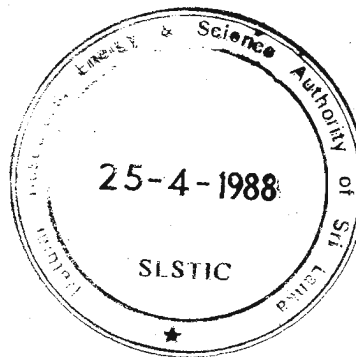


RADIOACTIVITY IN FOOD

GRANVILLE DHARMAWARDHANA

Director,
Radioisotope Centre, University of Colombo, Colombo 3.



Radioactive materials present in food can result from the following five sources:

- (1) Naturally occurring radioactive minerals.
- (2) Cosmogenic Radio nuclides.
- (3) Bomb fallout Radioactive materials.
- (4) Radioactive materials emitted from coal-fired power plants.
- (5) Releases from nuclear industry.

(1) Naturally occurring Radioactive minerals

Uranium and Thorium have been present on earth from its origin. Radioactive decay of these produce radioactive decay products which in turn produce further radioactive products. This produces a series of radioactive products. Radioactive materials from this source are present everywhere. But in some areas, these are present in higher concentrations, and can be absorbed by plants. The author has carried out studies in such high radioactivity areas in Sri Lanka during the last 12 years and two students have received M.Phil and M.Sc. degrees on this work. Based on exploratory work, it was felt that uptake of these by plants must be largely restricted to the soluble radionuclides and it is possible that each plant has some levels of selectivity.

Potassium-40 is a very long lived radionuclide that has been present on earth from its origin. 119 ppm of natural potassium is radioactive K-40 and all sources of natural potassium contain this fraction of radioactive potassium. A man of standard weight has about 3700 Bequerrels of radioactive potassium in his body. A heavier man will have more.

(2) Cosmogenic Radio nuclides

Cosmogenic radionuclides are those formed by the interaction of cosmic rays with the atmosphere. Carbon-14 and tritium-3 are the main radionuclides produced in this manner. Natural carbon contains 0.25 Bequerrels of carbon-14 per gram of carbon. Natural water contains about 0.3 Bequerrels of tritium per litre.

(3) Bomb Fallout Radio nuclides

Atmospheric weapon tests, particularly in the 1960's, injected radioactive nuclides such as Sr-90, Cs-137 and tritium to the upper layers of the atmosphere and these are slowly deposited on the surface of earth. At present there is a layer of these materials all over the earth, the fallout being higher in the Northern latitudes than in our part of the earth. These are usually bound to the soil. However, the extent of such binding depends on the nature and composition of the soil. These materials can be absorbed by plants if they are not sufficiently strongly bound.

(4) Radioactive materials emitted from coal fired power plants

Coal contains Uranium, Thorium and other radioactive decay products. When coal is burnt these are released to the atmosphere and the materials later settle down on plants and water. The plants are later eaten by animals whose flesh is in turn eaten by man. Some radioactivity enters the food chain in this manner.

(5) Release from the nuclear industry

The main concern at present on radioactivity in

food arises from the contamination of food resulting from the radioactive releases from the Chernobyl Nuclear accident in the USSR. Radioactive materials released by the accident were carried by the wind all over Europe. Some of these materials were deposited in these countries depending on the conditions prevailing at that time. For example, where there was light rain, large quantities of these materials got deposited on leaves. Where there were heavy lasting showers, the materials not only got deposited, they also got washed off the leaves of plants.

The radionuclides of main concern in an accident like this are Iodine-131, Caesium-137 and Caesium-134.

Once these radionuclides get deposited, they can enter the food chain either directly or indirectly. The main route into food is through animals like cattle, sheep, goat and also reindeer. Cattle eat grass and usually cover a large area a day accumulating whatever radioactivity has been deposited on it. Materials like Iodine and Caesium find their way into milk and flesh with accumulative effect. Sheep and goat scrub the grass with roots and traces of soil and usually are prone to collect more radioactivity. Reindeer feed on lichens which accumulate radioactivity and therefore reindeer flesh usually contain higher levels of radioactivity.

Absorption of the deposited radioactivity by edible plants and its solution in potable water resources also enter these materials into the food chain.

The problem of I-131 lasts only for a short period because of its short half life. At present the main concern with respect to this accident is on radioactive isotopes of Caesium.

