



FOOD FRAUD

DIANA D. MONACO, RDN, CDN, FAND



DEFINITION OF FOOD FRAUD

- Food fraud is the act of **purposely** altering, misrepresenting, mislabeling, substituting or tampering with any food product at any point along the farm-to-table food supply-chain.
- Fraud can occur in the **raw material, in an ingredient, in the final product or in the food's packaging.**
- **Fraudulent and intentional substitution, dilution or addition to a raw material or food product, or misrepresentation of the material or product for financial gain** (by increasing its apparent value or reducing its cost of production) or to cause harm to others (by malicious contamination), is 'food fraud.'

REVIEW OF FOOD INGREDIENTS, ADULTERANT-SUBSTANCES, AND ESTIMATED ECONOMIC GAIN, PER UNIT PER FRAUD INCIDENT

<u>Food ingredient</u>	<u>Adulterant-substance</u>	<u>Economic gain</u>	<u>Units</u>
Wheat Gluten	Melamine	\$31,000	Truckload (50 k lbs.)
Wheat	Urea	\$11,000	Bin (10 k bushels)
Apple Juice	High Fructose Corn syrup or Hydrolyzed Chicory syrup	\$18,000	Truckload (50 k lbs.)
Tomatoes	Maltodextrin	\$12,000	Truckload (50 k lbs.)
Spices (e.g., Paprika, Curry, Chili Powder, etc.)	Sudan Dyes	Undefined Note: \$0.06 of dye probably increases profit by \$1b/	

FOOD FRAUD ON THE RISE

- Food fraud is estimated to cost the global food industry \$10-\$15 billion a year.
- According to the U.S. Congressional Research Service, there have been 60 percent as many incidents of food adulteration from 2011 to 2012 than had been identified in the 30 years between 1980 and 2010.
- Food fraud is nothing new, but the intensity and frequency have been on the rise.
- Globalization and a much more complex supply chain are contributors.
- It is also very difficult for consumers to judge the characteristics of the product.



FOOD FRAUD – WORLDWIDE PROBLEM



Food fraud is the deception of consumers through intentional adulteration of food:

- (a) by substituting one product for another;
- (b) using unapproved enhancements or additives;
- (c) misrepresenting something (e.g., country of origin);
- (d) misbranding or counterfeiting;(mislabeling);
- (e) stolen food shipments (Grey market Theft/ Diversion) and/or
- (f) intentional contamination with a variety of chemicals, biological agents or other substances harmful to private– or public–health

WAYS TO DECEIVE

- ADULTERATION (ingredient substitution, dilution, and concealment, or impurities)
- ARTIFICIAL ENHANCEMENT
- USE OF UNDECLARED, UNAPPROVED, or BANNED BIOCIDES
- REMOVAL OF AUTHENTIC CONSTITUENTS
- MISREPRESENTATION OF NUTRITIONAL VALUE
- FRAUDULENT LABELING CLAIMS
- FORMULATION OF A FRAUDULENT PRODUCT
- TAMPERING (date code, refilling containers)
- THEFT (e.g. employees theft, shoplifting and cargo theft)
- DIVERSION (e.g. grey markets and parallel trade)
- COUNTERFEITS (e.g. Intellectual property rights infringement)
- OVERUNS

U.S. PHARMACOPEIAL (USP) CONVENTION'S FOOD FRAUD DATABASE.

August 2, 2016

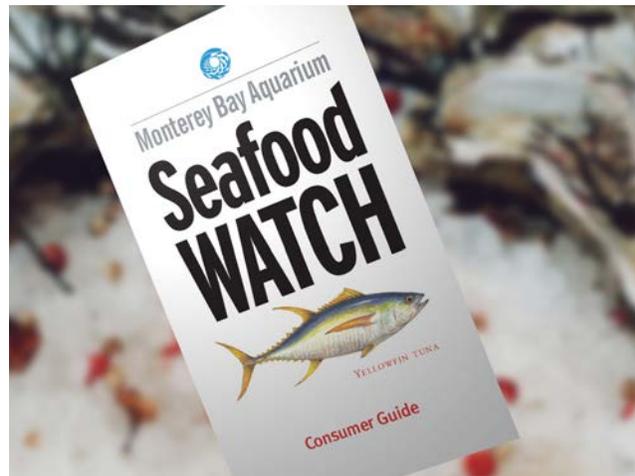
- **Food Fraud Database (FFD 2.0)**
- a continuously updated collection of thousands of ingredients and related records gathered from scientific literature, media publications, regulatory reports, judicial records, and trade associations from around the world.
- FFD v2.0 is available through an annual subscription.
- www.foodfraud.org

Food fraud, also referred to as economically-motivated adulteration (EMA),

- is a global economic and public health problem,
- costing industry an estimated 10 to 15 billion dollars annually
- and affecting as much as 10% of the global food supply.



OCEANA



"Olmsted makes you insanely hungry and steaming mad—a must-read for anyone who cares deeply about the safety of our food and the welfare of our planet."
—STEVEN RAICHLEN, author of the *Barbecue Bible* series

REAL FOOD FAKE FOOD

Why You Don't Know
What You're Eating & What
You Can Do About It

LARRY OLMSTED

EXAMPLES OF FOOD FRAUD

- **November 2015 to February 2016:**
 - In the UK, about 10,000 liters of fake or adulterated wine, whiskey, and vodka. In Greece, more than 7,400 bottles of fake alcohol and counterfeit labels. The seized alcohol was enough to fill 12,000 bathtubs.
 - In Australia, nearly 1,000 pounds of adulterated or blended honey, plus peanuts repackaged as more expensive pine nuts (a major risk for people with allergies).
 - In a warehouse in Bolivia, thousands of cans of sardines with fake labels of a famous Peruvian brand ready to be put on them.
 - In Italy, more than 85 tons of olives that had been dipped in copper sulphate solution to boost color.
 - In Hungary, more than 2 tons of duck meat being passed off as duck liver (that is, pricey foie gras).
 - In Thailand, more than 30 tons of illegal beef and buffalo meat that was not fit for human consumption, but was on its way to supermarkets.



WHAT ARE THE TOP TWO ADULTERATED FOODS?



