Need for Food Safety and Quality Assurance In India

Dr. M. Sreedhar
Senior Scientist
&
Dr Anurag chaturvedi ,
Professor (Foods and Nutrition) & PI,
Quality Control Lab
ANGRAU, EEI campus
Rajendranagar, Hyderabad 500 030

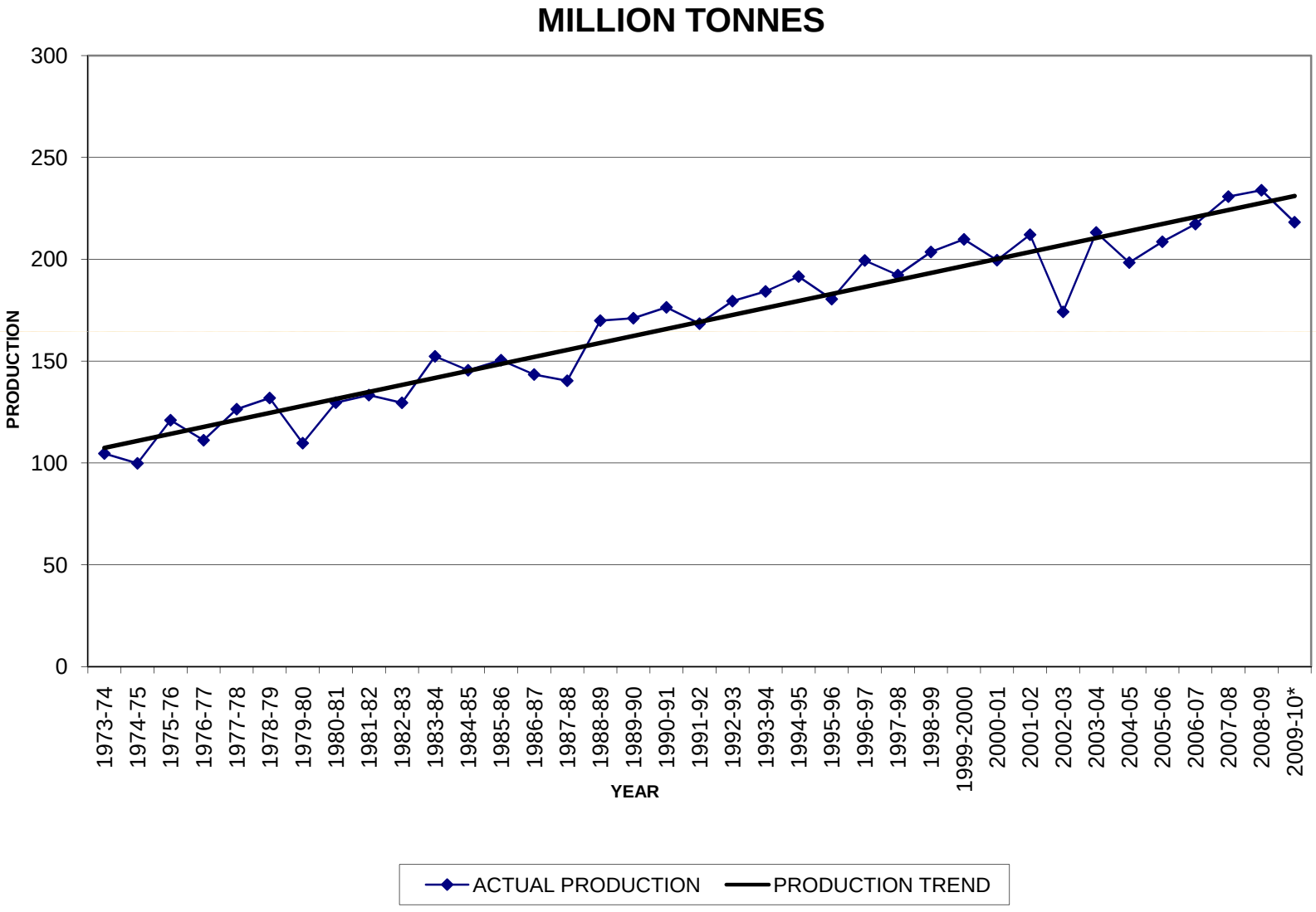
Anacon -2011, Mumbai, 13-10-2011

Food Safety INDIA ANGRAU

A paradigm shift in India’s food production scenario

-Green revolution : Dee-Geo-Woogen, Norin-8
-Blue, white, yellow revolutions followed
-Net food deficit state to net surplus state
-Subsistence kind of agriculture to commercial agricultural
-Quantity to quality
-Exponential growth of processing industry and exports
-Today India ranks among top 10 countries of the world in food production
-Focus on quality assurance of food produced or processed

