ROSS INSTITUTE UNIT OF OCCUPATIONAL HEALTH

CERTIFICATE COURSE IN FOOD HYGIENE AND THE HANDLING OF FOOD

REFERENCE NOTES

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SOURCES

3,4,7,10,11,12 & 13 - Lecture Notes/Royal Institute of Public Health and Hygiene, London
5 & 6 - Nutritive Value of Indian Foods, ICMR (NIN) Publication
8 - WHO Chronicle, 31:143-149 (1977)
9 & 19 - Preventive and Social Medicine, Textbook (J.E. Park)
14 - Theory and Practice of Public Health, (W. Hobson)
15, 16 & 17 - Manual of Health for the Armed Forces, 1968
18 - WHO Offset Publication - No. 34

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ST JOHN'S MEDICAL COLLEGE AND TEACHING HOSPITALS, BANGALORE

CERTIFICATE COURSE IN FOOD HYGIENE AND HANDLING OF FOOD

Introduction

The St John's Medical College is instituting special courses leading to the Certificate in Food Hygiene and Handling of Food. The course will be conducted in collaboration with the Royal Institute of Public Health & Hygiene, London, which has done pioneering work in such courses. The Certificates of merit will be issued jointly by these two institutions.

Objectives

1. To highlight the importance of ensuring the safety and wholesomeness of food at all stages from its growth and production until its final consumption

2. To instruct on the causes, consequences and prevention of infections transmitted through food

3. To make aware the legal provisions for ensuring safety of food

4. To highlight the causes, effects and prevention of food-poisoning

5. To impart knowledge of the various measures employed in the protection and preservation of food stuffs

6. To obtain improvement in the handling and distribution of food through persuasion, consent and Health Education of the managements and their staff

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Course components : As per attached syllabus

Fees: Tuition fees Rs.150/- per candidate

Entry to examination: All candidates musthave attended the approved course full time, before taking the examination.

Eligibility

These courses are open to restaurant managers, catering administrators, canteen managers, food and beverage managers, area managers/ supervisors and kitchen superintendents.

Venue: St John's Medical College, Bangalore

Faculty:

The faculty of the Departments of St John's Medical College and Hospitals, Medical Officer of Health of Bangalore City Corporation, Deputy Director of the Public Health Institute of Karnataka Government and Chief Medical Officers of Factories, will participate in the teaching.

Duration of the Course

2 weeks (16 hours)

These classes will be conducted between 2.00 pm & 4.00 pm from Monday through Thursday for two weeks to suit the convenience of managers and prevent dislocation of their work. The course will terminate with an examination (theory and oral) for the award of the Certificate of Merit.

Course Capacity: 25

Transport: For trips between college and other institutions for instructional purposes, transport will be provided by St John's Medical College.

Library facilities: The course participants will be given temporary loan cards for reference in the St John's Medical College Library during the period of the course.

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Associateship of Royal Institute of Public Health & Hygiene

Successful candidates are eligible to apply for the Associateship of Royal Institute of Public Health & Hygiene, after payment of entrance and annual subscription fees. This entitles them to receive the Journal on Health and Hygiene, published by the Royal Institute of Public Health, London.

Programme Director: Director of Rural Health Services and Training Programmes
St John's Medical College, Bangalore

Date of commencement and completion of the course will be finalised following the Food Hygiene Seminar on 29.8.79.

For further details, please write to:

The Programme Director, DRHS & TP.
Certificate Course in Food Hygiene and Handling of Food
St John's Medical College
Bangalore 560034

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NOTES FOR GUIDANCE OF STUDENTS

EXAMINATION SYLLABUS

This covers the subjects on which questions will be asked in both oral and written examinations. It is of course necessary for the student to show that he or she has sufficient knowledge of the subjects to obtain a pass. The following points should give some guidance on the level of knowledge required for each subject covered by the syllabus. The student should have enough knowledge to deal confidently with all the following points and questions:-

1. The Digestive Process

a) What is food, what are the component parts? Students should be able to give examples of carbohydrates, proteins and fats and the functions they perform in the human body. Also examples and functions of minerals and vitamins.

b) What happens to food when it is consumed? What chemical processes take place and where in the body do they occur?

c) Students should be able to re-produce the drawing of the digestive system as shown on page 5 of the lecture notes.

d) What is peristalsis and what happens in the body when vomiting and diarrhoea occurs?

2. Food Poisoning and Food Borne Diseases and their Prevention

a) What is food poisoning and what different types of outbreaks occur?

What is toxin, exotoxin and endotoxin?

b) How can chemical, vegetable or bacterial food poisoning be caused? The student must be able to give examples of each type of poisoning.

c) In bacterial food poisoning what do germs need to grow and multiply?

d) What are the symptoms in human beings of the different types of bacterial food poisoning and how are these different types spread?

e) How can the different types of food poisoning be prevented? e.g. in looking at the problem from the point of view of preventing contamination of food, premises and food handlers.

f) Typhoid, paratyphoid, brucellosis, tuberculosis and dysentery and trichinosis are food borne diseases. How is each disease passed on to food and how dangerous are these diseases?

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3. Bacteriology:

a) What do you understand by terms such as:- micro-organism, pathogen, bacilli, cocci, colory, Vibrio, spore?

b) Where are bacteria found, how do they live and how are they destroyed?

4. Transmission of infection:

a) How are food poisoning organisms actually passed on to the food from the sources of contamination? e.g. From person to food, from rodent to food, from a slaughterhouse floor surface to food?

b) What are convalescent and healthy carriers?

c) What are the environmental sources of food contamination and what diseases can be caused by them? e.g What food poisoning organisms can originate from the soil?

d) How widespread is food poisoning? Is the number of cases increasing or decreasing? Are there any new types of food poisoning being experienced? Has, for example, the increase in size of the broiler chicken industry any significance in food poisoning patterns?

e) Has the change in public eating habits over the years affected the number of food poisoning cases?

5. Investigation of an outbreak of food poisoning or food borne disease

a) What do you understand by "high risk" food, bacteriological analysis of food and faeces specimens, exclusion from work, incubation period and onset of symptoms?

b) Students must know the roles played by the MOH and the Health Inspector in the investigation of food poisoning cases.

6. The law relating to food hygiene

Detailed knowledge of the Food Hygiene Regulations, Milk, & Dairies Regulations and Food and Drugs Act etc. is not required but students must know the following:-

a) Responsibility for inspection of food premises, stalls and vehicles of the Health Inspector and what this Officer's general powers are;

b) Responsibility of MOH relating to notification and investigation of food poisoning and food borne disease.

c) Responsibility of the employees in food premises regarding food hygiene practices and notification of food poisoning and food borne diseases.

7. The Protection of Food:

a) Why is hand washing particularly important after use of the W.C. and after coughing or sneezing?

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b) What is cross contamination, and how many forms can it take in passing food poisoning from a contaminated source to a healthy human being?

c) What water temperatures are effective for:-
i. washing food room surfaces and equipment surfaces
ii. sterilising food room surfaces and equipment surfaces?

d) Students must be able roughly to describe a standard type of washing machine used in a large catering kitchen, and what the correct water temperatures should be.

e) What dangers-bacterial and otherwise, arise from infestations of rats mice, flies, wasps and cockroaches in food premises? What dangers can arise from the presence of domestic pets or birds?

f) What preventive measures can be taken to keep infestations out of food premises, when new premises are constructed, or where existing premises have been cleared of an infestation?

g) Students should have some knowledge of the materials used in the construction of food premises and particularly the surface finishes of walls, ceilings and floors in food rooms. Surface types of preparation tables, chopping blocks and cold storage rooms should also be known.

h) What is cooking, pasteurisation and sterilisation of food? What significance does pasteurisation have as regards milk, ice-cream and liquid eggs? What basically happens in the canning of food?

i) What are the dangers associated with re-heating of foods which have been cooked? What re-heating temperatures are satisfactory and what other conditions should apply in making re-heated foods acceptable?

j) Why must food awaiting immediate consumption in catering premises be kept either under 50°F or above 140°F?

k) In which foods is there bacterial growth which is likely to cause food poisoning? What types of common foods are hardly ever associated with bacterial food poisoning, and why?

l) At what temperature does a domestic refrigerator, a deep freeze and an ice-cream conservator normally operate?

What happens when food, contaminated with bacteria, is placed in a domestic refrigerator or deep freeze?

What should a housewife do to maintain properly a domestic refrigerator, and to obtain the maximum benefit from it?

MAKING FOOD SAFE

The problem of making food safe is clearly a vast one, for it involves an understanding of all the hazards to which the whole variety of foods (and drinks) are exposed; and the ways in which such hazards can be minimized, if not completely removed. Because of the size of the subject, the format of the notes for this lecture differs from those elsewhere in this booklet and does in fact conform more to true note form, than do the papers on other topics. Under the various sub-headings, some brief implications are mentioned, but neither the headings themselves, nor the additional remarks, are in any way exhaustive. It is hoped, however, that they provide a framework of ideas which readers can enlarge upon, and add to, in the light of their own experience, for one of the problems facing us in deciding the content of this brief course, is that those taking it, come from a variety of jobs and industries, and the only thing which many have in common, is a shared responsibility for food which others eat.

The order of the topics here, is not necessarily the only one possible, based as it is on the history of various food items from their source to their consumption, and clearly some workers will have no control at all over some aspects of the food with which they deal at different stages in this chain. Lastly, some hazards will clearly appear more than once in the chain, e.g. the danger of Salmonella from duck eggs.

THE NATURAL HISTORY OF FOOD:

A SOURCE

Degree of control available.

1. MEAT Inspection of slaughter-houses, sampling of imported meat.
2. POULTRY Control of rearing conditions.
3. EGGS Control of import of dried eggs. Note danger of Salmonella from duck eggs.
4. MILK Brucellosis-free herds.
   Tuberculin-tested (attested) herds.
5. VEGETABLES Avoid excessive soil contamination-B. Cereus. Possibility of danger from pesticide spraying. Possible danger of intestinal infections if faecally contaminated vegetables, e.g. salads, are consumed raw.
6. WATER Dangers of intestinal infections, e.g. Cholera, Typhoid Fever, Dysentery from faecal contamination, if untreated.

B. TRANSPORT

1. Danger of cross-infection of animals; increase in Salmonella before slaughter if crowded or too long in transport.
2. Cross contamination of food from animal excreta.
3. If meat, danger of spoilage and bacterial multiplication unless refrigerated.

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C THE TREATMENT OF FOOD

A wide variety of methods are designed to preserve food, and to prevent bacterial and other contamination.

1. HYGIENIC SLAUGHTERING (See B (1) above).
2. CANNING - to a temperature sufficient to kill all pathogens, e.g. a "Botulinum Cook". Ensure proper sealing of tin-cf. contamination of corned beef in the Aberdeen Typhoid outbreak.
3. FREEZING Rapidity is an important factor for quality. Does not kill all pathogens.
4. ACCELERATED FREEZE DRYING
5. DEHYDRATION
6. SMOKING AND CURING.
7. SALTING AND PICKLING e.g. the salt beef of Nelson's Navy.
8. PASTEURISATION, e.g. milk, canned ham. Kills pathogens - but spoilage organisms may survive.
9. STERILISATION, e.g. milk-kills all germs.
10. ULTRA HEAT TREATMENT-as for sterilization.
11. ADDITION OF PRESERVATIVES, e.g. Sulphur Dioxide to sausages, etc. Only a short-term effect.

D STORAGE

1. REFRIGERATION-Temperature control vital.
2. (a) Deep freezers.
   (b) Frozen food cabinets-watch the load line.
   (c) Domestic type refrigerators-avoid overloading and introducing hot food-
2. PEST CONTROL Rodents, insect pests, especially flies.
3. STOCK ROTATION- consider implications of date stamping.

E PREPARATION

1. Consider construction and use of premises.
2. CONSIDER FOOD HANDLERS ("Man in his own worst enemy").
   Clothing.
   Cleanliness.
   Absence of infection in throat, nose, on skin, in bowels.
   Hygienic practices.
3. STORAGE AFTER PREPARATION Avoid bacterial growth. Avoid contamination.
4. DISCARD THE DOUBTFUL FOOD.

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F SERVING FOOD

1. Cleanliness of handlers.

2. Cleanliness of utensils-washing methods.

G DISPOSAL OF WASTE FOOD

1. Dustbins-refuse collection.

2. Drains.

3. Flies, vermin, other pests.

H MONITORING

1. From within, by regular supervision-and irregular checks.

2. From without by the Food Inspectors of the Local Authority.

I THE AIM-is to break the chain.

1. Not to allow food to become contaminated.

2. To prevent bacterial growth.

J THE FINAL ANSWER IS HEALTH EDUCATION.

DIGESTION AND THE DIGESTIVE SYSTEM

The life of man can be regarded as a continual production of energy by oxidation or burning of the food he consumes. Oxygen in the inspired air frees the potential energy of foodstuffs by oxidizing them in the cells of the body to form CO_2 and water, and liberates heat and energy. The heat maintains the body temperature and the energy is expended in movement. The whole cycle of activity is known as Metabolism. The build up or repair of body tissues is called Anabolism, while the break down of the tissues with the liberation of energy and the excretion of wastes is called Katabolism. The waste products are excreted by the kidneys, bowel, lungs and skin and consist largely of water, CO_2 and nitrogenous breakdown products of protein such as urea, mostly found in the urine but also in the faeces.

Digestion converts the complex insoluble constituents of the food into simple and absorbable substances which diffuse through the lining of the intestine to enter the blood or lymph to be dealt with by the tissues.

Food consists of carbohydrate, protein and fat together with small quantities of vitamins and minerals, all of which should be present in a balanced diet. Water, which constitutes about 70% of the body weight, is essential to life.

Carbohydrates are sugars and starches, which provide energy and are broken down to sugar by the body. Rice, Wheat and Ragi are probably the carbohydrates most commonly and extensively eaten in this country.

Proteins are obtained from lean meats, fish, eggs, peas, beans, nuts and milk. Protein is required for the growth and repair of the body tissues.

Fats, which may be either animal or vegetable as also are the proteins, are valuable energy producing foods and are stored in the body as energy reservoirs. They are also useful vehicles of vitamins A & D
Ex: Animal fats - Cod liver oil, Shark liver oil
Vegetable fats - Ground nut oil, Coconut oil, Mustard oil.

The most important minerals in the diet are calcium, iron, phosphorus and iodine.

Carbohydrates are reduced to monosaccharides such as glucose, and disaccharides such as maltose and lactose. All are absorbed as monosaccharides after digestion.

Proteins are reduced to amino-acids and fats to fatty acids. Digestion is accomplished by the enzymes contained in the digestive juices formed by the various glands found along the length of the digestive system.

The process of chewing, hunger, the smell of a well cooked meal or even the anticipation of appetising food promotes the flow of saliva from the salivary glands situated in the mouth and the saliva thus secreted aids the process of mastication by softening and diluting the food introduced into the mouth. The saliva comes from the Parotid, Submaxillary and Sublingual Glands and contains Mucin and Ptyalin Enzymes the first to soften the food and the second to start the digestion of starch to maltose.

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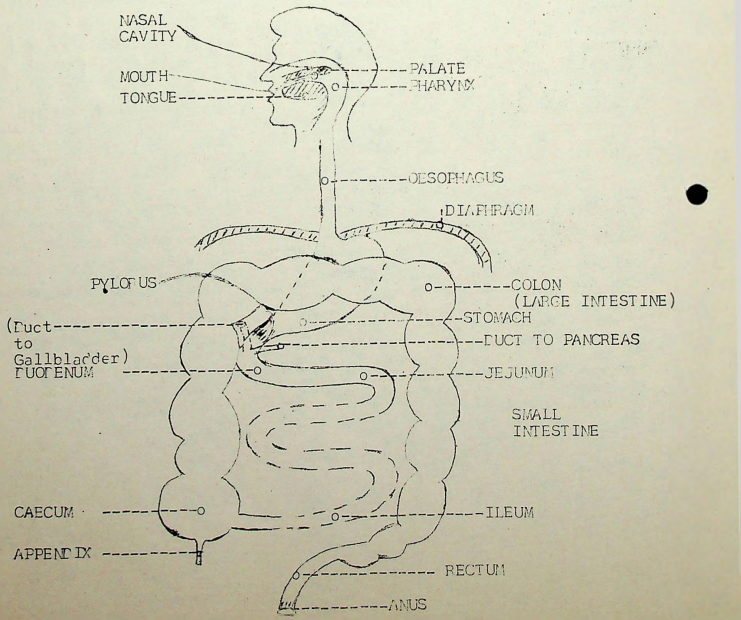
When the masticated bolus of food is ready to be swallowed it passes into the Pharynx where a reflex mechanism prevents its passage into the Larynx or windpipe by means of the Epiglottis, which seals off the entry, while the soft palate is raised and closes the nasal passages. The food is thus carried into the Oesophagus, a long thin muscular tube leading from the pharynx to the Stomach.

The Stomach (Gaster) is a hollow muscular organ whose walls, when it is empty, lie close together but can separate and dilate to accommodate the food which enters. Waves of muscular contractions start in the upper part of the stomach, occuring 3-4 times every minute and they sweep down to the pylorus or exit of the stomach. They thus both mix the food with the gastric juices and provide the force to drive the gastric contents out through the pylorus in small jets. These waves are called Peristaltic waves and in front of each wave the pylorus, which is a muscular ring, relaxes to allow a small part of the stomach contents to be ejected into the Duodenum.

The stomach acts as a reservoir, a temperature regulator and also be begins the digestion of proteins through the action of its glands which secrete hydrochloric acid and pepsin. Pepsin acts upon the proteins, reducing them to pentones. A further function that the stomach performs is a protective one, as its highly acid contents exert an antimicrobial action. Gastric digestion lasts 3-4 hours.

The first part of the small intestine is known as the Duodenum into which flow bile from the Liver and pancreatic juice from the Pancreas, an organ lying close to the spine with its head enclosed by the duodenum. Both the bile and the pancreatic juices are alkaline in reaction and so the acidity of the chyme entering the duodenum from the pylorus is quickly reduced.



The pancreatic juice contains three powerful enzymes:

Trypsin - Completes the digestion of proteins to their constituent amino-acids.
Amylase - Break down starch and other carbohydrates to glucose.
Linase - Break up fats into fatty acids and glycerol.

Bile is secreted by the liver and is stored in the gall bladder which is attached to the under-surface of the liver. When food enters the duodenum the gall bladder contracts and expels bile into the duodenum. Bile is a viscid green fluid, the colour being due to the bile pigments and these mixed with the food give the faeces their characteristic colour. It also contains bile salts which emulsify fats, thus facilitating their digestion by the pancreatic linase.

On leaving the duodenum, the food enters the Jejunum, which secretes two enzymes - Enterokinase, which helps to produce aminoacids, and Sucrase, which helps to produce glucose. This part of the intestine also contributes a large amount of water to facilitate the solution and absorption of the digested food.

On the whole the jejunum is chiefly occupied with secretion and digestion while the lower part of the small intestine or Ileum is largely concerned with absorption, but both processes can proceed simultaneously to some extent. The increasingly digested food is passed along the 20 feet of the small intestine by peristaltic waves occuring approximately 11 times per minute.

Absorption in the ileum is carried out by minute hair-like projections into the gut, called Villi. Each villus is richly supplied with blood vessels and a central lymphatic channel called a Lacteal for carrying digested fat globules to the main lymphatic channel of the body. The amino-acids, the monosaccharides and the water are absorbed into the blood vessels of the Villi and then distributed to liver and the tissues.

The small intestine also contains many bacteria which assist in the process of digestion and produce a slightly acid environment, this helping to inhibit the production of toxic materials.

The last part of the small intestine which is the ileum empties its contents into the Caecum. This is the first part of the large intestine, which is approximately 6 feet in length. The time taken by food to reach the caecum varies greatly in time. Food takes about two or three days to traverse the whole intestinal tract.

The Caecum, to which is attached that vestigial organ, the Vermiform Appendix, leads into the Ascending, Transverse and Descending Colon and this finally empties into the Rectum. The Anus is the tight muscular ring which guards the exit to the Rectum.

The importance of the large bowel, especially the caecum and ascending colon, is in the conversion of the fluid ileal contents into a formed stool. This is done by the absorption of the fluid elements of the contents as a result of which a semi-solid mass of faeces is formed. Faeces are principally composed of bacteria, secretions and undigested food residues. Peristaltic action continues slowly to move the faecal mass along the colon until the rectum is full and defaecation takes place. The bacteria normally found in the colon will produce gases from food residue not completely broken down in the small intestine.

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II. BALANCED DIETS IN TERMS OF STANDARD CUPS AND SPOONS

The balanced diets for different categories of people are given in terms of standard cups and spoons in the following table:

Table-1: Balanced Diet for Adult Man(Moderate worker)

Food Stuff	Qty (g)	Approximate volume in std. cup and std. spoon.	Number
I. CEREALS			
1. Rice	335	1-3/5	
2. Wheat flour	140	1	
II. PULSES			
1. Redgram dhal	50	1/5	
2. Blackgram dhal	30	6 std. sp.	
III. GREEN LEAFY VEGETABLE			
1. Amaranthus	125	1-4/5	3 bundles
IV. Roots and Tubers			
Potato	100	3/5	2 medium sized ones
V. OTHER VEGETABLES			
Beans	75	1/2	12-15 or a handful
VI. FRUIT			
Orange	30	-	3 segments.
VII. Milk	200	4/5	-
VIII. Fats and oils	40	2/5	-
IX. Sugar & Jaggery	40	1/5	-

Table-II: Balanced Diet for an Adult Women (Moderate Worker)

(1)	(2)	(3)	(4)
I. CEREAL			
1. Rice	230	1	
2. Wheat	180	-4/5	
II. PULSES			
1. Redgram dhal	45	-1/5	
2. Blackgram dhal	25	5 std. sp.	-
III. GREEN LEAFY VEGETABLE			
Amaranth	125	1-4/5	3 bundles.
IV. ROOTS AND TUBERS			
Potato	375	1/2	1
V. OTHER VEGETABLES - Beans	75	1/2	12-15or a handful.
VI. FRUITS - Orange	30	-	3 segments or a quarter fruit.
VII. Milk	200	4/5	-
VIII. Fats and Oils	35	1/5	-
IX. Sugar and Jaggery	30	6 Std. sp.	-

Table-III: Additional Allowance for Pregnancy and Lactation

Food Stuff	Pregnancy			Lactation		
	Qty (g)	Appx. Vol. in std.cup.	No.	Qty (g)	Appx. Vol. in std.cup	No.
I. CEREALS:						
Rice	50	1/5	-	40	1/5	-
Wheat				60	2/5	-
II. PULSES:						
Redgram dhal				20	2 std.sp.	-
III. GREEN LEAFY VEGETABLE	125	2/5	3/4 bundles	25	2/5	3/4bundles
VI. Milk	125	½	-	125	1/2	-
V. Fats & Oils				15	4 std.sp.	
VI. Sugar & Jaggery	10	2 std.sp	-	20	4 std.sp.	

Table - IV: Balanced Diet for a Child between the Age 3-6 years (Ref. - 6 years old child)

Food Stuff	Qty (g)	Appx. Vol. in std. cup	No.
(1)	(2)	(3)	(4)
I. CEREALS			
1. Rice	140	3/5	-
2. Wheat flour	60	2/5	-
II. PULSES			
1. Redgram dhal	30	6 std. sp.	
2. Blackgram dhal	15	3 "	
3. Other grams	15	3 "	
III. GREEN LEAFY VEGETABLE:			
Amaranth	75	1-1/5 std.cup	1-½ bundles
IV. ROOTS AND TUBERS			
Potato	50	2/5 "	1 medium size
V. OTHER VEGETABLES			
Beans	50	2/5 std.sp.	8-10 in no.
VI. FRUITS			
Orange	50	2/5 std.cup.	5 segments.
VII. Milk	250	1 "	
VIII. Fats and Oils	25	7 std.sp.	
IX. Sugar and Jaggery	40	8 std. sp.	

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Table - V : Balanced Diet for a Child Between the Age 1-3 years
(Ref: 3 year old child)

(1)	(2)	(3)	(4)
I. CEREALS			
1. Rice	90	2/5	-
2. Wheat	60	2/5	-
II. PULSES			
1. Redgram dhal	25	5 std. sp.	-
2. Blackgram dhal	10	2 std. sp.	-
3. Greengram dhal	15	3 std. sp.	-
III. GREEN LEAFY VEGETABLES :			
Amaranth	50	4/5 cup	1 bundle
IV. ROOTS AND TUBERS			
Potato	30	2/5 cup	1 small
V. OTHER VEGETABLES			
Beans -	30	2/5 cup	5-7 in no.
VI. FRUITS - Orange	50		5 segments
VII. Milk	300	1-1/5	-
VIII. Fats and Oils	20	6 std. sp.	
IX. Sugar and Jaggery	30	6 std. sp.	

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WHO Chronicle, 31: 143-149 (1977)

KEEPING FOOD SAFE FROM HARMFUL GERMS

The health of people depends to a large extent on the food they eat. Keeping food safe from harmful germs and their toxic products is therefore an important problem, which over the years has engaged the attention of various WHO expert committees concerned with different aspects of food hygiene. The latest report of the WHO Expert Committee on microbiological aspects of food hygiene, which met in Geneva in March 1976 (with the participation of FAO), has recently been published[1] and it describes the microbiological agents of food-borne disease and the microbiological hazards in relation to foods. The article below, which is adapted from the second part of the report, describes the microbiological hazards related to food processing, handling and storage, population movements, tourism, etc, as well as the measures available to control them.

Hazards related to food preparation

The largest proportion of food-borne disease is probably caused not by commercially processed foods but by food prepared at home, in institutions, or in food catering establishments. Food-processing plants were implicated in 6% of food-borne disease outbreaks in the USA are unexpected contamination of the raw food material and faulty preparation techniques. One study of disease outbreaks that could be attributed to food processing plants suggested that most of the outbreaks were due to contaminated raw materials (for products not given a terminal heat process) and to faulty applications of processing and packaging techniques.

Common faults in the handling and processing of food in homes, restaurants, and other food catering establishments, which led to disease outbreaks, are given in Table 1. In some cases several faults were found without the possibility of identifying the importance of each one. Several outbreaks of food poisoning, usually caused by salmonellae, were found to be due to the transfer of organisms from contaminated raw food to cooked food by hands, utensils, and unclean surfaces.

Table 1. Factors contributing to 493 outbreaks of disease caused by foods processed in homes or in food catering establishments

Factor	No. of outbreaks
Inadequate refrigeration	336
Food preparation far in advance of serving	156
Infected persons and poor personal hygiene	151
Inadequate cooking or heating	140
Food kept "warm" at a wrong temperature	114
Contaminated raw materials in uncooked foods	84
Inadequate reheating	66
Cross-contamination	58
Inadequate cleaning of equipment	52
Other conditions	160

[a] Adapted from BRYAN, F.L. Microbiological food hazards today-based on epidemiological information. Food technology, 28(9): 52(1974)

Hazards related to storage

Hazards related to the storage of food are determined by various combinations of factors-length of storage, type of food, methods of processing and preservation, types and relative proportions of organisms present, PH, water activity, and temperature.