A problem of radioactive contamination of food of this level was never experienced before and therefore when this accident occurred, no country had laid down the levels of radioactive contamination that should be permitted in food served to a general population which consists of all categories of people, infants, children, pregnant women, old,

sick and weak people. European countries which were the directly affected ones had to lay down emergency levels to cope with the crisis. These levels are valid for a limited period.

When the possibility of contaminated food arriving in Sri Lanka arose, immediate action had to be taken to control the problem. The main criterion to be used here is that as Sri Lanka is not a country affected by the accident, it is not necessary for Sri Lankan people to have any radioactive contamination in their food. This is to be in conformity with the ALARA principles. At this time we had no information about the action taken by other countries or the level of radioactivity in imported foods. As such, a temporary level of 13.5 Bq/Kg was accepted and a Committee consisting of experts in the field was appointed to decide on the suitable level. During the month after imposing the 13.5 Bq/Kg level, more information such as the levels of activities in the foods imported, certificates with incorrect information, levels set by some other countries became available. Within one month a great deal of information was obtained by examining many samples.

Some countries which only export food, particularly milk foods, had accepted the emergency levels laid down in Europe. Some countries officially accepted and implemented the European levels for export but unofficially enforced much lower levels for food meant for internal consumption. The Philippines had accepted a level of 22 Bq/Kg. for milk powder. Singapore had laid down the condition that no contamination whatsoever is allowed. India had laid down a normal level of 30 Bq/Kg applicable under normal circumstances such as now and an emergency level of 300 Bq/Kg. which will be applicable if a nuclear emergency happened in India.

After studying all these, the Committee appointed by the Atomic Energy Authority laid down a level of 20 Bq/Kg. as the maximum permitted quantity of radioactive Caesium isotopes in imported food.

Testing food for radioactive contamination is carried out at the Radioisotope Centre at the

University of Colombo where the staff is very small. The Centre has four scientists, two have academic degrees Ph.D's, M.Phil's and M.Sc's. However, when one considers persons with formally recognized training in Radiation Protection, there are only two i.e. the Director and the

Chief Technician, Mr. Ratnayake. There are two scientists with formal training in Radiation Protection at the Atomic Energy Authority. At present all food imported from Europe is tested for radioactivity.

THE MAIN TYPES OF FOOD CONTAMINANTS

M. O. C. DE SILVA

Government Analyst,

Government Analysts' Department, Torrington Square, Colombo 7.

I would first like to define the term contaminants in relation to food. These are substances that get added on to food at any stage of its production before its ultimate consumption. Contaminants can be considered as unintentional additives to food and are distinguished from permitted additives by the absence of an intention that they be present when the food is consumed. Permitted additives on the other hand are used to achieve a specific result in the food.

I will confine myself only to chemical contaminants leaving out the microbial contamination of food completely. Unlike in the more advanced countries of the world, the problem of food contaminants has not been considered very seriously in countries like Sri Lanka. This is explained easily by the fact that countries like Sri Lanka have still not got over the problem of gross adulteration of food whereas in the more advanced countries one comes across gross adulteration rather very infrequently. Gross adulteration like addition of saw-dust to powdered spices, burnt extraneous vegetable matter to ground-coffee, mineral oil to vegetable oils, etc., are serious problems in Sri Lanka and hence with the available resources not much thought has been given to the problem of chemical contaminants in food.

An attempt was made a few years back by the Food and Agricultural Organization of the United Nations to conduct a survey of food contaminants in four countries in Asia namely India, Nepal, Pakistan and Sri Lanka.

Speaking only about Sri Lanka this was not much of a success mainly due to the constraints of manpower, equipment, etc.

The main types of contaminants of food are:-

1. Metallic contaminants
2. Pesticide residues
3. Mycotoxins

Reference should also be made to contaminants like dirt, debris, insects, rodent infestation, etc., but though chemists are called upon to assess evidence of such contaminants it is more a food hygiene problem.

Metallic Contaminants

The main contaminants that we come across in Sri Lanka are lead, arsenic, cadmium, mercury, copper, tin and lately chromium.

Lead: is a cumulative poison and its presence in food can be due to a variety of reasons. Water pipes made of lead used to be a source of lead contamination but this practice has now largely disappeared. In addition to the internal combustion engine's contribution to lead in the atmosphere, use of impure chemicals in the manufacture of domestic equipment as well as use of cheap quality metals in the manufacture of the above equipment play their part in the addition of lead to the food chain. Use of lead solder in the canning industry and lead based paints and colours are other sources.

