Emerging Food Categories

Food Fraud Series Part 4 of 5

Presented by:

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• This webinar is being recorded and will be available for access by IAFP members at www.foodprotection.org within one week.
Food Fraud PDG Chair: Neil Bogart, Food & Beverage - Area Technical Support – Ecolab

Food Fraud PDG Vice Chair: Karen Everstine, PhD, Senior Manager, Scientific Affairs – Decernis
• Part 1: A Strategic Approach to Operationalize Food Fraud Mitigation (held on 2/20/19)
• Part 2: Challenges Identified with Food Fraud Implementation (held on 4/2/19)
• Part 3: Understanding Types of Risk (Regulatory, Operational, Enterprise)
• Part 4: Emerging Food Categories
• Part 5: Ecommerce, Counterfeit, and Labeling (scheduled for 6/27/19)
LATEST RISK & TRENDS FROM EMERGING MARKETS AND CATEGORIES

Dr. Psomiaidis David
Head of lab / Business Development Manager
WHAT IS FOOD FRAUD?

- The deliberate and intentional substitution, mislabelling, adulteration or counterfeiting of food, raw materials, ingredients or packaging placed upon the market for economic gain.

- This definition also applies to outsourced processes (International Featured Standards Food 6.1).
**FOOD AUTHENTICITY**

- **Authentic product**: match between the food product characteristics and the corresponding food product claims
- **Authenticity**: state of being *authentic*
- **Authentication**: process of verifying the *authenticity* of the food product
- **Methods for authentication based on analysis of product characteristics**: methods and procedures for analyzing food product characteristics to *authenticate* claims

*CWA 17369:2019*
In the food industry, the dominant forces come from the consumers, who are increasingly considering new value drivers when making a purchasing decision, like health and wellness, safety, social impact, experience, and transparency.

Supply chain risk control is not only an emerging requirement but is an important part of brand protection in today’s food integrity environment.

When risks are well managed, the opportunities for growth are multiple and varied for those organizations that are willing and able to adapt to market forces and challenges, while retaining a competitive edge.
Top 10 most fraudulent foods

* The vast majority of reported cases in food fraud relates to these twelve products.

Source: Till Nowis/gutenta-Hamburg
### RASFF - Rapid Alert System for Food and Feed - European Commission

<table>
<thead>
<tr>
<th>Product category</th>
<th>Reported incidents in 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>nuts, nut products and seeds</td>
<td>17</td>
</tr>
<tr>
<td>herbs and spices</td>
<td>12</td>
</tr>
<tr>
<td>fish and fish products</td>
<td>10</td>
</tr>
<tr>
<td>fruits and vegetables</td>
<td>5</td>
</tr>
<tr>
<td>prepared dishes and snacks</td>
<td>5</td>
</tr>
<tr>
<td>cereals and bakery products</td>
<td>2</td>
</tr>
<tr>
<td>cocoa and cocoa preparations, coffee and tea</td>
<td>2</td>
</tr>
<tr>
<td>confectionery</td>
<td>2</td>
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<tr>
<td>crustaceans and products thereof</td>
<td>2</td>
</tr>
<tr>
<td>honey and royal jelly</td>
<td>2</td>
</tr>
<tr>
<td>other food product / mixed</td>
<td>2</td>
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<tr>
<td>cephalopods and products thereof</td>
<td>1</td>
</tr>
<tr>
<td>fats and oils</td>
<td>1</td>
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<tr>
<td>meat and meat products (other than poultry)</td>
<td>1</td>
</tr>
<tr>
<td>milk and milk products</td>
<td>1</td>
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<tr>
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<td>1</td>
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<td>soups, broths, sauces and condiments</td>
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EMERGING CATEGORIES AND RISKS

Locally grown/produced food: Provenance

Premium foods/ingredients: market value

Clean labels: natural
Locally grown/produced food: Provenance

Local production (fruits and vegetables)

Regional value (olive oil)

National ‘brand’ (tomatoes)

Global origin control (soybeans)
Locally grown/produced food: Provenance

δ²H δ¹⁸O
δ¹³C
δ¹⁵N
δ³⁴S

δ²H δ¹⁸O δ¹⁵N δ³⁴S

EMERGING CATEGORIES AND RISKS
EMERGING CATEGORIES AND RISKS

Premium foods/ingredients: market value

- Is there any cane sugar in coconut sugar?
- Does xylitol come from China (maize) or Europe (birch)?
- Is this authentic Ceylon cinnamon?
- Is the claim ‘plant-based protein’ really true?
- Is there any added sugar/syrup in maple syrup?
Premium foods/ingredients: market value
Clean labels: natural

