

Food Fortification & Adulteration



Presenter - Dr. Vaibhav Gupta, MPH2nd year

Moderator - Dr. Sunil Kumar D. (Asst.Prof.)

Dept. of community medicine
JSSMC

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Plan Of Presentation

- Introduction
- History of Food Fortification
- Need For Regulation
- Approaches For Arriving At Fortification Levels
- Criteria for Fortification
- Advantages & Disadvantages FF
- Future Challenges of Food Fortification
- Government supported programmes
- Food adulteration & Food Standards

Nutrition

- The science of food & its relationship to health. It is concerned primarily with part played by nutrients in body growth , development and maintenance. (WHO)

Nutrients

- Nutrients are organic & inorganic complexes contained in food .
1. **Macronutrients:** These are Proteins, Fats & Carbohydrates which are often called “**Proximate Principals**” because they form the main bulk of food.
 2. **Micronutrients:** These are Vitamins & Minerals. They are called micronutrients because they are required in small amounts which may vary from a fraction of a milligram to several grams.

Key Micronutrients

1. Iodine

2. Iron

3. Vitamin A

4. Folic acid

5. Zinc

6. Vitamin D

7. Calcium

8. Other micronutrients:

Vitamin B2, B6, B12

Micronutrient Deficiencies In India

Micronutrient deficiencies such as:

- Iron deficiency anaemia (**IDA**)
- Vitamin A deficiency (**VAD**) and
- Iodine deficiency disorders (**IDD**) continue to be significant public health problems in India .

- well established deficiency cases of : **Iron, Iodine & Vit-A,**
- **emerging evidences:** reported on low plasma levels of **zinc, folic acid & vitamin D**
- **Sporadic deficiencies** related to **Vit B12, B1, B2**
- evidence of increasing fracture risk of Indian population attributed to **calcium & Vitamin D** deficiency has also been reported in the recent past.

Food Fortification

- WHO – “The process whereby nutrients are added to foods (in relatively small quantities) to maintain or improve the quality of the diet of a group , a community or a population.”



History of Food Fortification

- Iodised Salt was used in the United States before World War II
- Niacin has been added to bread in the USA since 1938
- Vitamin D was added to margarine in Denmark in early 50's
- Vitamin A & D were added to Vanaspati (hydrogenated Vegetable Oil) in India since 1954 as per mandate

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- Folic acid was added to bread for preventing neural tube defects in infants in 60's.
- Over the last 3 decades fortification of foods has become a public health measure for preventing deficiencies of Vitamin -A, Iron, Folic acid and Iodine.

Need For Regulation For Micronutrient Fortification Of Staple Foods

Fortification is the addition of one or more essential nutrients to a food, whether or not normally contained in food, for the purpose of preventing or correcting a demonstrated deficiency of one or more nutrient in the population or specific population groups .

Fortification of food under the government supported programmes

- a) Fortification of **ICDS** supplementary cooked food
- b) Fortification of food for the **Mid Day Meal**
- c) Fortification of factory produced **Ready-to-Eat (RTE) foods**
- d) Fortification of wheat flour supplied through **Targeted Public Distribution System(TPDS)**

Cont..

- However, for the packaged foods available in the open market there are no clear guidelines on nutrients that can be fortified or are permissible under law.
- Under the Prevention of Food Adulteration Act (**PFA**), The Food Safety and Standards Act (**FSSA**)
voluntary fortification guidelines are only given for:
 - ✓ Whole Wheat flour (**Atta**) and
 - ✓ Refined wheat flour (**Maida**)

Vehicles for fortification with combinations of micronutrients

Vehicles	Micronutrients
Edible common salt	iron and iodine
Whole wheat flour & Maida	iron, folic acid, calcium, zinc
Rice	iron, folic acid, calcium, zinc
Vegetable oils	vitamins A & D
Milk and Dairy products	vitamin D, A iron, folic acid, calcium, Omega-3,6 fatty acids
ICDS supplementary foods	iron, folic acid, calcium, zinc
Sugar	vitamin A

Criteria for Fortification

- Nutrient deficiency should be widespread.
- The vehicle food must be consumed by the target group.
- The high consumption of fortified food will not lead to toxicity.
- Addition of micronutrient should not change the taste, colour, flavour, texture and shelf- life of the food item.

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- The item of food should be centrally controlled and monitored
- The cost of fortification should be affordable.