Arsenic: Earlier impure sulphuric acid used in the manufacture of sugars, tartarates, etc., was a major

source of arsenic in foods. Arsenites used in the control of weeds and herbs was also a contributory factor. These practices are now not prevalent and arsenic present in soils is now a primary source and as such the level of arsenic found in food is very low. An exception is certain types of marine products especially those derived from crustaceans.

Cadmium: Cadmium plated vessels were a primary source for cadmium in food but due to the discontinuation of this practice nowadays cadmium gets into food mainly through the discharge of industrial wastes and through the soil.

Mercury: Gets into the food chain either due to the use of organo-mercury fungicides or the discharge of industrial effluents containing mercury into waterways. There was much concern in the early 1970's after it was discovered in Japan that fish in certain areas had excessive levels of methyl mercury.

Copper: Entry into food is mostly through copper containing fungicides and possibly through copper utensils. The presence of copper in food could contribute to the destruction of Vitamin C.

Tin: The source into food is obvious, namely the tin cans. It gets absorbed into the food only when oxygen is present, so that good airtight canning will prevent absorption into food. Acidic foods also tend to absorb tin.

Pesticide Residues: Ever since the end of the second world war, the use of pesticides in agriculture has become a *sine qua non*. The use of these chemicals *per se* cannot be called harmful for without their use the achievement of present day food yields would not be possible. It is only due to bad farming practices particularly in the less developed countries that have led to the presence of more than desirable levels of these contaminants in food. Farmers do not adhere to the instructions given to them by the Agricultural authorities, for instance after the application of a pesticide, a minimum period is fixed before which harvesting should not be done.

However, either due to ignorance or greed, farmers do not adhere to these requirements. Another unhealthy practice is to mix cereals and grains with pesticides to achieve a longer storage life and coating fruits like tomatoes and gourds with these pesticides. This practice is so widespread nowadays that it has been said that it is better to buy slightly spoilt fruits and vegetables and be sure no pesticide contaminants are present. The main types of contaminants one is apt to come across in Sri Lanka at the present time are the organophosphorous pesticides, the carbamates and paraquat and to a lesser extent diaquat. The general importation of organochlorine pesticides into our country has been stopped for sometime and this is a very good thing as the organochlorine pesticides are the most persistent and tend to build up in the fat of animals. However, a small amount is still brought in by certain state agencies for specific purposes. When correct farming practices are adopted, since the organo phosphates are degraded quickly the levels of residue found at the time of consumption are well within prescribed limits. Limits for the levels of pesticides that may be present in agricultural products like fruits and vegetables have been fixed by Codex, the latest publication being in 1986.

The pesticide Formulary Committee, appointed under the Pesticide Act (of which I am a member) has also very recently laid down limits for these levels. ADI's or acceptable daily intakes have also been laid down by Codex.

The commonest pesticides, weedicides, etc in use at present are Methamidophos, Monochrotophos, Quinalphos, Fenthion, Dimethoate, Malathion, Carbaryl, Carbofuran, Paraquat, Diaquat, etc.

Mycotoxins: These are toxic products of certain microscopic fungi (moulds). The most important of these are the aflatoxins, discovered in the early 1960's. The aflatoxins are liver poisons which are said to be carcinogenic. Aflatoxins are produced by certain strains of *Aspergillus flavus* and *Aspergillus parasiticus*. These fungi are ubiquitous. The occurrence and magnitude of aflatoxin contamination varies with geographical and seasonal

factors and also with conditions of growth, harvesting and storage ie. environmental factors such as humidity and temperature. Crops in tropical and sub-tropical countries are more prone to the growth of the mould. Generally mould growth is during storage but can also happen while the crops is on the plant if there is damage by insects.

A large number of plant products can serve as substrates for the growth of fungi and subsequent toxic formation and thus direct contamination of human food is possible. Also when animals ingest contaminated food not only do they get poisoned but may pass on the toxins to humans through meat, eggs, milk, etc. Quite a large portion of data on the aflatoxins have been obtained from studies on animals.