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1 WHO Technical Report Series, No.598, 1976 (Microbiological aspects of food hygiene). Report of a WHO Expert Committee with the participation of FAO, 103 pages, Price: Sw. fr. 9.--.

Temperature control is of major importance in reducing hazards from pathogenic bacteria, limiting spoilage, and keeping food safe. In countries where refrigeration facilities are available perishable foods should be stored at temperatures that inhibit the growth of pathogenic bacteria, i.e., less than 4°C (or alternatively above 60°C). The low temperatures must be achieved quickly after processing in order to obtain the greatest benefit from refrigeration. Slow cooling may allow heat-injured spores to recover and subsequently to grow before the temperature reaches an inhibiting level.

At low temperatures, particularly under chilled storage, changes may occur in food usually as a result of the growth of psychrophilic bacteria such as Pseudomonas, Achromobacter, Flavobacterium, and Alcaligenes and certain yeasts and moulds.

Hazards related to food habits

Food habits vary from one country to another and even within a country, but these habits are subject to change. In countries where environmental sanitary conditions are poor, gastroenteric diseases are one of the most important causes of morbidity and mortality. Food and water are important channels of transmission of these diseases.

The following factors tend to increase food-borne diseases:

(1) Intensive production of livestock and the use of contaminated feeds.

(2) Consumption of raw or undercooked meat or poultry. This increases the risk of parasitic diseases and bacterial infections and intoxications, e.g., salmonellosis, toxoplasmosis, human linguatulosis, Taenia saginata and T. sodium infestations and trichinosis. Even in countries where meat is thoroughly inspected to prevent transmission, mild infections of carcases can still be missed. The habit of cooking large cuts of meats into which heat cannot adequately penetrate may sometimes be responsible for these infections.

(3) Consumption of raw milk, either from choice or for economic reasons.

(4) Consumption of raw or undercooked fish. Infections due to Vibrio parahaemolyticus, Diphyllobothrium latum or other cestodes, trematodes, and nematodes may result.

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(5) Consumption of wild animal meat. Out-breaks of trichinosis have occurred through consumption of wild boar and bear meat.

(6) Improper home canning of foods. In the USA the majority of outbreaks of botulism occur as a result of home canning of vegetables and fruits where adequate processing has not been carried out.

(7) Preparation of ready-to-eat foods in bulk and mass feeding, where under certain conditions normal habits of food hygiene are relaxed.

(8) Consumption of traditional food delicacies. Utijak, an Eskimo delicacy prepared by keeping seal flippers soaking in oil until rotten, has been responsible for whole families dying from botulism.

Hazards related to population movements and travel

With improvements in the speed and safety of travel, more and more people now visit other countries; in the case of "package" tours, organized to attract tourists, a considerable number of people are exposed to environmental hazards which they would not experience in their own countries or homes.

Outbreaks of food-borne disease due to Staphylococcus aureus, Clostridium perfringens, salmonellae, V. parahaemolyticus, cholera and non-cholera international air travel. Strict control of food hygiene in flight kitchens as well as on board aircraft is essential.

Numerous outbreaks of enteric infection have been recorded on passenger ships; several of these have reported on cruise ships. Replenishment of ships' water supplies during a voyage has always presented a particular hazard since many opportunities exist for contamination of water between ship and shore. An additional hazard is cross contamination of drinking-water with bilge or waste water. Several outbreaks of V. parahaemolyticus gastroenteritis were reported on cruise ships sailing from ports in the USA in 1975. In one of these outbreaks V. parahaemolyticus serotype $O_3:K_{29}$ was isolated from sick passengers and seafood cocktail was implicated. It was thought that the food was contaminated with polluted sea water. In another investigation of the incidence of gastroenteritis on a passenger ship, Escherichia coli 027 was the predominant organism isolated from patients with diarrhoea.

In addition to the specific hazards of well-known enteric infections and intoxications, travellers and holiday-makers are exposed to other infections usually classed as "travellers' diarrhoea"; such infections are of limited duration. There is evidence that travellers' diarrhoea is associated with strains of enterotoxigenic E. coli new to the individual and acquired through the medium of food and water. Amoebiasis and giardiasis may also be involved in tourists' gastro-enteritis originating from food and water.

Owing to the influx of large numbers of people to sites of pilgrimages and refugee camps, the threat of cholera and other enteric diseases in these places is very real. Camping and caravan sites, fairs, and festivals can also present hazards of food-borne disease outbreaks if the sanitary arrangements are not satisfactory.

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Hazards related to imported foods

Large quantities of foods for human consumption and for feeding animals are transported from one country, or from one part of the world, to another. The exporting country may have no knowledge of the ways in which their products are used in importing countries, and foods that are considered safe in the country of origin may provoke disease in the importing country as a consequence of different food habits. The importing country, on the other hand, often has insufficient knowledge about the production and processing of the food, and public health authorities are concerned about the unknown risks. This has led to the setting up of control systems or requests for guarantees on wholesomeness, absence of pathogens, etc., which information many exporting countries are generally unable to give. Import control based only on sampling and testing of lots is often ineffective and has not been able to prevent several outbreaks of disease due to imported foods in various countries.

Eliminating harmful germs

Different processing methods, e.g., heat treatment, refrigeration; etc., are available for combating food-borne disease agents such as bacteria, parasites, and viruses. The effects of such treatment on these agents or on toxins produced by them are summarised below.

Effect of heat processing

(1) Non-spore-forming bacteria. Officially approved heat treatment of moist foods for the purpose of eliminating non-spore-forming bacteria, notably salmonellae, ranges from 3.5 minutes at 61.1°C for liquid whole egg to 1 second at 130.2°C or over for ultra-high temperature treatment of milk. Foods with low water activity or high fat content require more intense heat treatment than foods with high water activity or low fat content. Such treatment can be expected to effectively eliminate salmonellae, staphylococci, pathogenic streptococci, brucellae, etc. Studies of the heat resistance of V. parahaemolyticus have shown that this organism is killed as easily as other non-spore-forming bacteria.

(2) Spore-forming bacteria. The heat resistance of spores of C.botulinum type A has been the basis for calculating minimum heat processes for low-acid canned food for half a century. Spores of C. botulinum types B and F may have a heat resistance approaching that of type A; spores of most type E strains are destroyed at temperatures below 100°C and strains C and D barely survive heating to 100°C. The spores of type G seem to be as resistant as types C and D.

The heat resistance of C. perfringens type A spores may approach that of C.botulinum type A, which means that they are not killed by normal cooking (boiling) of food. The resistance of spores of non-haemolytic strains is generally higher than that of B.haemolytic strains. Heat-shocked C. perfringens spores, when ingested, germinate in the intestine. Later sporulation of these vegetative forms gives a greater yield of spores and therefore more toxin.

(3) Parasites. Trichina and several other parasites are killed by exposure to a temperature of 58°C and all food-borne parasites seem to be destroyed by boiling (100°C) for a short time.

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(4) Viruses. Oncogenic viruses in ice-cream mixes were effectively destroyed by standard pasteurization (68.3°C for 30 minutes or 79.4°C for 3.5 minutes resulted in a million-fold or tenthousand-fold decrease in poliovirus and echoviruses, respectively. Studies of survival of poliovirus and Coxsackie viruses during broiling of hamburgers showed that 4 minutes at 71°C respectively were required for 90% reduction. For complete destruction of some viruses it may be necessary to boil the food.

(5) Microbial toxins. Most fungal toxins, including the aflatoxins, are not destroyed by boiling or autoclaving. Staphylococcal enterotoxins are also very heat-resistant; more than 9 minutes at 121.1°C may be required for 90% destruction. Boiling readily destroys botulinal toxins as well as C. perfringens toxin, but the latter is never or only rarely present in foods.

(6) Microwave heating. Microwave heating of food has become widespread in recent years. Frequencies of 915 or 1450 MHz are most often used. Microwaves generate heat in foods and it has been suggested that their effect is solely due to the generated heat. There are indications of additional modes of action when vegetative cells are killed by microwave. However, microwaves do not effectively kill spores at temperatures below 100°C.

Effects of irradiation

Resistance of food-borne pathogens to ionizing radiation might be a problem in irradiation preservation of foods. Low doses of irradiation have been suggested as a means of prolonging the shelf-life of food and eliminating radiation-sensitive disease agents such as salmonellae. Large doses (4.8×10^4 Gy (gray)4.8 megarad) or more) have been recommended for sterilizing canned foods.

(1) Non-sporeforming bacteria. Irradiation of food with doses of up to 1×10^4 Gy (1 megarad) will effectively eliminate bacteria such as salmonellae, staphylococci, vibrio and others.

(2) Spores. Spores of C. botulinum are among the most radiation-resistant microbial forms. The dose required to destroy 90% of spores is a little more than 3×10^3 Gy (0.3 megarad) for the most resistant strains of types A and B and more than 6×10^3 Gy (0.6 megarad) for proteolytic type F. In the USA, 4.8×10^4 Gy (4.8 megarad) has become the accepted sterilizing dose for food.

(3) Parasites, viruses, toxins. Parasites are rather sensitive to irradiation. Larvae of Trichinella spiralis (0.01 megarad) suffices to sterilize the female larvae and thus interrupt the infection cycle. Viruses are quite resistant but it is believed that a sterilizing dose (4.8×10^4 Gy or 4.8 megarad) will inactive viruses naturally present in food. Toxins in food cannot be inactivated by irradiation.

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Refrigeration:

(1) Non-spore-forming bacteria. The growth of Salmonellae is arrested at temperatures below 5.2°C and above 44-47°C. Whether they will actually grow at these temperature extremes depends on other factors; low pH or water activity narrows the range of growth. Staphylococci can grow at temperatures between 6.7°C and 45.4°C and enterotoxin production can occur at temperatures ranging from 10°C to 46°C. The lowest reported temperature permitting growth of V. parahaemolyticus is 3°C and the maximum 44°C.

(2) Spore-forming bacteria. While the growth of proteolytic strains of C. botulinum is arrested at temperatures below 10°C it has repeatedly been confirmed that non-proteolytic E and F strains grow and produce toxins at temperatures down to 3.3°C. The minimum growth temperature for C. perfringens is 6.5°C but growth is slowed down considerably at temperatures below 20°C. No clostridia have been found to multiply at temperatures higher than 50°C. Bacillus cereus can multiply in the temperature range 7-49°C. Pathogenic bacteria may remain viable, but without growth, for a long time in refrigerated foods.

(3) Parasites, viruses, toxins. These agents do not multiply in foods but may remain active indefinitely at refrigeration temperatures.

(4) Moulds. The majority of fungal toxins may be produced in food kept at temperatures between 4°C and 40°C, but fungi that produce alimentary toxic aleukia can grow and produce toxin in the range of -2°C to -10°C with an optimum temperature for toxin production of 1.5 - 4°C.

Freezing

(1) Non-spore-forming bacteria. Freezing not only results in arrest of growth but also in destruction of some cells. However, like salmonellae and staphylococci, V. parahaemolyticus shows better survival at low freezing temperatures. At - 30°C, they may survive for longer than 4 months.

(2) Spore-forming bacteria. While the vegetative cells of bacilli and clostridia are not much more resistant to freezing than non-spore-forming organisms, their spores are highly resistant.

(3) Parasites. Protozoa are generally destroyed by freezing. Trichinella spiralis, Anisakis, and Toxoplasma cysts can be killed by exposure to freezing temperatures for long enough periods of time. The same is true for intermediate stages of Taenia and Diphyllobothrium latum in fish.

(4) Viruses, toxins, moulds. These agents are generally very resistant to freezing.

Water activity, pH, and other factors

Different types of microorganism have characteristic ranges of growth with respect to the water activity in foods. The latter is reduced by increasing the concentration of solutes, which can be accomplished by drying and/or the addition of agents such as sodium chloride, sucrose, glucose, glycerol and propylene glycol. The type of agent used influences the response of micro-organisms to variations in water activity. Values that are inhibitory to the growth of microorganisms do not necessarily destroy them or viruses or toxins. However, trichina and possibly other parasites die in heavily salted foods. Minimum and optimum levels of water activity that favour the growth of different bacteria and moulds may be found in the report on which this article is based.

The effect of the acidity (or pH) of food on the growth of different organisms, etc., may be summarized as follows:

(1) Non-spore-forming bacteria. Staphylococci can grow under aerobic conditions in food within the pH range 4.3-9.0 or higher, but enterotoxin production (with the possible exception of type C enterotoxin) does not occur at pH values below 4.5. The limiting acidity for anaerobic enterotoxin production is pH 5.3. Salmonellae can grow in the pH range 4.1-8.0 and V.parahaemolyticus in the range pH 4.8-11.0. Values below pH 4 are lethal to most vegetative cells of pathogenic food-borne bacteria. The lethal effect and the growth inhibitory effect depend on temperature, pH, and on the acids used.

(2) Spore-forming bacteria. Growth of C. botulinum in foods does not occur at pH values below 4.6. At this pH value the growth of C. perfringens and B. cereus is also inhibited although the latter may grow slowly at pH 4.4. in certain types of food. Bacterial spores die out slowly in foods with pH levels too low to permit growth.

(3) Parasites, viruses, toxins. Little or no information seems to be available about the effect of acids on parasites in foods. Some viruses are sensitive to acids but others are very resistant. Most toxins are quite resistant.

(4) Moulds. Aflatoxins can be produced in grapefruit juice (pH 3.3) and at even lower pH values in laboratory media. The fungi neutralize (metabolize) the organic acids during growth.

Fermentation, often combined with other means (especially salt), is used for preserving many types of food. The main preserving effect of fermentation is due to acid production, but other compounds inhibitory to food-borne pathogens may be formed by fermenting organisms. The growth of pathogens may be inhibited through competition for essential nutrients. The only effect of fermentation that can fairly accurately be predicted is the one based on acidity; the other effects are still not well understood.

Other factors in food processing or preservation, e.g., oxidation/reduction potential or the presence of carbon dioxide, exert small but important effects on pathogenic organisms in foods. The widespread use of plastic materials (with low oxygen permeability) for packaging has been discussed in recent years. Vacuum packaging prolongs the shelf-life of various products but does not offer protection against growth of all food-borne pathogens.

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Combined effect of preservation methods

The preserving effect of high and low temperatures, low pH, low water activity, irradiation, and curing salts is increased when these act together, as is very often the case in food preservation. The combined effect may be additive or there may be interaction producing a greater than additive total effect. These combined effects are difficult to predict quantitatively because of the complexity of the required experiments. Even in the case of cured meats where the combined effect of different treatments (each used at a subinhibitory level) is crucial, it is not possible to predict accurately the minimum changes required to ensure safety if any part of the treatment is reduced.

Influence of food habits

Microbiological hazards tend to be reduced by certain food habits, such as:

(1) Pasteurization or boiling of milk. In many tropical and subtropical countries, milk is boiled before consumption, thus reducing the risk of milk-borne disease. Where pasteurization can be enforced, the effectiveness of the treatment must be carefully and continuously controlled. For small and rural communities, wet pasteurization is recommended in the initial stages. Modern methods of pasteurization (HTST, high temperature, short time; and UHT, ultra-high temperature) should be used in urban areas.

(2) Use of fermented milk. Fermented milk is a common food in certain parts of Asia and in central and southern Europe. The concentration of lactic acid in fermented milks is sufficiently high to kill or inhibit the growth of salmonellae, shigellae, and other food-poisoning organisms.

(3) Prolonged cooking of foods. Except when a heat-stable toxin is present, food that is adequately cooked and eaten while hot is safe. After cooking, prolonged storage without refrigeration must be avoided because heat-activated spores of C. perfringens and B. cereus may germinate and multiply.

(4) Vegetarianism. As meat, meat products, fish, and eggs are important media for food-poisoning organisms, the omission of these products from diets diminishes the risk of food-borne disease. However, the risk of infection with shigellae, E. coli, parasites, and other intestinal pathogens originating from vegetable foods remains.

Importance of health education in food hygiene

Preventive measures in all countries should include health education to discourage unhygienic food habits. Health education should start in the schools. Adult education may be provided in maternal and child health centres and teacher training colleges, as well as by mobile teams, radio and television broadcasting, and other means of mass communication.

Travellers, particularly those going to countries with a low standard of hygiene, should be given information on the precautions to be taken. The inclusion of such information in travel brochures and similar literature, as is done by some travel agencies, should be standard practice; this information could be combined with details about vaccination requirements. This matter is discussed with special reference to air travel in the second edition of Guide to hygiene and sanitation in aviation.[2]

General measures for controlling food-borne microbiological hazards include the sanitary production of raw materials, cleaning and disinfection of food processing plants, and hygienic practices by personnel, especially when handling food. These measures are described in most reference works on food hygiene and in the Joint FAO/WHO Food Standards Programme code of practice in food hygiene, which is now under revision.[3]

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[2] PAINEY, J. Guide to hygiene and sanitation in aviation. Second edition. Geneva, World Health Organization (in press).

[3] CODEX ALIMENTARIUS COMMISSION. Recommended international code of practice: General principles of food hygiene. Rome, FAO and WHO, 1969 (Ref. No. CAC/RCP 1-1969).

FOOD POISONING

Food poisoning is a general term applied to certain illnesses, frequently of sudden onset, brought about through the consumption of food. They usually affect the gastro-intestinal tract, although in some cases other systems may be mainly affected. A notable example of the latter is Botulism in which the major symptoms are related to damage to the nervous system. Food poisoning can be chemical, vegetable or bacterial in origin, and, when the gastro-intestinal tract is mainly affected, it is associated with nausea, abdominal pain, vomiting and diarrhoea, occurring soon after the responsible food has been taken. In such cases the time of onset of symptoms varies from 10 minutes to 48 hours after the food has been consumed, according to the nature of the poisonous substance ingested.

TYPES

Incidents are divided into three categories:-

(1) General outbreaks - Two or more cases in different families.

(2) Family outbreaks - Two or more cases in the same family.

(3) Sporadic cases - Single cases which are isolated occurences, having no connection with other cases or carriers.

With certain uncommon exeeptions the mortality is low and it is virtually confined to the very young and very old. The term "food poisoning" is nowadays applied more and more to those outbreaks caused by germs, as these are the commonest cause.

Chemical Poisoning:

Chemical poisoning by metals is comparatively rare these days as the manufacturers of canned goods take stringent precautions to obviate the contamination of their products by metallic salts.

Lead poisoning due to the absorption of lead (from pipes and storage tanks) caused by soft water, acid in reaction, is now a thing of the past, while the use of arsenic as a preservative is strictly controlled by law. The spraying of fruits and vegetables with poisonous insecticides has in recent times attracted considerable attention.. A recent statement from the U.S.A. suggests that people who use a lot of spray insecticide such as D.D.T. in the home, have a correspondingly high concentration of residue in their bodies. Furthermore, investigations by W.H.O. and the Food & Agricultural Organization of the United Nations, indicate that there may be a link between pesticides, insecticides and liver damage. These sprays are used all over the world and can contaminate food.

The chief substances implicated are Aldrin, Dieldrin, Endrin, Rothane and Endosulfan.

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Although chemical food poisoning is uncommon nowdays dramatic incidents do occur occasionally, as for example in 1965 when 84 people became ill through eating bread made from flour which had been contaminated by a chemical hardener for epoxy resin. The latter had been carried in the same lorry as the sacks of flour and spillage of the chemical had occurred. This incident also illustrates the fact that very rarely are chemical poisons destroyed by cooking.

Most cases of chemical food poisoning fall within the province of home or industrial safety, being caused by carelessly stored pesticides, paraffin, detergents or sterilising agents leading to spillage or leakage or by these substances being placed in unmarked old food containers. It is particularly important, therefore, when such stores are bought in bulk and subsequently broken down for convenient use that the smaller containers are clearly labelled and kept well away from all food stuffs and out of the reach of children.

In recent years it has been shown that pollution of estuary waters by factory waste can cause disturbingly high concentrations of mercury compounds in the flesh of in-shore fish. This has led to strenuous efforts being made to control such pollution.

Vegetable Poisoning:

Certain plants when consumed are poisonous to human beings. Such poisoning is generally accidental, the plant, fruit or berry being mistaken for an edible variety. Examples are Hemlock, Aconite, Datura and Deadly Nightshade, while the commonest cause is the Toadstool. With regard to Mushrooms, the only safe procedure is to learn to identify certain well-known species by their botanical features and to avoid fungi growing under trees and those which are brightly coloured.

Bacterial Poisoning:

Food poisoning caused by micro-organisms is almost invariably due to infected solid food, as to-day water and milk supplies are treated so effectively as to render them comparatively uncommon as vehicles of infection.

Bacteria or germs are extremely small. Approximately a million can be accommodated on a pin's head. They are living organisms which produce themselves by simple division which takes place every 20-30 minutes. Thus one germ alone could in 12 hours produce between 500 and 1,000 million offsp-ring.

In order to grow and multiply a germ needs:-

(1) Warmth — Blood heat is the most favourable temperature for growth.

(2) Time — Although germs multiply rapidly, a certain time is required before there is sufficient growth to cause illness.

(3) Moisture — Like all living organisms, germs require water.

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Salmonellae:

Salmonellae are sometimes carried in the human bowel and in the bowels of cats, dogs, rats and mice, cattle and pigs. Toilet paper is porous and it follows that after defaecation all adults and children should immediately scrub their hands with soap and hot water, otherwise the organism can be transferred from the fingers to food stuffs. The lavatory chain, lavatory seat and door handle should receive frequent cleaning. Towels, especially roller towels can spread infection.

Flies can also spread infection as they will feed on animal deposits out of doors and then enter a kitchen or alight on uncovered food stuffs. Domestic pets can be a danger in the kitchen. Another source of danger is the lidless dust-bin or swill-tub which attracts flies.

In the past, imported bulked egg products, both frozen and dried, have been a source of food poisoning, but the treatment of shelled egg products is now established. The Liquid Egg (Pasteurisation) Regulations, 1963 ensure that liquid egg is heat treated before use and this measure has been very successful.

Salmonella organisms can infect the duck and infected ducks can lay eggs which are infected even before the shell is formed. Alternatively, an uninfected egg may become infected through having been laid in a dirty environment as the infection can penetrate the porous shell. Cakes made with duck eggs are safe to eat because the high temperature at which cakes are baked ensures that they are sterile when leaving the oven. On the other hand, lemon meringue pies with the meringue made from duck egg whites can be unsafe because temperature and time of cooking of the meringue is below the thermal death point of the organism. If duck eggs are eaten whole they should be hard boiled for approximately eight minutes.

Salmonellae in animal feeding stuffs can introduce infection into farm stock. Spread depends on factors in the farm, in transit and in the slaughterhouse. Strain, cold, wet, deprivation of food and drink, can spread the infection within the animal body. Long transport, long waits and high killing rates increase the excretion of Salmonella organisms. Cattle and pigs are important foci of infection and poor hygiene in slaughter-houses can lead to contaminated carcases and then to contaminated manufactured products, e.g. sausages.

Infection in the raw meat of cows and pigs in butchers' shop can be transmitted to cooked meats by the practice of using the same knife to cut both raw and cooked meats. Pet food can be heavily contaminated by Salmonella organisms and in the home great care should be taken that cross-infection to food for human consumption does not take place. Desiccated coconut used to be a frequent source of Salmonella infection but legislation introduced by the Ceylon Government reduced the incidence of infection considerably. Many of our own bakers and confectioners sterilise raw coconut by steam treatment.

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(4) Food — Unfortunately in the case of organisms which cause food poisoning the foods they thrive on best are those most palatable to human beings, e.g. meat and poultry, milk and cream.

How food Poisoning Germs Cause Illness:

Harmful germs are capable of producing poisons known as toxins, which cause illness in human beings. These toxins may be produced in one of two ways. Some germs produce the toxin outside their own bodies (exotoxin) so that it mixes freely with their surroundings. Others produce toxins inside their bodies (endotoxin) and these are not released until the organism dies.

These two forms of toxin produce different kinds of illness. If germs growing in food produce exotoxin then the food itself becomes poisonous and when taken will give rise to symptoms shortly afterwards. If, on the other hand, the germs growing in food are ones which produce endotoxin, then symptoms of food poisoning will necessarily be delayed until the germs have entered and established themselves in the bowel, and their numbers are such that the amount of toxin released from dying organisms is sufficient to cause illness.

An important fact in this connection is that exotoxin produced by the food poisoning staphylococcus is resistant to heat and may not be destroyed even by boiling for a short time. Thus stews and gravies, for example, in which this form of toxin has been produced, may still cause illness even if heated to boiling point before serving.

The commonest organisms responsible for food poisoning are the Salmonellae, Clostridium Welchii, Staphylococcus Aureus, and very rarely in this country Cl. Botulinum.

Agent	Time of Onset	Symptoms
Salmonellae	12-48 hours	Abdominal pain, diarrheoa, vomiting, fever.
Cl. welchii	8-24 hours	Abdominal pain, diarrhoea and often mild vertigo.
Staph. aureus	1-6 hours	Salivation, nausea, vomiting, abdominal pain, prostration and sub-normal temperature.
Cl. Botulinum	12-36 hours	Change of voice, double vision, paralysis of cranial nerves, obstinate constipation.

Method of Spread:

If we know where the different organisms live we can trace their method of spread and so take steps to prevent it.

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Staphylococci:

Food poisoning due to staphylococci depends largely upon the presence of sufficient exotoxin in the food, and the susceptibility of the individual. The predominant human sources are the nose, throat, skin and septic lesions. Thus, the personal hygiene of the food handler is of the utmost importance in preventing the growth of staphylococci in foods. Furthermore, the appropriate use of the refrigerator is of the utmost value. The majority of outbreaks are caused by the direct contamination of cooked foodstuffs by hands soiled with the secretion from the nose, mouth and skin lesions. Frequently the cooked food has been handled while warm and subsequent storage conditions have encouraged the staphylococci to grow and form toxin. Staphylococcal enterotoxin is heat resistant and this is of importance because, even if the food is thoroughly heated and all the staphylococci destroyed, the enterotoxin may well persist, so causing food poisoning of this type. Staphylococci have been found in 38% of raw meat samples and, as with Salmonellae, cross contamination can occur from raw to cooked meats.

Cheese prepared from raw or inadequately treated milk can present a problem.

The increasing veterinary use of antibiotics in the treatment of disease-especially staphylococcal mastitis in cows has resulted in the development of antibiotic resistance by the responsible organisms. These may therefore persist, be present in raw milk and in products manufactured from raw milk, and, flourishing under poor storage conditions be responsible for outbreaks of food poisoning. If only pasteurised milk is used in cheese making, such outbreaks can be avoided. Reports have also been received of Brucellosis being caused by cheese made from untreated milk.