TOTAL FOODGRAINS - ALL INDIA PRODUCTION



Fish & Meat Production in India

Fish		Meat	
Year	lakh tons	Year	('000 tons)
1950-51	7.52	2006-07	2302
1960-61	11.6	2007-08	2572
1970-71	17.56	2008-09	3822
1980-70	24.42		
1990-91	38.36		
2000-01	56.56		
2008-09	76.37		

- Dept. of AH, Dairying & Fisheries

Milk & Egg Production in India

Year	Milk (mill. tons)	Eggs (billion Nos)
1985-86	44.0	16.1
1990-91	53.9	21.1
1995-96	66.2	27.2
2000-01	80.6	36.6
2005-06	97.1	46.2
2008-09	108.5	55.6

- Dept. of AH, Dairying & Fisheries

Fruit & Vegetable production in India

-India ranks 1st in the world with 32 million MT of fruits (8% of world production)
-Growth rate 3.9%
-Processing sector grown at 20% PA
-Growth rate of frozen fruits & Vegetables 121%, dehydrated fruits & vegetables 24%
-4000 processing units with 12 lakh MT capacity (4% of total Production)
-India ranks 2nd in vegetable production with 71 million MT

Export of Agro Food Products (Value in Rs. Lacs)

Product	2007-08	2008-09	2009-10
Fresh Vegetables(126)	48949	68020	73185
Fresh Fruits (125)	30452	43086	52283
Dried & Preserved veg (119)	42993	49641	53207
Processed fruits & veg (154)	96281	137178	143550
Pulses (93)	54900	54232	40832
Processed Meat(37)	1296	1014	958
Poultry products (82)	44108	42205	37211
Dairy products (120)	86656	98086	40268
Basmati (131)	434458	947702	1088913
Non Basmati (130)	740979	168737	36529

-DGCIS Annual Export

Fertilizer Consumption in the World (kg ha^{-1})

Country	N	P	K
USA	29.1	10.2	11.3
Brazil	8.7	11.5	13.4
China	57.8	26.7	11.6
India	**76.6**	**30.8**	**13.0**
UK	56.3	12.8	18.2
World	19.7	7.8	5.6