There are 17 compounds designated as aflatoxins but the term aflatoxin usually refers to the four compounds Aflatoxin B₁, B₂, G₁ and G₂. They are distinguished on the basis of their fluorescent colours in ultraviolet light, B standing for blue and G for green, the subscript denoting their chromatographic mobility. Cows fed on feed contaminated with aflatoxins B₁ and B₂ excrete metabolites in milk called aflatoxin M₁ and M₂. Aflatoxins are intensely fluorescent in long wave ultraviolet light and this is the basis of their detection and estimation using thin layer chromatography.

Use of resistant varieties of seeds of pesticides and fungicides and careful drying and storage can reduce fungal infestation and thus reduce afla-

toxin production. These procedures do not totally eliminate the fungal growth and since ordinary cooking and processing methods of food do not ensure complete removal, techniques for decontamination have been developed. In cereals and seeds it is only in a small proportion of the material that the toxin is concentrated and these are often discoloured. Segregation and separation of undersized seeds/nuts, those that have visible mould growth, discoloured seeds/nuts can significantly reduce the level of toxin. However, it must be noted that aflatoxins can be present without detectable fungus. Chemical degrading with oxidising agents like hydrogen peroxide and storage under ammonia are some current decontamination methods but are used only in the case of animal feeds.

As said earlier, since ultraviolet light destroys the toxin a good method of decontamination would be exposure to morning sunlight and in fact it has been found that one of the best methods of decontaminating coconut oil is exposure to sunlight. Since distribution of toxin in a given unprocessed commodity is very uneven it is essential that proper sampling be done for any monitoring programme to be effective.

The other mycotoxins are the zearalenones and the ochratoxins. In passing I may mention two other contaminants that could assume importance in future. One is polyvinyl chloride-actually its monomer-in relation to its migration in to food from packaging materials and the other is the polychlorinated biphenyls which are important industrial chemicals.

THE PRESENT LEGISLATION ON FOOD CONTAMINANTS

DR. E. RAJANATHAN

Deputy Director General, Public Health Services.

INTRODUCTION

Legislation enacted in Sri Lanka on the prevention of contamination of food, is contained in several Ordinances and Acts from as far back as 1862. It was in 1949 that specific legislation on food was enacted. It was named the Food and Drugs Act. This Act was replaced in 1980 by the Food Act No. 26 of 1980.

A contaminant can be considered as any matter or agency which will cause the nature, substance or quality of the food to be so affected that the consumer will be prejudiced.

The main features in all these Acts regarding contamination are:-

- (a) Prevention of Chemical contamination.
- (b) Prevention from sale of unhygienic food.

(a) Prevention of Chemical Contamination

The chemical contamination referred to are the preservatives for which schedules were provided in the Food and Drugs Act, and the food colours that were not permitted.

Economic frauds by the adulteration with sub-standard foods, carried the risk of poisonous material being introduced to food and was prohibited in the several legislations. The absence of standards for good manufacturing practices is noteworthy as mainly prepared foods were then imported.

(b) Prevention of Sale of Unhygienic Food

"The prevention of sale of unhygienic, deleterious and unfit food" were the words used in most sections of the law. There were no bacterial standards given (except for ice cream) for the foods, either for the manufacture or the final product.

Food Act No. 26 of 1980

The present Food Act covers manufacture, sale distribution and import and the seizure of food. It prohibits:-

- (a) Natural or added deleterious substances which renders it injurious to health,
- (b) That which is unfit for human consumption,
- (c) That consists of unclean putrid repugnant, decayed decomposed animal or vegetable substances or which is insect infested;
- (d) That is adulterated, and also
- (e) The manufacture and sale of food under insanitary conditions.

At the moment till the draft regulations are gazetted the regulations regarding adulteration gazetted under the Food and Drugs Act of 1949 remain in force.

Regulations under the present Food Act have been drafted of which the law regarding labelling is with the Government Printer and the others (preservatives, etc.) are with the Legal Draftsman.

Sri Lanka Standards Institution Specifications

The Food Act Regulations will also contain references to the SLSI specifications which are applicable, with any necessary additions. This is a measure adopted to standardise regulations.

It will be necessary to include bacteriological standards where necessary.

OTHER LEGISLATIONS (prevention of Contamination)

Nuisance Ordinance (1862)

This is still enforced and has sections prohibiting the sale of "unwholesome meat and noxious articles of food".

Penal Code (1883)

This law prohibits the adulteration or sale of noxious articles of food and drink.