*The vanilla case*

<table>
<thead>
<tr>
<th>Product claim</th>
<th>Adulteration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vanilla extract</td>
<td>Addition of (any) vanillin to the authentic vanilla extract</td>
</tr>
<tr>
<td>Natural vanilla flavoring</td>
<td>Addition of non-natural vanillin (acc. to reg.)</td>
</tr>
<tr>
<td>Bourbon vanilla ice cream</td>
<td>Use of (any) vanillin instead of Bourbon vanilla</td>
</tr>
<tr>
<td>Pure vanilla</td>
<td>Use of tonka extract in vanilla extract</td>
</tr>
<tr>
<td>Natural vanilla flavored yogurt</td>
<td>Addition of non-natural vanillin (acc. to reg.)</td>
</tr>
<tr>
<td>Bourbon vanilla extract</td>
<td>Use of <em>V. Tahitensis</em> instead of <em>V. Planifolia</em></td>
</tr>
</tbody>
</table>
EMERGING CATEGORIES AND RISKS

Clean labels: natural

*The vanilla case*

Verification of source material

Diagram of isotope fingerprints of vanillin ($\delta^{13}$C und $\delta^2$H) depending on the source material

Verification of vanilla species

Vanilla species

- *V. planifolia*
- *V. tahitensis*

- Mean
- Outliers(1)
- Samples
ANTI-COUNTERFEITING DESIGN-DETERRENTS AND DETECTION STRATEGIES
Packaging Innovation & Anti Counterfeiting

1. Know what is happening
2. Know what is available
3. Know how to prepare
4. Strategy of Options
5. Recommendations
Know what is happening

- Channel News Asia (Feb. 2014)
  - 1,200 tons of counterfeit and substandard foods
  - 430,000 litres of counterfeit beverages seized across 33 countries.
  - Oil, vinegar, biscuits, and chocolate bars to fake spices, condiments and substandard dairy products.
- Wine industry experts estimate 20% of wine bottles sold worldwide are counterfeit.
- In 2013, the Chinese Ministry of Public Security reported that the counterfeit products seized and destroyed included:
  - Food and beverages 5,000 tonnes.
  - Drugs and tablets 2 billion tonnes.
  - Pesticides, fertilisers & agricultural seeds 3,100 tonnes.
  - Personal care products, machinery and electrical products 53 million tonnes.

Know what is happening

- Counterfeited products increasing risks to **Chinese health and safety**.
- **Escalating demand** for Anti-Counterfeit Packaging & Tracking Technology (ACP).
- Market expected to reach **US $62.5 billion** globally by 2020.
- **Asia Pacific** region projected as fastest growing area (estimated. CAGR of 18.1%, 2015 to 2020).

Source: www.alliedmarketresearch.com
Know what is happening

Counterfeiters are becoming more sophisticated in committing fraud because of:

- Low cost technology
- Globalization
- Consumer complicity
- Expansion of channels and markets
- Powerful worldwide brands
- Weak national and international enforcement
- High tariffs and taxes.

Know what is happening

Non-Deceptive Counterfeiting
Consumers are part of the fraud-chain

Some people may not mind to purchase **fake clothes and apparel** if the counterfeited goods are cheaper and look and feel like the original brands.

Deceptive Counterfeiting
Consumers are part of the solution

**Fake foods** however, have no benefit to consumers and are avoided at all costs.
Meet Con, the Artist

I want to make easy money!

Access to sophisticated manufacturing

Mass, Low-wage Labour Force

www.foodvaluechain.unimelb.edu.au
Beat Con on...

TIME

Extend  Reuse  Copier  Re-Engineer  Corruption  Rip-offs


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Know what is available
A LOOK AT HONEY

MEDIUM - HIGH RISK

• Long shelf life if stored in appropriate temp. range.

• High variable Asian consumer group.

• Growing counterfeited product worldwide.
  – Chongqing's Hechuan district police have discovered a production site for fake honey and confiscated about 500 kilograms of the fake nectar containing zero percent real honey and 187 mg of aluminium residue per kg of honey.

• Highly adaptable packaging.

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A LOOK AT HONEY

MEDIUM - HIGH RISK

OVERT

REMOTE

COVERT

STRUCTURAL

TRACK & TRACE

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OVERT

done or shown openly; plainly apparent.