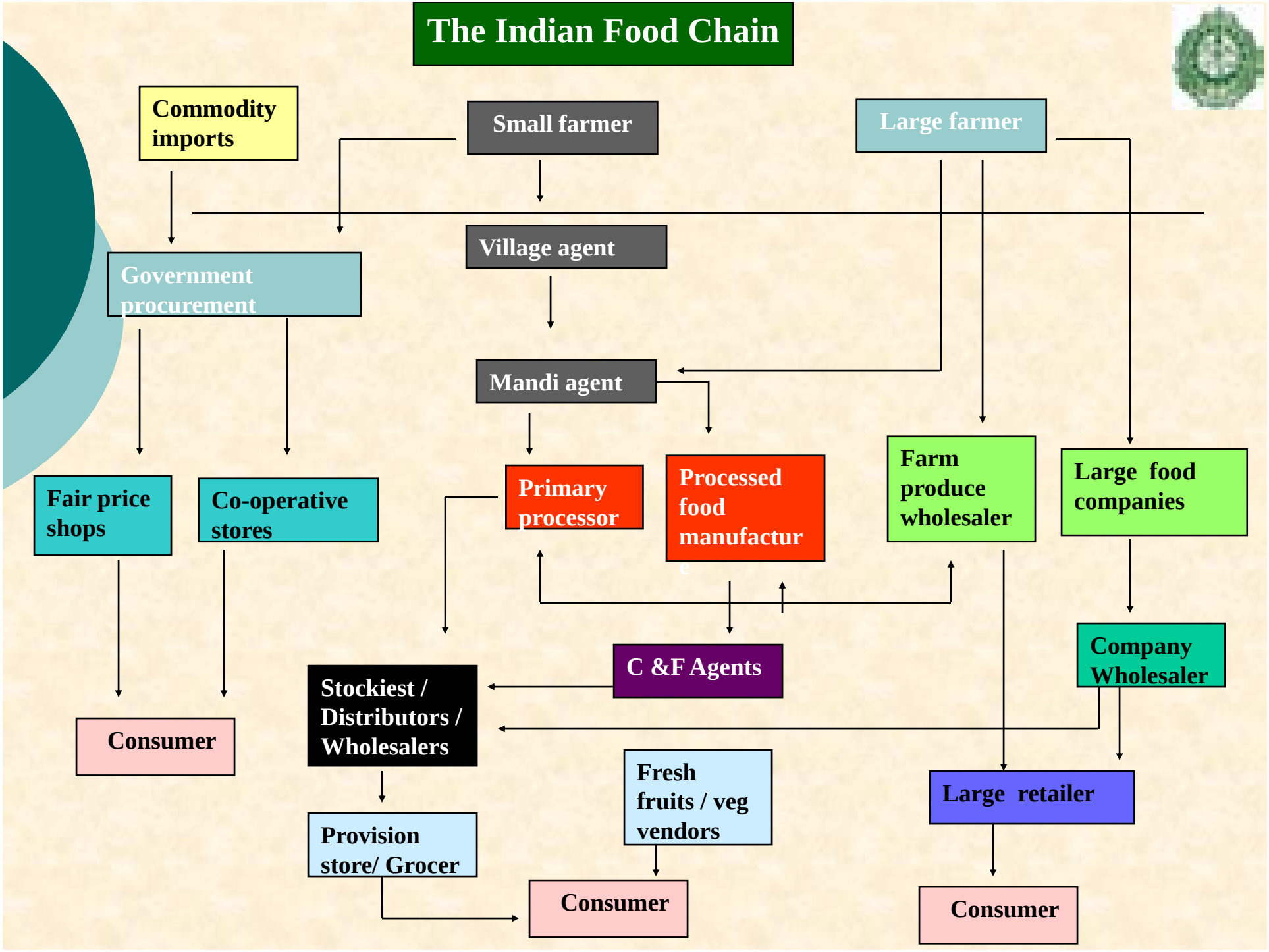
- Fertilizer Association of India, New Delhi

Agricultural Inputs in India

Inputs	1991-92	2001-02	2008-09
N(Lakh tons)	80.46	113.50	150.91
P(Lakh tons)	33.21	43.82	65.06
K(Lakh tons)	13.61	16.67	33.12
Pesticides (‘000 tons)	72.13	47.02	43.86

- Dept. of Agriculture & Coop, New Delhi

The Indian Food Chain



Domestic markets scenario

- **Infrastructure for marketing of perishables**
  - **Primary grading/ collection centers - non existent**
  - **Warehousing and cold storage - inadequate**
  - **Cold chain - non existent**
  - **Quality analysis & certification system - non existent**
  - **Transportation for perishables - non existent**
  - **Rural markets - complete lack of infrastructure**
  - **Wholesale markets - in government control, lack modern facilities**
  - **Private / direct markets - not permitted**
- **Post harvest losses: 25 to 30 % in perishables**

POST HARVEST LOSSES AT VARIOUS STAGES

S.No.	Stage	% of losses	Value(crores) India	A.P
1	Field level	10%	7670	382
2	Transport	5%	3830	192
3	Packing	2%	1530	77
4	Storage	9%	6900	345
5	Processing	4%	3070	154
	Total	30%	23000	1150

Indian Agricultural Products rejected / Alert Notices issued by Importing countries.