The Butcher's Ordinance (1893)

This ordinance lays down procedure for the slaughter of animals and for inspection. Contamination due to Zoonosis and pathogenic bacteria is reduced to a minimum.

The Consumable Protection Act (1979)

This Act requires articles (food) to be manufactured and sold not below specified standards. It depends on the standards prepared by the Sri Lanka Standards Institution.

Notification gazetted on "Infant feeding bottles" was meant to prevent bacterial contamination of milk due to cleaning problems associated with plastic bottles.

Pesticide Act (1980)

The two week pre-harvest moratorium on spraying of crops is an instance designed to

prevent pesticide deposits on marketed vegetables above the permitted levels.

Also, the storing of food along with pesticides is prohibited.

The Local Authorities by-laws

These by-laws adopted by each Local Authority provides for the cleanliness of food handling establishments and for the seizure of food found unfit for human consumption.

CONCLUSION

The dangers of contamination has become very realistic only during the recent past. The formation of Food Control Unit under the Director General of Health Services is now in progress. This is the cumulative effort of all Departments engaged in Food Control work.

The Food Advisory Committee is also functioning to advice the Hon. Minister of Health of the necessary legislation and procedures necessary.

Training of Food & Drugs Inspectors and Public Health Inspectors is an ongoing process. Their advisory role and the advantages of manufactory inspection is a priority factor in preventing contaminated food reaching the consumer. A scheme to inspect and record all manufacturing places and sales points including street outlets has commenced and should become effective in 1987.

There are areas where contamination studies should be done. Of these, one is radiation contamination of food, the other, lead contamination of food exposed in shops along the roadways due to vehicle exhaust fumes. Another area is the prevention of animal flesh which has a high residue of antibiotics reaching the public.

STANDARDS FOR FOOD CONTAMINANTS

C. D. R. A. JAYAWARDENE

Deputy Director General, Sri Lanka Standards Institute.

Member, Food Advisory Committee, Food Authority.

INTRODUCTION

Standardization is considered as one of the most important infrastructure facilities available for the planned economic development of a country. For over 20 years, the Sri Lanka Standards Institution (SLSI) has been playing a vital role in the standardization movement in our country. Its activities include formulation of National Standards and promoting their use by governmental agencies, Industry and Trade.

A 'Standard' is defined by the International Organization for Standardization (ISO) as a technical document prescribing a set of conditions to be fulfilled by a product or a process, drawn up with the consensus or general approval of all interested parties affected by it. It is based on the consolidated results of science and technology and experience and is aimed at the promotion of optimum community benefits. It should be approved by a recognized standardising body.

SLSI which is the National Standards Organization of the country was first incorporated by the Bureau of Ceylon Standards (BCS) Act No. 38 of 1964 under the then Ministry of Industries. The powers, duties and the functions of the earlier B.C.S. were widened with the establishment of the new Act, namely the Sri Lanka Standards Institution Act No. 6 of 1984, to enable the institution to better achieve the objectives for which it was originally established.

The general objectives of the institution are:

- (a) to prepare standards on National and International basis related to structures, commodities, products, materials, practices and operations and from time to time revise alter and amend the same and promote the general adoption of such standards;
- (b) to promote standardization and quality control in industry and commerce;
- (c) to establish and maintain Laboratories, Libraries and provide relevant facilities for the purpose of furthering the practicing of standardization and quality control in Sri Lanka.
- (d) to make arrangements or provide facilities for the examination and testing of products, commodities and materials, including food and drugs, locally manufactured or imported in order to determine whether they comply with the Code of Intellectual Property Act No. 52 of 1979, or otherwise as well as the examination of processes and practices used in the manufacture of locally produced products, commodities and materials.
- (e) to make arrangements or provide facilities for the testing and calibration of precision instruments gauges and scientific apparatus, and for the issue of certificates in regard thereto so as to comply with the required standards;
- (f) to provide or arrange facilities for undertaking research in connection with standardization and quality control;

- (g) to operate a certification marks scheme in accordance with the relevant provision of these Acts;
- (h) to certify the quality of commodities, materials, produce products and other things whether for local consumption or export;
- (i) to encourage and promote standardization and quality control by educational, consultancy and other means;
- (j) to provide for co-operation with any person, association or organization outside Sri Lanka, having objectives similar to those for which the Institution is established;
- (k) to co-ordinate the efforts of producers and users for the improvement of commodities, materials, products, appliances, processes and methods.