Cl. Botulinum:

The toxin of the Cl. Botulinum is a highly poisonous substance which affects the Nervous System, and can be fatal. Cases rarely occur in Great Britain but are reported from other countries such as Canada, the U.S.A. and Japan. They have been attributed to uncooked, under-cooked or stale fish. Smoked fish and canned tuna fish have given rise to occasional outbreaks in various countries in recent years and the use of home preserved foods, such as meat and vegetables, have also been associated with outbreaks. The famous Loch Maree incident in 1922, when eight people died, was attributed to duck paste sandwiches. The last incident in Britain some nine years ago was due to pickled fish privately imported.

Prevention:

Food poisoning can be avoided by:-

(a) Preventing germs getting into the food, or if this fails,
(b) storing the food so that any germs present do not multiply, and
(c) ensuring that food is so well cooked that all germs in it are destroyed.

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In many parts of the world, including the United Kingdom, antibiotics are incorporated into animal feeding stuffs to promote rapid growth and fattening (presumably by keeping down bacteria in the animal body and so minimising the production of toxic substances which slow the animal's growth). Antibiotics are also used in the treatment of animal infections. Infecting organisms therefore tend to become antibiotic resistant and such resistant bacteria may infect man by contact with the animal or by the ingestion of infected food of animal origin. An important point which has only recently been discovered and is the subject of much investigation at present, is that in the human gut such antibiotic resistance is transferrable from one species of bacterium to another. The importance of this in the spread of cross-infection with antibiotic-resistant bacteria is obvious.

Clostridium Welchii:

Clostridium welchii is an organism that develops spores which are hardy and capable of living through adverse physical conditions such as high temperatures and dehydration. They can survive for long periods of time in dust and dirt and may be present in food after cooking. Raw meat and poultry are common sources of these organisms but they have been found in up to 25% of human and animal stools and also in the soil. The majority of outbreaks of Cl. welchii food poisoning occurred in canteens, hospitals, schools and hotels, and the foods responsible were chiefly meat and poultry products where the meat was pre-cooked and reheated.

Meals which include cooked meat eaten cold or reheated and meat pies have frequently caused Clostridium welchii food poisoning. In large Canteen kitchens meat is frequently cooked, allowed to cool slowly at atmospheric temperature and stored in a cool or cold room overnight. The following day it is served cold, warmed up, sliced in hot gravy or made into pies or meat puddings. This practice is dangerous, as in meats cooked at a temperature not higher than 212°F(100°C) spores of Cl. welchii may survive cooking and in slowly cooling meat germinate into large numbers of actively multiplying bacteria able to cause food poisoning. Big cuts of meat are particularly dangerous because heat penetrates very slowly into meat. Meat thus reheated is responsible for the majority of cases of Cl. welchii poisoning.

Bacillus cereus:

This is a sporing bacillus which occurs in soil. It is a common contaminant of cereals. Food poisoning by this organism is being more frequently reported in the last two or three years, particularly as a result of eating infected rice in Chinese restaurants. The spores resist the initial cooking (boiling) of the rice. This is often done in the evening and the boiled rice left overnight on a table. The spores germinate and the vegetative forms multiply rapidly. Next day the rice is served after a rapid process of re-heating, insufficient to kill off the vegetative bacteria. The problem is therefore essentially similar to that of Cl. Welchii food poisoning, except that rice takes the place of meat. The cure in each case is the same. If re-heating must be used, the food should be refrigerated as soon as possible after cooking and re-heating should be adequate. In both cases cross-contamination via infected surfaces and equipment is possible.

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Of these three, the safe storage of food is perhaps the most important. During this period, everything possible must be done to rob the germ of the things it needs to grow and multiply.

(i) Warmth

Food poisoning germs do not multiply in cold conditions. Storage in a refrigerator or cool larder will retard their growth. Deep freezing will stop their growth. No form of cold will kill germs and they will start growing as soon as the food is warmed up again.

(ii) Time

Germs are like seeds. The more that are planted, the more likely it is that there will be a successful crop, or in the case of germs, a successful "infection". Germs need time to multiply. Therefore, if food is eaten shortly after it is prepared, the risk of food poisoning is considerably reduced.

(iii) Moisture:

Germs do not multiply in dry products, e.g. dried egg and dried milk, but when these are mixed with water the germs can multiply freely. Such food should always be used shortly after mixing.

(iv) Food:

Stored food must be adequately protected from all forms of contamination.

(v) The Human Factor:

When it is known how human beings can spread the organisms of food poisoning it becomes obvious that the maintenance of strict personal hygiene is of paramount importance.

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Source: Royal Institute of Public Health & Hygiene - London

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EXAMPLES OF OUTBREAKS OF FOOD POISONING AND FOOD BORNE ILLNESS

The Principal features of Bacterial Food Poisoning.

For practical purposes there are three main types of bacterial food poisoning; salmonellae, staphylococci and clostridium welchii. The onset of symptoms are : Salmonella (12-24 hours), clostridium welchii (8-22 hours) and staphylococci (1-6 hours). Table B provides a detailed breakdown of incidents of each in 1974.1975,

Method of Spread of the Bacterial Food Poison:

Food can become contaminated due to the poor hygiene practised by a food handler who may be a symptomless excreter, by vermin, flies, or during the slaughter of an animal. If the bowel of a slaughtered beast is cut during preparation, the contents of the gut will spill into the carcass and contaminate the muscle tissue. Food may often be cross-contaminated if prepared on an infected work surface or by addition to an already infected food substance, such as meat or gravy.

EXAMPLES OF OUTBREAKS OF SALMONELLA POISONING

1. Salmonella typhimurium: Three members of a family became ill after eating a chocolate mousse prepared with uncooked white of an egg. Salmonella typhimurium was isolated from the faeces (stools) of all three cases. The eggs used were laid by the family's hens. Salmonella typhimurium were isolated from the hens' eggs and their droppings. The same type was identified from the patients' stools and the eggs.

2. Salmonella dublin: 249 cases of Salmonella dublin food poisoning occurred in 90 households. 85 out of 89 households investigated had a common milk supply. Salmonella dublin was isolated from the milk supply and from a number of cows and calf on a farm supplying this particular dairy. It was also found that several of the farm workers were symptomless excreters of the germ.

3. Salmonella virchow: 50 people out of 120 who had attended a club dinner subsequently developed both diarrhoea and vomiting. Salmonella virchow was found to be the causative organism. Unfortunately samples of the food served were not available for bacteriological examination during the course of the investigation.

The meal had included spit-roasted chicken portions prepared and packed by a catering firm. Samples of spit-roasted chicken grew salmonella virchow. The source of supply was traced back through the caterer's usual supplier to a processing plant and from there to individual farms. From the investigation carried out it did not appear that the chicken had been the cause of the outbreak of food poisoning.

The catering firm's procedure had been store the chickens overnight in a dee-freeze. The following morning the chickens were left at room temperature to unfreeze for two hours and then cooked on a spit roaster for about one-and-a-half hours. They were then allowed to cool for an hour before they were quartered. The portions were packed into boxes and sent to the club where they arrived during the mid-morning still warm. The working space at the catering establishment was reported to be unhygienic. Thawing out after freezing and the subsequent cooling after cooking were done on the same restricted surface. The cleanliness of the spits and ovens was also criticised. Eight of the 11 persons employed on the premises were found to be carriers of the organism Salmonella virchow.

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When the warm chicken portions were received at the club they remained in their boxes, unopened, on a very hot afternoon from mid-morning until 4.30 pm. when about 100 portions were served. The remainder of the portions were eaten at about 9.30 p.m.

N.B. There were 45 deaths reported in 1975 in which Salmonellae organisms were isolated either ante or post mortem.

STAPHYLOCOCCI.

Illustrative Examples

1. Eight explosive outbreaks of food poisoning, totalling some 1,190 cases, occured as a result of food contaminated by Staphylococci which was served in a school canteen. The incriminated food substance was spray-dried skim milk. In each incident the food prepared from this was artificial cream made from the skim milk that had not been heat-treated. It was consumed within 3-4 hours after preparation. The milk powder was found to contain very large numbers of staphylococci. In one instance it was found that a cook had a septic finger. Staphylococci of an identical type were isolated from the finger. Staphylococci of an identical type were isolated from the finger and the unopened tins of milk powder. It was concluded from this that the milk powder had infected the cook, rather than the reverse. The factory which had prepared the milk powder was then investigated. This showed that some batches of dried milk grew 20,000,000 and 9,000,000 staphylococci bacteria per gram on two separate occasions. These counts included 500,000 and 2,750,000 staphylococci per gram.

2. Sixty-one out of 110 people on a coach party developed food poisoning two hours after eating cold ham at a cafe. Staphylococci were isolated from some of the patients stools, and vomit. These types were identified with those isolated from the ham slicer and the chef's hands as well as from other food in that cafe.

3. Six out of eight people who ate home-made "veal and ham" pie later developed f food poisoning. Staphylococci were isolated from the six patients. The bacteria were similar to those isolated from the nose of the person who had made the pie.

CLOSTRIDIA

(a) Clostridium welchii.
(b) Clostridium botulinum.

Illustrative Examples

(a) Clostridium welchii

1. Twenty-five out of 30 people who ate a Lancashire "hot-pot" served in an office canteen became ill between eight to twelve hours later. Clostridium welchii organisms were isolated from 12 of the patients tested and from the "hot-pot", which had been cooked two days previously and had been re-cooked twice subsequently.

2. Thirty-one out of 63 people who ate a turkey Christmas lunch in a canteen became ill between 9 to 15 hours later. Clostridium welchii was isolated from 9 of the patients, from 11 of the food handlers and from the table on which the turkey had been carved.

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(b) Clostridium botulinum

An outbreak may result from badly prepared food contaminated by the organism. This particular type of food poisoning is now very uncommon in England and Wales. Incidents have occurred in North America which were attributed to the home-canning of vegetables. Clostridium botulinum causes a food poisoning called botulism. The organisms produce a strong poison (toxin) which almost invariably results in death. The poison has a specific effect on the central nervous system causing paralysis of the muscles.

BACILLI

B. CEREUS

Illustrative Examples

1. Two persons who ate a meal from a Chinese take-away restaurant developed vomiting 3 hours later. One also had diarrhoea. The meal included curried prawns, curried chicken and fried rice. B. cereus was isolated from the one patient who submitted a specimen of faeces. 200 million bacilli (B.cereus) per gram were isolated from fried rice. B. cereus was also isolated from freshly boiled rice and from curry.

2. An outbreak of food poisoning affecting two groups of people occurred after a meal in a Chinese restaurant. Six young men in one party, and another two people, all of whom had the "meal of the day" were taken ill with vomiting 1½ to 2 hours later. The meal consisted of soup, rice, prawns, beanshoots and finished up with ice cream.

B. cereus was isolated from the seven affected patients who submitted specimens of faeces, the count in one instance being 2½ million per gram of faeces: None of the suspect rice was available but subsequent samples prepared as usual yielded over 30 million B. cereus per gram.

FOOD BORNE ILLNESSES

Food borne illnesses (unlike food poisoning caused by Salmonellae, Staphylococci or Clostridia) have a longer incubation period. The diseases normally run a different course. The food borne illnesses include:

(a) Certain bacteria, e.g. typhoid fever, para-typhoid fever (i.e. enteric fever), undulant fever, tuberculosis and some dysentery, and

(b) Some types of food borne parasites (i.e. worms such as Cysticercus bovis and Trichinella spiralis).

EXAMPLES OF FOOD BORNE ILLNESSES AND INFESTATION

Enteric Fever: Enteric fever includes typhoid fever and para-typhoid fever. Typhoid fever is caused by the organism Salmonella typhi. The incubation period for typhoid fever is between 5 and 25 days (usually 21 days). Para-typhoid fever is usually caused by Salmonella para-typhoid B. The incubation period is 7-10 days.

Sources of germs: Both typhoid and para-typhoid organisms are excreted in the faeces and urine of patients suffering from the disease or in the excreta of convalescent or symptomless carriers.

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Method of spread: Outbreaks of both diseases have occurred through water contaminated by sewage. Similarly, milk supplies, cream or ice cream have sometimes been infected by the contaminated hands of food handlers who were convalescent or healthy carriers of the organism. Less often, outbreaks of enteric fever have been caused by eating shellfish taken from sewage [illegible] contaminated sea-water or water cress which has been grown in sewage contaminated water. Enteric fever is accompanied by generalised fever (pyrexia), weakness, severe diarrhoea and prostration. It can still cause death in severe or untreated cases. The intestinal symptoms do not usually predominate until the second or third week when severe diarrhoea may occur.

Illustrative Examples

(a) Typhoid fever

1. Two large outbreaks of typhoid fever occurred in 1946 and 1964. In 1946 nearly 200 persons developed typhoid fever after eating contaminated ice cream in Aberystwyth, North Wales. The epidemic was explosive in character, 97 cases occurred in the Borough itself, 30 other cases occurred in neighbouring rural districts. The remainder occurred elsewhere in the country and was thought to be attributable to visitors who had been on holiday in the town. Four of the 97 local cases died as a result of the illness. The ice cream was manufactured under the supervision of the local authority and was considered to be satisfactory. The manufacturer had been registered as an authorised ice cream vendor. One of his staff was found to be a healthy "carrier".

2. A more recent epidemic of typhoid fever was reported in Zermatt (Switzerland) in 1964. Approximately 437 cases occurred in and around Zermatt. As a result of this outbreak some 260 cases of typhoid fever were subsequently discovered in the United Kingdom and America. For some years prior to 1964 it had been found that the water supplies at Zermatt were inadequate to cope with the extra demands made on them by the tourists visiting the area. To meet this demand, the local authorities had given their approval for water to be taken from certain streams. This water was used for human consumption after treatment. Unfortunately, some of the water in a storage tank became contaminated by a sewage effluent.

(b) Para-typhoid fever

This disease is similar to typhoid fever but the symptoms are generally less severe. The incubation period is between 7-10 days. The illness arises most frequently in the summer months. Sometimes para-typhoid fever presents the same characteristics as Salmonellosis but more often resembles a prolonged mild form of typhoid. Outbreaks of para-typhoid fever have been and are occasionally associated with food substances containing artificial or synthetic creams which have become contaminated by the organism Salmonella paratyphi B.

Para-typhoid organisms are thought to be responsible for about 400 cases of paratyphoid (enteric) fever each year. It has a low death rate. Para-typhoid fever is an illness which is commonest in the age group 15-30 years old. Apart from human contamination typhoid and para-typhoid germs may be conveyed to uncovered food substances by flies or vermin which may have previously been in contact with infected excreta. Clearly great care must always be taken to ensure that food substances are always adequately protected, from both flies and vermin. Hand washing after using the toilet is essential as part of the prevention of the spread of both diseases.

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BRUCELLOSIS (Undulant or Abortus Fever)

The causative germ is called Brucella abortus. The infection has a variable incubation period of 1-4 weeks.

Source of germs is from infected cattle, goats or pigs.

Method of Spread is either by drinking raw contaminated, untreated milk (or milk products such as cheese), or as a result of coming into physical contact with animals which are infected by the organism Brucella abortus. The illness is characterized by the gradual onset of recurrent fever, sweating, pain in the joints and in the muscles. The disease gives rise to prolonged ill health.

Illustrative Examples

Illustrative examples of recent outbreaks are difficult to find, since in most instances the signs and symptoms are transient and relatively mild. The diagnosis, therefore, may sometimes be confused between enteric fever (more especially para-typhoid fever) aor influenza. The diagnosis is confirmed both bacteriologically and by means of certain blood tests. The majority of cases of Brucellosis are thought to result from physical contact with infected animals or infected carcasses. The transmission of Brucellosis to man from contaminated cows' milk is now rare in this country. All milk sold for human consumption should be pasteurised. This kills the brucella abortus "germ". For many years past it has become possible to immunize herds of cattle against Brucellosis by means of vaccination. The immunity given to calves lasts about seven years. Pregnant cows suffering from Brucellosis tend to abort, hence the second name Abortus Fever. The by means of the vaccination process previously described.

Two other strains of the Brucella organism have been described. One affects goats and may be transmitted to man by drinking contaminated unpasteurized goats' milk. The other is a strain which sometimes affects pigs. Some decades ago Brucellosis was endemic on the island of Malta.

TUBERCULOSIS

Drinking unpasteurized tuberculous contaminated milk (obtained from a diseased cow) may cause bovine tuberculosis in man. The illness causes chronic ill health, until detected. Advances in modern drug therapy have greatly helped to combat the disease. Tuberculosis-free herds have been built up in this country to a point at which bovine tuberculosis is rare. Even so, this is no justification in abandoning the heat-treatment of milk (pasteurization).

DYSENTERY

There are two types of dysentery:

(1) Amoebic dysentery caused by a unicellular organism in tropical and sub-tronical countries. This is rare in Europe.

(2) Bacillary dysentery (the commonest form of dysentery in Europe), is caused by a bacillus. The incubation period for the disease may be from two to four days.

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Outbreaks of bacillary dysentery occur most often in institutions and schools. Cross-infection plays a considerable part in the spread of the disease but this can be greatly reduced by hand washing after using toilets. There are almost 25,000 cases of dysentery reported in this country each year. Most of these cases occur during the months of January and June.

FOOD-BORNE PARASITIC WORMS

(a) Tapeworms

These are flat worms consisting of a head and a chain of flat oblong segments arising from the head-piece. The two tapeworms of most importance in man are the beef tapeworm (Taenia saginata) and the pork tapeworm (Taenia solium).

Both of these parasites have a two-stage life cycle, a larval stage which occurs in the intermediate host, and an adult stage which occurs in man. In the case of the beef tapeworm, the intermediate host is a member of the ox family which becomes infected by eating the eggs of the adult worm, passed in his faeces by an infected human. In the ox the eggs liberate their embryos which invade the tissues of the jaw, tongue, shoulder, heart and other muscles of the beast, producing oval cysts in these areas. This stage in the life cooked [illegible] known as cysticercus bovis and the disease in cattle which is adult tapeworm T. saginata. [illegible] mosis. If infected meat is inadequately [illegible] larvaes, in his gut, into the

While meat inspectors may not infrequently find [illegible] worm is nevertheless uncommon among the native population of this [illegible] suggesting a high standard of meat inspection, and adequate standards of cooking, infection of home grown beef is uncommon because hygiene facilities are such that ingestion by cattle of the eggs shed by humans must be rare.

The pork tapeworm (T.solium) has a similar double life cycle, the intermediate host being the pig. However, this worm does not occur in the United Kingdom, and need not be discussed further, except to point out that in this case the condition of cysticercosis can also occur in man.

b) The Trichina Worm

This is a roundworm and is not segmented. It infests the small intestine of its hosts, man, pig, rat, etc, The female is fertilized within the gut, burrows its way into the gut wall and there lays its larvae, the fertilized eggs hatching within the womb of the worm. The larvae are carried throughout the body of the host and undergo further development within its muscles. In man, this is the end of their life cycle, but in rare cases, migration may occur into the brain and cause neurological symptoms, including unexplained epilepsy. In the case of the pig, the infected flesh, if inadequately cooked and consumed by man, will cause infection of the human, this infection being known as Trichiniasis. The larvae in the consumed meat develop into adults in the subject's gut and the life cycle is repeated.

Source : Royal Institute of Public Health & Hygiene, London

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CLEANING ROUTINES

All merchandising techniques produce the need for specialized designed cleaning techniques to fit the trade or selling circumstances. Here is an example of such a routine. This is designed for the bakery trade, but all other trades can be studied and routines of similar calibre designed.

ROUTINE CLEANING CHART

Equipment or area	Routine to follow	Frequency of cleaning
GENERAL GOODS STORE		
Walls and shelves	Sweep and/or vacuum clean.	Frequently and regularly
	Wash down with hot water containing detergent.	At least once a week
Floors	Sweep and/or vacuum clean.	Frequently and regularly
	Wash down with hot water containing detergent.	Daily
ISSUING STORES		
General	Sweep and/or vacuum clean. Wash any surface that comes into contract with food with hot water containing detergent.	Daily
Walls and shelves	Wash down with hot water containing detergent. Walls can be hosed with 'live steam' if facilities exist.	Frequently and regularly
Floors	Wash down with hot water containing detergent or hose with 'live steam' if facilities available.	Daily
EQUIPMENT		
Utensils and supply vessels	Wash with hot water containing detergent, rinse and dry or wash out with 'live steam' if facilities available. If the utensils, etc., are used for meat, cream, imitation cream, or egg the hot water should contain detergent with sterilant.	At least once a day, more frequently if the process requires

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Equipment or area	Routine to follow	Frequency of cleaning
Measures and pans	Clean thoroughly, wash with hot water containing detergent, rinse, and dry. If the measures and skaps are used with meat, cream, imitation cream, or egg the hot water should contain detergent with steri-lant.	Frequently and regularly
Ventilation ducts and fans	Brush and/or vacuum clean outside surfaces of ducts and metal fitments.	When cleaning the walls of the appropriate store
	Wash down with hot water containing detergent.	Regularly in other parts of the premises.
	Clean inlet screens and filters in the same way.	At least once a week
Storage tanks (not completely sealed)	Drain tank. Wash interior with hot water containing detergent. Rinse thoroughly and run off. When refilling first run off sufficient water to dispose of any residues.	At least once every 6 months
Brining tanks	Scrape, scrub, and wash with hot water containing detergent. Rinse thoroughly. Alternatively, wash out with 'live steam' if facilities available.	Before refilling
Bulk egg-storage tanks	Wash out with cold water to remove residues. Wash with hot water containing detergent with sterilant. Rinse thoroughly with cold water.	Before refilling
Blocking, forming, and stamping machines.	Dismantle, degrease, and clean thoroughly, Immerse dismantled parts in boiling water or swab thoroughly with warm water containing detergent. Rinse, dry, and reassemble.	Frequently and regularly.
Homogenizers	Dismantle, wash working parts in warm water and detergent. Rinse with sterilant, rinse with clean water, reassemble.	At the close of every working period

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Equipment or area	Routine to follow	Frequency of cleaning
Whisks and cooling utensils	Clean thoroughly and scrub in water at 43.5° C. or above, immerse in warm water containing detergent with sterilant. Scour, rinse, and dry.	After every period of use
Conveyor belts	Clean off dropped materials.	Frequently and regularly during use
	Swab with warm water containing detergent.	At least once a day
	Clean surface of rollers.	At least once a day.
Proving and baking tins	Clean thoroughly.	When necessary
Proving trolleys	Wash with hot water containing detergent, rinse, and dry.	Frequently and regularly during use
Dough and pastry mixers	Remove spillage and extruded food.	Frequently and regularly during use
	Clean thoroughly and wash with warm water containing detergent. Rinse with cold water and dry.	At the close of every working period
Flavours, essences, and colour containers	Clean the outside of containers.	Each time they are used.
Pastry boards and icing tables	Keep clean during use. Remove all traces of flour or sugar deposit. Immerse boards in boiling water and scrub, or scrub with warm water containing detergent with sterilant. Always scrub wooden surfaces with the grain.	At the close of every working period.
Scale pans and measures	Remove deposit or spillage.	Frequently and regularly during use
	Wash with warm water containing detergent, rinse, and dry. If the pans and measures are used with meat, cream, or egg the water should contain detergent with sterilant.	At the close of every working period and at any change of trade operation.

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Equipment or Area	Routine to follow	Frequency of Cleaning
Knives, etc.	Wash in water at 43.5°C or above or in warm water containing detergent with sterilant. Rinse and dry. Replace in purpose-built racks (preferably metal) attached to fixed equipment.	After use
Wooden trays	Scrub with the grain in warm water containing detergent. Rinse and dry.	Frequently and regularly
	Wash with warm water containing detergent with sterilant. Rinse and dry. If the trays are used with meat, cream, imitation cream, or egg products the water should contain detergent with sterilant. Alternatively, wash by machine in hot water (above 43°C.).	Trays to be used must be clean or cleaned ready for the start of every working day.
Wiping materials and cloths	a) Use expendable material.	(a) Discard into suitable containers conveniently placed
	OR	
	b) Keep in suitable chemical sterilant between uses and boil after changing.	(b) Change several times a day.
Savoy bags (icing bags)	Turn inside out, wash away surplus cream. Scrub inside and out with warm water containing detergent with sterilant, rinse in hot water. Boil for 5 minutes if material is suitable. Scour and sterilize nozzles. Rinse and dry.	After use
EXTERIOR		
Drains	Remove grease-trap inserts and clean. Wash out body of trap with hot water containing detergent with sterilant. Renew filter material.	Frequently and regularly

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Equipment or Area	Routine to follow	Frequency of cleaning
Open drainage channels	Remove any surface grit and scrub grids channels with hot water containing detergent with sterilant.	At the close of every working day
Dustbins	Wash out with hot water and soda or a detergent solution and invert to dry. Alternatively, wash out with 'live steam' if facilities available.	After each emptying
VEHICLES		
Surfaces, receptacles, and equipment, or parts of equipment that touch food	Clear crumbs and spillage during use.	Frequently
	Clean thoroughly.	Every day
	Surfaces soiled only with flour dust or non-fatty crumbs can be brushed out.	
Remaining parts of the interior of the vehicle and interior equipment.	Wash with warm water containing detergent.	At least once a week.

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Source: The Theory & Practice of Public Health
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THE PROTECTION OF FOOD

The main object of food hygiene is to prevent food poisoning and in order to do so it is necessary to protect the food against contamination. Generally speaking, food poisoning is caused by bacteria or their products and it is therefore against this form of contamination that we must take preventive measures.

Bacterial food poisoning originates in human beings, animals and the soil.

So far as human beings are concerned the principal sources of infection are the bowel, the nose and throat, the skin, cuts and boils, septic spots and the hair and clothing.

Animals may cause food poisoning due to the fact that the flesh itself contains bacteria, or due to their activities whilst alive in carrying bacteria on their bodies and feet. The soil is a prolific source of the Clostridia particularly welchii and botulinum, and of Bacillus cereus.

Infection is spread by human beings either through the hands or through coughs and sneezes. The hands receive infection from the bowel after visiting the lavatory, from cuts and septic spots by the act of touching, from the hair, from the nose, and from the throat by handling of those infected parts either consciously or unconsciously. The hands may also be a vehicle of cross-contamination by handling infected raw food and subsequently touching cooked meat. Utensils used for raw food may contaminate cooked food if not sterilized between operations. Smoking normally contaminates hands either by direct contact with lips in the act of smoking a cigarette or by indirect contact with the lips through touching the stem of a pipe. It is for this reason that smoking is prohibited in food premises. The risk of contamination by ash or cigarette ends are relatively minor factors although of course any form of contamination is important.