Approaches For Arriving At Fortification Levels

- National RDA of nutrients
- Prevalence of deficiency in the region
- Per capita consumption of food vehicle to be fortified
- Current dietary habits of the population
- Stability of the nutrient in the food being fortified
- Chemical sources

Advantages

- Providing certain nutrients simultaneously in the same food improves the utilization of certain
- vitamins and minerals, e.g. vitamin C enhances the absorption of iron
- Providing nutrients through the regular food supply and distribution system reduces costs.

Disadvantages

- Shelf life of fortified milled cereals is reduced
- Regular quality control is essential.
- Prolonged cooking of fortified food leads to 90% loss of vitamin C
- Fortified commodity is more expensive .

Future Challenges of Food Fortification

1. Create **community awareness** about benefits of food fortification.
2. Private Sector, Governments & International Agencies need to make **commitments** for investing in food fortification.
3. Ensure increased **availability** of fortified foods to the vulnerable groups of populations.

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4. Governments & International Agencies should encourage fortification by way of **tax concessions** or **duty rebates**.
5. Regulatory authorities to recommend **Uniform Food Fortification Guidelines** to the group countries.
6. Develop **Technologies** that will produce the Futuristic food.

Food adulteration

The process of lowering the nutritive value of food either by removing a vital component or by adding substances of inferior quality, is called food adulteration.

FSSA - Adulterant

- Any material which is or could be employed for making the food unsafe or sub-standard or mis-branded or containing extraneous matter
- **Misbranded:**
 - i) False claims on label / ad
 - ii) imitation / substitute
 - iii) false statement, design or device regarding the ingredients
 - iv) false Manufacturer details or
 - v) improper label - artificial flavouring, colouring or chemical preservative

Cont..

Substandard: if it does not meet the specified standards but does not render the food unsafe

Unsafe : article of food which is injurious to health:-

- i) article / package
- ii) decomposed / diseased animal substance or plant substance
- iii) is processed unhygienically
- iv) substituted by inferior or cheaper substance
- V) illegal ingredients

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- vi) prepared, packed or kept under unsanitary conditions
- vii) mis-branded / sub-standard / containing extraneous matter
- viii) excess pesticides & other contaminants

Common Food Adulterants

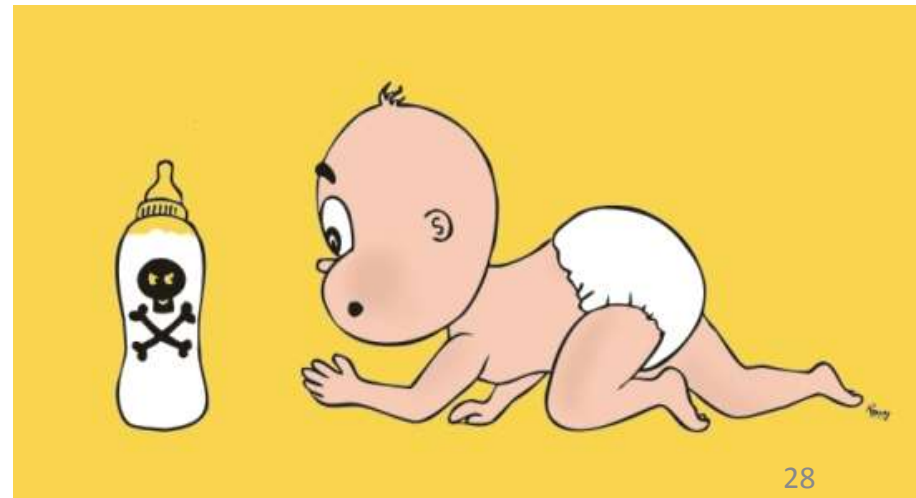
S.n	Food Material	Common Adulterants
1	Milk	Extraction of fat, addition of starch & water
2	Coffee powder	Date husk, tamarind husk, chicory
3	Mustard seeds	Seeds of prickly poppy-argemone
4	Butter	Oleo, margarine
5	Honey	Fructose syrup /cane sugar
6	Rice , wheat	Mud grits ,soapstone bits
7	Black pepper	Dried seeds of papaya

HEALTH HAZARDS OF ADUTERATION

- Breaking of teeth & adverse effect on the lining of the GIT.
- Cause GIT disturbances like **diarrhea, infections** .
- Stomach or intestinal **Cancer**.
- Toxicity due to toxic sweeteners , additives, colours etc.
- **Lathrysim** due to consumption of Kesari dal .
- **Epidemic Dropsy** due to consumption of Argemone oil mixed mustard oil.
- Various abnormalities of bone ,eyes ,skin and lungs.
- **Anaemia**

Disadvantages For The Consumer

- He is paying more money for foodstuff of lower quality.
- Some forms of adulteration are injurious to health , even resulting in death.