The Institution has already formulated more than 750 National Standards. These standards can be broadly classified in to the following fields.

Agricultural and Food standards	201
Chemical Standards	218
Textiles Standards	133
Engineering Standards (Civil, Electrical, Mechanical)	262

The implementation programme of the SLSI consists of regular monitoring of the quality of consumer and Industrial products to assess whether the manufacturers and importers comply with the relevant standards.

The institution also take steps to promote the use of standards among manufacturers, traders and consumers by organising conferences and seminars to explain the contents of the standards and the benefits that would accrue to them by using these standards. These conferences are also useful to get a feed-back from the users of standards so that these standards could be made more acceptable and up to date. The institution adopts the following strategies to protect the local consumers and to safeguard the image of Sri Lanka produce in international markets.

- (a) Compulsory pre-export quality Inspection scheme,
- (b) Certification Marking Scheme,
- (c) Compulsory Import Inspection Scheme.

The mandatory Pre-export Certification Scheme launched in 1974 assumes great significance as a part of the implementation strategy. This scheme precludes the export of designated commodities without a certificate of quality issued by the SLSI. This scheme commenced with the inspection of spices such as Cloves, Nutmeg, Cardamoms, Pepper and later extended to Sesame seeds and Cashew Kernels and Coffee Beans. Over the past 12 years export of these commodities have gained a good reputation in the overseas markets and the number of trade complaints have been reduced considerably.

The Sri Lanka Standards Institution also launched a Certification Marking Scheme on a voluntary basis in 1980, where licences are issued to manufacturers who have proved capability to adhere to the relevant Sri Lanka Standards to use the SLS Quality Symbol on their products. Since the issue of the first Mark in July 1980, 149 permits covering 23 different products and 25 manufacturing units have been issued.

Poor response for voluntary Certification and the absence of a firm commitment from the manufacturers to produce quality goods necessitated the Institution to commence a movement for greater product safety.

Even though the Sri Lanka Standards Institution Act No. 6 of 1984 provided wider powers to cover products under compulsory certification, the powers under this Act were not recommended due to various reasons. However, the Import Control Act and the Consumer Protection Act have been used to prevent the importation and sale of 8 designated products which do not conform to the Sri Lanka Standards with effect from 1986-06-01. Since the commencement of this scheme 342 import notifications were studied. With respect to canned fish, 89 consignments were subjected to sampling out of which 8 samples did not meet the requirements of the Standard. Eight consignments failed on drained mass, 8 on marking and 6 on microbiological requirements. 133 import notifications were received for electrical items and 109 consignments have been examined out of which only 2 failed to conform to the Sri Lanka Standard.

Statistics of the Import Inspection Scheme for the Period 86-06-01 to 86-11-01

	Import Notifica- tions Studied	No. of Consign- ments Inspected	No. of Rejected
Food Products			
1. Canned Fish	206	89	08
2. Condensed Milk	—	—	—
3. Cordials	03	03	—
Electrical Products	133	109	02
Total	342	201	10

Standardization in the Field of Food Products

From the inception of the SLSI, standardization in the field of food and agricultural products received the highest attention of the Institute. In spite of the fact of there being a separate authority responsible for food standards and for food control activities in the country, the SLSI thought it necessary to prepare standards for Food products and promote them in Industry and Trade for the following reasons.

The standards prepared under the Food Act were minimum standards mainly intended to safeguard the health and safety aspects of the consumer. Those standards do not specify the type of test methods to be used or the sampling procedures. The analysts very often used their discretion in selecting the test methods and interpreting the results. On the other hand standards prepared by the SLSI will have more stringent quality requirements in addition to the minimum standards specified under the Food Act. Detailed sampling procedures, test methods, are also laid down for the purpose of comparison of test results between laboratories and for arbitration purposes.