THE TOP TEN MOST ADULTERATED FOODS IN THE UNITED STATES

The Top Ten most adulterated foods in the United States in 2013 were:

- (1) olive oil,
- (2) milk,
- (3) honey,
- (4) saffron,
- (5) orange juice,
- (6) coffee,
- (7) apple juice,
- (8) grape wine,
- (9 tie) vanilla extract, (9 tie) maple syrup.



OLIVE OIL



Olive oil is the food most subject to fraud, according to the Journal of Food Sciences study. – 16%

They defraud consumers in three main ways:

(1) by diluting real extra-virgin olive oil with less expensive oils, like soybean, hazelnut or sunflower oil;

(2) by diluting high-quality olive oil with low-quality olive oil; or

(3) by making low-quality extra-virgin olive oil, typically incorporating older—and often rancid—stocks of oil held over from bumper crops of previous seasons

THREE OIL CASES

- In Spain in 1981 people died after "olive oil" that was actually a non-food-grade (industrial-grade) rapeseed oil intended as an industrial lubricant was sold. There were 20,000 people sick and it killed 1,200.
- In 1998, adulteration of cooking oils in India made with oil from the Mexican Poppy (*Argemone mexicana*) made more than 2,500 people sick and killed at least 65.
- 2016- the Italian press revealed large-scale olive oil fraud. Products from seven major olive oil producers labelled as Extra Virgin Olive Oil also contained significant amounts of lower quality oils and therefore did not meet EU labelling rules for extra virgin olive oil.





INTERNATIONAL OLIVE OIL BUYING TIPS

International olive oils, look for the **Protected Designation of Origin logo**, which guarantees that these oils were indeed produced, processed, and prepared in a specific region of the labeled country using traditional production methods—as opposed to containing oils from elsewhere (often soybean or hazelnut oil) that were simply *bottled* in the labeled country.

- **French olive oils will sport an “AOC” (Appellation d’origine contrôlée) logo.**
- **Italian olive oil will show a “DOP” (Denominazione di Origine Protetta) logo, and**
- **Spanish olive oil will have a “DO” (Denominación de Origen) seal.**
- Look for **Extra Virgin Alliance (EVA)** and **UNAPROL**, the respected Italian olive growers’ association.

DOMESTIC OLIVE OIL BUYING TIPS



- Look for the **California Olive Oil Council (COOC) logo** on a bottle, or order directly from its certified producers. In order to earn the COOC’s “certified extra virgin” seal, olive oil producers must submit a laboratory analysis and have samples evaluated by the COOC Taste Panel.
- Look for the label “**USDA Quality Monitored.**”



COUNTRY OF ORIGIN AND OLIVE OIL

- Current international standards for extra virgin olive oil allow a wide range of oil qualities to be marketed as extra virgin. In addition, the standards are widely unenforced.

Judge the country of origin:

- Chile or Australia.: The two countries received the highest marks from the US International Trade Commission's report on average quality of extra-virgin olive oil.





BALSAMIC VINEGAR

- Top of the line balsamic vinegar, officially known as *Aceto Balsamico Tradizionale*, stems from grape varieties grown in one of two provinces in northern Italy—Reggio Emilia and Modena.
- **Most of the supermarket brands are mass produced with caramel, sugar and other flavorings and preservatives. True traditional balsamic vinegar has only one ingredient: cooked grape must, or *mosto d'uva cotto*. It is the grape juice that contains stems, seeds, and skins—is cooked over low heat until it is quite thick and dark brown, then left to rest, activating the natural fermentation**
- The vinegar is poured into smaller and smaller barrels as it ages, anywhere from 12 to 50 years. Each barrel is made of specific woods that help give balsamic vinegar its unique, multilayered taste.
- Imitation balsamic vinegar starts off with wine, rather than grape must, and usually has sweeteners and coloring added during its quick processing to give it the appearance and flavor of aged balsamic.



SPOTTING HIGH QUALITY BALSAMIC VINEGAR



**EXTRAVECCHIO ACETO BALSAMICO
TRADIZIONALE DI MODENA DOP GOLD
SEAL BALSAMIC VINEGAR \$195.95**

SKU AFF-002

- A high price does not guarantee authenticity, but you will never come across authentic *Aceto Balsamico Tradizionale* at a bargain price. (It may instead be the less expensive *Aceto Balsamico di Modena*.)
- The **DOP seal on balsamic vinegar from Italy** guarantees that the bottle was produced and bottled in Italy using traditional methods and following strictly regulated guidelines set forth by the Italian government.
- To spot the legitimate balsamic vinegar varieties, you want to see the word **“tradizionale”** on the label, and **“grape must”** or **“aged grape must”** should be listed as an ingredient.
- **On the back label it should also say produced and bottled by.** This means the producer actually grew the grapes used in the vinegar and produced the vinegar too. It’s an indication of higher quality.
- **There will be a seal on top of the bottle.** This seal bears a number and a hologram, a sign of certification from the Consorzio.

SPOTTING HIGH QUALITY BALSAMIC VINEGAR

- **Extra vecchio** means the vinegar has been aged at least 25 years.
- **Affinato** means the vinegar has been aged at least 12 years.
- **What is Aceto Balsamico di Modena I.G.P.?** The initials I.G.P. stand for protected geographical indication.
- I.G.P. balsamic vinegar can be high quality when made the same way as traditional balsamic vinegar. It is aged for less time, a minimum of six years, vs. a minimum of 12 years for traditional balsamic. Caramel, means it has been added for color and is of a lesser quality.
- I.G.P. balsamic vinegars are less expensive since they aren't aged as long. Expect to pay in the \$25-\$50 range for a good bottle.



- **What is a balsamic vinegar condimento?** You will also see balsamic vinegar “condiment.” Depending on the producer, this can also be a high quality product and a good alternative to traditional balsamic vinegar for every day use.
- Condimentos make great salad dressings. They are much less expensive too, although a good one can cost more than \$30.

PARMIGIANO-REGGIANO

- Wood Pulp or Potato Starch - These additives are used to prevent clumping.
- Wood pulp is actually considered safe for consumption in certain quantities.
- There may be a temptation to use more than necessary. Wood pulp is cheaper than cheese, so some companies may use more to undercut their competition.
- Authentic Parmesan cheese (without the wood pulp), look for the full name **“Parmigiano-Reggiano”** and make sure it reads, **“made in Italy.”**



CUTTING MILK

- Sheep's milk has been found to be cut with bovine milk, and buffalo milk with goat-antelope milk.
- Milk has also been adulterated with reconstituted milk powder, urea, and rennet.
- Milk has even been cut with something called “fake milk”: a mixture of oil, urea, detergent, caustic soda, sugar, salt, and skim milk powder.