Brand enhancing view and interact applications
1. Gradient colours & complex backgrounds
2. Custom fonts
3. Industry recognised badges & awards
4. Imagery referencing specific locations
5. Unique textures
6. Origin ref.
7. Health benefits
8. Unique story with graphics
OVERT SECURITY GRAPHICS

SIGNATURES, PATTERNS, SUBSTRATES

- VOID PANTOGRAPH
- HANDWRITTEN SIGNATURE ON TEXTURED PAPER
- ALERT CONSUMERS - GRAPHIC CHANGE EVERY 6-12 MONTHS. Eg. Batch 02/258.2016
- CUSTOM SHAPED BOTTLE
- SPECIAL PAPER WEIGHT, FIBERS, UNUSUAL SUBSTRATE
- WATERMARKS & SIMULATED WATERMARKS (WHITE INK)
- COMPLICATED NON-REPEATING PATTERNS
- CUSTOM DESIGNED MICRO FONTS

CUSTOMER EMPOWERMENT

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This ink is made up of either very small liquid crystals or a special pigment called leucocytes.
CONSUMER OVERT SECURITY

HOLOGRAMS, FOILING & EMBOSsing

BRAND PROTECTION AND AUTHENTICITY CHECK

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COVERT

not openly acknowledged or displayed, concealed.

embedded authenticity security
COVERT SECURITY TECHNOLOGY

BRAND IDENTITY PROTECTION

SPRAY ADHESIVE DATA DOTS

HIDDEN UV INK CODES

LOGISTICS VARIFICATION

FUJIFILM

UV EMBEDDED COTTON FIBRES

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PUF TAGS
COVERT SECURITY TECHNOLOGY

RFID & TAGGANTS

RFID TAGS

ELECTRONIC TECHNOLOGIES

OTHER E-TAGS

RETAIL & LOGISTICS
VARIFICATION

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REMOTE

Situated at a distance from the point of connection.
Digital scanning for online authentication

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REMOTE SECURITY

NFC – PEER TO PEER COMMUNICATION

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REMOTE SECURITY

NFC CHIP PRE-PRINTED STICKERS

Pre-encoded NFC stickers

Sustainable high quality stickers
Printed ID for easing installation
Reliable NFC NTAG213 chips

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REMOTE SECURITY

QR CODES, BAR CODING & DESTRUCTIVE COATINGS
REMOTE SECURITY

PHOTO RECOGNITION SOFTWARE

CONNECTS THE NEW #PURE LIMITED EDITION WITH MYPACK®!

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STRUCTURAL

Relating to things perceived through the senses.
Tangible protection measures
STRUCTURAL SECURITY TECHNOLOGY

DISTINCTIVE OR DESTRUCTIVE PACKAGING

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TRACK&TRACE

Determining the Past and Current locations.

Checkpoints for monitoring origin and logistic movements.
Customer can authenticate product using a unique QR or serial codes with a free app on their smart phone.

1. **MaXQ : AMCOR**

2. **AuthenticateIT + GS1**

3. **OZIRiS : Beston Global Food Co.**
Know how to prepare
Know how to prepare

‘There is no silver bullet for counterfeiting. It’s really a matter of putting a business process in place with measures that help protect the brand and the consumer.’

Source. http://www.abc.net.au/radionational
Know how to prepare

Busy growing and protecting your jurisdiction

Counterfeiting opportunity found in an unprotected jurisdiction

unmet market needs

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Know How To Prepare

- Strong Deterrence
  - Anti-counterfeiting
    - Best Practice
  - Outside jurisdictions
    - Unprotected

- Weak Detection
  - Vulnerable
  - Common counterfeiters

- Strong Deterrence
  - Strong detection
Beat Con on...

