thead>
<tr>
<th>‘Food fraud vulnerability assessment’ requirements</th>
<th>The standard shall require that the organisation have a documented food fraud vulnerability assessment in place to identify potential vulnerability and prioritise food fraud vulnerability control measures.</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Food fraud vulnerability control plan’ requirements</td>
<td>The standard shall require that the organisation have a documented plan in place that specifies the control measures the organisation has implemented to minimise the public health risks from the identified food fraud vulnerabilities. This plan shall cover the relevant GFSI scope and shall be supported by the organisation's Food Safety Management System.</td>
</tr>
</tbody>
</table>
## Senior Management Commitment and Continual Improvement

### 1.1.6
The company’s senior management shall have a system in place to ensure that the site is kept informed of and reviews:

- Scientific and technical developments
- Industry codes of practice
- New risks to authenticity of raw materials
- All relevant legislation applicable in the country of raw material supply, production and, where known, the country where the product will be sold.

## Management of suppliers of raw materials and packaging

### 3.5.1
The company shall undertake a documented risk assessment of each raw material or group of raw materials including packaging to identify potential risks to product safety, legality and quality. This take into account the potential for:

- allergen contamination
- foreign-body risks
- microbiological contamination
- chemical contamination
- substitution or fraud (see clause 5.4.2)

Consideration shall also be given to the significance of a raw material to the quality of the final product.

The risk assessment shall form the basis for the raw material acceptance and testing procedure and for the processes adopted for supplier approval and monitoring. The risk assessments shall be reviewed at least annually.
### 5.4 Product Authenticity, Claims and Chain of Custody

<table>
<thead>
<tr>
<th>Statement of Intent</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>5.4</strong></td>
<td>Systems shall be in place to minimise the risk of purchasing fraudulent or adulterated raw materials and ensure that all product descriptions and claims are legal accurate and verified.</td>
</tr>
<tr>
<td><strong>5.4.1</strong></td>
<td>The company shall have processes in place to access information on historical and developing threats to the supply chain which may present a risk of adulteration or substitution of raw materials. Such information may come from:</td>
</tr>
<tr>
<td></td>
<td>• trade associations</td>
</tr>
<tr>
<td></td>
<td>• government sources</td>
</tr>
<tr>
<td></td>
<td>• private resource centres.</td>
</tr>
<tr>
<td><strong>5.4.2</strong></td>
<td>A documented vulnerability assessment shall be carried out of all food raw materials or groups of raw materials to assess the potential risk of adulteration or substitution. This shall take into account:</td>
</tr>
<tr>
<td></td>
<td>• historical evidence of substitution or adulteration</td>
</tr>
<tr>
<td></td>
<td>• economic factors which may make adulteration or substitution more attractive</td>
</tr>
<tr>
<td></td>
<td>• ease of access to raw materials through the supply chain</td>
</tr>
<tr>
<td></td>
<td>• sophistication of routine testing to identify adulterants.</td>
</tr>
<tr>
<td></td>
<td>• Nature of the raw material</td>
</tr>
<tr>
<td></td>
<td>The vulnerability assessment shall be kept under review to reflect changing economic circumstances and market intelligence which may alter the potential risk. It shall be formally reviewed annually.</td>
</tr>
<tr>
<td><strong>5.4.3</strong></td>
<td>Where raw materials are identified as being at particular risk of adulteration or substitution, appropriate assurance and/or testing processes shall be in place to reduce the risk.</td>
</tr>
</tbody>
</table>
Opportunity for profit

Low risk of detection

Motivational drivers

Leniency of punishment

Source: A.T. Kearney analysis
### Strategic consequences

- **Failed business or bankruptcy**
- **Damaged brand**
- **Lost revenue or market share**
- **Increased costs (recall, liability, withdrawals)**
- **Reduced market size**

### Company examples

#### 2008: Sanlu (milk)
- Melamine in milk products
- Sanlu went bankrupt, milk industry lost ~$5 billion in sales

#### 2007: Mattel (toys)
- Toxic lead paint found in toys sourced in China
- Bad publicity, 10 million toys recalled (~$30 million)
- Liability costs of ~$50 million

#### 1987: Beech Nut (juice)
- Artificially flavored sugar water sold as juice
- Market share dropped 4% due to lawsuits
- Company acquired by Ralston Purina

#### 1995: General Mills (cereals)
- Unapproved pesticide chemical on oats
- Destroyed 55 million boxes of cereal in inventory and suffered losses of more than $140 million

#### 2009: Peanut Corporation of America (peanuts)
- Intentionally sold salmonella-contaminated peanuts
- Peanut butter market shrunk 25% after incident
- Company went bankrupt

*Source: A.T. Kearney analysis*
Vulnerability Assessment

- Information, understanding, skill
- Logical grouping of inputs – and outliers
- Sketch supply chain – both directions
- Identify significant risks
- Mitigation strategies
- Re-assessment
Information

- Historical incidents
- Changes in supply and demand
- Economic factors/price fluctuations
- Geographic origins
- Length/complexity of the supply chain
- Storage/Distribution arrangements
- Nature of the raw material (value of material or size of market)
- Emerging issues or concerns (recent news or regulatory authority alerts)
- Existing controls (routine testing or audits)
- Availability (seasonality or harvest variability)
- Ease of access to materials
Two available databases are:
1. United States Pharmacopeial Convention (USP) Food Fraud Database
2. National Center for Food Protection and Defense (NCFPD) EMA Incident Database.
   - USP’s database is open and publicly accessible; NCFPD’s databases are accessible upon request.