BABY FORMULA

- Although not a top offender in the Food Fraud database, baby formula poses considerable food fraud risk.
- Formula is one of the most common targets for organized retail theft and criminals often tamper with the sell-by codes to move expired product.
- Adulterated milk, which can make it into formula, also poses a concern.
- TIPS: Buy from a major retailer rather than less-monitored venues such as flea markets and online auctions. And don't buy any package that has a blurred-out expiration date or otherwise looks tampered with.



HONEY AND MAPLE SYRUP



Honey and maple syrup may be **processed with corn syrup and other sugars to increase their sweetness, and to dilute them**; both products are expensive to produce and process, and a **low-cost filler can make them stretch further**.

- The Journal of Food Sciences study says honey represents 7% of food fraud cases. Food Safety News tests also found that 75% of store honey doesn't contain pollen. People are still buying a bee-made product, but all the pollen has been screened out.
- A lack of pollen makes it tough to determine its geographic origin -- and also means regulators don't recognize the product as honey.
- Food Safety News tests found a third of the faux honey imports from Asia were contaminated with heavy metals like lead and illegal Chinese antibiotics.

ALLOWRIE BRANDED MIXED BLOSSOM HONEY



- Australia’s biggest listed honey company and some of the country’s largest supermarket chains face accusations of selling fake honey.
- Testing at a leading international scientific lab that specializes in honey fraud detection has found almost half the samples selected from supermarket shelves was “adulterated”, meaning it had been mixed with other substances. The adulterated samples were all products that blend local and imported honey.
- Capilano’s Allowrie branded Mixed Blossom Honey, which sources honey from Australia and overseas, and markets itself as 100 per cent honey, showed up as “adulterated” in the majority of samples tested.
- **Experts say adulterated honey was generally bulked up with rice syrup and beet syrup and other unidentified substances, which aren’t detected by official honey tests.**
- International fraudsters, often criminal gangs in China, produce the fake honey and sell it to unsuspecting suppliers at a higher price, making a fortune along the way.
- SEPTEMBER 2018

ADULTRATED SPICES

Food fraud in spices:

- **Saffron represents 5%**
 - **Vanilla extract, 2%.**
 - **Turmeric, star anise, paprika and chili powder each account for another 1%.**
 - Paprika can be flavorless leftovers of spices that have already been processed for extracts or even brick dust.
 - Chinese star anise, may be substituted with toxic Japanese star anise.
 - Consumers should be cautious about buying from markets or bulk bins without knowing the spice's origin.
- For herbs, a recent study found that 25% of 78 samples of dried oregano bought from UK retailers contained ingredients other than oregano.
 - Borate, glycerin, barium sulfate, and a variety of other chemicals have been found in spice jars.



SAFFRON

- Saffron, an extremely expensive spice, is a common culprit of food fraud. Many packaged spices contain adulterants, especially if they're sold in powdered form, because the original spice is so costly.
- According to the Food Fraud Database, saffron can actually contain **marigold flowers, corn silk, chalk, dyed onions and strands of cotton or plastic thread, glycerin, sandalwood dust, tartrazine (a yellow dye linked to hyperactivity in children and lupus); barium sulfate (a fluid mainly used in oil well drilling); and borax.**
- The best way to avoid fake saffron is to buy the spice in whole threads, which is more difficult to fake.



VANILLA FRAUD

- Misrepresentation of country of origin
- and adulterating real vanilla with artificial vanilla. (natural vs. synthetic)
- dilution
- The primary flavoring compound used to make artificial vanilla, vanillin, is a relatively inexpensive byproduct of the chemical and paper industries.
- Madagascar vanilla is thought to contain the highest levels of vanillin. Adding synthetic vanilla to pure Madagascar vanilla- economic fraud, deception
- Adulteration with synthetic coumarin which has a pleasant sweet, fresh scent and is not permitted to be used as a food additive due to its toxicity can also occur.
- Tonka beans, which contain naturally high levels of coumarin have also been used as vanilla substitutes, including in 'Mexican vanilla'.



BLACK PEPPER

- Pepper has a history of being tainted with starch, flour, buckwheat, and millet, chili powder and paprika faked with dyes, sand, twigs and leaves.
- Whole black peppercorns are also fraudulently replaced with or diluted with papaya seeds.



ABOUT 84.5% OF FOOD SAMPLES COLLECTED ON CHAR DHAM ROUTES ADULTERATED

FnBnews.com



AN ARTICLE FROM FnBNEWS.com of India

Of the 1,186 food samples collected over the last three months by the Society of Pollution and Environmental Conservation Scientists (SPECS), Dehradun, Uttarakhand, from 47 places along the Char Dham Yatra routes of Garhwal region of Uttarakhand, 1,003 samples (or a whopping 84.5 per cent) were found to be adulterated.

Eighty-four per cent of the adulteration in foodstuff took place on the Badrinath-Kedarnath route, while 84.5 per cent adulteration in foodstuff took place on the Gangotri-Yamnotri Route.

Eighty-one per cent of the iodized salt samples contained no iodine.

*The prasad (offerings to gods in the temples) is also of a poor quality. Ilaichi dana was **found to contain chemicals**. The coconut was found to be stale and of a poor quality, as were chhuara, cashew and kishmish in Kedarnath. The pure ghee offered to Kedarnath Ji was **also found to be adulterated**.*

Chilli sauce, tomato sauce and vinegar used for chow mein and other Chinese meals were found to be 100 per cent adulterated.