PERSONAL HYGIENE:

The principal method of preventing the spread of infection from human beings is by means of personal hygiene and this may be considered under five main headings.

(a) Hand washing-is of primary importance and should be carried out in the basin which is required by law to be provided in every food. In addition to a hand basin supplied with hot and cold running water and suitable drainage, there should also be a towel, or means of hand drying, soap or detergent and a nail brush. This hand basin is one of the essential breaks in the food poisoning chain and must be reserved exclusively for the purpose for which it is provided. It is the duty of management to ensure that under no circumstances are these hand basins misused for such purposes as washing small pieces of equipment, lettuce heads, etc. The hand basin should be used not only after visiting the lavatory but also after smoking, after coughing or sneezing, after using a handkerchief, after touching any raw food, and before handling any form of cooked food.

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(b) Coughs and sneezes-spread bacteria, particularly staphylococci and streptococci into the atmosphere and on to food or working surfaces. Great care must therefore be taken to avoid coughing and sneezing wherever open food is handled. Smoking encourages coughing and the use of snuff encourages sneezing so it is for this reason that these habits are prohibited in food premises.

(c) Outdoor clothing-is frequently contaminated by staphylococci and streptococci from the atmosphere. This contamination is particularly heavy in congested areas such as public transport, so lockers for outdoor clothing should be located outside of food rooms. Usually these lockers are situated in changing rooms where the outdoor clothing can be removed and clean protective clothing put on. Where protective clothing is worn it is a statutory requirement that this shall be clean and it should also cover those parts of the body liable to contaminate the food. Protective head gear should be designed so as to retain the hair in position since bacteria and dandruff from the hair are a potential source of contamination.

(d) Cuts, boils, whitlows, septic spots-frequently harbour staphylococci and the law requires that these should be covered with a waterproof dressing whenever food is handled. Most large firms today carry this one stage further and insist upon coloured waterproof dressings so that should these fall off due to the action of grease the coloured dressing will be seen before the food is made up. Where coloured waterproof dressings are provided it is essential that they be used in all cases.
It is very easy for a member of staff to use a domestic transparent type of dressing on a cut and for this to come off and pass undetected into the food

(e) The law also requires that any person engaged in the handling of food who is suffering from food poisoning or is a carrier of food poisoning bacteria, any bowel infection, any staphylococcal infection or any serious skin infection should notify his employer immediately. The employer is required to notify the local Public Health Department. The Medical Officer for Environmental Health may well require that the employee concerned be restrained from handling food until such time as he is certified free from infection.

Foreign bodies in food may come under the category of failures in personal hygiene if those foreign bodies are parts of personal jewellery, worn by employees. There is always a risk that earrings, tiepins, cufflinks, beads and stones from dress rings, etc., could fall off and become mixed up with food under preparation. For this reason no personal jewellery other than wedding rings should be worn by any food handler.

Apart from this, foreign bodies occur in food often as a result of failure to clean up adequately after machinery or premises have been repaired. No matter how minor the repair may be, even the fitting of a small wire fuse, it is essential that great care be taken to ensure that every scrap of material is removed before the area is re-used for food preparation. Small pieces of concrete, wire, nails, washers, nuts, bolts, screws, etc., have all been found in food, in many instances in areas where some work had been carried out recently.

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Cross Contamination:

Approximately 25 per cent of the raw meat supplied to customers in this country contains live food poisoning organisms. This is due to a variety of causes including poor meat handling, the feeding of animals with infected foodstuffs and incorrect storage of the meat. This infected meat may cause illness either directly if the meat is consumed without adequate cooking, or indirectly if the meat is sliced upon a working surface which is subsequently used for cooked food without adequate sterilization. This is one of the many forms of cross contamination which can occur between raw and cooked food. Others include the location of raw food above cooked food in refrigerators allowing blood and moisture to drip on to the cooked food, the use of the same equipment (e.g. knives) for raw and cooked food without adequate sterilization between, the handling of raw food by an individual followed by the handling of cooked food without adequate handwashing and the use of swabs first to wipe down an infected surface and then to wipe some equipment used for cooked food.

The main key to the prevention of cross contamination is as far as possible to use separate storage areas, separate equipment and separate working surfaces for cooked and raw foods. As this is not always practicable great care must be taken not only to clean but also to sterilize equipment after it has been used for raw food and prior to its use for cooked food.

Another frequent source of cross contamination is the swab used universally for wiping down. Wherever possible these should be of disposable material and thrown away after being used only once. If this is totally impracticable the swab should be made of short-lived material and when not in actual use should be kept in a bowl of hypochlorite or other strong sterilizing solution. Once it has been used it should be washed, rinsed and placed back in the bowl of sterilant. The sterilant should be changed frequently and certainly be discarded at the end of the day.

CLEANING OF SURFACES AND EQUIPMENT:

The normal procedure for cleaning equipment is to wash it in a detergent or cleaning agent and this definition includes soap, although, because of the problems related to hard water, soap is not now used as frequently as synthetic detergents. A detergent must primarily be a good wetting agent, i.e. it must break down the surface tension of the water so as to allow the whole surface of the article to be wetted instead of the water forming droplets on the top. It should also emulsify grease and hold dirt in suspension so that the grease and dirt once removed do not float to the surface as a scum to be redeposited on other articles. Detergents should be chemically stable, non-toxic, soluble in water and easily rinsed off. A detergent is normally used in warm water at a temperature of about, but not exceeding, 62.7°C.(145°G.). This should succeed in removing most of the grease and dirt, whereas the use of a higher temperature will tend to bake on certain protein products. The physical removal of this grease and dirt will in effect reduce the bacterial count considerably since the dirt contains a high proportion of germs. However, this process will not render the article totally free from germs as a detergent does not normally have any specific germ killing properties. The object of sterilization is to kill any remaining germs. In practice, this can be carried out in two ways, either by heat or by chemicals. In washing up by hand, two sinks are usually used, the first containing the detergent solution at the temperature of

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approximately 60-62.7°C.(140-145°F.)and the second being either a boiling sink where the water is literally at or near boiling point or a very hot sink with the water at a temperature of at least 77°C. (170°F.). After the articles have been washed in the first sink they are placed in a basket and immersed in the second sink for a period varying with the timperature-between half a minute and 2 minutes. After this they are taken out and allowed to dry in the air. This second sink serves three purposes: the first is to rinse off any traces of detergent; the second, to kill off any bacteria which may have remained (using the heat of the water); the third, to heat the article to a sufficiently high temperature to allow it to air dry without the necessity of wiping it with a cloth.

This procedure is closely followed in most mechanical dish-washing operations. The number of washing and rinsing cycles may vary from machine to machine, but in principle, apart from any initial pre-wash or pre-rinse, the main washing operation is carried out in a tank at a temperature of approximately 62.7°C. (145°G.Φ), the water containing a detergent with or without a bleaching agent, the main purpose of the latter being to ensure effective stain removal. The second stage is rinsing with water at a temperature of approximately 77°C. (170°F), sprayed on to the crockery from various rinse arms. Frequently a rinse additive is placed in this water but its function is not so much to sterilize as to act as a wetting agent so that the highly concentrated detergent found in the first stage is removed completely.

In washing up by hand, where it is impracticable to use boiling or very hot water, chemicals (frequently hypochlorites) are often added to the second sink. These are quite effective germs killers providing that sufficient contact time is allowed. In some instances it may not be possible to sterilize metallic objects in this way because of the risk of corrosion. After sterilizing in a chemical it is often desirable to rinse the article in some clean hot water to remove any residue, after which they are dried and put away. Wherever possible air drying should be used, but if it is necessary to wipe or polish any article a disposable towel should always be employed. Whether washing up is done mechanically or by hand it is still essential to ensure that all machinery and equipment used in the process is kept thoroughly clean and in good order. This applies particularly to dish-washing and glass-washing machines which, unless they are cleaned and maintained regularly, can frequently produce unsatisfactory bacterial counts on the crockery.

So far as crockery and cutlery are concerned, these can be dealt with by washing up either by hand or by machine in the two-stage process mentioned, but this procedure is not always practicable for the large equipment to be found in food premises. Working surfaces must be cleaned and sterilized at least daily and often more frequently. Where sufficient labour is available a two-stage process is ideal, i.e. washing down with a suitable detergent to be followed by rinsing thoroughly with a suitable chemical sterilant. How-ever as time and labour are frequently at a premium it is often only practicable to carry out a single operation. In this case it is necessary to use a combined detergent-sterilizer. Various combinations of chemicals are available on the market but many detergent-sterilizers today fall into the group of chemicals called quaternary ammonium compounds. These may not be as effective cleaning agents as detergents or even as effective sterilizing agents as pure sterilants but, if properly used, they can, under normal circumstances, provide an adequate cleaning and sterilizing process in one operation. Their detergent properties tend to be inversely proportional to their sterilizing power. It is common practice therefore to combine a

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quaternary ammonium compound of high sterilizing power with a suitable (non-ionic) detergent. Detergent-sterilizers are used frequently for such equipment as milk machines, ice-cream machines, the insides of refrigerators, meat slicers, mixing machines and working-surface tops.

After equipment has been cleaned and sterilized, it is essential that it be put away properly in a suitable clean store, and not left lying around in the kitchen to become recontaminated.

THE DESIGN OF EQUIPMENT AND PREMISES:

The law requires that equipment used for the handling of food should not only be efficient but shall also be made of material which is impervious, easily cleansed and non-reactive to food ingredients. The actual materials used in the construction of a piece of food machinery or of a working surface must depend upon the particular operation involved and it is only possible to lay down very general guide lines. Nowadays, galvanized material is rarely used, because it is difficult to clean and the galvanizing ultimately corrodes. Stainless steel is obviously the most popular material, but in some cases it is precluded because of expense. However, wherever possible, this or one of the harder plastics is the most suitable material; the one surface which should not appear in any food premises is soft wood. Even now, soft wood shelving is frequently found in stores and if there is no means of avoiding this (as, for example, in existing premises) these shelves should be covered with an impervious surface, even if this is only a hard, polyurathane paint. It is almost impossible to avoid spills and leakages from bottles and cans, and therefore untreated wood surfaces rapidly become contaminated and impossible to clean. Cutting boards can be obtained in various plastic materials, and on the whole they have proved quite satisfactory, provided they are not subjected to too much heat in the process of washing, when they tend to warp. The only wood surface which should be allowed to come into contact with food, is a hard, wood chopping block.

All equipment, particularly bins and containers should have rounded corners to facilitate cleaning, as food particles left in odd corners will not only harbour bacteria and mould spores, but may provide a breeding ground for various forms of vermin, including cockroaches, mites, weevils, etc.

So far as possible, the premises themselves should be so designed that they can be easily kept clean. The actual lay-out of the food room will depend upon the particular business being conducted on the premises, but it is essential that it be lighted adequately and ventilated properly. The walls, ceiling and floors, too, should be made of an impervious material, which can also be easily cleansed.

In the past, tiling has often been used to cover walls, and whilst there are many points in its favour, there are distinct disadvantages. Tiles are not hard-wearing and get damaged in areas such as corners and behind pan wash sinks. They also tend to come away from a wall subjected to intense heat-for example, behind grills and ovens. In these areas, a better proposition is to instal a metal lining to the wall, properly sealing it to prevent vermin from nesting behind the metal. At higher levels, a good hard plaster finished with a high-gloss paint, would usually be easier to keep clean than a tiled surface with its inevitable grooves between tiles.

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In so far as floor covering is concerned, it is imperative that the junction between the wall and floor be covered by a large radius the. Even in those areas where coved tiles are used, there is a tendency to employ a tile with a radius of approximately only half an inch. This type of corner is extremely difficult to clean, as grease and food particles tend to accumulate there, particularly behind pieces of equipment which provide an ideal breeding ground for vermin. Quarry tiles have been popular for many years as a floor covering, but where these are used, care should be taken to ensure that the tiles are laid as close together as practicable. Wide joints between tiles will absorb grease, and although floor cleaning machines may be employed satisfactorily to clean the tile surface, the brushes on these machines cannot reach the junction between the tiles where grease builds up. In the larger organizations experiments are being conducted with epoxy resin and various other forms of continuous flooring which can be laid in a single surface from wall to wall (and even up the walls to a certain extent) and this will probably be the answer to cleaning problems. On the other hand, some of these floor surfaces can become very slippery when in contact with water or grease and care must therefore be taken in the selection of these materials to ensure that the surface is both safe and can be easily cleaned.

Ventilation is very important, not only from the point of view of keeping the kitchen cool, but also in preventing fat and grease contaminating the walls in the cooking process. Hoods connected to a suitable extract system should be fitted with easily accessible filters and grease drip-trays. These must be cleaned very regularly as choked filters not only prevent the effective operation of the ventilating system, but are also a real fire hazard should the grease tray over-flow on to a hot surface. All fittings and equipment should be as simple in design as is possible, free from corners where dirt can accumulate. Shelves should be slatted in to allow any spillage to fall through and the bottom shelf should be at least 12 inches from the ground to facilitate cleaning. Similarly, work tables and other pieces of equipment should, wherever possible, be movable. Where this cannot be arranged, equipment should either be built-in, so as to prevent one continuous surface with the wall, without joints in which grease and dirt can lodge, or located far enough from the wall for the area behind to be easily cleaned. Free standing equipment should be sufficiently high from the floor to allow the area beneath to be properly cleaned. Particular attention should be paid to the supply pipes leading to such equipment, e.g. gas pipes, electricity cables and water pipes, which are often too close to the floor and where grease and dirt get trapped. Window sills and unnecessary leges should either be removed or made to slope steeply to prevent dust, dirt and rubbish accumulating.

THE PREVENTION OF INFESTATIONS BY RODENTS AND OTHER PESTS:

Rats and mice are liable to harbour food-poisoning organisms in their bowels and carry many forms of contamination on their fur and feet. The main danger from infestations lies in the unknown quantity of food which may have been contaminated either by their droppings or their physical contact when running around the premises, and not in the relatively small amount of food which is damaged. A careful watch must, therefore, be kept for signs of gnawings, grease marks, holes, droppings and damage to packages. If an infestation is suspected, expert advice should be sought from a specialist disinfestation firm or from the local Health Department.

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The main preventive action so far as infestations are concerned, may be defined in the two words-"Good Housekeeping". No crumbs or particles of food should be left around. All stock should be kept off the ground and used in rotation to deny harbourage for breeding purposes. Dust-bins should always be fitted with lids and care must be taken to ensure the lids are properly in place, particularly at the end of the working day. Used plastic or paper sacks should be properly secured before being deposited in the bin area. Too often these sacks are left open and if knocked over and spilled, the contents will attract the attentions of vermin and other animals.

The building should be examined frequently with a view to detecting failures in vermin proffing. Pipe runs should be sealed at the entrance to buildings and where pipes pass from room to room. Ventilators should be covered with fine gauze to prevent flying insects gaining access. The bottoms of doors should be fixed with kick-plates to prevent vermin easily gnawing through any damaged parts.

Insecticides, particularly slow acting ones such as DDT, should only be used in dust-bins, stores and passages, etc., and not where there is food exposed. In kitchens and food preparation areas where it is inevitable that a certain amount of food is exposed, electrically operated fly-killers should be employed. These consist of a blue light bulb or tube which, when switched on, attracts flies to an electrically charged metal grid. As the flies touch the grid they are electrocuted and their bodies fall into the collecting tray under-neath. While this method does involve a certain amount of capital outlay, it does preclude the risk of bodies of dead flies appearing in food.

THE DESTRUCTION OF GERMS IN THE FOOD ITSELF:

In practice, the only real method of destroying germs is by heat. There are three main categories of heat-treatment: pasteurization, sterilization and cooking.

The aim of pasteurization is to destroy the pathogens without necessarily killing all bacteria. At the same time, by reducing the temperature and time for which food has to be heated, changes in flavour and appearance of the food itself are minimized. This applies to milk, ice-cream, cream, liquid eggs and certain cooked meats which, for commercial reasons it may be impossible or impracticable to sterilize.

There are two methods of milk pasteurization: the holder or batch method and the continuous or high temperature short time method (HTST). In the case of the former, a batch of milk is heated to between 62.7°C.(145°F) and 65.C.(150°F), retained at that temperature for 30 minutes then cooled to 10°C.(50°F.) before being bottled. This is a relatively slow process and is, therefore, only used in very small dairies. The high temperature short-time method is used in larger establishments and is a continuous flow system by means of which milk is pumped steadily around the plant from the supply tanks at one end to the bottling machine at the other, and filtered. The milk is then warmed by heat exchangers to 71.3°C.(161°F), retained at that temperature for 15 seconds, during which time it flows through an insulated pipe to be cooled to 10°C.(50°F.) at the other end of the machine. It is required by law that indicating and recording thermometers be provided so that inspectors can see that each batch has been correctly treated. The flow diversion valve fitted at the output end of the holding tube, returns to the beginning of the process any milk which is not at the correct temperature.

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Ice-cream mix must be either pasteurized or sterilized. In the case of pasteurization, a number of different combinations of time and temperature may be used. These vary according to the size of the establishment and both batch and continuous flow methods are used.

Liquid eggs used for baking or for the manufacture of dried egg must be pasteurized at a temperature of 64.9°C.(148°F.) for 2½ minutes.

Most canned meats are sterilized, but in some instances it is impracticable to guarantee that the entire mass of the meat is heated to a sufficiently high temperature to destory all bacteria without damaging the outside of the meat in the process. In this case, a lower temperature is used so that only the pathogens are destoryed and the can is then labelled- "To be Kept Under Refrigeration". It is very important that these instructions be carried out in the case of pasteurized meats.

The aim of sterilization is to kill all bacteria. This is applied mainly to canned goods, milk, and to certain ice-cream dried mixes. The time and temperature combination for the sterilization of canned foods depends to a very large extent upon the nature of the food itself, the type of pack and the size of the pack. The principle behind the process is to ensure that the entire mass of the meat reaches a temperature above boiling point. The main organism with which canners are concerned is clostridium botulinum. For this reason most canned foods are heated to temperatures around the 115.5°C.(240°F.) mark for a period of several minutes, but it is not possible to generalize on this subject.

So far as milk is concerned, this may be sterilized either in batches or by the continuous flow method. Again, there are variations of time and temperature, no statutory figures having been laid down, but in the batch method the milk is heated to approximately 115.5°C.(240°F.) for 20 minutes in bottles that have already been sealed. It is then cooled and despatched. Since the souring organisms as well as the pathogens have been destroyed, this milk will keep for long periods without refrigeration, but unfortunately the milk sugars are caramelized and the milk, therefore, has a characteristic flavour. However, if the bottle has been opened the milk turns sour relatively quickly-as will fresh milk. Before milk can be legally described as "sterilized" it must pass a test known as the "Turbidity Test".

To obviate the unpleasant flavour of sterilized milk, a new method, known as Ultra Heat Treatment, has been devised. This is a continuous flow process similar to the high temperature short time method of pasteurization, but in this case the milk is heated to 132°C. (270°F.) for one second before being poured, under aseptic conditions, into sterile containers which are then sealed. This milk is often known as Long Life milk. Although for technical reasons it will not pass the turbidity test, and cannot legally be sold as "sterilized milk", for all practical purposes it is free from bacteria and will keep for as long as the conventional sterilized milk.

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Ice-cream is sterilized in a similar manner at a temperature of approximately 149°C. (300°F.) for 2 seconds, after which it is dried and packed into sealed containers for use by those manufacturers who do not have the facilities for heat-treatment (e.g. soft ice-cream sales from mobile vans).

The method most commonly employed in the kitchen for killing bacteria in food, is cooking. To be effective, the entire mass of the food must be exposed to the heat and, therefore, small joints of meat are much better than large ones. Minced meat should be spread out on shallow trays.

Unless the meat is to be served immediately, it should, after cooking, be cooled very rapidly and refrigerated as soon as possible to reduce to a minimum the development of bacteria from any spores which may have survived the cooking. Slow cooling of food followed by re-heating is a frequent cause of food-poisoning, particularly by organisms of the welchii group. In general, meat food should not be re-heated, but if this is unavoidable, then thorough re-heating is essential. The warming up of these dishes has caused many food poisoning outbreaks. The law requires that when food is needed for immediate consumption, it must be kept hot, i.e. at a temperature above 62.7°C. (145°F.), or cooled rapidly to below 10°C. (50°F. , until it is to be actually served for immediate consumption.

THE PREVENTION OF GERMS FROM MULTIPLYING:

The foods in which bacteria multiply most rapidly are: meat and meat products; milk and milk products; egg and egg products. One way of controlling the rate of multiplication is to remove the free moisture either by dehydration or the action of salt of sugar. With certain foods, the creation of an acid environment by the addition of vinegar or benzoic acid will prevent germs from multiplying, but in many cases, the nature of the food is altered and in others, the law limits the quantity of acid which may be added.

The most practical method of controlling bacterial multiplication is by regulating the temperature, normally by refrigeration. There are three main types of refrigeration in general use.

The dairy or domestic type of refrigerator operates at a temperature between 1°C. (34°F.) and 4°C.(40°F.) and is used for the short-term storage of various foods. Since most pathogenic bacteria do not multiply appreciably at temperatures below 10°C. (50°F.), food kept in these refrigerators is reasonably safe. However, there are many spoilage organisms which will continue to grow at a temperature of around 4°C. (40°F.) and, therefore, spoilage can occur even within the refrigerator to slightly above freezing point, is to prevent the formation of large ice crystals. Where any food containing moisture is cooled slowly, there is a tendency for large ice crystals to form within the cells of the food. In the latter stages of thawing, these ice crystals rupture the cell-walls so that valuable salts and products contained in the food-cell are lost as the water is drained away. On the other hand,

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this is not the case with food that is frozen by the "quick-freeze" process, as only small ice crystals are formed within the cells which do not rupture the cell-walls. It is, therefore, possible to reconstitute quick-frozen food with the minimum loss of nutritional value.

As the function of a refrigerator is to circulate cool air it is essential that it should not be over-loaded, for unless the air is freely circulating round the food, that food will not be cooled. As refrigeration space is relatively expensive, the most effective use must be made of the refrigerator and, therefore, canned goods, acid foods, raw fruit, raw vegetables, dried goods, etc., should not be placed inside the refrigerator. It should be reserved for the high protein wet foods, such as meat and meat products, milk and milk products, and egg and egg products. Because of air circulation, strong smelling foods such as fish should not be placed in the refrigerator with other foods unless the pungent food is put into an air-tight container first.

Another type of refrigeration frequently found in food premises, is the deep-freeze cabinet. This should be kept at a temperature of - 25°C. to - 19°C. (-5°F. to +5°F.). It should be used solely for the storage of food which has already been frozen and, therefore, it is not quite so essential to allow air space around the various items stored there. On the other hand, should the deep-freeze unit fail and any quick frozen food commence to thaw, it must not be re-frozen even in the deep-freeze unit itself. The temperature of this unit is insufficient to ensure the formation of the small ice crystals and any food re-frozen would suffer damage due to the formation of large ice-crystals. If such a problem arises the options open to a food handler are:-

(a) to destroy the food: (b) to use the food immediately; (c) to use as much food as possible immediately and store the remainder in a dairy refrigerator for a period not exceeding 48 hours, or (d) cook the food, cool it rapidly and store it in a dairy refrigerator for immediate use, again within two or three days.

The last type of refrigeration is the ice-cream conservator. This operates at a temperature of around -7°C. to -4°C. (20°F. to 25°F.). It is intended for the storage of ice-cream which the law requires to be kept at a temperature not exceeding - 2°C. (28°F.). It is, therefore, not suitable for the long-term storage of quick-frozen foods, although there is a tendency among certain caterers to use it for this purpose. Little bacterial growth will take place within frozen foods kept in these cabinets but flavour changes may well take place due to enzymic action which is not stopped completely at these temperatures.

Since the efficient operation of a refrigerator depends upon the cooling effect of air circulating outside as well as inside the cabinet, care must be taken in every instance to ensure that the ventilation grilles leading to the motor unit are kept clean and free from obstruction.

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Source: Royal Institute of Public Health & Hygiene
- London

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ST. JOHN'S MEDICAL COLLEGE & HOSPITAL

DIRECTOR OF RURAL HEALTH SERVICES & TRAINING PROGRAMME

MATERIALS USED IN CONSTRUCTION OF FOOD PREMISES:

All materials used in the construction of food premises should be such as will, of themselves, assist in the task of maintaining the premises in a proper state of cleanliness. For example:

Outer yards should be paved with-

(a) Hard-rolled tar macadam.
(b) Hard-surfaced concrete.
(c) Concrete-based cement-rendered surfaces.
(d) Tiles (earthenware) set to tight joints.
(e) Stone setts with flush joints, set in cement.
(f) Flagstones with good hard cement.

Interior work floored should be-

(a) Granolithic.
(b) Terrazo.
(c) Quarry tiles.
(d) Quarry tiles incorporating non-slip elements.
(e) Specialized plasticized floor tiles.
(f) Hard cork lino over flush-fitted wood.
(g) Surfaced-tight jointed hardwoods.
(h) Oiled and sealed hardwoods.
(i) Oil-dressed cement floors treated with silicate of alumina when laid.

Interior room floors where no heavy work is carried out and where the public are allowed for service or shopping should be-

(a) Specialized plasticized floor tiles.
(b) Hard cork lino over flush-fitted wood.
(c) Surfaced-tight jointed hardwood.
(d) Oiled and sealed hardwoods.
(e) Where the sales action demands rugs or carpeting these should be of a quality that will withstand regular daily vacuum cleaning or surface cleaning.

Walls of food rooms should be-

(a) Plastered and painted, two or three coats lead-free paint.
(b) Tiled (ceramics or earthenware).
(c) Sheeted with plastic laminate.
(d) Sheeted with metal sheet (not glavanized).
(e) Tiled with plasticized polyurethane tiles or the like.

Ceilings should be-

(a) Plastered but not painted. They are designed when plastered to act as a heat-absorbing area, and painting of this plaster leads to increased problems of condensation in rooms where steam rises freely.

Woodwork where wood has to be used, should be-

(a) Hard-wood.
(b) Other woods given added protective surfacing such as two or three coats of lead-free paint.

Brickwork-

All brickwork of food premises (excluding outside walls) should be finished with fair face. That is, without uneven mortar joints.

CODE OF PRACTICE (EXAMPLE)

It is now practicable to set down an example of a code of practice which will equally apply to the construction and conduct of all food premises. In setting down the paragraphs it is inevitable that some of the items specified will also be the subject of food-control law. The agreed construction principles are, however, good sense in any food-handling circumstances.

1. The walls of food rooms made from permanent materials should be smooth and impervious.

2. Walls should be in good repair and be finished in a light colour.

3. Flaking paints and non-washable powder paint colours (distempers) should not be used.

4. Tiles are advantageous, and there should be rounded angles at floor level.

5. Ceilings should be in good repair, of even surface, and either porous or specifically insulated according to the process carried out.