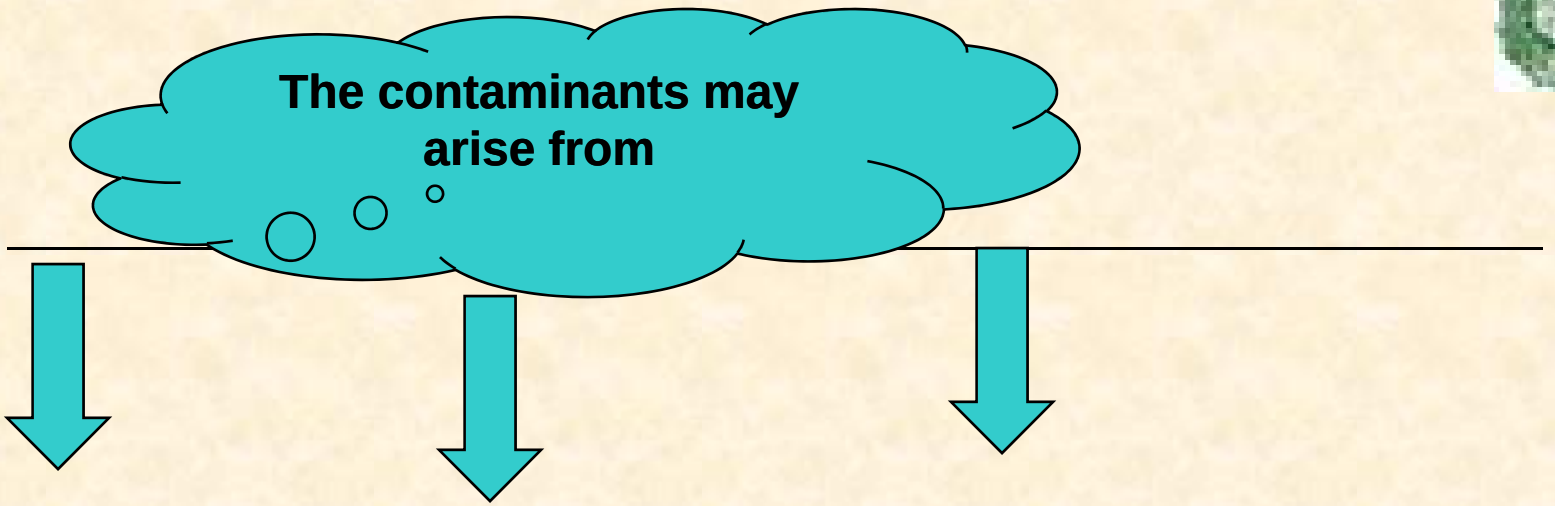
Importing Country	*Agricultural Product*	*Reasons*
UK	Chilli Powder	Sudan Red-I
	Curry powder	Salmonella, Ethion
	Grapes	Methomyl, Acephate
	Extra hot chilli peppers	Aflatoxin
	Dabur Honey	Streptomycin
Italy	Nutmeg, Chilli powder	Aflatoxin

Indian Agricultural Products rejected / Alert Notices issued by Importing countries

Netherlands	**Chilli powder**	**Aflatoxin**
Italy	**Herbal products**	**Heavy metals**
UK	**Coriander**	**Rat droppings**
Spain	**Pepper**	**Aflatoxin**
Greece	**Crushed chilli powder**	**Aflatoxin**

Food Contaminants

- Physical
- Chemical
  - Aflatoxins
  - Pesticide Residues
  - Dyes
  - Other Chemicals
- Microbial



If any portion of the food chain should become contaminated, the contaminant is likely to enter the human food supply, presenting a potential hazard to human health as well as an impediment to food trade.

Quality: Why?

- **Transition of countries from production economies to market economies (growth, productivity, diversity, profitability, quality, etc).**
- **Increasing globalization of the world economy.**
- **Increasing international competition.**
- **Recognizing the importance of adopting an integral approach to the quality concept, as key element to reduce costs, improve efficiency, etc.**

Quality from the producer's point of view...

Some aspects:

- **Appearance.**
- **Added value as result of a process or practice.**
- **Market opportunities.**
- **Price.**
- **Environmental considerations/improving and sustainability of farming resources- soil, diversity, flora, fauna, etc.**

Quality from the buyer's point of view...

Some aspects:

- **Appearance and sensorial characteristics.**
- **Seed variety, added value, innovation.**
- **Reliability of suppliers.**
- **Market opportunities.**
- **PROFITABILITY.**

Quality from the consumer's point of view...

Some aspects:

- **Appearance and taste.**
- **Variety, added value, innovation.**
- **Safety/Health**
- **Ethical value.**
- **Nutritional value**
- **Price.**
- **Environmental protection.**

"Food safety" implies absence or acceptable and safe levels of contaminants, adulterants, naturally occurring toxins or any other substance that may make food injurious to health on an acute or chronic basis. Food quality can be considered as a complex characteristic of food that determines its value or acceptability to consumers.

National food control systems suffer from serious inadequacies, including:

-They are not based on modern scientific and management concepts using compliance policies, risk assessment, HACCP, transparency, and broad-based involvement of industry, trade and consumers.

-Insufficient involvement of scientific expertise from the academia, industry, consumers to strengthen the scientific basis for food control decision making processes.

- Lack of suitable facilities such as laboratories.

