

Food Adulteration & Control Mechanism

At the Workshop on Food Defense Awareness for
Food Business Operators and Exporters

February 5, 2013 - Hyderabad

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Food Adulteration

An **adulterant** is a chemical substance which should not be contained within other substances (e.g. food, beverages) for legal or other reasons. The addition of adulterants is called *adulteration*.

Food Adulteration

Historical Perspective

The usage of adulterants has been common in societies with few legal controls on food quality and/or poor/nonexistent monitoring by authorities; sometimes this usage has even extended to exceedingly dangerous chemicals and poisons. eg. Coloring of Cheese(s) with Lead.

Food Adulteration

Historical Perspective

Adulterant usage was first investigated in 1820 by the German chemist Frederick Accum, who identified many toxic metal colorings in foods and drinks.

The physician Arthur Hill Hassall later conducted extensive studies in the early 1850s, which were published in The LANCET and led to the 1860 Food Adulteration Act and subsequent further legislations.

Food Adulteration-Notable Incidents

1987: Selling of artificially flavored sugar water as apple juice

1997: Spraying of water on stored grain to increase its weight and value.

2007: Mixing of melamine in wheat gluten in pet foods to produce artificially inflated results from common tests for protein content.

2008: Mixing of melamine in milk and infant formula products.

2012: Milk adulteration with detergent, fat and Urea.

Food Adulteration

Examples :

- ❑ Mogdad coffee [*Senna occidentalis*] - to adulterate coffee
- ❑ Roasted ground peas, beans, or wheat to roasted chicory
- ❑ Diethylene glycol - used by some winemakers to fake sweet wines
- ❑ Oleomargarine or lard - added to butter
- ❑ Alum is added to disguise usage of lower-quality flour in expensive flours
- ❑ Addition of Sudan [I, II, III, Red] to chili powder to obtain the required color
- ❑ Starch - added to sausages.

Food Adulteration

Examples

- ❑ Powdered beechnut husk aromatized with cinnamic aldehyde, marketed as powdered cinnamon.
- ❑ High fructose corn syrup or cane sugar, used to adulterate honey
- ❑ Glutinous rice coloring made of hazardous industrial dyes, as well as tinopal to make rice noodles whiter (to serve as bleach).
- ❑ Usage of formaldehyde to prevent spoilage of Noodles, meat, fish, tofu from the sun.
- ❑ Water or brine injected into chicken, pork or other meats to increase their weight

Food Adulteration

Categories

Replacement:

Complete or partial replacement of a food ingredient or valuable authentic constituent with less expensive substitute with the intention of circumventing on “*origin*” and false declaration of the “*process*”.

Addition:

Addition of small amounts of non-authenticated substances to mask inferior quality ingredient.

Removal:

Removal of authentic and valuable constituent without purchasers knowledge.

Food Adulteration

Statistics

Food Ingredient Fraud Data Base of Food Chemical Codex:

About 1500 examples of replacement type, 90 examples of addition and 1 example of removal between 1980-2012] from scholarly & media based reported articles for ingredient categories:

1. Cereals, grains, Pulses
2. Colors
3. Dairy Products & Milk derivatives
4. Fruit juices, concentrates, Jams
5. Functional food ingredients
6. Gums
7. Vinegars
8. Oils
9. Protein based ingredients
10. Sea Food
11. Spices
12. Sweeteners
13. Wines, musts, spirits, liquors, and
14. Meats
15. Natural Flavoring complexes

Food Adulteration

Reasons:

- When supply is less than demand
- To cut down the product costs to meet the market competition.
- To earn more profits.
- Shortage of authentic ingredients at affordable prices.
- Shortage of qualified personnel and no updation of processing techniques.
- Inadequate knowledge on the consequences and associated food safety risks.
- Lack of awareness and updation of the information on the adulteration related food safety outbreaks.

Adulteration

Reasons

- ❑ Adulteration in general is done to increase the value of a commercial attribute / characteristic of the products.
- ❑ Sometimes Adulteration, even though not hazardous, may lead to severe contamination issues, eg. spraying of water on dry chilies to cope with the excess weight loss may lead to Aflatoxins.
- ❑ Blending is not Adulteration, unless origin of the product is significant

Food Adulteration Vs Food Additives

Food Additives are Chemical substances added to processed foods:

- To enhance/retain quality attributes such as texture, physical properties, taste, flavour etc.
- To control the spoilage and enhance shelf life of the processed foods.

General Food Additives are:

Antioxidants

Emulsifiers/stabilizers

Preservatives

Anti caking agents

Artificial sweeteners

Bulking agents

Acid regulators

Leavening agents

Flavor enhancers

Glazing agents

Food Adulteration Vs Food Additives

- All additives are not adulterants, if present within the specific limits and once exceeded the limits they become significant adulterants and can cause serious health hazards to the consumers.
- All additives are not adulterants until reported outbreak of food safety issues occur.

Food Adulteration - Control Approach

- ❑ Integrated approach through out the food chain involving all the stake holders :
 - *Statutory & regulatory authorities*
 - *Industry*
 - *Scientific community*
 - *Consumers / end-users*

- ❑ Through regular update of information regarding reported outbreaks of food safety issues pertaining to adulteration.

Food Adulteration - Control Approach

Statutory and regulatory authorities:

- Stipulating the practically feasible rules, requirements and regulations on the adulterants and updating them at regular intervals.
- Stringent monitoring of the implementation.
- Regular interactions with the industry to understand their concerns.

Food Adulteration - Control Approach

Industry:

- To feel more ethical and moral responsibility as food business operator to supply & serve wholesome food to the society.
- Regular updates on the process and allergen related outbreaks in the world.
- Risk assessment [*probability x severity*] for all the ingredients, additives & processing aids and processing techniques w.r.t. adulteration.
- Frequent testing of vulnerable ingredients, additives & processing aids for positive clearance w.r.t. allergens.
- Third party auditing of the process to identify existing & probable lacunae of the system.

Food Adulteration - Control Approach

Scientific Community:

- To develop validated simple, quick and authentic test procedures to scan the ingredients, additives & processing aids for positive clearance.
- To share the knowledge with the statutory bodies and industry.

Food Adulteration - Control Approach

Consumers/end users:

- Proper understanding of the adulteration issues.
- To know difference between the natural and aesthetic attributes [texture, appearance & taste] of foods and accepting the natural ones to the extent possible.



Thank You