6. Ventilation canopies should be fitted wherever excess steam is generated.

7. Such canopies should be of rust-proof materials.

8. Floors should be even, surfaced, and impervious to moisture.

9. Where frequent washing down is needed the floor should gently slope to a drain.

10. Pipes coming through walls, floors, or ceilings should be fitted in a manner that prevents ingress of insects through gaps.

11. All floors should be cleaned at least once a day.

12. Internal woodwork should be reduced to a minimum and should be of a design that makes cleaning easy. Wood should not (with the possible exception of butchers' blocks and special food-cutting surfaces) be used for food work surfaces.

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13. Doors should be fitted so as to prevent insects and rodents gaining access.

14. Windows should be of plain glass, and the window-sills sloped so as to stop them being used as 'unofficial' shelves. Where cooked meat and processed made-up foods are displayed the windows should be refrigerated.

15. All lights should be placed to a planned illustrated pattern to fit the work process. The scale of lighting should never fall below 25 lumens per ft.^{2} (formerly termed foot-candles or lamberts) at any work surface.

16. Ventilation must be worked out to suit the process, but some degree of mechanical ventilation is needed in most food rooms.

17. Ventilation should aim at minimum of 20 changes of air per hour.

18. The heating systems needs to be planned to fit the process and the ventilation system, and must have relationship to the needed relative humidity.

19. Any outdoor yards or paving used in connexion with the food business should be of an even impervious good-condition surface.

20. Separate tools should be used for cutting raw foods, especially meats and cooked foods.

21. Where wooden work surfaces have to be used they should be cleaned to a special routine, and will best be sterilized by washing with sodium hypochlorite in a correct solution that will be advised by the makers.

22. Regreasing is as important as sterilizing, and correct detergents should be selected and properly used.

23. Premises should be inspected regularly for the presence of rodents and insects, and domestic animals should be banished from food rooms.

24. Adequate storage for food and all utensils should be provided and kept in a good state of repair to prevent accidental contamination or contamination by insects, rodents, etc.

25. Refuse should be moved regularly and completely from food rooms and stored under cover and kept dry as possible until final removal from the premises.

26. Refrigerators should be purpose built and correctly used. Full regard must be to aid the food and the special needs of that food when correctly kept.

27. Meat should be hung or placed in containers or on special clearable pallets.

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28. Products should be kept at their correct temperatures and not indiscriminately taken into and out of that temperature ambient.

29. Refrigerators should be defrosted and cleaned regularly.

30. Food should not be placed on sale display in the direct rays of the sun or where any atmospheric contamination may occur or where persons may contaminate it.

31. Hands should be kept off food as far as possible, and where the trade-needs make handling necessary, then the hands should, indeed must, be clean.

32. Dressing poultry, and the like should never be carried out on the same surface as other food preparation, and the hands should be washed between every such operation.

33. Food for animals and pets should be handled absolutely separately from human food.

34. Delicatessen and meat products should be very carefully displayed and screened from contamination at all times.

35. All meat and meat products should be kept at below 10°C. until cooked.

36. Gelatines and gravies should not be kept in a ready-to-serve or use state from one day to the next.

37. All equipment should be purpose designed, and so should all utensils. Only correct utensils and equipment should be used, and they should be of correct materials and shape to make maintenance and cleaning easy.

38. All machine and container doors should be tightly fitting, and panels intended to be removed for cleaning or maintenance access should be gasketed to keep out insects and to prevent other forms of possible contamination of contents.

39. There should be a minimum of inaccessible internal surface that can be reached for cleaning. All the materials used should be non-toxic.

40. All machines or equipment delivery tubes, pipes, and chutes should be subject to a reasoned-out in situ chemical sterilization routine.

41. All liquid container machines and equipment should be fitted with anti-overflow devices.

42. Equipment designed to achive set temperatures should have indicator thermometers to show their working efficiency.

43. Light should be arranged so that all working parts of any machine or equipment can be examined for cleanliness.

44. Precise cleaning instructions should be worked out and known to all operatives for all machines, equipments, and utensils.

MGM/ms*/24/1/80/

W H O Offset Publication No. 34

F O O D H Y G I E N E I N C A T E R I N G E S T A B L I S H M E N T S :

LEGISLATION AND MODEL REGULATIONS

Published under the joint sponsorship of the Food and Agriculture Organization of the United Nations and the World Health Organization

in collaboration with the United Nations Environment Programme

WORLD HEALTH ORGANIZATION GENEVA 1977

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INTRODUCTION

The World Health Organization, through its Food Safety Programme, which is aimed at ensuring the safety of foods for the consumer, initiated a survey of legislation related to food hygiene in catering establishments. The results of the survey, which are summarized in this publication, and the model food hygiene regulations for catering establishments, also included here, were reviewed by a joint FAO/WHO expert consultation held in Geneva from 28 April to 2 May 1975. This meeting was funded by the United Nations Environment Programme (UNEP) as part of its activity to "support and accelerate or expand the work of the FAO/WHO Codex Alimentarius Commission on international standards for pollutants in food and strengthening of FAO/WHO capabilities to assist developing countries in food control". In this activity the Food and Agriculture Organization of the United Nations and the World Health Organization are cooperating agencies.

Many of the legislative texts on which this survey was based have been published, in full or in summary, in:

(1) International digest of health legislation. Geneva, World Health Organization (published quarterly); and

(2) Food and agricultural legislation. Rome, Food and Agriculture Organization of the United Nations (published quarterly).

The survey covers a reasonably representative cross-section of the legislation of Member States in all parts of the world.

Food control has two principal objectives: protecting consumers against health risks, fraud, and adulteration of foods and assuring fair practices in the food trade. The survey described here was concerned with the first of these objectives, namely, the safety and cleanliness of food, i.e., food hygiene.[1]

The need for a high standard of food hygiene and for adequate control measures is particularly important in catering[2] establishments of all kinds. The fourth report of the WHO Expert Committee on Environmental Sanitation[3] points out that:

> "One careless food handler, or one human carrier of disease, preparing food at home will jeopardize the health of only a small number of persons, mainly members of the family. When one such person works in the kitchen of a restaurant, hospital, factory, canteen, school, or other place where meals are supplied to many people, the number of potential victims is correspondingly greater."

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[1] "Food hygiene" has been defined as, "The measures whereby the wholesomeness soundness and safety for human consumption are checked or increased, covering all foods at food production, harvesting, processing, distribution, preparation and service and of possible causes of toxicity (physical, chemical or microbiological)" (Food and nutrition terminology. Geneva, World Health Organization (document MNFP/73.2)).

[2] "Catering" has been defined as, "The provision of meals and snacks for groups of persons, e.g., catering in hotels and restaurants, schools, plants and factories, armed forces, etc." (Food and nutrition terminology. Geneva, World Health Organization (document MNFP/73.2)).

[3] WHO Technical Report Series, No. 104, 1956, p.17.

strong arguments to justify the request, particularly where a country has previously not had a comprehensive food control service. Since the primary object of a food hygiene programme is to protect the health of the public, it is not always easy to present a case on a cost-benefit basis.

It must be recognized that promotion of food hygiene is only one of a number of measures for protecting and improving human health that fall within the scope of environmental health. According to a WHO Expert Committee on National Environmental Health Programmes: Their Planning, Organization, and Administration,[2] environmental health "refers to the ecological balance that must exist between man and his environment in order to ensure his well-being". Within the field of environmental health, environmental sanitation was defined by a WHO Expert Committee in 1950[3] as "the control of those factors in man's environment which exercise or may exercise a deleterious effect on his physical, mental, or social well-being". The report of the WHO Expert Committee on National Environmental Health Programmes[1] lists 17 items considered to be included in, or related to, environmental health. Among those items are water supplies, wastes disposal, vector control, and food hygiene.

Food hygiene, therefore, is an integral part of a health service and it is important to appreciate that is is difficult to develop in isolation a satisfactory programme for raising standards of food hygiene. High priority should be given to achieving proper standards in this particular field, but progress will be made more easily if efforts are also made to improve general environmental health. In other words, a food hygiene programme should be developed within the context of progressive environmental health and personal health programmes. Good food hygiene is impossible without adequate supplies of safe water, proper means for wastes disposal, effective pest control, and reasonable living conditions. It is also difficult to reduce the incidence of food-borne infections where disease is widespread among the population and adequate steps are not taken to reduce sources of infection.

CURRENT LEGISLATION

Registration[2] and licensing[3] of premises

To exercise control over premises used for food handling the responsible agency must know the location of the premises, and its task of ensuring that these premises are properly constructed and adequately equipped, and that satisfactory hygienic standards are maintained, is facilitated if a business is not permitted to open until the premises are officially closure of unhygienic premises.

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[2] WHO Technical Report Series, No. 439, 1970.

[3] WHO Technical Report Series, No. 10, 1950 (Report of the first session of the Expert Committee on Environmental Sanitation).

[1] WHO Technical Report Series, No. 439, 1970.

[2] Registration of food establishments is the process by which food control authorities, local or national, maintain registers in which is entered information that applicants must supply before they may operate. This information should include the name and address of the establishment and other relevant data. The approval of premises may berequired before registration; however, this practice is not universal. Registration is usually for an indefinite period of time, subject to cancellation for causes indicated in the law.

Many countries recognize the need to control the opening of catering premises so as to ensure that before business commences they comply with the standards in force. Provision is usually made also for the closure of premises in the event of serious contraventions of the law. The opening of premises is controlled in various ways. Sometimes a permit or licence from the local health department is required, and this may be revoked or suspended if the premises are allowed to fall into an unsatisfactory condition. One large city requires an applicant for a permit to complete successfully a course of instruction in food protection conducted by the health department. Sometimes there is a system requiring premises to be approved before they are opened.

In some countries control is achieved by a requirement that all catering establishments must be registered. For practical purposes no real distinction can be drawn between licensing and registration although licensing is normally for a limited period and implies periodical renewal of licences. However, the health authority will need for its own purposes a record of the premises for which it is responsible, and a registration scheme therefore seems most appropriate.

Where licensing or registration schemes are not operated the task of the health authorities is more difficult, but they could still have power to enforce the closure of premises that present a danger to health. The requirement that premises may not be opened for business until they have been registered or licensed is of value to both the health authorities and the operator of the business. If catering premises may be opened without any prior consultation with the health authority, or without their approval, the operator may be faced subsequently with the need to make substantial alterations at heavy expense in order to comply with the food hygiene regulations. Such expense might be avoided if the operator is required to consult the health authorities at the outset and accepts guidance from health officers in the design and equipping of the premises. Indeed, the health authorities could warn operators against attempting to use an unsuitable building that could not be made to comply with the required standards.

Authority to enforce the closure of insanitary premises is most important. Clearly, there must be a means of speedily closing catering establishments that constitute a danger to public health, but the machinery for doing this requires much consideration.

Construction

Regulations for the construction and equipping of catering premises in force in different countries vary considerably in detail although their basic intention is to provide conditions under which food can be prepared hygienically and without endangering the health of the consumer. There can be little dispute about the basic constructional elements required, or about the essential pieces of equipment necessary for good food hygiene. It is obvious, however, that there is a wide difference of opinion on the extent to which it is necessary to impose on operators of catering businessesdetailed legislative requirements concerning the buildings in which they carry on their business and the equipment to be installed.

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3 Licensing of food establishments is the process by which appropriate food control authorities, local or national, issue licences to operators of food establishments that have complied with relevant legal requirements. The licence authorizes the establishment to operate for a specified period of time, after which renewal is required. Licences may be suspended or revoked as provided for in the law.

Regulations may, in addition to specifying some matters in detail, state certain broad principles. For example, one set of national regulations for food premises contains this provision:

"Every food premises shall be so constructed, located and maintained that,

(a) the premises are free from every condition that may,

(i) be dangerous to health,

(ii) injuriously affect the wholesomeness of food prepared, processed, packaged, served or stored therein; . . ."

Some other regulations have a similar general requirement worded as follows:

"No food business shall be carried on at any insanitary premises or place or at any premises or place the condition, situation or construction of which is such that food is exposed to the risk of contamination".

A further example reads:

"Any person who sells, prepares, packages or stores for sale any food under insanitary conditions shall be guilty of an offence."

General provisions of this kind are desirable because in legislation it is difficult to specify in detail all conditions which should constitute an offence.

The extent to which legislation contains detailed requirements regarding the construction of catering premises varies considerably. The points usually covered are that in rooms where food is stored or prepared the floors must be of smooth, non-absorbent materials and no constructed as to be easily cleaned; all walls and ceilings in such rooms must be capable of being readily cleaned; all parts of these rooms must be kept in good order, repair and condition so as to enable them to be effectively cleaned.

Premises are often required to be of such construction and in such a state of repair as to resist the entry of rats, mice and insects. In some cases, openings to the outer air are required to be effectively protected against the entry of flies and other flying insects.

Lighting and ventilation

It is usual to require all food preparation and storage rooms to be adequately lighted and ventilated. This is normally stated in general terms but in some areas the degree of illumination is specified in detail. For example, one set of rules prescribes that at least 215 lux (20 foot candles) of light must be provided on all working surfaces and equipment in food preparation, utensil washing, and hand washing areas and in toilet rooms, At least 54 lux (5 foot candles) at a distance of 75 centimetres (30 inches) are required in dining rooms and all other areas during cleaning operations.

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Equipment and utensils

It is usual for food hygiene legislation to contain provisions concerning equipment and utensils. Legislation may require equipment and utensils to be of such materials, workmanship and design as to be smooth, easily cleaned and resistant to damage. Provisions are sometimes laid down that all surfaces that come into contact with food must be readily accessible for cleansing and inspection. It is quite common to impose an obligation to ensure that all articles, equipment and surfaces must be non-toxic and, as far as possible, non-absorbent. In one country legislation requires equipment and utensils to be:

(a) of sound and tight construction;

(b) kept in good repair;

(c) of such form and material that it can be cleaned and disinfected;

(d) free from cracks, crevices and open seams; and

(e) corrosion-resistant and non-toxic.

A most important part of the operation of catering establishments is the cleansing of equipment and utensils. The duty of ensuring that these are effectively cleansed after use and maintained in a clean and sanitary condition may be imposed in very general terms, leaving it to the operator of the business to adopt whatever methods he regards as the most effective. In such cases the legislation may simply require facilities for the cleansing of utensils and equipment to be provided and utensils and equipment to be thoroughly cleansed after use and kept clean.

On the other hand, regulations in force in some countries specify in considerable detail how the cleansing of utensils and equipment should be carried out. Sometimes, sinks with two or three compartments must be provided if cleansing is performed manually. Such detailed regulations usually divide cleansing into three operations: prerinsing, cleansing, and disinfecting or sanitizing. The temperature of the water used for cleansing may be laid down, 43.5°C (110°F) being usual. For machine washing, a higher water temperature may be specified. Use of a detergent may also be obligatory.

There may be a requirement that after utensils have been washed they should be sanitized by immersion either in hot water or in water containing a sterilizing agent. The temperature of the water used for sanitizing is usually required to be between 76.5°C and 82°C (170° - 180°F) with an immersion time of 30 seconds at the lower temperature or 10 seconds at the higher. Where methods of chemical sterilization are specified the required immersion time varies from 45 to 60 seconds. The sterilizing agents allowed are solutions containing 50-100 parts per million of available chlorine, 12.5-25 parts per million of available iodine, or quaternary ammonium compounds at a concentration of not less than 200 parts per million. These solutions are to be used at a temperature of not less than 24°C (75°F).

Rules are also sometimes laid down for the operation of dishwashing machines. Where these are of the immersion type the requirements are similar to those for manual dishwashing. For spray-type machines the temperature of the rinsing and sanitizing water may be specified. Detailed instructions may be given for cleansing procedures. These may require that, before being washed, articles must be flushed or scraped, and when necessary soaked, to remove large food particles and soil. Effective concentrations of a suitable detergent may be insisted upon for both manual and mechanical dishwashing.

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As a check on the efficiency of dishwashing, utensils may have to meet a prescribed bacterial standard. This is usually a plate count of not more than 100 bacterial colonies per utensil, using the swab technique.

In the design of legislation for the cleansing of utensils and equipment there are clearly two current philosophies. The first is that it is sufficient merely to require the provision of adequate facilities for washing, such as hot and cold water and sinks, and to make it obligatory to cleanse all vessels and other equipment thoroughly after use. The operator of the food business is left to decide for himself the precise methods to be used to achieve a satisfactory standard of cleanliness. The second philosophy is that not only must there be an obligation to provide the necessary cleansing facilities, but the methods to be used must be prescribed in considerable detail including the temperature of the hot water and procedures for sterilization. This philosophy also maintains that visual cleanliness is not enough; after being washed and sterilized, equipment must satisfy a bacteriological test.

The need for strict cleanliness is unquestionable and the law should be adequate to enforce this. It is doubtful, however, whether there is really any need to embody in legislation the precise methods and materials to be used. If failure to cleanse equipment adequately is made an offence with an appropriate penalty for non-compliance, this should give the health officer the necessary authority to ensure that proper cleansing procedures are followed. His training should enable him to advise on how the required standards can be maintained.

Washing facilities for staff

All food premises need adequate washing facilties for the staff. They must be provided with a sufficient number of suitable wash-hand basins for the use of all persons engaged in the handling of food on or around the premises, and the basins should be conveniently placed in an accessible position. Wash-hand basins should be provided with an adequate supply of hot and cold water or of hot water at a controlled temperature. Soap or other suitable detergent, nail-brushes, and clean towels or other drying facilities must also be supplied. These washing facilities should not be used for any purpose other than personal hygiene. Food hygiene regulations generally contain provisions of this kind. Some insist that signs must be displayed conspicuously, instructing workers to wash their hands after using toilets.

Sanitary facilities

Satisfactory sanitary facilities are necessary in all food premises for the use of the staff and this is usually legally enforceable. Sometimes, sanitary accommodation is also specifically required in catering establishments for customers' use. This accommodation must be adequately lighted and ventilated and kept clean and in good order.

Sleeping places

It is usual for food hygiene legislation to prohibit the unhygienic practice of using rooms in which food is prepared, served or stored for sleeping purposes, and in some cases the legislation bans direct communication between sleeping quarters and rooms in which food is handled.

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Refuse

Some regulations make it obligatory to provide adequate space, in a suitable situation, for the removal of waste from food, the separation of food fit and unfit for human consumption, and the storage of waste and unfit food before disposal. There must be no avoidable deposit or accumulation of solid or liquid wastes in a food room.

Sometimes the law is more precise. It may insist, for example, that all garbage and refuse in kitchen areas should be kept in separate, leakproof, non-absorbent containers equipped with tight-fitting covers unless otherwise protected from flies and other insects. There may be a specific obligation to maintain refuse storage areas in a clean sanitary condition. Garbage and refuse should be disposed of as often as necessary to prevent decomposition or overflow.

First-aid

The provision of first-aid equipment for food handlers is obligatory in some countries and should be generally compulsory.

Storage of clothing

It is usual to require lockers to be provided for the outdoor or other clothing and footwear of employees arriving for work in food handling establishments.

Water supply

An adequate supply of clean and wholesome water is generally stipulated for all food premises. Clearly, this should be a universal requirement.

Food protection

It is common to embody in food hygiene legislation an obligation to protect food from contamination by insects, rodents, dust, and from all other kinds of contamination. In addition, some countries specifically require the exclusion of domestic animals and birds from premises in which food is handled commercially. In some cases provision is made to avoid contamination of food by toxic materials such as insecticides, rodenticides, and other substances used for the maintenance of hygienic conditions. The points covered are labelling of containers of toxic materials so that the contents may be easily identified, storage of these substances in locked cupboards, and their use in such a manner as not to contaminate food or endanger health.

Food hygiene regulations also often contain obligations concerning the control of the temperature of food in catering establishments. These controls usually apply to perishable or potentially hazardous foods, that is, to foodstuffs that support the growth of pathogenic organisms. The general principle embodied in this legislation is that the foodstuffs concerned should not be kept any longer than is necessary at a temperature favourable to the growth of bacteria. There is some variation in temperature range specified but the extreme limits are 4.4°C (40°F) and 65.5°C (150°F). This range, with slight variations, is regarded as a danger zone to be avoided as far as possible.

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The foods to which temperature control applies are described in different ways. In some cases the legislation refers to "perishable food of animal or vegetable origin". Sometimes particular foods are referred to, such as "custards, cream fillings or similar products". In one case regulations apply to "infection and toxin prone food" which is defined as "perishable food consisting in whole or in part of milk, milk products, meat, poultry, fish, shellfish or any other ingredient capable of supporting the rapid growth of pathogenic organisms or the production of the toxins of such organisms".

In another case temperature control applies to all food "consisting of meat, fish, gravy, or imitation cream, or prepared from or containing, any of these substances or any egg or milk". There are, however, exceptions for such articles as bread, biscuits and cakes containing egg or milk as ingredients that were introduced before baking, chocolate or sugar confectionery, butter and other fats, cheese and uncooked bacon and ham.

It is not usual to impose legal requirements for the cooking of food but some regulations provide that pork products must be thoroughly cooked to heat all parts to a minimum temperature of 65.6°C (150°F). Stuffings, poultry, stuffed meats and stuffed poultry must be heated throughout to a minimum temperature of 74 C (165°F).

Food handlers

It is a standard requirement of food hygiene legislation that food handlers must be clean and practise hygienic habits. They are generally required to wear clean, washable overclothing and, in some countries, to wear headgear that confines the hair. Smoking in food preparation areas is often prohibited. In some cases food handlers are specifically required to wash their hands after visits to the toilet. One set of regulations requires employees and management to be adequately informed concerning acceptable and sanitary food handling practices. They are expected to attend approved food handler training programmes when these are available. Another set of regulations requires supervisors of food processing establishments, including caterers, restaurants and eating places, to complete a course in food protection.

Many countries in their food hygiene legislation try to ensure that persons who become infected and who may transmit infection to food are excluded from handling food while they are in this condition or require all food handlers to undergo periodical medical examinations to determine that they are healthy and free from infection.

For example, some regulations for restaurants require any restaurant licensee who suspects that an employee has contracted any form of communicable disease, or has become a carrier of such disease, to exclude the employee from the restaurant and notify the local health officer immediately. The health officer has to determine whether the food handler is infected or is a carrier, and laboratory examinations may be required. No persons who have a communicable disease or are carriers of such disease are permitted to work in a restaurant. Restaurants are forbidden to employ such persons or any persons suspected of being so affected. Chest X-ray examinations and/or tuberculin tests are recommended annually for all restaurant personnel. Persons who at any time have had typhoid or paratyphoid fever may not be employed in a restaurant until it has been definitely determined that they are not carriers.

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Similar regulations elsewhere provide that every food handler must be free from, and not a carrier of, a disease that could spread through the medium of food, and that food handlers must submit to such medical examinations and tests as the medical officer of health or the minister of health may require. No person who has a communicable skin disease or infection or who resides in a dwelling where there is communicable disease is permitted work as a food handler unless he obtains a certificate from the medical officer of health showing that he is free from infection. The operator of a food business who knows or suspects that an employee is violating these provisions must notify the medical officer of health.

Another example of this kind of legislation is an order prohibiting persons liable to taint or contaminate food from engaging in the handling of food. This provision applies, inter alia, to persons who:

(1) are suffering, or suspected to be suffering, from typhoid or other Salmonella infections, dysentery, or staphylococcal infections;

(2) are carriers of the micro-organisms causing these diseases;

(3) show detectable clinical symptoms of infectious hepatitis;

(4) are suffering, or suspected to be suffering, from tuberculosis in a communicable state;

(5) are suffering, or suspected to be suffering, from a contagious disease of the skin.

This legislation also requires all persons professionally engaged in the production or distribution of foodstuffs or substances used as food and who are in direct contact with such products to undergo an annual examination to verify that they are free from tuberculosis in a communicable state.

Legislation in another country places an obligation on any person employed as a food handler and who knows that he, a member of his family, or another person who lives in the same dwelling is suffering from a dangerous disease to inform his immediate superior of the facts. The latter must immediately notify the health board.

This legislation also provides that no person who is suffering from boils, a rash or sores, or from a dangerous disease, or from tuberculosis, leprosy or syphilis, may be permitted to engage in the handling of foodstuffs intended for sale. This also applies to carriers of disease. Where necessary, the person concerned must produce a medical certificate proving that the disease from which he is suffering is not contagious or liable to cause food poisoning. Further, before any person is engaged, or begins to work, as a food handler he must produce a medical certificate to show that he is not suffering from a disease which, having regard to the nature of the work, could involve a danger of contagion or food poisoning through the agency of foodstuffs. The medical certificate must not have been issued more than 30 days previously. It must be kept and, on request, shown to the health and police authorities.

In yet another country, immediately a person engaged in the handling of food becomes aware he is suffering from, or is a carrier of, typhoid or paratyphoid fever or any other Salmonella infection or amoebic or bacillary dysentery or any staphylococcal infection likely to cause food poisoning, he is required to inform his employer who must immediately

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notify the proper officer of the local authority. Infected persons may be ordered to discontinue or to refrain from engaging in any occupation connected with the preparation and handling of food or drink for human consumption until further notice is given by the local authority that the risk of transmitting infection no longer exists. Food handlers suspected of being carriers of any of the diseases mentioned above may also be required to undergo a medical examination.

One local authority may require food workers, before employment, or at any other time, to undergo a chest X-ray examination or any other test or examination deemed necessary for the protection of the public health. Certification of such examinations may be issued by the local health authority and, when required by the authority, a copy of the certificate for each employee must be in the possession of the management of the food service establishment. Certificates are not valid for more than 12 months from the date of issue.

Certain countries require food handlers to hold a health booklet or certificate. In one of these countries workers who are to be employed in the food industry are obliged to undergo a pre-employment medical examination. This examination is necessary even for temporary employees, apprentices, and students. The workers covered by this obligation include those employed in the sale of foodstuffs and the provision of meals to the public, as well as in the distribution of snacks and refreshments.

Also in that country, food workers must undergo other preventive medical examinations at times determined by the hygiene services. In addition, they must undergo, without delay, emergency medical examinations:

> "(a) if they are suffering from diarrhoea, a purulent disease or a fever, or a communicable disease, or if they are suspected or suffering from a communicable disease;
>
> (b) if a communicable disease, or a suspected case of such a disease, occurs in the work-place or at home.".

These medical examinations include a detailed clinical examination, a medical history, and a microbiological examination, particularly with a view to the detection of tuberculosis and possible carriers of the pathogens of typhoid and paratyphoid and other salmonelloses and shigelloses.