Sindoor, or roli, was found to contain 100 per cent toxic chemicals. It can cause local irritation and skin toxicity. The nature of sindoor, or kumkum, can change with exposure to the environment over time, and this can result in blisters, itching, rashes, pigmentation and, at times, serious dermatological disorders. AUGUST 2018

WATERING DOWN ORANGE JUICE AND POMEGRANATE JUICE



- Diluted juices, especially expensive ones, sometimes have little or no notable change in taste or consistency.
- Orange juice represents 4% of cases in the U.S. Pharmacopeial Convention's Food Fraud Database, and apple juice, 2%.
- Consumers buying one of those common juices might get more water for their money, while an expensive one like pomegranate may be cut with apple juice.
- *Consumers should be especially careful to read labels and pick a trusted brand when buying into the latest super-fruit craze. It takes time to build up supply of a newly hot fruit, so those products are more likely to be adulterated.*

ORANGE JUICE

- Adulterants include illegal fungicide
- OJ has been shown to host unlisted
 - lemon juice,
 - mandarin juice,
 - grapefruit juice,
 - high fructose corn syrup,
 - paprika extract,
 - and beet sugar

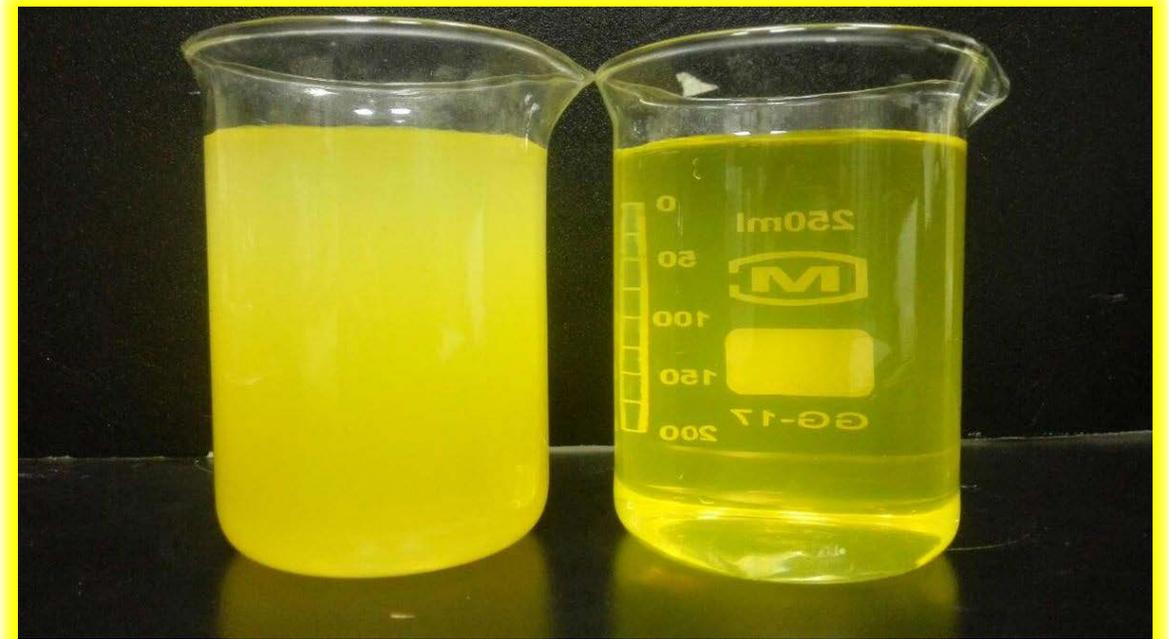


JUICES AND CLOUDING AGENTS

- Juices may also contain 'clouding agents' to make them look fresh, and some of these could make consumers sick.
- The US Pharmacopeial Convention found 877 food products from 315 companies with fake clouding agents.
- Most common fraudster:
 - The plasticizer Di(2-ethylhexyl) phthalate (DEHP), a chemical that's been linked with cancer and thwarted reproductive development in children.

DEFINITION:

- **Clouding agents** or **Cloudy Agent/Cloudifier** are a type of food additive used to make beverages such as fruit juices to look more cloudy, and thus more natural-looking and visually appealing, typically by creating an emulsion of oil droplets.



COFFEE AND TEA

Food fraud with ground and instant coffee along with teas may contain

- twigs, paper, malt, chicory, starch and various grains, roasted corn, ground roasted barley, and even roasted ground parchment, cereals, caramel, starch, malt, and figs.
- Gluten intolerant individuals can get symptoms
- Suggestion: To avoid the adulterated beans, buy whole beans and grind them at home.



TEA

Researchers found that tea has been polluted with

- leaves from other plants,
- color additives,
- and even colored saw dust.



THE U.S. SEAFOOD SUPPLY

Imported Seafood Supply - Over 90% of the seafood consumed in the U.S. is imported from other countries around the world.

The leading foreign suppliers of seafood products to the U.S. in 2014 were:

China,	Canada,
Thailand,	Vietnam,
Indonesia and	Chile

About two thirds of the edible seafood imported into the U.S. came from these six countries.



Shrimp is the leading fresh or frozen product imported into the U.S. accounting for about 33% of all imports by weight followed by

Canned seafood products represent about 12% of all imported seafood, and canned tuna was over half of all canned imports.

About 2% of all imported seafood products were cured.

FAUX FISH

- 2012 study by Oceana discovered that almost 40% of fish sold in New York City was mislabeled.
- A 2013 U.S. study conducted by Oceana found 38 per cent of all restaurants sampled and 74 per cent of all sushi eateries, mislabeled the species of fish served.
- It may be advertised as wild caught when it's farmed, or as a totally different species.
- And when fish is sold in fillet or frozen form, it's hard to tell what it is and where it came from without genetic testing.
- Farmed fish also get advertised as more expensive wild versions.
- Scallops, for example, might actually be punched out circles from a whitefish fillet,.
- Grouper might be what it is labeled but it is really tilefish, a species that contains enough mercury to make the FDA's list of foods that pregnant women and young children should avoid.

Experts suggest buying whole fish when possible – which are harder to fake.

MANY FISH LOOK ALIKE



- (From top) Oceana paired wild salmon, red snapper and halibut, all on the left, with other fish that look remarkably similar to demonstrate how easy it would be to mislabel them.

GROUPER, OR IS IT?



- Diners' knowledge of frequently mislabeled fish was tested with an escabeche-style grouper, left, paired with an escabeche-style weakfish, right, and potatoes between them.

WILD OR FARM RAISED SALMON?



- Wild Alaskan king salmon, at left, with farm-raised salmon, right, are served at a dinner at the National Aquarium in Washington, D.C.

RED SNAPPER OR TILAPIA?



- Fillets of chimichurri-crusted red snapper and tilapia, separated by fresh corn polenta.