Food Standards

1. **Codex Alimentarius :**

Collection of international food standards recommended by FAO and WHO.

2. **PFA-Standards :**

Its purpose is to obtain a minimum level of quality of food stuffs attainable under Indian conditions.

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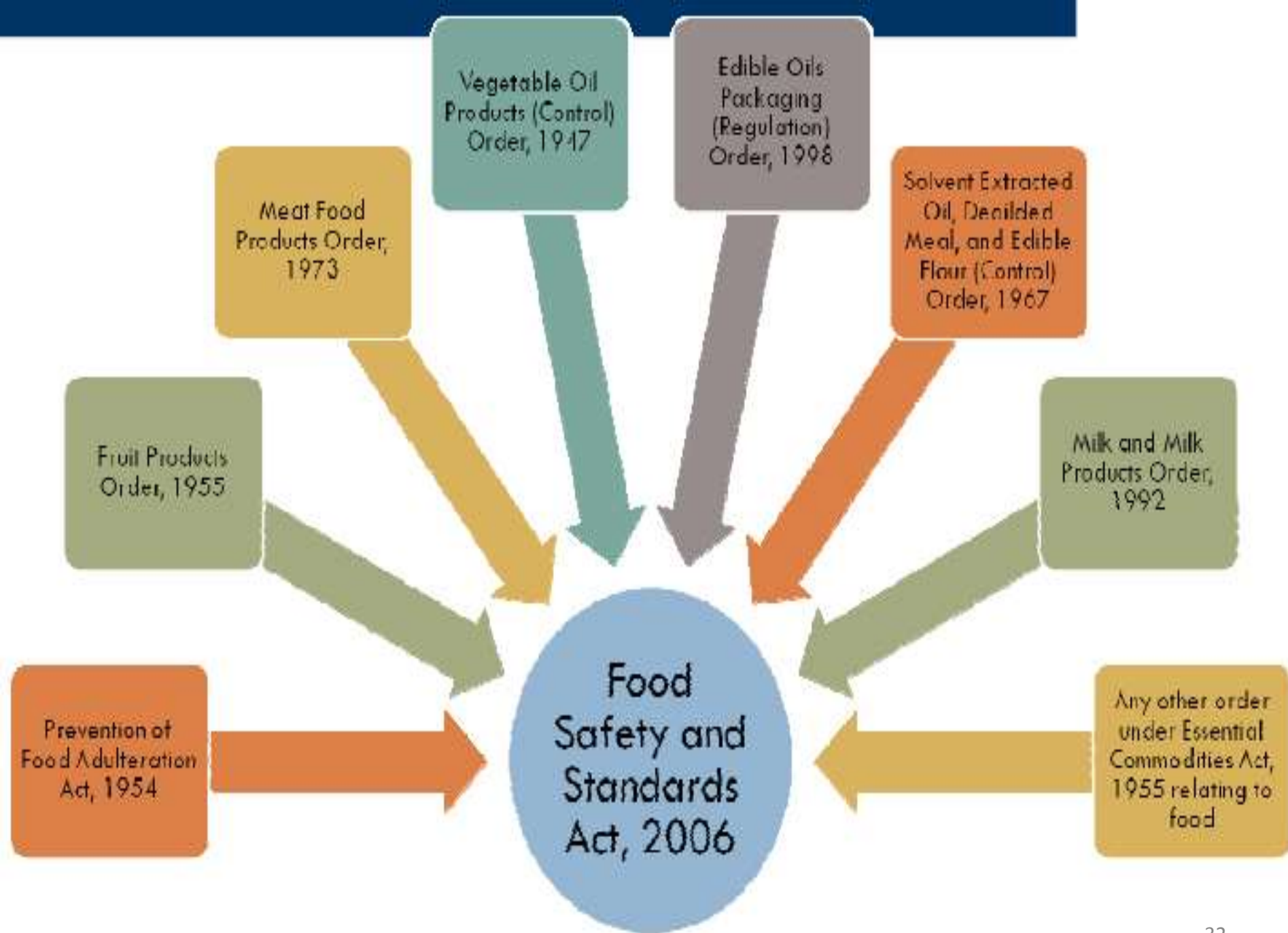
- 3. Agmark Standards:** Gives the consumer an assurance of quality in accordance with standards laid down.
- 4. Bureau Of Indian Standards :** The ISI mark on any article of food is a guarantee of good quality.