Workers engaged in the food industry are obliged to hold a health booklet issued by the health community medical officer for the area in which they live or, if they work in a factory having a medical officer, by that officer. In the case of workers employed for short periods a certificate as to their medical fitness is issued in place of the booklet. The booklet (or certificate) is kept by the person in charge of the undertaking, but where workers carry out their work outside the undertaking, they are required to carry the booklet (or certificate themselves. The person incharge of the undertaking must keep a list of the workers indicating when they were medically examined, the results of the examination, and when the next medical examination should be carried out.

At each medical examination the worker must produce his booklet or certificate. If the physician finds, or suspects, that the worker is suffering from a disease or infection he must take charge of the booklet or certificate and give the worker a written receipt in exchange. The worker is obliged to hand over the receipt, without delay, to the person in charge of the undertaking. Every food establishment must ensure that the handling of food is carried out only by workers holding a booklet or certificate; work may not be commenced before the booklet or certificate has been issued. The establishment must notify the health community medical officer in good time of every worker who is required to undergo a preventive medical examination.

Another country imposes compulsory medical examinations on certain groups of workers including those in catering establishments. In addition to the usual examinations for typhoid, paratyphoid, dysentery and other Salmonella infections, workers in catering establishments are subject to examination for infestation with intestinal parasites. A worker who is transferred to another undertaking, establishment or installation is not subject to a prior medical examination if his health booklet shows that his initial pre-employment examination was satisfactory, that his state of health has been under systematic surveillance, and that during the previous two years, no member of his family or other person living in his household has suffered from an infectious intestinal disease or an intestinal parasitosis. After every absence from work lasting more than one month the person concerned must be examined as if he were beginning work for the first time.

Every food handler (i.e., any person who carries out, directly or indirectly, manual activities involving foodstuffs in such a manner as to be able to affect their wholesomeness, quality or hygiene) in another country must undergo the health examinations prescribed by the health authority for the purpose of acquiring a health certificate entitling him to work in that occupation. The certificate must be renewed annually or at more frequent intervals should the health authority consider it necessary. Any person who, while not holding the appropriate health certificate, engages in food handling and the proprietor of the establishment where he works are both liable to penalties.

Another example which may be mentioned is an ordinance concerning hygiene in restaurants and catering establishments. Every worker must undergo a pre-employment medical examination to determine his suitability for the work he will be engaged in. The nature of the examinations required, the classes of workers subject to such examinations, and the frequency of, and procedure for, the medical examinations are prescribed.

A recent piece of legislation on food hygiene states that only persons who provide a medical certificate indicating that they are free from diseases or infections that could be transmitted to other persons by means of foodstuffs may commence work involving the handling of foodstuffs other than pre-packed foodstuffs, or work directly related to hygiene in the handling of foodstuffs, in various types of premises including restaurants and other catering establishments. This legislation also requires persons working in the types of premises to which it applies to undergo at least once a year a medical examination or other health check-up as officially prescribed. Physicians or veterinarians who have good grounds for believing that food poisoning has been caused by a foodstuff contaminated by pathogenic bacteria or extraneous substances during food handling operations are required to notify the local medical officer.

BASIC PRINCIPLES OF FOOD HYGIENE LEGISLATION

General

An essential part of the health services of every country must be ensure that food is safe, wholesome and not injurious to health, and that proper hygienic standards are observed at all stages from production or manufacture until it reaches the consumer. The requirement that food must not be injurious to the consumer means that food traders must be under a legal obligation not to sell food which they know to be unfit for human consumption or could with reasonable diligence ascertain to be unfit. They must also have a duty to make due care to ensure that adequate standards of food hygiene are observed at all times in the conduct of their business.

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It is not sufficient merely to place legal obligations on food traders. There must also be official agencies charged with the duty of exercising close surveillance of all types of food premises, including catering establishments. Many environmental factors can influence the maintenance of satisfactory standards of food hygiene and, as indicated on p.3, progress will be made more easily if a food hygiene programme. Where food hygiene is the responsibility of the agency responsible for general environmental health there should be no problems in securing coordination of effort. Where separate agencies are responsible it is important that there should be close liaison between them. Agencies with the duty of controlling food hygiene should not be regarded merely as law enforcement bodies, though they should possess adequate legal powers to establish and maintain the required standards. Their officers need to have authority to enter food premises during business hours without warning in order to carry out the necessary inspections and investigations, and it should be an offence to obstruct officers who are carrying out these duties.

Effective legislation is necessary to secure the proper observance of hygienic practices. The basic legal requirements should be embodied in national statutes but the more detailed and technical requirements should be contained in regulations which can be readily and quickly changed to keep pace with scientific and technical developments. There is a need also for codes of practice which, while not legally enforceable, give guidance to food traders and the officials responsible for inspection and control of food premises on equipment, materials and practices for maintaining the desired standards.

Although the basic legal requirements embodied in national statutes and the more detailed and technical requirements contained in regulations will cover very many points it is not advisable that legal provisions should be too rigid or too detailed. Often, the more satisfactory approach is to prescribe the objective to be achieved and to allow some flexibility in the choice of methods to be used to achieve that objective. In any case, it is impracticable for laws to be drafted in sufficient detail to take account of all possible circumstances.

Basic legal requirements

The principal points that should be included in the basic legal requirements are as follows:

(a) the authorities responsible for the enforcement of food hygiene legislation should be specified;

(b) It should be an offence to sell food that is diseased, unsound, or unwholesome;

(c) recognized officers of the responsible authorities should be authorized to inspect food intended for sale, to take samples, and to seize and condemn food that appears to be unfit for human consumption;

(d) recognized officers should have power of entry to all food premises;

(e) all food premises of prescribed types should be required to be registered by the responsible authorities before being

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opened for business and these authorities should be empowered to revoke registration where continued use of the premises constitutes a potential danger to health; particular types of premises should be registered under regulations made in accordance with point (f) below;

(f) authority should be given to the appropriate minister to make regulations containing specific and detailed legal requirements with respect to food hygiene in particular types of premises and different food handling activities; compliance with the appropriate regulations would be a condition for the registration of premises;

(g) physicians who become aware, or suspect, that patients they are attending are suffering from food poisoning should be required to notify the local public health authority;

(h) authority should be given to recognized officers to prohibit the use or removal from the premises of food which they believe is likely to cause food poisoning until investigations have shown whether it may safely be used for human consumption;

(i) persons engaged in the handling of food should be required to notify their employers if they become aware that they are suffering from any condition that might lead to the infection of foods and employers should be under an obligation to inform the local medical officer.

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[1] Where a licensing system is preferred, points (e) and (f) should be amended accordingly.

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ADULTERATION OF FOODS

Adulteration of foods consists of a large number of practices - mixing, substitution, abstraction, concealing the quality, putting up decomposed foods for sale, misbranding or giving false labels and addition of poisons. Some forms of adulteration are injurious to health, e.g. adulteration of mustard oil with argemone oil. But for the most part, food adulteration has an economic rather than a sanitary significance, e.g. addition of water to milk.

Food adulteration practices vary from one part of the country to another, and from time to time. Our knowledge about the current practices of food adulteration is meagre. The types of adulteration commonly found in various foodstuffs in India are as follows:

(1) Milk: Perhaps no other food is subjected to such frequent adulteration as milk. Addition of water, removal of cream, and addition of starch, paper pulp and skim-milk powder are the common types of milk adulteration

(2) Ghee: Ghee is adulterated with vanaspathi and animal fats such as pig's fat. In order to improve the flavour of adulterated ghee, tributyrin is added. The Government of India have not succeeded in enforcing the colouring of vegetable ghee.

(3) Cereals: Rice and wheat are mixed with stones, sand, grit and mud to increase bulk

(4) Flours: Wheat flour is mixed with soap stone (talc) powder and chalk powder. Bengal gram (Besan) flour is adulterated with lathyrus flour. Maida is adulterated with singhada flour.

(5) Pulses: Pulses are adulterated with lathyrus. Chemical substances such as metanil yellow are added to old stocks of pulses to improve the colour and appearance.

(6) Edible oils: Admixture of cheaper oils and mineral oils is commonly practised. Dyes are also added to improve the appearance. Argemone oil is another intentional adulterant.

(7) Tea and Coffee: Tea leaves are adulterated with exhausted old tea leaves and dust, black gram husk, saw dust and cashew husk. Coffee powder is adulterated with roasted dates, tamarind seeds, husk powder, added colour and chicory without declaration.

(8) Honey: Honey is adulterated with sugar or jaggery and boiled with empty beehives. The list is endless

Food Standards:

(1) Codex Alimentarius: This is a collection of international food standards prepared by the Codex Alimentarius Commission, which is the principal organ of the Joint FAO/WHO Food Standards Programme. The food standards in India are based on the international codex alimentarius (2) PFA Standards: Under the prevention of Food Adulteration Act (1954) rules have been framed. These are revised from time to time by an expert body called the "Central Committee for Food Standards". Any food that does not confirm to the minimum standards is said to be adulterated.

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The purpose of the PFA standards is to obtain a minimum level of quality of foodstuffs attainable under Indian conditions. (3) The Agmark Standards: These standards are set by the Directorate of Marketting and Inspection of the Government of India. The Agmark gives the consumer an assurance of quality in accordance with the standards laid down. (4) ISI Standards: The ISI mark on any article of food is a guarantee of good quality in accordance with the standards prescribed by the Indian Standards Institution for that commodity. The Agmark and ISI standards are not mandatory; they are purely voluntary. The express degrees of excellence above the PFA Standards.

Prevention of Food Adulteration (Amendment) Act, 1976

The prevention of Food Adulteration Act was enacted by the Indian Parliament in 1954. Standards have been laid down under this Act for various foods, and these standards vary from State to State. Any food that does not confirm to the minimum standards is said to be adulterated. Although it is a Central Act, its implementation is largely carried out by the local bodies and the State Governments. In 1963 and 1969, the Act was amended in order to make it more stringent. The more recent Prevention of Food Adulteration (Amendment) Act came into force throughout the country on April 1, 1976. The new Act provides for summary trial and deterrent punishment including life imprisonment under certain circumstances. There is also a Central Committee for Food Standards. A chain of laboratories, including four regional appellate laboratories have been established. The purpose of the Prevention of Food Adulteration Act is to protect the health of the consumer and to assure foods of honest nutritive value.

FOOD ADDITIVES

The concept of adding 'non-food' substances to food products is not new. Pickling is an ancient culinary practice aimed at preserving food articles such as mango, lime and amla for fairly long periods by the addition of salt and spices. Modern science of food technology employs more than 3,000 substances- some natural (e.g. saffron, turmeric) and others artificial or synthetic (e.g. saccharin, sorbic acid) known as 'food additives'. Majority of the processed foods such as bread, biscuits, cakes, sweets, confectionary, jams, jellies, soft drinks, ketchup, all contain food additives.

Food additives are defined as non-nutritious substances which are added intentionally to food, generally in small quantity, to improve its appearance, flavour, texture or storage properties. The definition also includes animal feed adjuncts which may result in residues in human food and components of packing materials which may find their way into foods.

The food additives may be classified as colouring agents (e.g. saffron, turmeric), flavouring agents (e.g. vanilla essence), sweeteners (e.g. saccharin), preservatives (e.g. sorbic acid, sodium benzoate), bleaching agents (eg, chlorine) acidity imparting agents (eg, citric acid, acetic acid), etc. Uncontrolled or indiscriminate use of food additives may pose health hazards among consumers.

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The use of food additives is subjected to government regulation throughout the world. In India, two regulations, viz. the Prevention of Food Adulteration Act and the Fruit Products Order govern the rules and regulations of food additives. Any food that contains food additives that are not permitted is considered adulterated; if the permissible limit exceeds, then also the food is considered adulterated. The nature and quantity of the additive shall be clearly printed on the lable to be affixed to the container. Whenever, any extraneous colouring matter has been added to any article of food, the words 'Artificially Coloured' shall be written on the label. At the international level, food standards are fixed by the codex alimentarius commission.

FOOD FORTIFICATION

The 8th Joint FAO/WHO Expert Committee on Nutrition (1971) defined fortification as "the process whereby nutrients are added to foods to maintain or improve the quality of the diet of a group, a community or a population". On the other hand, the word enrichment is used to signify the addition of dietary essentials to a food to restore the total content of the former. The following are some examples: (1) Milk: Milk is fortified by the addition of vitamins A and D (2) Wheat flour: In February 1970, the Government of India launched a programme in Bombay for fortification of atta with vitamins and minerals, and for increasing the protein content by admixture with edible groundnut flour. This programme is planned to be extended to other cities at a later date. (3) Edible oils: Fortification of "vanaspathi" (hydrogenated fat) with vitamin A has been made compulsory (2,500 i.u. of vitamin A and 175 i.u. vitamin D per 100 g of vanaspathi) by the Government of India. (4) Common salt: Common salt is fortified with potassium iodate and supplied in areas where goitre is endemic. Fortification of common salt with calcium and iron is being considered to be taken up on a national scale in India. (5) Synthetic amino acids: Addition of synthetic amino acids to foods offers great possibilities for the future, e.g., lysine to wheat flour. (6) Sugar: fortified with vitamin A is being used in some countries for the prevention of nutritional blindness. Fortification and enrichment have made tremendous contributions to the public health in improving the nutritional standards of the people and in correcting specific deficiency states.

SOURCE: PREVENTIVE & SOCIAL MEDICINE

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THE PREVENTION OF FOOD ADULTERATION ACT, 1954

(Act 37 of 1954)

This Act to make provision for the prevention of adulteration of food was enacted by the Indian Parliament in 1954. It extends to the whole of India except the State of Jammu & Kashmir and supersedes all Food Laws that were passed by individual States in their own territories. It came into force in May, 1955.

An attempt has been made under this Act to make the provisions uniform, broadbased and more deterrant and to remove some of the lacunae that were found in the existing Food Laws and Bye-laws of the different States and local bodies.

Some of the important Sections are summarised below :

Section 2. Definitions

(1) "Adulterated"- an article of food shall be deemed to be adulterated -

(a) if the article sold by a vendor is not of the nature, substance or quality demanded by the purchaser and is to his prejudice, or is not of the nature, substance or quality which it purports or is represented to be;

(b) if the article contains any other substance which affects, or if the article is so processed as to affect injuriously the nature, substance or quality thereof;

(c) if any inferior or cheaper substance has been substituted wholly or in part for the article so as to affect injuriously the nature, substance or quality thereof;

(d) if any constituent of the article has been substituted wholly or in part abstracted so as to affect injuriously the nature, substance or quality thereof;

(e) if the article had been prepared, packed or kept under insanitary conditions whereby it has become contaminated or injurious to health;

(f) if the article consists wholly or in part of any filthy putrid, disgusting, rotten, decomposed or diseased animal or vegetable substance or is infested or is otherwise unfit for human consumption;

(g) if the article is obtained from a diseased animal;

(h) if the article contains any poisonous or other ingredient which renders it injurious to health;

(i) if the container of the article is composed, whether wholly or in part, of any poisonous or deleterious substance which renders its contents injurious to health;

(j) if any colouring matter other than that prescribed in respect thereof and in amounts not within the prescribed limits of variability is present in the article;

(k) if the article contains any prohibited preservative or permitted preservative in excess of the prescribed limits;

(l) if the quality or purity of the article falls below the prescribed standard or its constituents are present in quantities which are in excess of the prescribed limits of variability.

(V) "Food" means any article used as food or drink for human consumption other than drugs and water and includes;

(a) any article which ordinarily enters into, or is used in the composition or preparation of human food, and

(b) any flavouring matter or condiments.

(IX) "Misbranded"- an article of food shall be deemed to be misbranded -

(a) if it is an imitation of, or is a substitute for, or resembles in a manner likely to deceive, another article of food under the name of which it is sold, and is not plainly and conspicuously labelled so as to indicate its true character;

(b) if it is falsely stated to be the product of any place or country;

(c) if it is sold by a name which belongs to another article of food;

(d) if it is so coloured, flavoured or coated, powdered or polished that the fact that the article is damaged is concealed or if the article is made to appear better or of greater value than it really is;

(e) ifalse claims are made for it upon the label or other;

(f) if, when sold in packages which have been sealed or prepared by or at the instance of the manufacturer or producer and which bear his name and address, the contents of each package are not conspicuously and correctly stated on the outside thereof within the limits of variability prescribed under this Act;

(g) if the package containing it, or the label on the package bears any statement, design or device regarding the ingredients or the substances contained therein, which is false or misleading in any material particular; or if the package is otherwise deceptive with respect to its contents;

(h) if the package containing it or the label on the package bear the name of a fictitious individual or company as the manufacturer or producer of the article;

(i) if it purports to be, or is represented as being, for special dietary uses, unless its label bears such information as may be prescribed concerning its vitamin, mineral, or other dietary properties in order sufficiently to inform its purchaser as to its value for such uses;

(j) if it contains any artificial flavouring, artificial colouring or chemical preservative, without a declaratory label stating that fact, or in contravention of the requirements of this Act or rules made thereunder.

(k) if it is not labelled in accordance with the requirements of this Act or rules made thereunder.

Section 3. The Central Govt. to constitute a Central Committee for Food Standards with D.G.H.S. ex-officio as Chairman and Director of Central Food Laboratory, ex-officio member and the following members nominated by the Central Government-two experts, one representative each of the Central Ministries of Food and Agriculture, Commerce and Industry, Railways and Defence, two representatives from Union Territories, two representatives of industry and commerce. Besides these, each State nominates one representative and the Indian Council of Medical Research nominates a representative of the medical profession.

Section 4. The Central Govt. to establish a Central Food Laboratory, and after consultation with the Central Committee make rules regarding the functions of the Central Food Laboratory. The object of these two sections is to bring about uniformity of Food Standards throughout the country and to maintain a satisfactory standard of laboratory practices in the different States.

Section 5. Prohibition of certain articles of food into India.

(i) any adulterated food ;
(ii) any misbranded food ;
(iii) any article of food for the import of which a licence is prescribed, except in accordance with the conditions of the licence; and
(iv) any article of food in contravention of any other provision of this Act or of any rule made thereunder.

Section 7. Prohibition of manufacture, sale, etc., of certain articles of food. No person shall himself or by any person on his behalf manufacture for sale, or store, sell or distribute -

(i) any adulterated food ;
(ii) any misbranded food ;
(iii) any article of food for the sale of which a licence is prescribed, except in accordance with the conditions of the licence ;
(iv) any article of food the sale of which is for the time being prohibited by the Food (Health) Authority in the interest of public health ; or
(v) any article of food in contravention of any other provision of this this Act or any rule made thereunder.

Section 8. The Central or State Govt. to appoint Public Analysis and define their jurisdiction.

Section 9. The Central or State Govt. to appoint Food Inspectors who shall be deemed to be public servants within the meaning of the section 21 I.P.C. thereby having definite rights and responsibilities.

Section 10. (1) A food inspector shall have power -

(a) to take samples of any article of food.
(b) to send such sample for analysis to the public analysts.
(c) with the previous approval of the health officer having jurisdiction in the local area concerned, or with the previous approval of the Food (Health) Authority, to prohibit the sale of any article of food in the interest of public health.

(2) Any food inspector may enter and inspect any place where any article of food is manufactured, stored or exposed for sale and take samples of such articles of food for analysis.

(4) A food inspector may seize and carry away or keep in safe custody of the vendor with a bond, if any article intended for food appears to be adulterated or misbranded.

(6) Any material apparently of a kind which may be employed for purpose of adulteration may be seized by the food inspector and if necessary, a sample submitted for analysis to a public analyst.

(7) Where the food inspector takes any action under clause (a) of sub-section (1), sub-section (2), sub-section (4) or sub-section (6), he shall call one or more persons to be present at the time when such action is taken and take his or their signatures.

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Section 11. (1) When a food inspector takes a sample of food for analysis, he shall

(a) give notice in writing then and there of his intention to have it so analysed to the person from whom he has taken the sample :

(b) except in special cases provided by rules under this Act separate the sample then and there into three parts and mark and seal or fasten up each part in such a manner as its nature permits ; and

(c) (i) deliver one of the parts to the person from whom the sample was taken;
(ii) send another part for analysis to the public analyst; and
(iii) retain the third part for production in case any legal proceedings are taken or for analysis by the Director of the Central Food Laboratory under sub-section (2) of section 13, as the case may be.

Section 12. A purchaser may have food analysed by giving notice to the the vendor of his intention to have the same analysed; if, on analysis, the article is found to be adulterated, the fee paid by him for analysis will be refunded to him and the vendor will be dealt with according to law.

Section 15. The Central Government or the State Govt. may, by notification in the Official Gazette, require medical practitioners carrying on their profession in any local area specified in the notification to report all occurences of food poisoning coming within their cognizance to such officer as may be specified in the notification.

Section 16 to 20. Penalties : If any person whether by himself or by any other person on his behalf (a) contravenes Sec. 5 or 7, or (b) prevents a food inspector from taking samples for analysis or (c) obstructs the food inspector in the discharge of his duties or (d) being a manufacturer has any material that can be used for adulteration in his possession or in one of his premises, or e) uses any report or certificate of a test issued by the Director of Central Food Laboratory for advertising or (f) gives a false warranty to the purchaser in, writing in respect of any food sold by him, he shall be punishable.

He shall, in addition to the penalty to which he may be liable under the provisions of section 6, be punishable with imprisonment for a term which shall not be less than six months but which may extend to six years, and with fine which shall not be less than one thousand rupees. There are other provisions also.

If any person convicted of an offence under this Act commits a like offence afterwards, it shall be lawful for the court before which the second or subsequent conviction takes place to cancel the licence and to cause the offender's name and place of residence, the offence and the penalty imposed to be published at the offender's expense in such newspapers or in such other manner as the court may direct. The expenses of such publication shall be deemed to be part of the cost attending the conviction and shall be recoverable in the same manner as a fine.

No court inferior to that of a Presidency Magistrate or a Magistrate of the first class shall try any offence under the Act.

Section 23. The Central Govt., may after consultation with the Committee and subject to the conditions of previous publication, make rules/

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(a) specifying the articles of food or classes of food for the import of which a licence is required and prescribing the form and conditions of such licence the authority empowered to issue the same and the fees payable therefor;

(b) defining the standards of quality for, and fixing the limits of variability permissible in respect of any article of food ;

(c) laying down special provision for imposing rigorous control over the production, distribution and sale of any article or class of articles of food and other rules for proper implementation of the Act.

Section 24. The State Government may also make rules in the same way as above in matters not falling within the purview of section 23.

3. THE PREVENTION OF FOOD ADULTERATION RULES, 1955

In exercise of the powers conferred under the Act, the Central Government after consultation with the Central Committee of the Food Standards have made the following rules.

These cover the definitions and standards of quality of various articles of food as also definite directives regarding the Central Food Laboratories, Public Analysts and Food Inspectors, packing, sealing and despatch of samples, conditions for sale and licence, colouring matter and preservatives, anti-oxidants, emulsifying, stabilising and flavouring agents.

Standards of Quality of food - The standards of some food items are given below:

A.08 Coffee -

A.0801 (1) Coffee (green, raw or unroasted) means the seed of coffea arabica, Coffea liberica or Coffea robusta, freed from all but a small portion of its spermoderm by decortication.

(2) Roasted Coffee means the properly cleaned green coffee which has been roasted to a brown colour and has developed its characteristic aroma.

(3) Ground coffee means the powdered product obtained from 'roasted coffee' only and shall be free from husk.

(4) Coffee (green, raw or unroasted), 'roasted coffee' and 'ground coffee' shall be free from any artificial colouring, flavouring, facing, extraneous matter or glazing substance and shall be in sound, dry and fresh condition free from rancid or obnoxious flavour.

(5) Coffee (green, raw or unroasted), 'roasted coffee' and 'ground coffee' shall conform to the following analytical standards -

(i) Total ash (determined on the sample dried to constant weight at 100°C), shall be feathery white or bluish white in colour and shall be not less than 3.5 per cent and not more than 5.0 per cent by weight of which not less than 65 per cent shall be soluble in boiling distilled water. The ash insoluble in hot dilute HCl shall be not more than 0.1 per cent.

(ii) The alkalinity of the soluble ash per gram, of dried coffee shall be equivalent to not less than 3.4 ml. and not more than 4.4 of N/10 acid.

(iii) The caffeine content as obtained by standard methods, shall be not less than 1.0 per cent.

(iv) The aqueous extract determined by extraction of 2 grams of the sample direct to constant weight at 100°C with 100 ml. of boiling distilled water for one hour under reflux shall be not less than 25 per cent and not more than 32 per cent.

A.11 Milk and Milk Products.

A.11.01 Milk means the normal clean and fresh secretion obtained by complete milking of the udder of a healthy cow, buffalo, goat or sheep during the period following at least 72 hours after calving or until colostrum free whether such secretion has been processed or not.

The standards prescribed for milk shall apply for boiled milk also.

A.11.01.01 Cow milk shall contain not less than 3.5 per cent of milk fat, except in Orissa, where it shall be not less than 3 per cent and in Punjab and PEPSU where it shall be not less than 4.0 per cent. The milk solids other than milk fat, shall be not less than 8.5 per cent.

A.11.01.02 Buffalo milk shall contain not less than 5.0 per cent of milk fat except in Delhi, Punjab, PEPSU, Uttar Pradesh, Bihar, West Bengal, Assam, Bombay and Saurashtra where it shall not be less than 6 per cent. The milk solids other than milk fat, shall be not less than 9 per cent.

A.11.01.03 Goat or Sheep milk shall contain not less than 3.0 per cent of milk fat except in Madhya Pradesh, Punjab, PEPSU, Bombay, Uttar Pradesh, and Travancore-Cochin where it shall be not less than 3.5 per cent. The milk solids other than milk fat, shall be not less than 9 per cent.

Where milk, other than skimmed milk, is sold or offered for sale without any indication as to whether it is derived from cow, buffalo, goat, or sheep the standard prescribed for buffalo milk shall apply.

A.11.02 Skimmed milk, either fresh or reconstituted means milk from which all or most of the milk fat has been removed by mechanical or any other process and includes "separated milk" or "machine skimmed milk". The milk solids other than milk fat shall be not less than 8.5 per cent.

A.11.03 Butter-milk means the product obtained after removal of butter from curds by churning or otherwise.

A.11.04 Toned milk means the product prepared by blending milk with fresh separated milk or with separated milk reconstituted from spray dried skim milk powder or by partial abstraction of fat through skimming or separation of milk.

It shall contain not less than 3.0 per cent of milk fat and 8.5 percent of milk solids other than milk fat.

A.11.04.01 Double Toned Milk means the product prepared by blending milk with

(a) fresh separated milk ; or

(b) separated milk reconstituted from spray dried skim milk powder; or

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(c) by partial abstraction of fat through skimming or separation of milk; and containing not less than 1.5 per cent of milk fat and 10 per cent of milk solids other than milk fat.

A.11.06. Dahi or curd - (a) Whole milk dahi or curd means the product obtained from fresh whole milk either of cow or buffalo by souring. It shall not contain any ingredient not found in milk except sucrose and/or gur.