-Lack of resources such trained inspectorate and laboratory staff, funding.

--Inflexibility of the system making it difficult to cope with developments in food science and technology, changing consumer demands, and newer requirements of trade and industry. Institutional obstacles to reforms can be formidable and can create disincentives for development of industry causing serious damage to national economy.

- Lack of coherence among different governmental activities concerning agriculture, food, trade, industry and health. Lack of coordination to achieve optimal results.

ELEMENTS OF A NATIONAL FOOD CONTROL SYSTEM

Building Blocks

(a) Food Law and Regulations
(b) Food Control Management
(c) Inspection Services
(d) Laboratory Services: Food Monitoring and Epidemiological Data
(e) Information, Education, Communication and Training

Policy

The need for a national policy on food safety A sound national food safety policy responding adequately to our health needs is to be formulated in our country with the following objectives

- To establish the integrated scientific and technological bases needed to develop an environmentally friendly production and distribution chain of safer, healthier and more varied food including crops, meat and sea food.

- To improve understanding of the link between food and health.

- To control food-related risks, relying in particular on biotechnology tools and the results of post-genomic research.

- To control health risks associated with environ-mental changes.

Central Food Acts in India

- Prevention of Food Adulteration Act(1954)
- Fruit Products Order(1955)
- Meat Food Products Order(1973)
- Vegetable Oil products (Control) Order(1947)
- Edible Oils Packaging (Regulation) Order(1988)
- Solvent Extracted Oil, De-Oiled Meal, Edible Flour (control) Order(1967)
- Milk and Milk Products Order(1992)
- Any order issued under Essential Commodities Act(1955)

The main objective of the enforcement is to improve capabilities of a country to enforce food safety norms according to Codex standards including:

---

1. **Food additives.**
2. **Food contaminants and heavy metals**
3. **Methods of analysis**
4. **Sampling methods**
5. **Import and export inspection and certification systems**
6. **Residues of veterinary drugs**
7. **Pesticide residues**
8. **Microbiological hazards**
9. **Labeling**
10. **Codes of practices**
11. **Allergens**
12. **Novel foods and GMO's**
13. **Product composition.**

An effective food enforcement system comprises four elements:

- **Inspecting food premises**
- **Instigating necessary action for non-compliance with regulations**
- **Investigating of food disease outbreaks**
- **Giving advices to the food production and processing sectors. The inspection should focus on modern approach based of food (safety) assurance system based on methods of controlling and monitoring risks and encourage the food sector to adopt the HACCP technique**

Safety program and activities should be applied to the complete food chain, from food production on the farm, through to the consumer.

- This is accomplished with the implementation of GAP, GMP, GHP, HACCP, MRA, QM, ISO 9000 series (9000-9004) and 14000 and TQM
- GMP covers the fundamental principles, procedures and means needed to design an environment suitable for the production of acceptable quality.
- GHP describes the basic hygienic measures that establishments should meet and which are the perquisites (s) to other approaches, in particular HACCP.
- GMP/GHP requirements have been developed by governments, Codex, food industry in collaboration with other groups and food inspection and control authorities.

An analytical capacity is the basic requirement to monitor the quality and safety of food.

The following topics should be addressed when conducting and reporting results:

- **Microbiological safety of food**
- **Toxicity of chemicals in foods**
- **Novel foods and processes**
- **Pesticides**
- **Veterinary residues**

SPS Measures Agreement

Any measure/procedure/requirement/regulation taken by Govts

To Protect Human & Animal life from plant or animal carried diseases

To Protect / prevent / limit damage due to entry / spread of diseases

To Protect human health from contamination of food

To Protect environment

To Protect consumer interests

Allows member countries to set their own safety, animal & plant health standards, but to be applied to the extent necessary.

The regulations MUST BE BASED ON SCIENCE

SPS regulations SHALL NOT BE ARBITRARILY OR UNJUSTIFIABLY discriminate between countries.

Codex Risk Assessment (CODEX, 1998) . Includes

Risk characterization

The qualitative and/quantitative estimation including attendant uncertainties of the probability of occurrence and severity of known or potential adverse health effects in a given population.

Hazards characterisation

The qualitative and/or quantitative evaluation of the nature of the adverse effects associated with the hazard, including dose response assessment.

Exposure assessment

The qualitative and/or quantitative evaluation of the likely intake ofbiological, chemical and physical agents in a food as well as exposuresfrom other sources of relevance.