EXAMPLES OF COMMONLY MISLABELED SEAFOOD

YOU PURCHASED/YOU RECEIVED

YOU PURCHASED	YOU RECEIVED
RED SNAPPER	Slender Pinjalo, Channel Catfish, Nile Perch, MahiMahi, Mullet Snapper, Malabar Blood Snapper, Atlantic Cod
MAHI MAHI	Yellowtail
GROUPEL	Channel Catfish, Hake, Tilapia, Alaska Pollock, Nile Perch
WILD SALMON	Farmed Salmon

YOU PURCHASED /YOU RECEIVED

YOU PURCHASED	YOU RECEIVED
BLUEFIN TUNA	Bigeye Tuna, Yellowfin Tuna
WHITETUNA	Escolar
WHITE SNAPPER	White Hake
ATLANTIC COD	Alaska Pollock, Norwegian Pollock, Whiting, Saithe, Escolar
CHILEAN SEA BASS	White Bass, Striped Bass
SHARK MEAT	Nile Perch

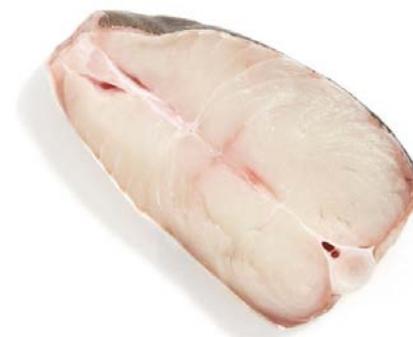
EXAMPLES OF COMMONLY MISLABELED SEAFOOD

YOU PURCHASED/YOU RECEIVED

SWORDFISH	Mako Fish
RED DRUM	Black Drum
HALIBUT	Sea Bass, Deep Water Cape Hake
HADDOCK	Saithe
ANCHOVIES	Icefish
ORANGE ROUGHY	Oreo Dory, John Dory

YOU PURCHASE/YOU RECEIVED

RED MULLET	Spotted Goatfish
MONKFISH	Pufferfish



EMERGENCY ALERT IN JAPAN AFTER SUPERMARKET ACCIDENTALLY SOLD EXTREMELY TOXIC FISH JANUARY 2018

- Health authorities in the Japanese city of Gamagori were forced to activate an emergency warning system after a local supermarket accidentally sold five packages of potentially deadly pufferfish to customers.
- The fish, called *fugu* in Japan, is prized as a delicacy, but has also been dubbed the 'Russian roulette' of dining because it contains a dangerous poison called tetrodotoxin, the consumption of which can be fatal to humans.
- In fact, at least 10 Japanese people have died since 2006 from eating the toxic fish, and it used to be far worse – *fugu*'s death toll peaked in 1958 with a stunning 176 victims, when awareness of the dangers was lower.



WHITE TUNA



- There have been countless cases of people getting sick from the bait-and switch of white tuna for cheaper escolar, a bottom-feeder fish that's full of a waxy substance that is indigestible by humans.
- It can lead to severe gastrointestinal distress (it's known as the "Ex-Lax fish").
- Escolar is a type of snake mackerel. Sometimes it's under the name "butterfish," "oilfish," or "waloo/walu."
- Sushi restaurants occasionally serve it as "super white tuna" or "king tuna." It's cheap, it's sustainable, and it's buttery and succulent.

ESCOLAR WARNINGS AND RECOMMENDATIONS

- The Japanese and Italian governments have banned the importation and sale of escolar for these reasons.
- The governments of Canada, Sweden, and Denmark require that all escolar come with warning labels.
- The FDA lifted the escolar ban in 1992 because the fish is nontoxic.
- In spite of all this, escolar is indeed very buttery and delicious, and should be enjoyed, but **never in portions larger than six ounces**. Portions below six ounces will not cause gastrointestinal distress.



*Most people should not eat more than 150 g (5 oz.) per week of fish that are known to have higher **mercury** levels. These include fresh or frozen tuna (not canned "light" tuna), shark, swordfish, marlin, orange roughy, and **escolar**.*

RED SNAPPER



- *The poster child for fish fraud, real red snapper is served only six percent of the time.*
- Rockefeller University's Dr. Mark Stoeckle, involved in DNA species testing for the Barcode of Life project
- TIP: Try to buy it as close to its “natural form”

CAMBODIAN PONGA, BASA AND SWAI

- **Cambodian ponga**, a catfish mass-produced in Asian fish farms under suspect conditions that have included banned drugs.
- It often is used instead of red snapper, **cod, halibut, flounder, and grouper**
- **Basa** is inexpensive because it grows fast, it's easily harvested and it's processed in factories near the farm. Being able to get the fish to market without the expense of maintaining a fleet of fishing boats helps keep the price low.
- **Swai, along with basa and tra**, two related varieties belong to the Pangasius family and they're similar in character to catfish.
- **Swai** (river farmed catfish)- is native to Southeast Asia—Vietnam, Thailand, Laos, and Cambodia
- Be sure to look for country of origin labeling at the fish counter to determine whether your catfish is from the Mekong Delta or the Mississippi Delta.

SEAFOOD SOLUTIONS AND/OR OCEAN DUKE CORPORATION.



- February 2012 Chau-Shing (“Duke”) Lin and Christopher Scott Ragone were sentenced for their role in a seafood mislabeling scheme involving *pangasius* falsely imported and marketed as other fish species.
- Mr. Lin received a sentence of three years probation, one hundred hours of community service, and a fine of \$60,000. Mr. Ragone received three years probation with an order for one hundred hours of community service and a fine of \$5,000.
- The sentencing for Mr. Lin and Mr. Ragone follows an order handed down the week prior that Seafood Solutions, Inc. be placed on three years probation, pay a fine of \$700,000, make an additional community service payment of \$300,000, and forfeit all remaining inventory of *pangasius* falsely labeled “ponga” held by either Seafood Solutions or Ocean Duke Corporation.

STERLING SEAFOOD CORPORATION

- Imported Vietnamese catfish mislabeled as grouper over the course of 2004-2006
- Sold as misbranded fish throughout the United States
- In 2010 Thomas George received 22 months in prison
- 64 million dollars in restitution
- George, the 61-year-old founder of Sterling Seafood Corp., pleaded guilty and admitted he imported more than 11 million pounds of the catfish, also called swai or basa. But in every case, he called them grouper or soul.