The standard of purity of dahi or curd shall be the same as prescribed for the milk from which it is derived.

A.11.11 Ice-cream shall contain not less than 36 per cent by weight of solids and 10 per cent by weight of milk fat except that when the ice-cream contains fruits or nuts or both, the content of milk fat may be proportionately reduced but not less than 8.0 per cent by weight. Ice-cream prepared from skimmed milk shall not contain less than 8.5 per cent of milk solids other than milk-fat.

Mixed Ice Cream should have the same fat content and total solid contents as prescribed for Ice cream.

A .11.14 Ghee means the pure clarified fat derived solely from milk or from curd or from deshi (cooking) butter or from cream to which no colouring matter or preservative has been added. The standard of quality of ghee produced in a State or Union territory shall conform to the standards as laid down for that area. Although the maximum limits of the percentage of (1) free fatty acid (as oleic acid) and (2) moistre have been uniformly specified, the standards for minimum Reichert value and Butyro-refractometer reading at 40°C varies from region to region.

A.14 Tea means tea derived exclusively from the leaves, buds and tender stems of plants of the Camellia genus and thea species. It shall conform to the following specifications:

(a) Total ash determined on tea dried to constant weight at 100°C - 5.0 to 8.0 per cent

(b) Total ash soluble in boiling Distilled Water - Not less than 40.0 per cent of total ash.

(c) Ash insoluble in HCl-Not more than 1.0 per cent.

(d) Extract obtained by boiling dry tea (dried at constant weight at 100°C) with 100 parts of distilled water for one hour under reflux - Not less than 1.3 per cent.

(e) Alkalinity of soluble ash - Not less than 1.3 per cent and not more than 2 per cent expressed as K_2O

(f) Crude fibre-Not more than 15 per cent. It shall not contain any added colouring matter.

A.17.06 Mustard oil (Sarson-ka-tel) means the oil expressed from clean and sound mustard seeds, belonging to the: campestris, juncea or napus varieties of Brassica. It shall be clear, free from rancidity, suspended or foreign matter, separated water, added colouring or flavouring substances or mineral oil. It shall conform to the following standards:

(a) Butyro-refactometer reading at 40°C -58.0 to 60.5

(b) Saponification value - 168 to 178

(c) Iodine value - 96 - 108

(d) Unsaponifiable matter - Not more than 1.2 per cent

(e) Free fatty acid as Oleic acid - Not more than 3.0 per cent.

(f) Bellier (Turbidity test) by Ewer's method (Acetic Acid) - Not more than 26.5°C.

The test for argemone oil should be negative.

A.17.11 Til Oil (Gingelly or sesame oil) means the oil expressed from clean and sound seeds of Til (Sesamum indicum) black, brown, white, or mixed. It shall be clear, free from rancidity, suspended or other foreign matter, separated water, added colouring or flavouring substances, or mineral oil. It shall conform to the following standards:

(a) Butyro-refractometer reading at 40°C-58.0 to 61.0

(b) Saponification value-188 to 198

(c) Iodine value-105 to 115.

(d) Unsaponifiable matter - Not more than 1.5 per cent.

(e) Free fatty acid as Oleic acid-Not more than 3.0 per cent.

(f) Bellier Test (turbidity temperature - Acetic acid method) - Not more than 22°C.

A.19. Vanaspati means any refined edible vegetable oil or oils, subjected to a process of hydrogenation from groundnut oil, cotton seed oil and sesame oil or mixtures thereof or any other harmless vegetable oils allowed by the Government for the purpose. It shall conform to the standards specified below:

(i) It shall not contain any harmful colouring, flavouring or any other matter deleterious to health.

(ii) No colour shall be added to hydrogenated vegetable oil unless so authorised by Government, but in no event any colour resembling the colour of ghee shall be added.

(iii) If any flavour is used, it shall be distinct from that of ghee in accordance with a list of permissible flavours and in such quantities as may be prescribed by Government.

Provided that diacetyl to the extent of not more than 4.0 p.p.m. may be added to Vanaspati exclusively meant for consumption by the Armed Forces.

(iv) It shall not have moisture exceeding 0.25 per cent.

(v) The melting point as determined by the capillary slip method shall be from 31°C to 37°C both inclusive.

(vi) The Butyro-refractometer reading at 40°C, shall not be less than 48.

(vii) It shall not have unsaponifiable matter exceeding 1.25 per cent.

(viii) It shall not have free fatty acids (calculated as Oleic acid) exceeding 0.25 per cent.

(ix) The product on melting shall be clear in appearance and shall be free from staleness or rancidity, and pleasant to taste and smell.

(x) It shall contain raw or refined sesame (til) oil not less than 5 per cent by weight, but sufficient so that when the vanaspati is mixed with refined groundnut oil in the proportion of 20:80, the red colour produced by the Baudouin test shall not be lighter than 2.0 units in a 1 cm. cell on a Lovibond scale.

(xi) It shall contain not less than 25 LU. of synthetic Vitamin 'A' per gram.

(xii) No anti-oxident, synergist, emulsifier or any other such substance shall be added to it except with the prior sanction of the Government.

PART X

PRESERVATIVES

Preservative has been defined as a substance which when added to food, is capable of inhibiting, retarding or arresting the process of fermentation, acidification or other decomposition of food. Preservatives have been divided into two classes:

(i) Class I preservatives comprise of : Common Salt, Sugar, Dextrose, Glucose, Wood smoke, spices, Vinegar or acetic acid, Honey, Hops, Commercial salt petre, and Alcohol or potable spirits. Addition of Class I preservatives in any food in any proportion is not restricted.

(ii) Class II Preservatives are : Benzonic acid including salts thereof, Sulphurous acid including salts thereof, and Nitrites of Sodium or Potassium in respect of food like ham, pickled meat. Use of more than one Class II Preservative in or upon a food is prohibited. Their use has been restricted to the specified group of foods in concentration not exceeding the proportions fixed against each. These foods comprise of Sausage and Sausage meat, Fruits and fruit juices, Cooked picked meat, Alcoholic and non-alcoholic wines, Syrups, Sherbets, Dehydrated vegetables, etc.

PART XII

ANTI-OXIDANTS, EMULSIFYING AND STABILISING AGENTS

'Anti-oxidant' means a substance which when added to food retards or prevent oxidative deterioration of food and does not include sugar, cereal oils, flours, herbs and spices. No anti-oxidant, other than lecithin, ascorbic acid and tocopherol shall be added to any food, but a number of anti-oxidants have been specified which may be added to edible oils and fatss

"Emulsifying agents" and "Stabilising agents" mean substances which when added to food are capable of facilitating a uniform dispersion of oils and fats in aqueous media, vice versa, and or stabilising such emulsions and do not include the following, namely -

Agar, alginic acid, calcium and sodium alginates, carrageen, edible gums, dextrin, sorbitol, pectin, sodium and calcium pectate, sodium citrate, sodium phosphate, sodium tartrate, calcium lactate, lecithin, gelatin, quillaia, modified starches and hydrolysed protein.

Except in milk and cream, a number of specified emulsifying or stabilising agents are permitted to be used in foods.

Container of an article of food to which any emulsifying and stabilising agent has been added shall bear a statement of the chemical nature of such emulsifying and stabilising agents in addition to any trade name.

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PART XIII

FLAVOURING AGENTS

The use of coumarin and dihydrocoumarin as flavouring agents in any article of food is prohibited. Use of Diethylene Glycol monoethyl ether as a solvent in flavours has been prohibited.

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MODEL FOOD HYGIENE REGULATIONS FOR CATERING ESTABLISHMENTS
(WHO Offset Publication No.34)

The basic legal requirements for the control of food hygiene which should be embodied in a national statute. Detailed legal requirements should be stated in regulations or secondary legislation made under the authority given by the statute. It should be noted that in these model regulations expressions such as "adequate", "suitable", and "sufficient" are frequently used. This is because a legal document of this kind must have sufficient flexibility to meet the varying circumstances found in different types of establishment and in different parts of the world. The interpretation of these terms is left to the discretion of local control authorities.

The following Model Code details those matters which it is suggested should be included in the food hygiene regulations for catering establishments.

Registration[1]

(a) No premises shall be used as catering premises unless they are registered for that purpose by the local authority. Any person who uses unregistered premises shall be guilty of an offence.

(b) Application for registration must be made before the premises are opened and the application must be refused if the premises do not comply in all respects with food hygiene regulations for catering premises.

(c) Registration may be revoked if at any time serious breaches of the food hygiene regulations occur.

Construction and maintenance of premises

(a) No catering business shall be carried on in any premises in which food is exposed to the risk of contamination

(b) The premises shall be of adequate size, sound construction and in good repair. Areas used for the handling of food shall be completed separated from any part of the premises used as living quarters.

(c) The internal walls, floors, windows, ceilings, woodwork and all other parts of every room shall be so constructed and maintained in such good order, repair and condition as to enable them to be cleaned effectively and to prevent, as far as practicable, infestation by rats, mice, insects and birds.

(d) The premises must be kept free from rodent and insect pests, and birds, and dogs, cats and other domestic animals must be excluded from areas where food is processed or stored. All rodenticides, insecticides and other toxic substances must be clearly labelled and, when not in use, be kept in separate, locked cupboards.

[1] Where a system of licensing is preferred this section should be amended accordingly.

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(e) The premises must be kept in a clean condition; water must be deposited or allowed to accumulate in rooms in which food is prepared, stored or served, except in so far as this may be unavoidable for the proper conduct of the business.

(f) All rooms in which food is stored, prepared or served, or in which utensils are washed, and all sanitary conveniences shall be well ventilated and well lighted.

(g) No room in which food is stored, prepared or served may be used as a sleeping place or communicate directly with a sleeping place or sanitary convenience.

Water supply

(a) An ample supply of water of drinking quality must be provided at all premises; where possible this should be from the public supply main but if from any other source it must be approved by the health authority and checked for bacteriological and chemical quality at intervals.

(b) An adequate supply of hot and cold water or of hot water at a suitable controlled temperature shall be provided in all areas where food is prepared and where equipment and utensils are washed.

(c) Water used for making ice shall be of drinking quality.

Drainage

(a) All premises shall be provided with an adequate drainage system which, where practicable, shall be connected to the public sewerage system.

(b) Where connexsion to the public sewerage system is not practicable the method of sewage disposal must be approved by the health authority.

Personal washing facilities

(a) An adequate number of suithle wash-hand basins shall be provided for the use of all persons engaged in the handling of food. These basins must be conveniently accessible to these persons and in any case must be located in or immediately adjacent to all sanitary conveniences. In all new premises, and where practicable in existing premises, hand-washing facilities must be provided within or immediately adjacent to food preparation areas. All wash-hand basins shall be properly connected to the drainage system and be provided with an adequate supply of hot and cold water or of hot water at a suitable controlled temperature. At each basin shall be provided an adequate supply of soap or other suitable detergent, nail brushes and clean towels or other suitable drying facilities.

(b) Facilities for personal washing must not be used for any other purpose.

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Sanitary facilities

(a) An adequate number of conveniently located sanitary conveniences shall be provided for all employees. Separate conveniences shall be provided for each sex. An adequate supply of toilet paper[1] must be available at all times.

(b) In or near every sanitary convenience a clearly legible notice must be displayed in a prominent position requiring users to wash their hands after using the convenience.

Storage of clothing

Adequate facilities shall be provided for the storage of employees' clothing and personal belongings not being worn during working hours and such clothing and belongings shall not be kept on the premises other than in the accommodation provided.

First-aid materials

(a) A sufficient supply of suitable bandages, dressings (including waterproof dressings) and antiseptics shall be provided for the first-aid treatment of persons engaged in the handling of food.

(b) This material must be kept in suitable locations readily accessible to employees and clearly labelled.

Storage of refuse

(a) A sufficient number of watertight containers of durable and non-absorbent material with tight-fitting or self-closing lids shall be provided for the storage of food waste and other refuse.

(b) Adequate space shall be provided for the temporary storage of waste; this space must not be in any room where food is stored, prepared or served.

Food

(a) Food, while being stored, prepared, displayed or served, shall be protected from dust, flies, rodents and other pests, and other contamination and all persons engaged in the handling of food shall take all reasonable steps to protect the food from risk of contamination.

(b) Raw meat, poultry, fish, shellfish, milk or uncooked products containing those foodstuffs shall not be permitted to come into contact with any cooked foods. Any persons handling any of these raw or uncooked foodstuffs must, before handling any cooked food, thoroughly wash their hands and carefully cleanse all surfaces, utensils and equipment with which the foodstuffs may have come into contact.

....4

[1] This requirement should be suitably modified to take account [illegible].

(c) All perishable food consisting in whole or in part of milk or milk products, eggs, meat, poultry, fish, shellfish or other ingredients capable of supporting the rapid growth of pathogenic organisms shall be kept at a temperature that is not within the range from 4.5 deg. C (40 deg. F) to 65.5 deg. C (150 deg. F) except during necessary periods of preparation and service.

(d) Raw, unprocessed fruits and vegetables shall be throughly washed in clean drinking water before use.

(e) All ice used for cooling drinks or food by direct contact shall be made from water of drinking quality.

Equipment

(a) All articles of equipment with which food comes into contact, or may come into contact, must be kept clean, be so constructed, placed, of such materials, and kept in such good order, repair and condition as to:

i. enable them to be thoroughly cleaned;

ii. prevent, so far as is reasonably practicable, any matter being absorbed by them; and

iii. prevent, so far as is reasonably practicable, any risk of contamination of the food.

(b) An adequate number of sinks or other suitable facilities for the washing of food and equipment when necessary shall be provided. These sinks or other facilities shall be provided with an adequate supply of hot and cold water or of hot water at a suitable controlled temperature, or with cold water only where the sink is used only for washing fish, fruit or vegetables. These facilities must not be used for any other purpose.

(c) Equipment shall be so installed as to facilitate its cleaning and the cleaning of adjacent areas.

Personnel[1]

(a) Every person handling or coming into contact with food, or with any equipment or utensil used in its preparation, processing or service shall:

i. keep as clean as may be reasonably practicable all parts of his body that are liable to come into contact with the food and, in particular, he shall wash his hands thoroughly before commencing work and after using a sanitary convenience;

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[1] This article, relating to health and cleanliness of food handlers, was prepared in the light of comments provided by WHO on the DRAFT CODE OF HYGIENIC PRACTICE FOR FRESH MEAT reviewed at the 3rd session of the Codex Committee on Food Hygiene, London 25-29 November 1974 (Joint FAO/WHO Food standards Programme, Codex Alimentarius Commission, Eleventh session 1976, document ALINORM 76/15).

.....5

ii. wear clean, washable outer garments and headgear that confines his hair;

iii. keep any open cut or abrasion on any exposed part of his body covered with a suitable waterproof dressing; and

iv. refrain from spitting and using tobacco in any form while engaged in the handling, preparation or service of food, while handling utensils or equipment, and while he is in any room containing open food.

(b) No person who is affected with any disease in a communicable form may work in any catering premises and the proprietor of any catering establishment shall not permit any such person to work in the establishment. Immediately a person engaged in the handling of food becomes aware, or has reason to suspect, that he is suffering from, or is a carrier of, typhoid, paratyphoid or any other Salmonella infection or amoebic or bacillary dysentery or any staphylococcal infection likely to cause food poisoning he shall immediately inform the person operating the catering premises in which he is employed and that person shall immediately notify the medical officer of the health authority.

.....

Model Food Hygiene Regulations for Catering (WHO offset Publication) NUT 8.18

ಆಹಾರ ವಿತರಣಾ ಸಂಸ್ಥೆಗಳಲ್ಲಿ ಆಹಾರ ಶುಚಿತ್ವದ ವಿಷಯದಲ್ಲಿ ಮಾದರಿ ನಿಯಮಗಳು :—

ಆಹಾರ ಶುಚಿತ್ವವನ್ನು ಹತೋಟಿಯಲ್ಲಿಡಲು ಬೇಕಾದ ಮೂಲಶಾಸನ ಸಮ್ಮತವಾದ ನಿಯಮಗಳನ್ನು ರಾಷ್ಟ್ರೀಯ ಕಾನೂನಿನಲ್ಲಿ ಅಳವಡಿಸಿರಬೇಕು. ಈ ನಿಯಮಗಳನ್ನು ಶಾಸನಬದ್ಧವಾಗಿ ವಿವರಿಸಬೇಕು: ಇಂತಹ ಒಂದು ಕಾನೂನು ಪತ್ರದಲ್ಲಿ ವಿವಿಧ ರೀತಿಯ ಸಂಸ್ಥೆಗಳಲ್ಲಿ ವಿವಿಧ ಸನ್ನಿವೇಶಗಳಿಗೆ ಹೊಂದಿಕೊಳ್ಳುವ ಹಾಗೆ ಸಾಕಷ್ಟು ನಮ್ಯನೀಯತೆ ಇರಬೇಕಾದುದರಿಂದ, ಈ ಮಾದರಿ ನಿಯಮಗಳಲ್ಲಿ "ಸಾಕಷ್ಟು", ತಕ್ಕ ಮತ್ತು "ಸಾಕಾದಷ್ಟು" ಎಂಬ ಪದಗಳನ್ನು ಪದೇ ಪದೇ ಉಪಯೋಗಿಸಿದೆ. ಈ ಪದಗಳ ಅರ್ಥವಿವರಣೆ ಆಯಾಭಾಗದ ಸ್ಥಳೀಯ ಅಧಿಕಾರದ ವಿವೇಚನೆಗೆ ಬಿಟ್ಟದ್ದು.

ಆಹಾರ ವಿತರಣಾ ಸಂಸ್ಥೆಗಳಲ್ಲಿ, ಆಹಾರ ಶುಚಿತ್ವ ಕಾನೂನಿನಲ್ಲಿರಬೇಕಾದ ವಿಷಯಗಳನ್ನು ಈ ಕೆಳಗಿನ ಮಾದರಿ ನಿಯಮಗಳಲ್ಲಿ ವಿವರಿಸಿದೆ.

ದಾಖಲಾತಿ :— (ಅನುಮತಿ)

(1) ಸ್ಥಳೀಯ ಅಧಿಕಾರದಿಂದ ಅನುಮತಿ ಪಡೆಯದೆ ಯಾವ ಕಟ್ಟಡವನ್ನೂ ಆಹಾರ ವಿತರಣೆಗೆ ಉಪಯೋಗಿಸಬಾರದು. ಹಾಗೆ ಅನುಮತಿಯಿಲ್ಲದೆ ಕಟ್ಟಡವನ್ನು ಉಪಯೋಗಿಸುವ ವ್ಯಕ್ತಿಯು ತಪ್ಪಿತಸ್ಥನಾಗುತ್ತಾನೆ.

(2) ಅನುಮತಿ ಪಡೆಯಲು ಅರ್ಜಿಯನ್ನು ಕಟ್ಟಡವನ್ನು ಆಹಾರ ವಿತರಣೆಗೆ ತೆರೆಯುವುದಕ್ಕೆ ಮುನ್ನ ಕಳುಹಿಸಬೇಕು. ಕಟ್ಟಡವು ಆಹಾರ ಸ್ವಚ್ಛತೆಯ ನಿಯಮಗಳಿಗೆ ಸರಿಹೊಂದದಿದ್ದಲ್ಲಿ ಅನುಮತಿ ನಿರಾಕರಿಸಬೇಕು.

(3) ಕಾನೂನಿನ ನಿಯಮಗಳ ಪಾಲನೆಯಲ್ಲಿ ತೀವ್ರ ದೋಷಗಳು ಕಂಡುಬಂದಲ್ಲಿ ಅನುಮತಿಯನ್ನು ರದ್ದುಪಡಿಸಬಹುದು.

ಕಟ್ಟಡ ಮತ್ತು ಅದರ ಸಂರಕ್ಷಣೆ :—

(1) ಆಹಾರ ವಸ್ತುಗಳಿಗೆ ಸೋಂಕು ತಗಲುವ ಅವಕಾಶವಿರುವ ಯಾವ ಕಟ್ಟಡದಲ್ಲೂ ಆಹಾರ ವಿತರಣೆಯ ಕಾರ್ಯ ನಡೆಸಬಾರದು.

(2) ಕಟ್ಟಡವು ಸರಿಯಾದ ದುರಸ್ತಿನಲ್ಲಿದ್ದು ಸಾಕಷ್ಟು ವಿಸ್ತಾರವಾಗಿರಬೇಕು. ಕಟ್ಟಡದಲ್ಲಿ ಆಹಾರ ವಿತರಣೆಯ ಭಾಗವು ವಾಸದ ಭಾಗದಿಂದ ಸಂಪೂರ್ಣವಾಗಿ ಬೇರ್ಪಟ್ಟಿರಬೇಕು.

(3) ಕಟ್ಟಡದ ಒಳಗೋಡೆಗಳು, ನೆಲ, ಕಿಟಕಿಗಳು, ಸೂರು, ಮರಗೆಲಸಮಾಡಿರುವ ಭಾಗಗಳು ಅಲ್ಲದೆ ಕೊಠಡಿಗಳ ಇತರ ಭಾಗಗಳು ಇಲಿ, ಕ್ರಿಮಿ, ಪಕ್ಷಿಗಳು ಮುಂತಾದುವು ಸೇರಲು ಅವಕಾಶವಿಲ್ಲದಂತೆ ಮತ್ತು ಸಾಕಷ್ಟು ಚೊಕ್ಕಟವಾಗಿಡುವಂತೆ ಕಟ್ಟಲ್ಪಟ್ಟದ್ದು, ಸರಿಯಾದ ದುರಸ್ತಿನಲ್ಲಿರಬೇಕು.

(4) ಕಟ್ಟಡದಲ್ಲಿ ಆಹಾರ ತಯಾರಿಸುವ ಮತ್ತು ಶೇಖರಿಸುವ ಭಾಗಗಳಲ್ಲಿ ಇಲಿ, ಕ್ರಿಮಿ ಕೀಟಗಳು ಇಲ್ಲದಂತಿರಬೇಕು, ಅಲ್ಲದೆ ಪಕ್ಷಿಗಳು, ನಾಯಿ ಬೆಕ್ಕು ... ಮುಂತಾದ ಸಾಕು ಪ್ರಾಣಿಗಳನ್ನು ಸೇರಿಸಬಾರದು. ಇಲಿ ಅಥವಾ ಕ್ರಿಮಿ ಕೀಟಗಳನ್ನು ನಾಶಮಾಡುವ ಔಷಧಿಗಳನ್ನು ಖಚಿತವಾಗಿ ಸೂಚಿಸುವ ಪಟ್ಟಿಗಳನ್ನು ಅಂಟಿಸಿ ಅವುಗಳನ್ನು ಉಪಯೋಗಿಸದಿರುವಾಗ ಬೀಗಹಾಕಿದ ಬೀರುಗಳಲ್ಲಿ ಇಟ್ಟಿರಬೇಕು.

(5) ಕಟ್ಟಡವನ್ನು ಬೊಕ್ಕಟವಾಗಿಟ್ಟಿರಬೇಕು. ಅಲ್ಲದೆ ಆಹಾರ ಶೇಖರಿಸುವ, ತಂಯಾರಿಸುವ ಮತ್ತು ವಿತರಣೆ ಮಾಡುವ ಕೊಠಡಿಗಳಲ್ಲಿ ಅವಶ್ಯಕತೆಗಿಂತ ಹೆಚ್ಚಾಗಿ ನೀರು ಶೇಖರಿಸಿ ಬಾರದು ಅಥವಾ ನಿಲ್ಲಲು ಅವಕಾಶ ಇರಬಾರದು.

(6) ಆಹಾರ ಶೇಖರಣೆಯ, ತಂಯಾರಿಸುವ, ವಿತರಣೆ ಮಾಡುವ ಕಪ್ಪು ಬಸಿಗಳನ್ನು ತೊಳೆಯುವ ಸ್ಥಳಗಳಲ್ಲಿಮತ್ತು ಕಟ್ಟಡದಲ್ಲಿನ ಶೌಚಗೃಹಗಳಲ್ಲಿ ಧಾರಾಳವಾಗಿ ಗಾಳಿ ಬೆಳಕು ಬರಲು ಅವಕಾಶವಿರಬೇಕು.

(7) ಕಟ್ಟಡದಲ್ಲಿ ಆಹಾರ ಶೇಖರಿಸುವ, ತಂಯಾರಿಸುವ, ಮತ್ತು ವಿತರಣೆ ಮಾಡುವ ಕೊಠಡಿಗಳಲ್ಲಿ ಕೆಲಸಗಾರರು ಮಲಗಬಾರದು ಮತ್ತು ಈ ಕೊಠಡಿಗಳು ಇತರ ಮಲಗುವ ಕೊಠಡಿ ಅಥವಾ ಶೌಚಗೃಹಕ್ಕೆ ನೇರ ಸಂಪರ್ಕ ಹೊಂದಿರಬಾರದು.

ನೀರು ಸರಬರಾಜು :—

(1) ಎಲ್ಲಾ ಆಹಾರ ವಿತರಣೆ ಮಂದಿರಗಳಲ್ಲಿ ಕುಡಿಯಲು ಯೋಗ್ಯವಾದ ನೀರನ್ನು ಯಥೇಚ್ಛವಾಗಿ ಒದಗಿಸಿರಬೇಕು, ಸಾಧ್ಯವಾದಲ್ಲಿ ನೀರನ್ನು ಸಾರ್ವಜನಿಕ ನೀರು ಸರಬರಾಜು ವ್ಯವಸ್ಥೆಯಿಂದ ಒದಗಿಸಬೇಕು.

ಹಾಗಿಲ್ಲದೆ ಇತರ ಮೂಲಗಳಿಂದ ಒದಗಿಸಬೇಕಾದಲ್ಲಿ ಅಂತಹ ಮೂಲವನ್ನು ರಾಸಾಯನಿಕ ಮತ್ತು ಬ್ಯಾಕ್ಟೀರಿಯಲಜಿಕ್ಕ ಪರೀಕ್ಷೆಗೆ ಒಳಪಡಿಸಿ ಆರೋಗ್ಯ ಇಲಾಖೆ ಕಾಲಕಾಲಕ್ಕೆ ಪಡೆದ ಬಳಿಕ ಉಪಯೋಗಿಸಬೇಕು.

(2) ಆಹಾರಪದಾರ್ಥಗಳನ್ನು ತಂಯಾರಿಸುವ ಮತ್ತು, ಕಪ್ಪು ಬಸಿ ಮುಂತಾದುವುಗಳನ್ನು ತೊಳೆಯುವ ಸ್ಥಳಗಳಲ್ಲಿ ಶಾಕಷುಷ್ಣ ಪ್ರಮಾಣದಲ್ಲಿ ಬಿಸಿ ಮತ್ತು ತಣ್ಣೀರನ್ನಾಗಲಿ ಅಥವಾ ತಕ್ಕಷುಷ್ಣ ಉಷ್ಣವಿರುವ ಬಿಸಿನೀರನ್ನಾಗಲಿ ಶಾಕಷುಷ್ಣ ಪ್ರಮಾಣದಲ್ಲಿ ಒದಗಿಸಬೇಕು.