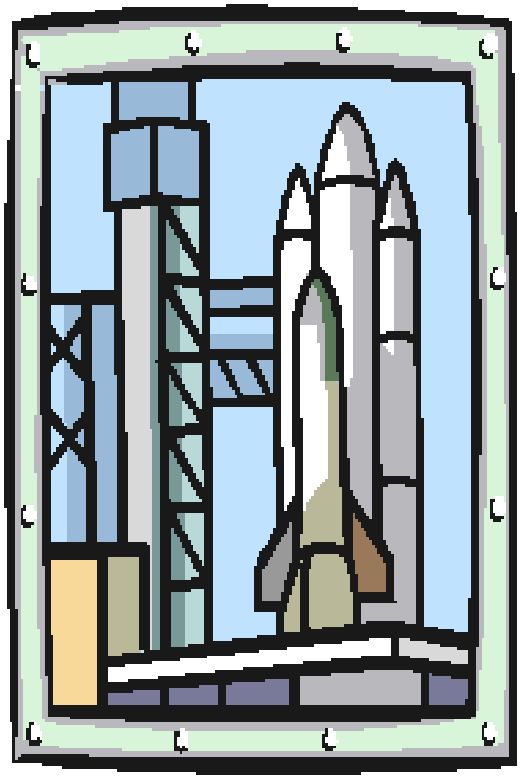
Hazards identification

The identification of biological, chemical and physical agents capableof causing adverse effects and which may be present in a particularfood or groups of foods.

BACKGROUND OF HACCP

- HACCP was originally developed by Pillsbury Company working along with NASA and US Army laboratories at Natick, to ensure the safety of food for the astronauts.

- It is based on FMEA – Failure, Mode and effect analysis system which entailed looking at what could potentially go wrong at each stage in an operation along with possible causes and likely effects before deploying effective control mechanisms.



HACCP BENEFITS

- Enhances Food Safety and reduces risk of food borne diseases;
- Provides greater confidence to customers;
- Reduction in production costs through reduced wastage;
- Facilitates compliance with statutory requirements;
- Current and potential hazards can be identified and removed or minimised.

India GAP

Draft Indian standard covers

-Fruits and Vegetables

-Food grains

-Plantation crops

-Spices and condiments

-Oil seeds & Nuts

Control points and compliance criteria

-Site record

-Grower record

-Nursery

-Transplanting

-Irrigation

-Harvesting

-Packing

- Land
- Seed / plants
- Cultural practices
- Manures
- Crop protection
- Post Harvest Handling

Food Safety and Standards Bill, 2005

Implementation and enforcement includes the following areas:

- **Managing Pesticide Residue**
- **Traceability**
- **Testing Facilities**
- **Promote or Penalise**
- **Penalty Provisions**
- **Consumer Safeguards**
- **Safeguards for Food Businesses**
- **Labelling**

FSSA -2006

The food safety and standards Act of 2006 came into force across the country on August 5, making it at par with the international standards. The act will ensure improved quality of food for the consumers and censure misleading claims and advertisement by those in food business.

FSSAI, established under the overarching legislation, will lay down science based standards for food items and regulate their manufacture, storage, distribution, sale and import to ensure availability of safe and wholesome food for human consumption.

As many as 22 states and Union Territories now have food commissioners in place as required under the Act, while seven were expected to do so by the time it is enforced.

FSSA -2006

The Food Safety and Standards Act 2006, which comes into effect five years after it was passed in Parliament, subsumes various central Acts in force so far

The FSSAI, set up in 2008, will collect and collate data regarding food consumption, incidence and prevalence of biological risk, residues of various contaminants in foods products, identification of emerging risks and introduction of rapid alert system.

The Act has provision for compounding offences (except for which punishment is prescribed), adjudication and trails in Appellate Tribunals and special courts, including summary trials. The trial has to start within a year from the date of commission of offence.

Initiatives at ANGRAU

Research in Organic farming

Designing eco friendly crop varieties

Analysis of Global GAP samples for Heavy metals and Pesticide residues

Assessment of Environmental pollution on Heavy metal toxicity and nutritional profile of Rice & Vegetables

Research in development of DNA Based tools for Mycotoxins identification

Influence of radiation in crops as part of climate change

Assessment of food quality parameters using high end equipment

NABL, APEDA, BIS Accreditation

Thanks for your attention