* Trade associations

USD/Kg

Leading EMA Incidents by Location Produced

- United States: 29.8%
- China: 13.6%
- India: 12.6%
- Other Asia: 5.0%
- Australia: 3.0%
- Other Europe: 3.0%
- Other EU: 9.3%
- United Kingdom: 3.6%
- Spain: 2.0%
- Italy: 3.3%
- South/Central America: 3.3%
- Canada: 1.0%
- United States: 7.3%
- Middle East, Africa: 3.3%
- Unknown: 3.3%

Compiled by NCFPD EMA Incident Database
Leading Reported Types of Fraud, USP Scholarly Records (1980-2012)

As reported by
A.G. Ebert, “The Food Chemicals Codex EMA Activities: The Food Fraud Database – What’s Next?”
# The Risk Map

<table>
<thead>
<tr>
<th>Likelihood</th>
<th>Consequences</th>
<th>Extreme</th>
<th>Major</th>
<th>Moderate</th>
<th>Minor</th>
<th>Insignificant</th>
</tr>
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<tbody>
<tr>
<td>Very likely</td>
<td>10</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>6</td>
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<tr>
<td>Likely</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>5</td>
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<tr>
<td>Possible</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>4</td>
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<tr>
<td>Unlikely</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>3</td>
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<tr>
<td>Rare</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
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<tr>
<td>Contributing factor</td>
<td>Low</td>
<td>Medium low</td>
<td>Medium</td>
<td>Medium high</td>
<td>High</td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Supply chain</strong></td>
<td>Vertically integrated</td>
<td>Supplier vertically integrated</td>
<td>Single point supplier</td>
<td>upstream supplier</td>
<td>Open market</td>
<td></td>
</tr>
<tr>
<td><strong>Audit strategy</strong></td>
<td>Robust anti-fraud assessment</td>
<td>On-site reputable audit</td>
<td></td>
<td>None</td>
<td></td>
<td></td>
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<tr>
<td><strong>Supplier relationship</strong></td>
<td>Trusted existing products</td>
<td>Trusted new products</td>
<td>Established known supplier</td>
<td>Established unknown supplier</td>
<td>Unestablished unknown</td>
<td></td>
</tr>
<tr>
<td><strong>Supplier history</strong></td>
<td>No issues</td>
<td>Minor, quick resolution</td>
<td>Minor, poor resolution</td>
<td>Recurrent issues</td>
<td>Persistent issues</td>
<td></td>
</tr>
<tr>
<td><strong>Testing frequency</strong></td>
<td>Intensive, independent, by buyer</td>
<td>Random by buyer</td>
<td>Interval by buyer</td>
<td>C of A from supplier</td>
<td>L of G from supplier</td>
<td></td>
</tr>
<tr>
<td><strong>Test methods</strong></td>
<td>Selective and specific</td>
<td>Selective or specific</td>
<td></td>
<td>Not selective or specific</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Geopolitical</strong></td>
<td>Single component, single low risk geographical origin</td>
<td>Multiple components, low risk geographical origins</td>
<td>Single component, sourced in or transited through mild risk areas</td>
<td>Multiple components, sourced in or transited through mild risk areas</td>
<td>Sourced in or transited through high risk areas</td>
<td></td>
</tr>
<tr>
<td><strong>Historical</strong></td>
<td>No substantiated reports</td>
<td>Numerous unsubstantiated reports</td>
<td></td>
<td>Multiple substantiated reports</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Economical</strong></td>
<td>No unusual events</td>
<td>Localized events</td>
<td></td>
<td>Common widespread events</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

FCC Forum December 2014 Appendix XVII: Guidance on Food Fraud Mitigation
Mitigation

Where a risk is identified the needs to be action, for example:

- Raw material testing
- Supply chain audits
- Use of tamper evidence on incoming raw materials
- Enhanced supplier approval checks
- Changes to the supply chain
- Change to product ingredients
Mitigation Strategies

- Elimination
  - Effective supplier approval
- Control at source
- Separation and isolation
- Supervision
- Final product testing
- Certificates of analysis
• FSMA Section 103 (Hazard Analysis and Risk-Based Preventive Controls – include intentional adulteration).

• FSMA Section 106 (Protection Against Intentional Adulteration).

• FSMA Section 402 (Employee Protections for whistleblowers).
How do you eat the elephant?

Overview risk assessment of the entire chain

Identify top tier concerns – “significant risk”

Re-assess (impact and tolerance, risk and likelihood, mitigation and success)
Vulnerability Assessment

Information, understanding, skill

Logical grouping of inputs – and outliers

Sketch supply chain – both directions

Identify significant risks

Mitigation strategies

Re-assessment
Questions?

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