Modify
Conceal
Extend

Reuse

Scan

Re-Engineer

Corruption
Bribery
Stealing

Rip-off
Replicas

STRONG
DETERRENCE

STRONG
DETECTION


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<table>
<thead>
<tr>
<th>SELECTED AC TECH (YOGURT TUBS)</th>
<th>VIRTUAL PROTOTYPES (LAYERED OPTIONS)</th>
<th>RISK LEVEL</th>
<th>Hard to (copy) Category does not lend to reuse.</th>
<th>Cost/Effort to Business</th>
<th>Customer Benefits</th>
<th>Overall Added Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HERITAGE INBUILT LABELS + IMAGE RECOGNITION + DUPLICATION HINDRANCES</td>
<td><img src="image1.png" alt="Image" /></td>
<td>1</td>
<td>Product can be copied over time however Duplication Hindrances (DuHs) can be designed into labels and product shape to slow targeting. Anti-Counterfeit security depending on DuHs.</td>
<td>Research and design DuHs into label graphics. Purchase Image Recognition subscription. Register images for launched products. Future updates for each new launch. Labour cost in Content Management.</td>
<td>Physical or digital products scannable to find authentic locations on where it is sold. Benefits similar to QR codes through education, rewards etc. Can choose between offline and online.</td>
<td>- No need for a QR - Register only high risk products. - Consumers looking for easy access to information. - No need for an APP.</td>
</tr>
<tr>
<td>SMART QR CODES + SERIALISATION + DIRECT OUTLET CONFIRMATIONS</td>
<td><img src="image2.png" alt="Image" /></td>
<td>1-2</td>
<td>Easy to copy the QR code however hard to counterfeit the site it directs to. Site can be added where products are sold.</td>
<td>QRs can be stickers or built into manuf. Printing process for easy application. A management database is required as well as an app to read them. Labour cost in Content Management.</td>
<td>Chinese consumers well educated in QRs and use them daily for payments, special connections, education and rewards.</td>
<td>- QR codes can be used in combo with unique serialisation for tracking and code verification online. - Can track customer scans and identify fraudulent activity.</td>
</tr>
<tr>
<td>THERMO, UV OR TENSILE - CHROMIC INKS OR PLASTICS</td>
<td><img src="image3.png" alt="Image" /></td>
<td>2-3</td>
<td>Hard to duplicate well. Inks ideally used on surfaces and to direct contact with quick method for use validation. Innovate quickly with new designs.</td>
<td>New tech and thus compliance with future changes of requirements.</td>
<td>A quick and interactive marketing tool for product.</td>
<td>- Consumers like this technology requiring regular renewal.</td>
</tr>
<tr>
<td>HOLOGRAPHIC LAMINATES OR FOIL STAMPS</td>
<td><img src="image4.png" alt="Image" /></td>
<td>2-3</td>
<td>Off the shelf holograms or laminates can be copied over time however uniquely branded 3D holograms with layered images and text are difficult to copy.</td>
<td>High tech solution for validation if done well. Small unit on yogurt pack.</td>
<td>- -</td>
<td></td>
</tr>
<tr>
<td>PRINTED NFC CHIPS</td>
<td><img src="image5.png" alt="Image" /></td>
<td>3-4</td>
<td>Hard to replicate due to programming. Counterfeiters would try to reuse stickers however destructive attributes could be built in to void reappropriation.</td>
<td>Med cost for setup + manag. database required. Cheaper generic versions applied post-printing, an additional step in production. Mass usage lowers costs.</td>
<td>Growing trend in consumer interaction and validation. Majority of smart phones can scan NFCs. Vast benefits and new ideas of applications are generated daily.</td>
<td>- NFC used in tracking and validation by logistics. consumers + detailed analytics. - Peer to peer communication, added-value for product learning and adaptation.</td>
</tr>
<tr>
<td>PRINTED MEMORY CIRCUITS STICKERS</td>
<td><img src="image6.png" alt="Image" /></td>
<td>3-4</td>
<td>Hard to replicate due to new technology. Destructive nature to avoid reuse. New applications are yet to be explored.</td>
<td>Low-Medium cost - setup + manag. database required. Easier production than NFC. Applied post-printing. Add step in production. Mass usage lowers costs.</td>
<td>Graphics would need to communicate technology. Technology would require a QR to link consumers to educational piece about security.</td>
<td>- Benefits are more so for the business and imply security. - Currently no commercial examples show technology applied with call out features and consumer engagement.</td>
</tr>
<tr>
<td>UNIQUE SUBSTRATE OR PLASTICS WITH IMPREGNATED VISABLE FLECKS</td>
<td><img src="image7.png" alt="Image" /></td>
<td>3-4</td>
<td>Dependable on uniqueness of substrate or plastic selected. Difficult to copy if flecks are unique in nature.</td>
<td>Med costs for purchase of materials + setup for production usage. offers a P.O.D and brand protection.</td>
<td>Low tech/high impact that over time can build brand semantics reinforcing quality and trust.</td>
<td>- Workmanship is admired and brands using unique substrates create identity and trust. - Can be paired with other AC.</td>
</tr>
</tbody>
</table>

**Anti-Counterfeiting Tailored Assessment Reports**
STRATEGY OF OPTIONS

Anti-Counterfeiting Conceptual Design
Recommendations

1. **High security**: they must be as difficult as possible to forge or replicate (Deterrent-Design)

2. **Easy visual judgement**: in most cases, you should be able to verify the document without the need for special equipment (Security Graphics and Icons)

3. **Verification with a simple tool**: as a next level, a covert element should be included (Smart Phone)

4. **Re-labelling or repacking prevention**: it should be possible to detect when an anti-counterfeit solution has been tampered with. (Destructive Packaging)

5. **Dynamic**: Security changes to stay ahead of copy cats. (Forecasted Plan)

6. **Stay Informed**: Digital and Printing technologies are continuously improving.
Thank you

Caroline Francis  |  Design Director & Researcher
caroline@fordholm.com
Questions?

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