Prevention of Food Adulteration Act (PFA) 1954

- Enacted in 1954 and amended in 1963, 1969 and 1986 to make it more stringent

OBJECTIVES:

- Social legislation to protect health of the consumer
- To ensure foods of honest and nutritive value
- To punish guilty traders and manufacturers



FSSA, 2006

- Food Safety and Standards Bill piloted by MOFPI, passed by parliament in Monsoon session and approved by President in September, 2006

WHY FSSA ACT?

- Multiplicity of food laws, standard setting and enforcement agencies for different sectors of food
- Varied Quality/Safety standards restricting innovation in food products
- Thin spread of manpower, poor laboratories infrastructure and other resources non-conducive to effective fixation of standards

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- Standards rigid and non-responsive to scientific advancements and modernization
- Poor Information dissemination to consumer level

Definition of Food Under FSSA ACT, 2006

- Any substance, whether processed, partially processed or unprocessed, which is intended for human consumption & includes primary food i.e. all raw produce except those in hands of the grower, farmer, fisherman etc., genetically modified or engineered food or food containing such ingredients, infant food, packaged drinking water, alcoholic drink, chewing gum, & any substance, including water used into the food during its manufacture, preparation or treatment.

The Food safety and Standards Act, 2006

Aims :

1. The primary focus is to integrate the existing food laws and to bring about a single statute under a single regulatory authority, and to provide regulatory system for the production, manufacture, processing, and sale of safe and suitable food.

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2. The Act incorporates the salient provisions of the PFA Act 1954, and is based on international legislations, instrumentalities and Codex Alimentarius Commission.

3. This Act with its three tier structure is expected to lay more emphasis on science based and participatory decisions.

FSSA- 2006

Objectives:

- To consolidate the Laws relating to food.
- To establish the Food Safety and Standards Authority of India for.
- Laying down science based standards for articles of food.

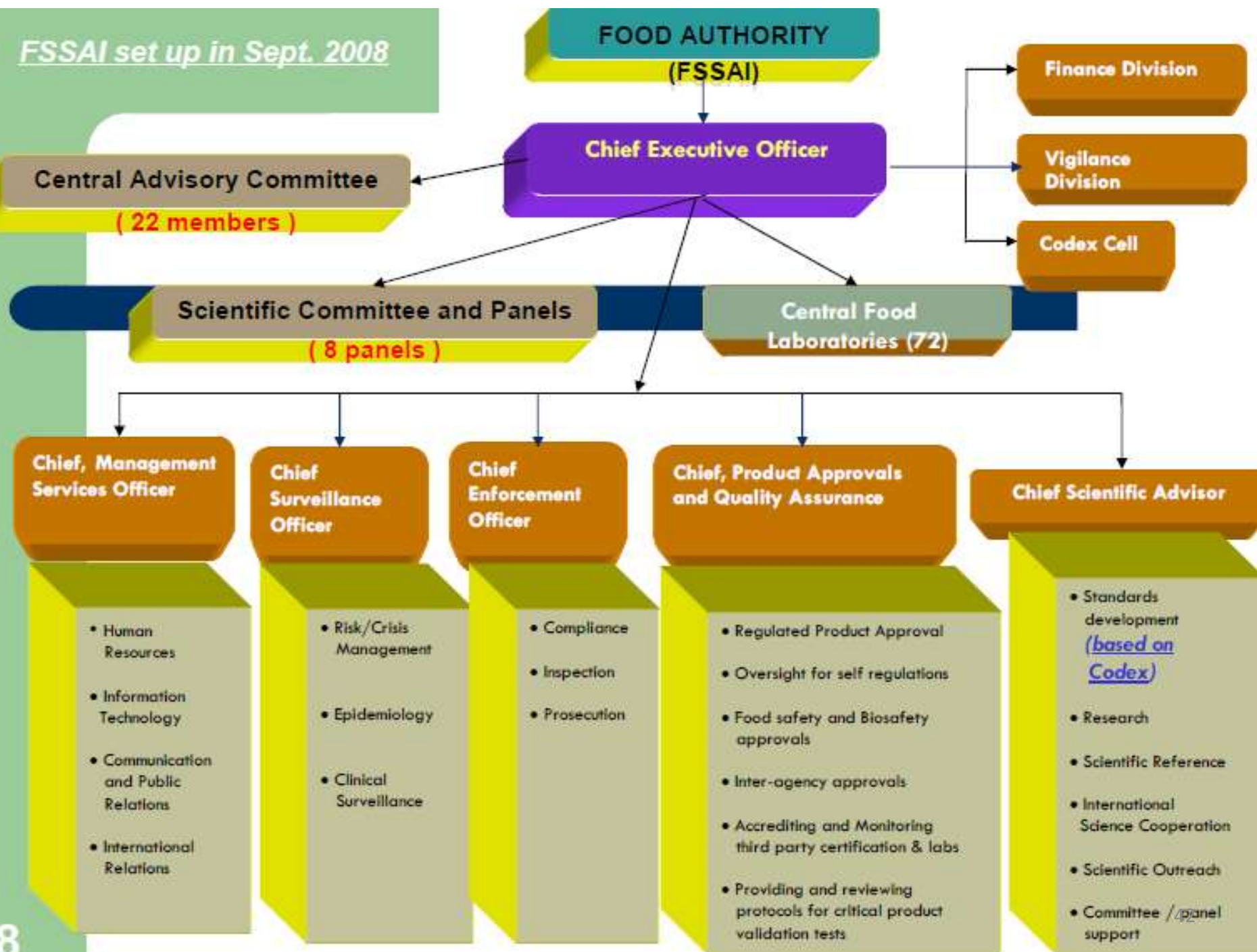
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- To regulate their manufacture, storage, distribution, sale and import of food.
- To ensure availability of safe and wholesome food for human consumption.