PRESIDENTIAL TASK FORCE ON COMBATTING ILLEGAL, UNREPORTED AND UNREGULATED (IUU) FISHING AND SEAFOOD FRAUD

- In 2014, the Presidential Task Force on Combatting Illegal, Unreported and Unregulated (IUU) Fishing and Seafood Fraud was instituted, and in 2015 it made 15 recommendations to reduce seafood fraud.
- The recommendations include a traceability program for popular seafood such as tuna, shrimp, red snapper, Pacific cod, Atlantic cod, grouper, and some species of crab.

Action Plan Recommendations

- Recommendation 1: International Port State Measures
- Recommendation 2: International Best Practices
- Recommendation 3: International Maritime Domain Awareness
- Recommendation 4: International Free Trade Agreements
-

VERIFY LABEL INFORMATION

- There is no universal seafood labeling system for grocery stores so buying fish products.
- Food & Drug Administration launched an online learning module to help food retailers ensure the proper labeling of seafood
- [productshttps://www.youtube.com/watch?v=RX5OS7ePV0w&feature=youtu.be](https://www.youtube.com/watch?v=RX5OS7ePV0w&feature=youtu.be)
- **Use a third-party certification partner**
- Third-party experts can provide food retailers with a number of benefits. Among them is their impartiality to data allowing for trusted, ethical reporting.
- They can also offer counsel on the correct set-up of tracing product authenticity, further reducing any need for unnecessary expenditures due to fraud or labeling mistakes. Finally, they have access to state-of-the-art equipment and technology that can synthesize and analyze data to identify trends and opportunities for supply chain improvements, remedies and corrections.

NORTH COAST SEAFOODS

- If you were to track the history of one fish traveling through the traditional distribution channel, the journey might make you dizzy.
 - Fish caught in North Carolina is loaded into bins, sold and trucked up to New York's Fulton Fish Market,
 - where it is traded and sold again to wholesalers, trucked back down to North Carolina,
 - where it is bought and sold again before being sold a week later to restaurants a few miles away from where it was originally caught.
- SEAFOOD FRAUD
 - North Coast Seafoods, one of New England's largest distributors, who sold **mislabeled fish** to many of Boston's top restaurants.
 - DNA testing revealed that Pacific Cod was used as a stand-in for more valuable local Atlantic Cod, but in each case North Coast resorted to blaming the restaurant, saying that "they have no obligation to make sure restaurant menus are accurate."
 - December 2012

CAN YOU PICK
OUT WHAT TYPE
OF FISH IS IN
THIS SEAFOOD
BISQUE?
THIS ETOUFFEE?
OR
THIS CIOPPINO?



CALIMARI OR HOG RECTUM?



Calamari's modest cousin, "imitation **calamari**." Though it has a shape and texture similar to the real thing, its component parts are decidedly different.

- **Calamari** comes from squid, the replica is made of hog **rectum**, otherwise known as "bung."

DID YOU KNOW?: **Squid** is cheaper and tougher; **calamari** is more tender and expensive.

- **Squid** is generally *Nototodarus gouldi*, also known as Gould's **squid**, but a species named *Teuthoidea* is also targeted.

- **Calamari** come from the genus *Sepioteuthis*. You can see the word "sepia" in the name, which refers to their ink.

KOBE BEEF



- No beef from Japan was allowed to be imported into this country by the USDA, starting back in 2009.
- *“... You cannot buy Japanese Kobe beef in this country. Not in stores, not by mail, and certainly not in restaurants. No matter how much you have spent, how fancy a steakhouse you went to, or which of the many celebrity chefs who regularly feature “Kobe beef” on their menus you believed, you were duped. I’m really sorry to have to be the one telling you this, but no matter how much you would like to believe you have tasted it, if it wasn’t in Asia you almost certainly have never had Japan’s famous Kobe beef...”* **Larry Olmsted**, CONTRIBUTOR- FORBES.ORG

GRAINS

Some known adulterants in rice and lentils include

- ✓ herbicides and pesticides
- ✓ toxins like melamine.

Many are also mislabeled, with incorrect information about their region of origin reflected on the label.



GINGKO BILOBA



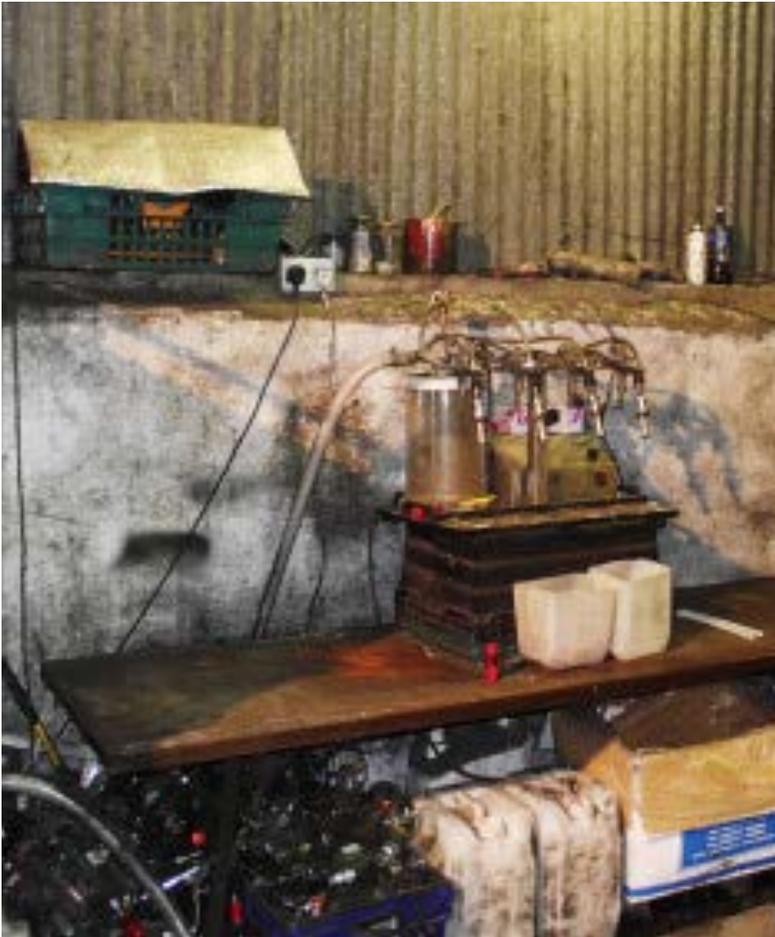
- Ongoing problems with ginkgo supplements not being 100% ginkgo. It takes 50 pounds of dried leaves to make one pound of extract.
- To reduce costs some manufacturers or ingredient suppliers provide less ginkgo than claimed or use material that has been adulterated or spiked with one or more compounds or extracts from other plants that can trick simple chemical tests
- (It is now believed to be the most adulterated herb on the market. Industry experts agree it is intentional.)