The procedures adopted for formulation of standards is also different in both cases. Under the Food Act, standards are prepared by members of the Food Advisory Committee comprising of government officials who are experts in the field of Food Science and Technology. Hardly any

representation is made by the Food Industry, Trade or the consumer when establishing these standards. SLSI on the other hand invites the participation of all interested parties when standards for different items are prepared. The drafting committee consisting of manufacturers, consumers, traders, scientists and technologists and regulatory bodies, first studies various aspects of the standards under formulation before they are circulated for public comments for a period of one month. After the public circulation stage the draft standard is once again reviewed by the committee in the light of the comments received and it is then submitted to the Agricultural and Food products Divisional Committee for their approval. The Divisional Committee comprises of senior officials of both public and private sector who are knowledgeable in the field of food science and technology. The draft approved by the divisional committee is then placed before the council of the SLSI for its ratification as a national standard. These standards prepared by the SLSI are always subject to review and revision and they could be changed without much inconvenience to the users. On the contrary some of the standards prepared under the 1947 Food Act are still in use. However, these are now being reviewed by the Food Advisory Committee under the new Food Law. The recently concluded National workshop on Food control activities in Sri Lanka attended by nearly 200 delegates from various government and private sector organizations has decided that the food law in the future

SOME COMMON CONTAMINANTS SPECIFIED IN SRI LANKA STANDARDS

Standard	Acid insoluble ash	As	Pb	Fl	Zn	Sn	Hg	Cu	dirt, grit or foreign matter	Cd	Fe
1. Baking Powder		1.0ppm	2.0ppm	15.0ppm							
2. Canned Fish		1.0ppm	5.0ppm		50.0ppm	250.0ppm	0.5ppm				
3. Mango Chutney	0.5% m/m	1.0ppm	2.0ppm		50.0ppm	250.0ppm			should be free		
4. Beer		0.5ppm	0.2ppm			250.0ppm		2.0ppm			
5. Cocoa Powder	0.5% m/m	1.0ppm	5.0ppm		50.0ppm			70.0ppm		0.1ppm	
6. Ice Cream		0.5ppm	1.0ppm		10.0ppm			20.0ppm		0.1ppm	
7. Margarine		0.1ppm	0.1ppm					0.1ppm		0.1ppm	1.5ppm
8. Vinegar		1.0ppm	1.0ppm		10.0ppm			10.0ppm			30.0ppm
9. Chocolate		1.0ppm	2.0ppm		20.0ppm			10.0ppm		0.1ppm	
10. Jams, Jellies, Marmalades		1.0ppm	2.0ppm		20.0ppm	250.0ppm		20.0ppm		0.1ppm	
11. Squashes, Cordials, Fruit Syrups		1.0ppm	2.0ppm			250.0ppm		20.0ppm			
12. Tomato Juice		0.2ppm	0.5ppm		5.0ppm	250.0ppm		5.0ppm		0.1ppm	
13. Fruit Juice		1.0ppm	2.0ppm		20.0ppm	250.0ppm		30.0ppm		0.1ppm	
14. Synthetic Syrups & Cordials		1.0ppm	2.0ppm		20.0ppm	250.0ppm		20.0ppm	should be free	0.1ppm	
15. Tomato Sauce		1.0ppm	2.0ppm		20.0ppm	250.0ppm		20.0ppm		0.1ppm	
16. Pickles		1.0ppm	2.0		50.0	250.0		20.0			
17. Canned Mango		1.0%	2.0%		20.0%	250.0%		20.0%		0.1%	
18. Papadam	0.5%										
19. Jaggery	0.5%	0.5	1.0					5.0			
20. Lozenges	0.2%	1.0	2.0		5.0			5.0			

should as far as possible refer to the standards prepared by the SLSI, instead of drawing up separate standards.

This will not only reduce the burden on the food advisory committee with respect to preparation of food standards but also will avoid duplication of efforts by both agencies and eliminate dual standards for food products in the country.

Standards for Food Contaminants

The following are some of the Food Contaminants specified in the SLSI standards.

1. Acid Insoluble Ash,
2. Admixture,
3. Foreign matter,
4. Residual Antibiotics,
5. Pesticide residues,
6. Metallic Contaminants

Arsenic,
Lead,

Copper,
Zinc,
Tin,
Cadmium,
Mercury.

When specifying standards for contaminants the SLSI adopts the following procedures:

- (a) They should meet the minimum standards stipulated in the Food Law.
- (b) If it is an item meant for export, the specifications in major buying countries are taken into consideration.
- (c) In the absence of (a) and (b) the limits specified in the recognised International Standards such as codex standards are taken into consideration.
- (d) When specifying limits for contaminants which are non-hazardous but only contribute towards the poor quality of the products, the SLSI gives consideration to the process capability of local industries and the limits are based on the level of technological development of the Industries.