Salient features

- Defines the concept of “substandard” and “unsafe food”;
- emphasizes on the need on risk assessment; not trade restrictive
- Provisions relating to functional and novel food
- Prescribes graded penalties for offenses/violations
- Improvement notices

FSSAI set up in Sept. 2008



FRAMEWORK FOR REGISTRATION/ LICENSING/MONITORING OF FOOD BUSINESS ESTABLISHMENTS



Functions of FSSAI

- Prepare the **standards & guidelines** to regulate safety of food.
- **Setting of Limits** for food additives, contaminants, Residues, processing aids etc.
- **Accreditation of certification** bodies engaged in certification of FSMS.
- Procedure and the **enforcement of quality control**.
- Accreditation of laboratories & their notification to stakeholders.
- Method of sampling, analysis & exchange of information among enforcement authorities.

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- **Food labeling standards** including claims on health, nutrition, special dietary uses & food category systems for foods.
- Issuing Licenses within a time frame of **2 months**
- Provision of **Improvement Notice** by Designated Officers
- Compounding and Adjudication of cases – to reduce Court's workload and expedite the disposal of cases
- Prosecution, if to be launched, should be **within 1 year** time frame

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- Constitution of Special Courts for summary trials
- Compensation to Victims (for any case of Injury/ Grievous injury/ Death)
- Reward to informer (informing about the violators – adulteration etc.) by State Govt.
- One composite license for unit(s) falling under one area

Difference PFA & FSSAI

PFA	FSSAI	
Multiple Authorities	Single Authority, Single Reference Point	
Adulteration	Food Safety	
Inspection/Control (regulatory regime)	Monitoring Surveillance (self compliance)	
Insufficient Enforcement/Personnel	Full time Food Safety Officer and Designated Officers Under FSC	
Direct prosecution by court - no appeal before moving to court	Graded fine & penalties for offences through adjudication process. Food Safety Tribunals	
No provisions of improvement notices	Provision of improvement notices	
GMP/GHP Not mandate	GMP/GHP Mandatory (Schedule -4)	
Improper Control on Import	Proper Import Control/Structure	

Offences Vs Penalties/Fine

Penalty for substandard food	Rs 5 lacs
Penalty for misbranded food	Rs 3 lacs
Penalty on misleading advertisement	Rs 10 lacs
Food containing extraneous matter	Rs 1 lac
Penalty for failure to comply with food safety officer/False & Misleading Info	Three months of imprisonment/Rs 2 lacs
Penalty for unhygienic processing of food	Rs 1 lacs
Punishment for unsafe food - Which Does not result in injury Non-grievous injury Grievous injury Death	6 Months Imp and 1 lakhs 1 Year Imp and 3 Lakh 6 Y Imp and 5 Lakh 7Y or Life Imp and 10 Lakh
Unhygienic or unsanitary conditions	1 lakh rupees
Not having valid license	6 M Imp and 5 Lakhs
Compensation to consumer Death Grievous injury Injury	5 lakh rupees 3 Lakh 1 Lakh

Organisations



- Food and agriculture organisation(FAO)
- Micronutrient Initiative (MI)
- World Food Programme (WFP)
- CFTRI
- NIN(National Institute of Nutrition)
- WPHNA(World Public Health Association)
- FNB (Food Nutrition Board)



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THANK YOU

LOGO AND OFFICIALLY APPROVED CLAIM