FAKE ALCOHOL

- Fraudulent booze can contain substitutes for ethanol including chemicals used in cleaning fluids and automobile screen wash, as well as methanol and isopropanol which are used in antifreeze and some fuels.
- Drinking alcohol containing these chemicals can lead to serious health problems.
- Most faux wines are just a cheaper vintage and a bad bargain, but adulterated spirits are potentially more dangerous.
- Counterfeiters are likely to focus most of their attention on the packaging, so consumers should keep an eye out for logos and bottles that don't look quite right.



COUNTERFEIT VODKA



- Counterfeit vodka worth almost half a million seized at farm in Louth (Ireland) (November 2017)

FOOD FRAUD CASES – DOMESTIC

Examples of malicious intentional adulteration include:

- September 1984—A religious sect intent on disrupting local elections in The Dalles, Oregon contaminated restaurant salad bars, creating ‘a large community outbreak of Salmonellosis
- September 2002—a snack-bar owner in Nanjing China spread lethal rat poison into the food of his business rival, killing 38 people and leaving hundreds seriously ill;
- USA (2009–present) Salmonella in peanuts, honey–laundering, meat from undeclared species
- May 2016—Kyle Bessemer, in Michigan, sprayed mouse poison on food in snack bars.



FOOD FRAUD CASES-WORLDWIDE

- 2005–present: meat from undeclared species (Mexico)
- 2005: Chili powder adulterated with Sudan (India)
- 2008: Dairy products and baby food adulterated with melamine (China)
- 2011: Illegal organic produce (Italy)
- 2013: Manuka honey where it was known that bees were not feeding from pollen of the Manuka bush (New Zealand)
- 2013: “Beef” Burgers and meatballs containing pork and horsemeat (UK)
- 2014: Hydrogen peroxide on seafood (Italy)
- 2015: Stating Free–range eggs but from caged hens (Australia)
- 2015: ‘zombie meat’ frozen chicken, beef and pork (China)
- 2015: Palm oil in milk (Russia)
- 2016: Dried oregano adulterated with other dried plants (Australia)



2008 CHINESE TAINTED MILK SCANDAL



- The **2008 Chinese milk scandal** was a widespread food safety incident in China. The scandal involved milk and infant formula along with other food materials and components **being adulterated with melamine**.
- Of an estimated 300,000 victims in China, six babies died from kidney stones and other kidney damage and an estimated 54,000 babies were hospitalized.
- The chemical gives **the appearance of higher protein content** when added to milk, leading to protein deficiency in the formula. In a separate incident four years prior, watered-down milk had resulted in 12 infant deaths from malnutrition.
- The chemical turned up in the products of international companies, including giants such as Cadbury, Nestlé, and Unilever, leading to product recalls around the world.

ZOMBIE MEAT

- More than 100,000 tons of frozen chicken, beef and pork smuggled into China — some of it four decades old and posing a dangerous health risk — were seized in a crackdown – June 24, 2015
- Fourteen gangs were involved in smuggling the frozen food valued at nearly half a billion dollars.
- Arrests and seizures occurred in 14 provinces and regions throughout the nation this month. Much of the meat was expired, some of it from the 1970s.
- In Hunan Province in southern China, 20 members of two gangs were taken into custody and 800 tons of food were seized.
- **The Hunan seizure included frozen chicken feet, a popular Chinese snack served cold and with beer.**
- News of the smuggled food swept the Internet in China where tens of thousands complained about "Jiangshi Fengzhao" or "zombie chicken feet" being slipped past official food inspections.



RUSSIA (2015) PALM OIL IN MILK



How did they find out?

- According to data from the Russian State Statistical Service (Rosstat), the import of palm oil in the country rose by 37% compared to 2014, while production of milk decreased by 2%. At the same time, production of cheese rose by 33%. Russian experts say that it is obvious that Russia does not have enough ingredients to produce all the cheese.
- **Milk down, palm oil up**

Some product samples do not contain any milk fat, but instead have palm oil in them as a substitute.
- A market study by Rosselkhoznadzor at the end of 2015 showed that 78% of all cheese in the country was falsified.

FINES AND JAILTIME- HALAL BEEF



- Midamar Corporation and Islamic Services of America have been ordered to forfeit \$600,000 in the US District Court.
- Three defendants—William, Jalel and Yahya Aossef admitted to a scheme involving falsification of export certificates to ship Halal beef to customers in Malaysia and Indonesia.
- They faced up to 5 years in jail plus a \$250,000 fine for a felony conspiracy violation plus 1 year and \$100,000 for each misdemeanor charge.

ANOTHER TYPE OF FOOD FRAUD



- In 2009, Peanut Corporation of America (PCA) executives were indicted for fraud when an outbreak of *Salmonella* resulted in 9 deaths and 700 people hospitalized.
- Although food contamination with pathogens such as *Salmonella* usually does not fall into the category of food fraud, investigations found that **PCA executives knew about the contamination for months, falsified laboratory results, and willingly continued to ship the product to avoid profit losses.**

- April 2016: a large-scale recall was announced due to adulteration of ground cumin with peanut protein, leading the U.S. Food and Drug Administration (FDA) to issue a warning to consumers not to use this common spice if they have an allergy to peanuts.
- Consensus among many experts in the field is that this adulteration incident was most likely a case of food fraud.

CASE STUDY: HORSEMEAT IN BEEF

Horsemeat was illegally mixed into beef products. This incident occurred primarily in the British consumer marketplace in 2013,

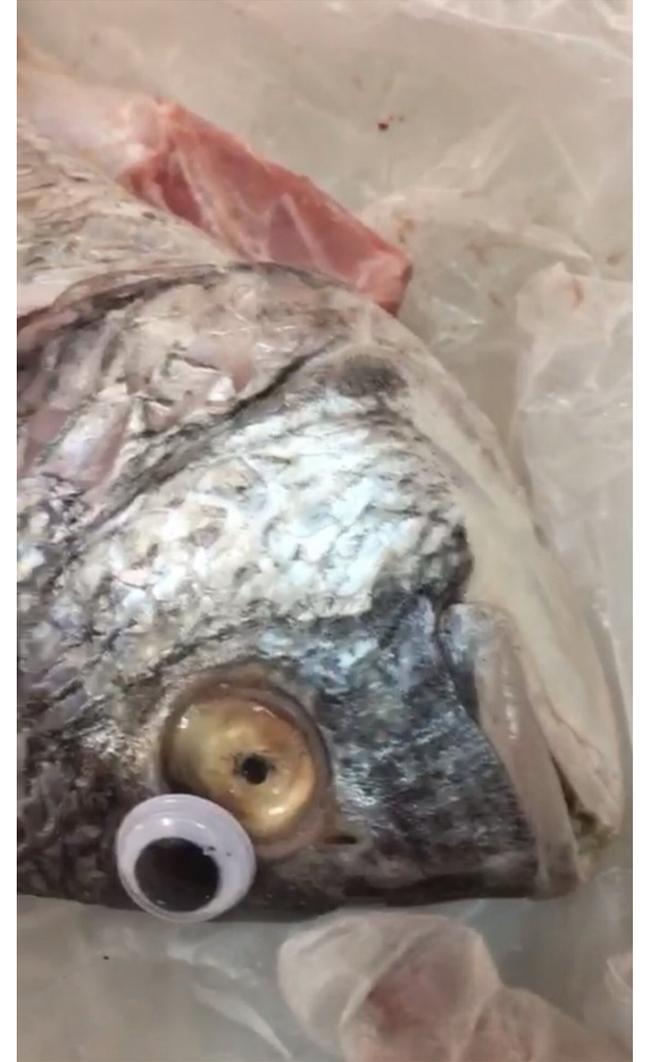
The product was produced in Romania, and was transshipped through several European countries.

This is an adulterant-substance Food Fraud incident because horsemeat was not authorized as an ingredient or as a substitute for beef. Additionally, the product was not labeled as containing horsemeat.

- The horse meat scandal of 2013 was a turning point for DNA analysis in food authenticity. The discovery of horse meat as a fraudulent addition to beef meat preparations across Europe, such as burgers and lasagna, brought to the attention of consumers, law enforcers, and regulators the need for reliable, rapid, and effective tools for detection of such cases of adulteration.
- It was evident that the only way to detect the presence of horse meat was through analysis of DNA extracted from food.

STORE CAUGHT STICKING GOOGLY EYES ON FISH TO MAKE THEM LOOK FRESH

- A store in Kuwait has reportedly been shut down after it was discovered that its owners were sticking googly eyes on fish in an attempt to make them appear fresher.
- Images of one of the fish, which were uploaded to Twitter by Al Bayan newspaper on Saturday, left users in hilarious disbelief at the creativeness of the store's owners.
- February 2018



SPANISH AUTHORITIES SEIZE 45 TONS OF TUNA

AUGUST 2018



- The Spanish Civil Guard, **SEPRONA**, seized a total of 45 tons of frozen **tuna** in four provinces; Alicante, Cartagena, A Coruna and Barcelona in Spain.
- The fish had been treated with additives, in amounts much higher than recommended, in order to enhance their color making them appear fresh, and not thawed.
- Frozen tuna authorized for canned consumption had been **marked as freshly caught fish, with its value priced at four times its worth.**

COMPANY ACCUSED OF DILUTING CHESAPEAKE BLUE CRAB MEAT WITH IMPORTED CRAB



- A major Virginia seafood supplier was selling packages of premium Chesapeake blue crab meat cut with cheaper foreign crab. It wasn't even the same species.
- In an unusual probe, federal agents fanned out to markets across Virginia, Delaware and North Carolina, scooping up crab meat from Casey's Seafood and sending it out for the type of DNA analysis more common in rape and murder cases.
- The results would reveal the tip of what authorities say is a massive fraud worth millions of dollars, one so large it has shaken the food industry and raised questions about just how much of the iconic food labeled as local comes from the Chesapeake Bay.
- Federal prosecutors allege in a case unsealed this year that the Newport News, Va., company sold a whopping 398,000 pounds of Chesapeake blue crab mixed with cut-rate crab from as far away as Indonesia or Brazil and labeled it as an American product. The retail value of the crab is roughly \$14 million at current prices.
- New rules went into effect at the start of 2018, requiring importers to document that the catch is legally and sustainably caught.
- 2012-2015

WHAT CAN COMPANIES DO TO MITIGATE THE RISK?

- Control measures to prevent food fraud activities include the adequate evaluation and selection of suppliers, as well as the ‘suppliers of the suppliers’.
- Other food fraud activities include effective traceability systems, monitoring current worldwide news and notifications on food fraud using international databases (EU-RASFF, USA- EMA NCFPD and USP, etc.), and product testing.
- Product testing is becoming an important tool for the food industry to become confident in sourcing raw materials, ensuring the management of food fraud control measures, fulfilling applicable legal requirements, and ensuring the safety of consumers.
- Product testing laboratories offer different kinds of testing methods depending on the required output; for example, if it is possible and requested, a targeted or non-targeted result.

WHAT CAN COMPANIES DO TO MITIGATE THE RISK?

Targeted analysis involves screening for pre-defined components in a sample:

- Liquid chromatography
- Gas chromatography
- Mass spectrometry (LC-MS and GC-MS)
- Nuclear magnetic resonance spectroscopy (NMR).
- PCR technique

Non-targeted analysis aims to see any chemical present in the sample:

- Isotopic measurement-determination of whether ethanol and vinegar and flavorings are natural or synthetic
- Metabolomics: Maturation and shelf life
- Proteomics: Testing for pork and beef additives in chicken, confectionery and desserts

WHAT CAN YOU DO ABOUT FOOD FRAUD AS A CONSUMER?

- Ask questions
- Become familiar with the type of foods you like
- Buy from reputable sources
- Be skeptical when prices are really too low
- Be aware of legitimate sites where there is additional information