(3) ವನ್ನು ತಂಯಾರಿಸಲು ಉಪಯೋಗಿಸುವ ನೀರು ಕುಡಿಯಲು ಯೋಗ್ಯವಾಗಿರಬೇಕು.

ಚರಂಡಿ ವ್ಯವಸ್ಥೆ :—

(1) ಕಟ್ಟಡದ ಎಲ್ಲಾ ಭಾಗಗಳಲ್ಲೂ ತಕ್ಕಷುಷ್ಣ ಚರಂಡಿ ವ್ಯವಸ್ಥೆ ಇರಬೇಕು. ಅಲ್ಲದೆ ಸಾಧ್ಯವಾದಲ್ಲಿ ಅದನ್ನು ಸಾರ್ವಜನಿಕ ಚರಂಡಿ ವ್ಯವಸ್ಥೆಗೆ ಕೊಡಿಸಿರಬೇಕು.

(2) ಎಲ್ಲಿ ಕಟ್ಟಡದ ಚರಂಡಿ ವ್ಯವಸ್ಥೆಯನ್ನು ಸಾರ್ವಜನಿಕ ಚರಂಡಿ ವ್ಯವಸ್ಥೆಗೆ ಕೊಡಿಸಲಾಗುವುದಿಲ್ಲವೊ ಅಂತಹ ಸಂದರ್ಭದಲ್ಲಿ ಕಟ್ಟಡದ ಚರಂಡಿ ನೀರಿನ ವಿಸರ್ಜನೆಯು ಆರೋಗ್ಯ ಕ್ರಮವು ಆರೋಗ್ಯ ಇಲಾಖೆಯು ಒಪ್ಪುವಂತೆ ಪಡೆದಿರಬೇಕು.

ವೈಯಕ್ತಿಕ ಸ್ವಚ್ಛತೆ ಅನುಕೂಲಗಳು :—

(1) ಆಹಾರ ವಸ್ತುಗಳ ವಿತರಣೆಯನ್ನು ನಿರ್ವಹಿಸುವಿಕೆಯಲ್ಲಿ ನಿರತರಾಗಿರುವ ಎಲ್ಲಾ ಕೆಲಸಗಾರರು ಕೈ ತೊಳೆಯಲು ಅನುಕೂಲವಾಗುವಂತೆ ಅವರಿಗೆ ಅನುಕೂಲವಾದ ಸ್ಥಳಗಳಲ್ಲಿ ಮತ್ತು ಶೌಚಗೃಹ ಮತ್ತು ಮೂತ್ರಗಳ ಪಕ್ಕದಲ್ಲಿ ಶಾಕಷುಷ್ಣ ಸಂಖ್ಯೆಯಲ್ಲಿ ಕೈತೊಳೆಯುವ ಬೇಸಿನ್‌ಗಳನ್ನು ಒದಗಿಸಬೇಕು.

ಇಂತಹ ಬೆರೋಗುಣಿಗಳನ್ನು ಆಹಾರ ಪದಾರ್ಥಗಳನ್ನು ತಯಾರಿಸುವ ಸ್ಥಳಗಳ ಪಕ್ಕದಲ್ಲಿ ಕಡ್ಡಾಯವಾಗಿ ಒದಗಿಸಬೇಕು. ಕೈ ತೊಳೆಯುವ ಬೊಗುಣಿಗಳಿಗೆ ಸಾಕಷ್ಟು ಬಿಸಿ ಮತ್ತು ತಣ್ಣನೀರಿನ ಅಥವಾ ತಕ್ಕಷ್ಟು ಬಿಸಿಯಿರುವ ನೀರನ್ನು ಒದಗಿಸುವುದಲ್ಲದೆ, ಉಪಯೋಗಿಸಿದ ನೀರು ಚರಂಡಿಗೆ ನೇರವಾಗಿ ವ್ಯವಸ್ಥಿತ ಮಾಡಬೇಕು. ಪ್ರತಿ ಬೊಗುಣಿಯ ಬಳಿ ಸಾಕಷ್ಟು ಸಾಬೂನು ಅಥವಾ ಪುಡಿ, ಉಗುರುಗಳನ್ನು ಸ್ವಚ್ಛಗೊಳಿಸುವ ಕುಂಚ, ಬೊಕ್ಕಟವಾದ ವಸ್ತ್ರಗಳನ್ನು ಒದಗಿಸಿರಬೇಕು.

(2) ವೈಯಕ್ತಿಕ ಸ್ವಚ್ಛತೆಯ ಈ ಅನುಕೂಲತೆಗಳನ್ನು ಮಹಿಳೆಯರಿಗೆ ಕೆಲಸಗಳಿಗೂ ಉಪಯೋಗಿಸಿಕೊಳ್ಳಬಾರದು.

ಶೌಚಗೃಹ ಮತ್ತು ಮೂತ್ರಗಳ ಸೌಲಭ್ಯ :—

(1) ಪುರುಷರಿಗೆ ಮತ್ತು ಸ್ತ್ರೀಯರಿಗೆ ಪ್ರತ್ಯೇಕವಾಗಿರುವಂತೆ ಎಲ್ಲಾ ಕೆಲಸಗಾರರ ಉಪಯೋಗಕ್ಕೆ ಶೌಚಗೃಹ ಮತ್ತು ಮೂತ್ರಗಳನ್ನು ಸಾಕಷ್ಟು ಸಂಖ್ಯೆಯಲ್ಲಿ ಒದಗಿಸಿರಬೇಕು. ಅಲ್ಲದೆ ಇವುಗಳಲ್ಲಿ ಸ್ವಚ್ಛತೆಯ ಅನುಕೂಲತೆಗೆ ಸಾಬೂನು ಮತ್ತು ಸ್ವಚ್ಛವಸ್ತ್ರಗಳನ್ನು ಸಾಕಷ್ಟು ಪ್ರಮಾಣದಲ್ಲಿ ಸದಾ ಒದಗಿಸಿರಬೇಕು.

(2) ಇಂತಹ ಸೌಲಭ್ಯಗಳ ಬಳಿ, ಇವುಗಳನ್ನು ಉಪಯೋಗಿಸುವವರು, ಇವನ್ನು ಉಪಯೋಗಿಸಿದ ಬಳಿಕ ತಮ್ಮ ಕೈಗಳನ್ನು ಬೊಕ್ಕಟವಾಗಿ ತೊಳೆಯಬೇಕೆಂಬ ಎಂಬುದನ್ನು ವಿಶದವಾಗಿ ಬರೆಸಿದ ತೂಗು ಹಲಗೆಗಳನ್ನು ಹಾಕಬೇಕು.

ಉಡುಪುಗಳು :—

(1) ಕೆಲಸಗಾರರು ತಮ್ಮ ಕೆಲಸದ ವೇಳೆಯಲ್ಲಿ ಉಪಯೋಗಿಸಿದಿರುವ ಉಡುಪುಗಳು ಮತ್ತು ಅವರ ಇತರ ಸ್ವಂತ: ಪದಾರ್ಥಗಳನ್ನಿಡಲು ಪ್ರತ್ಯೇಕವಾಗಿ ಸಾಕಷ್ಟು ಸ್ಥಳಾವಕಾಶ ಒದಗಿಸಿರಬೇಕು. ಕೆಲಸಗಾರರು ಇಂತಹ ಪ್ರತ್ಯೇಕ ಸ್ಥಳದಲ್ಲಿ ಅಲ್ಲದೆ ಇತರೆ ಸ್ಥಳಗಳಲ್ಲಿ ತಮ್ಮ ಉಡುಪುಗಳನ್ನಿಡಬಾರದು.

ಪ್ರಥಮ ಚಿಕಿತ್ಸಾ ಅನುಕೂಲತೆ :—

(1) ಆಹಾರ ತಯಾರಿಕೆ ಮತ್ತು ವಿತರಣೆಯಲ್ಲಿ ನಿರತರಾಗಿರುವವರಿಗೆ ಆವಶ್ಯಕಬದ್ದಲ್ಲಿ ಪ್ರಥಮ ಚಿಕಿತ್ಸೆ ಕೊಡಲು ಬೇಕಾದ ಗಾಯದ ಕಟ್ಟು ಪಟ್ಟಿಗಳು, ಔಷಧಿಗಳು, ಮತ್ತು ನಂಜು ನಿರೋಧಕಗಳನ್ನು ಸಾಕಷ್ಟು ಪ್ರಮಾಣದಲ್ಲಿ ಒದಗಿಸಬೇಕು.

(2) ಈ ಅನುಕೂಲತೆಗಳನ್ನು ಕೆಲಸಗಾರರಿಗೆ ಬೇಕಾದ ಸಮಯಕ್ಕೆ ದೊರಕುವಂತೆ ಅನುಕೂಲವಾದ ಸ್ಥಳಗಳಲ್ಲಿ ಇರಿಸಬೇಕು.

ಕಸ ಶೇಖರಣೆ :—

(1) ಕಸ ಮತ್ತು ಆಹಾರ ತುಣುಕುಗಳನ್ನು ಶೇಖರಿಸಲು ಗಟ್ಟಿಯಾದ ತೇವವನ್ನು ಹೀರದಂತಹ ಮತ್ತು ಭದ್ರವಾದ ಮುಚ್ಚಳಗಳಿರುವ ಸಾಕಷ್ಟು ಡಬ್ಬಿಗಳನ್ನು ಒದಗಿಸಬೇಕು.

(2) ಈ ಡಬ್ಬಿಗಳನ್ನು ಇಡಲು, ಆಹಾರ ಶೇಖರಿಸುವ ತಯಾರಿಸುವ ಮತ್ತು ವಿತರಣೆ ಮಾಡುವ ಸ್ಥಳಗಳನ್ನು ಬಿಟ್ಟು ಮಿಕ್ಕ ಸ್ಥಳಗಳಲ್ಲಿ ಸಾಕಷ್ಟು ಸ್ಥಳಾವಕಾಶ ಮಾಡಿರಬೇಕು.

ಆಹಾರ :—

(1) ಆಹಾರ ಪದಾರ್ಥಗಳನ್ನು ಶೇಖರಿಸುವಲ್ಲಿ, ತಯಾರಿಸುವಲ್ಲಿ, ಪ್ರದರ್ಶಿಸುವಲ್ಲಿ ಮತ್ತು ವಿತರಣೆ ಮಾಡುವಲ್ಲಿ ಆಹಾರವನ್ನು ಧೂಳು, ಸೊಣ, ಅಲ್ಲದೆ ಇತರ ಕ್ರಿಮಿಗಳು ಮತ್ತು ಇತರ ಕಲುಷಿತಗಳಿಂದ ರಕ್ಷಿಸಬೇಕು. ಆಹಾರ ತಯಾರಿಕೆ [illegible] ಕೆಲಸ ನಿರ್ವಹಿಸುವ ಕೆಲಸಗಾರರು, ಆಹಾರ ಕಲುಷಿತವಾಗದಂತೆ ಇರಲು ತಕ್ಕ ಕ್ರಮಗಳನ್ನು ತೆಗೆದುಕೊಳ್ಳಬೇಕು.

(2) ಹಸಿಮಾಂಸ, ಕೋಳಿ, ಮೀನು, ಹಾಲು, ಅಥವಾ ಇವುಗಳಿಂದ ಕೂಡಿದ ಬೇಯಿಸಿದ ತಯಾರಿಕೆಗಳು ಬೇಯಿಸಿದ ಆಹಾರ ಪದಾರ್ಥಗಳ ಸಂಪರ್ಕ ಪಡೆಯದಂತೆ ನೋಡಿಕೊಳ್ಳಬೇಕು. ಇಂತಹ ಹಸಿ ಪದಾರ್ಥಗಳು ಅಥವಾ ಬೇಯಿಸಿರುವ ಆಹಾರ ಪದಾರ್ಥಗಳಲ್ಲಿ ಕೆಲಸ ಮಾಡುವವರು ಇತರ ಬೇಯಿಸಿದ ಆಹಾರ ಪದಾರ್ಥಗಳನ್ನು ಮುಟ್ಟುವ ಮೊದಲು ತಮ್ಮ ಕೈಗಳನ್ನು ಸ್ವಚ್ಛವಾಗಿ ತೊಳೆದುಕೊಳ್ಳಬೇಕು. ಅಲ್ಲದೆ ಈ ಪದಾರ್ಥಗಳ ಸಂಪರ್ಕಪಡೆದಿರುವ ಪಾತ್ರೆಗಳು ಮತ್ತು ಇತರ ಸಲಕರಣೆಗಳನ್ನು ಸ್ವಚ್ಛವಾಗಿ ತೊಳೆಯಬೇಕು.

(3) ಹಾಲು ಅಥವಾ ಹಾಲಿನಿಂದ ತಯಾರಿಸಿದ ಪದಾರ್ಥಗಳು, ಮೊಟ್ಟೆ, ಮಾಂಸ ಕೋಳಿ, ಮೀನು ಅಥವಾ ರೋಗಕಾರಕ ಜೀವಾಣುಗಳ ಬೆಳವಣಿಗೆಗೆ ಅನುಕೂಲವಾದ ಪದಾರ್ಥಗಳಿರುವ ಆಹಾರ ಪದಾರ್ಥಗಳನ್ನು ತಯಾರಿಕೆ ಮತ್ತು ವಿತರಣೆ ಕಾಲವನ್ನು ಬಿಟ್ಟು ಇತರ ಸಮಯದಲ್ಲಿ ಶೀತ ಪೆಟ್ಟಿಗೆಯಲ್ಲಿಟ್ಟಿರಬೇಕು.

(4) ಹಸಿ ತರಕಾರಿ ಮತ್ತು ಹಣ್ಣುಗಳನ್ನು ಉಪಯೋಗಿಸುವ ಮೊದಲು ಸ್ವಚ್ಛವಾದ ಕುಡಿಯುವ ನೀರಿನಲ್ಲಿ ಚೆನ್ನಾಗಿ ತೊಳೆಯಬೇಕು.

(5) ಆಹಾರ ಪದಾರ್ಥಗಳನ್ನುಉಪಯೋಗಿಸುವ ಬರ್ಫವನ್ನು ಕುಡಿಯುವ ನೀರಿನಿಂದ ತಯಾರಿಸಿರಬೇಕು.

ಪರಿಕರಣಗಳು :—

1) ಆಹಾರ ಪದಾರ್ಥಗಳ ಸಂಪರ್ಕ ಹೊಂದಿರುವ ಅಥವಾ ಹೊಂದಬಹುದಾದಂತಹ ಎಲ್ಲಾ ಪರಿಕರಣಗಳನ್ನು ಸ್ವಚ್ಛವಾಗಿಟ್ಟಿರಬೇಕು ಅವುಗಳನ್ನು

ಅ) ಪೂರ್ಣವಾಗಿ ಸ್ವಚ್ಛಗೊಳಿಸಲು ಅನುಕೂಲವಾಗಿರುವಂತೆ

ಆ) ಅವು ಯಾವ ಪದಾರ್ಥವನ್ನು ಹೀರಿಕೊಳ್ಳದಂತೆ.

ಇ) ಮತ್ತು ಅವುಗಳಲ್ಲಿಟ್ಟ ಆಹಾರ ಪದಾರ್ಥಗಳು ಕಲುಷಿತವಾಗದ ಹಾಗೆ ಇರುವಂತೆ ಅವುಗಳನ್ನು ಸರಿಯಾದ ಸ್ಥಳದಲ್ಲಿಸುವುದಲ್ಲದೆ ಸರಿಯಾದ ದುರಸ್ತಿನಲ್ಲಿಡಬೇಕು.

(2) ಆಹಾರ ಪದಾರ್ಥಗಳನ್ನು ಮತ್ತು ಪರಿಕರಣಗಳನ್ನು ತೊಳೆಯಲು ಶಾಕಷ್ಟು ತೊಟ್ಟಿಗಳನ್ನು ಒದಗಿಸಿರಬೇಕು ಇಂತಹ ತೊಟ್ಟಿಗಳಿಗೆ ಅಥವಾ ತೊಳೆಯಲು ವ್ಯವಸ್ಥೆಮಾಡಿರುವ ಸಾಧನಗಳಿಗೆ ಶಾಕಷ್ಟು ತಣ್ಣೀರು ಮತ್ತು ಬಿಸಿನೀರನ್ನು ಅಥವಾ ತಕ್ಕಷ್ಟು ಬಿಸಿಯಾಗಿರುವ ನೀರನ್ನು ಮತ್ತು ಮೀನು, ಹಾಲು, ತರಕಾರಿಗಳನ್ನು ಮಾತ್ರ ತೊಳೆಯುವುದಾದರೆ ಶಾಕಷ್ಟು ತಣ್ಣೀರನ್ನು ಒದಗಿಸಬೇಕು. ಈ ಸಾಧನಗಳನ್ನು ಮತ್ತಿತರ ಕೆಲಸಗಳಿಗೂ ಉಪಯೋಗಿಸಬಾರದು.

(3) ಪರಿಕರಣಗಳನ್ನು ಮತ್ತು ಅವುಗಳ ಪರಿಸರವನ್ನು ಸ್ವಚ್ಛವಾಗಿಡುವ ರೀತಿಯಲ್ಲಿ

ಕೆಲಸಗಾರರು:—

(1) ಆಹಾರ ಪದಾರ್ಥಗಳನ್ನು ವಿತರಣೆ ಮಾಡುವವರು, ಅವುಗಳ ಸಂಪರ್ಕ ಹೊಂದುವವರು, ಅಥವಾ ಆಹಾರ ಪದಾರ್ಥಗಳ ತಯಾರಿಕೆ ಮತ್ತು ವಿತರಣೆ ಉಪಯೋಗಿಸುವ ಪಾತ್ರೆಗಳ ಸಂಪರ್ಕ ಪಡೆಯುವ ಕೆಲಸಗಾರರು,

ಅ) ಈ ಸಂಪರ್ಕ ಹೊಂದಬಹುದಾದಂತಹ ತಮ್ಮ ಶರೀರ ಭಾಗಗಳನ್ನು ಆದಷ್ಟು ಸ್ವಚ್ಛವಾಗಿಟ್ಟುಕೊಳ್ಳಬೇಕು. ಅದರಲ್ಲೂ ತಾನು ಕೆಲಸ ಮಾಡುವ ಮೊದಲು ಮತ್ತು ಶೌಚಗೃಹಕ್ಕೆ ಹೋಗಿಬಂದ ಮೇಲೆ ತನ್ನ ಕೈಗಳನ್ನು ಸ್ವಚ್ಛವಾಗಿ ತೊಳೆದುಕೊಳ್ಳಬೇಕು.

ಆ) ಬೆನ್ನಾಗಿ ಒಗೆದು ಸ್ವಚ್ಛಪಡಿಸಿದ ಉಡುಪುಗಳನ್ನು ಮತ್ತು ತಲೆಗೂದಲನ್ನು ಹಿಡಿತದಲ್ಲಿಡಲು ಸರಿಯಾದ ಟೋಪಿಯನ್ನು ಧರಿಸಬೇಕು.

ಇ) ತನ್ನ ಮೈಮೇಲೆ ಗಾಯಗಳಿದ್ದಲ್ಲಿ ಅವುಗಳನ್ನು ನೀರು ಹೀರದಂತಿರುವ ಗಾಯಪಟ್ಟಿನಿಂದ ರಕ್ಷಿಸಬೇಕು.

ಈ) ಆಹಾರ ವಿತರಣೆ ಮಾಡುವಾಗ, ತಯಾರಿಸುವಾಗ, ಪರಿಕರಣಗಳನ್ನು ಉಪಯೋಗಿಸುವಾಗ, ಅಥವಾ ಆಹಾರ ಪದಾರ್ಥಗಳಿರುವ ಕೊಠಡಿಗಳಲ್ಲಿರುವಾಗ ಕೆಲಸಗಾರರು ಉಗಿಯುವುದಾಗಲಿ ಅಥವಾ ಯಾವ ರೂಪದಲ್ಲಾಗಲಿ ಹೊಗೆಸೊಪ್ಪನ್ನು ಉಪಯೋಗಿಸಬಾರದು.

(2) ಯಾವುದಾದರೂ ಸೋಂಕು ಜಾಡ್ಯಗಳಿಂದ ನರಳುವವರು ಆಹಾರ ವಿತರಣಾ ಗೃಹಗಳಲ್ಲಿ ಕೆಲಸ ಮಾಡಬಾರದು. ಅಲ್ಲದೆ ಅಂತಹ ಗೃಹದ ಮೇಲ್ವಿಚಾರಣಾ ಅಂತಹವನನ್ನು ತಮ್ಮಲ್ಲಿ ಕೆಲಸ ಮಾಡಲು ಅಪ್ಪಣೆ ಕೊಡಬಾರದು. ಆಹಾರ ವಿತರಣೆಯಲ್ಲಿ ಕೆಲಸ ಮಾಡುವ ಕೆಲಸಗಾರರು ತಮ್ಮಲ್ಲಿ ಯಾವುದಾದರೂ ಸೋಂಕು ಜಾಡ್ಯದ ಚಿಹ್ನೆ ಕಂಡುಬಂದಲ್ಲಿ ಅಥವಾ ಸೋಂಕಿನ ಅನುಮಾನ ಬಂದಲ್ಲಿ ಅಥವಾ ಟೈಫಾಯಿಡ್, ಪ್ಯಾರಾಟೈಫಾಯಿಡ್, ಅಮಶಂಕೆ ಸೋಂಕಿನ ವಾಹಕರಾಗಿದ್ದಲ್ಲಿ ಕೂಡಲೇ ತಾನು ಕೆಲಸ ಮಾಡುವ ಸಂಸ್ಥೆಯಲ್ಲಿ ಮೇಲ್ವಿಚಾರಕರಿಗೆ ತಿಳಿಸಬೇಕು. ಮೇಲ್ವಿಚಾರಕರು ಈ ವಿಷಯವನ್ನು ಕೂಡಲೆ ಸಂಸ್ಥೆಯಲ್ಲಿ ಆರೋಗ್ಯಾಧಿಕಾರಿಗಳಿಗೆ ವರದಿ ಮಾಡಬೇಕು.

ಆಹಾರ ವಿತರಣಾ ಸಂಸ್ಥೆಗಳ ಅಡಿಗೆ ಕೋಣೆ ಮತ್ತು ಗಾಜಿನ ಪಾತ್ರೆಗಳಿಗೆ ಅನ್ವಯವಾಗುವ ನಿಯಮಗಳು

(1) ಟೈಫಾಯಿಡ್, ಪ್ಯಾರಾಟೈಫಾಯಿಡ್, ಅಮಶಂಕೆ, ಸೋಂಕಿನ ವಾಹಕರು, ಅಮಶಂಕೆ, ಭೇದಿ, ಸೋಂಕಿನಿಂದ ನರಳುತ್ತಿರುವ ಅಥವಾ ಬಿಕಿತೆ, ಪಡೆಯುತ್ತಿರುವ ಅಥವಾ ವಾಹಕರಾಗಲಿ ಅಥವಾ ಇತರ ಯಾವ ಸೋಂಕು ಜಾಡ್ಯಗಳಿಂದ ನರಳುತ್ತಿರುವವರನ್ನು ಆಹಾರ ವಿತರಣಾ ಸಂಸ್ಥೆಗಳಲ್ಲಿ ಯಾವ ಕೆಲಸಕ್ಕೂ ನೇಮಿಸಬಾರದು. ಅವರು ಆರೋಗ್ಯವಂತರಾಗಿರುವರೆಂದು ವೈದ್ಯರು ನಿರ್ಣಯಿಸುವವರೆವಿಗೂ ಕೆಲಸಕ್ಕೆ ತೆಗೆದುಕೊಳ್ಳಬಾರದು.

(2) ಅಡಿಗೆ ಕೋಣೆಯಲ್ಲಿ ಕೆಲಸ ಮಾಡುವ ಎಲ್ಲಾ ಕೆಲಸಗಾರರ ಪಟ್ಟಿಯನ್ನು ಅಡಿಗೆ ಕೋಣೆಯಲ್ಲಿ ತೂಗುಹಾಕಿರಬೇಕು. ಈ ಪಟ್ಟಿಯಲ್ಲಿ ಅವರಿಗೆ ರೋಗ ನಿರೋಧಕ ಚುಚ್ಚು ಹಾಕಿದ ತಾರೀಖು ಮತ್ತು ವೈದ್ಯಕೀಯ ಪರೀಕ್ಷೆ ಮಾಡಿದ ತಾರೀಖುಗಳನ್ನು ನಮೂದಿಸಿರಬೇಕು.

(3) ಅಡಿಗೆ ಮಾಡುವ ಕೆಲಸಗಾರರಿಗೆ ನಿಗದಿಯಾದ ವಿಶೇಷ ವಸ್ತ್ರಗಳನ್ನೊದಗಿಸಬೇಕು, ಕೆಲಸ ಮಾಡುವಾಗ ಮೇಲು ಜೊಂಡಿಕೆಯನ್ನು ಉಪಯೋಗಿಸುವಂತೆಯೂ ಕಡ್ಡಾಯಪಡಿಸಬೇಕು, ಅವುಗಳನ್ನು ಪ್ರತಿದಿನವೂ ಬಿಸಿನೀರಿನಲ್ಲಿ ಒಗೆದು

(4) ಪ್ರತಿ ಅಡಿಗೆ ಕೋಣೆಯಲ್ಲಿ ಗಾಬ್ರಾನು ಉಗುರು ತೊಳೆಯುವುದಕ್ಕೆ ಕುಂಚ, ಸ್ವಚ್ಛವಾದ ಕೈ ವಸ್ತ್ರಗಳು ಮತ್ತು ಸ್ವಚ್ಛವಾದ ನೀರನ್ನು ಒದಗಿಸಬೇಕು. ಅಡಿಗೆ ಮಾಡುವವರು ತಮ್ಮ ಕೈ ಉಗುರುಗಳನ್ನು ಮಚ್ಚುವಂತೆ ಕತ್ತರಿಸುವುದಲ್ಲದೆ, ಅಡಿಗೆ ಮಾಡುವ ಮೊದಲು ಮತ್ತು ಶೌಚಗೃಹಕ್ಕೆ ಹೋಗಿಬಂದ ಮೇಲೆ ತಮ್ಮ ಕೈಗಳನ್ನು ಸ್ವಚ್ಛವಾಗಿ ತೊಳೆಯಬೇಕು.

(5) ಅಡಿಗೆ ಕೆಲಸದವರ ಸ್ವಂತ ಉಡುಪುಗಳನ್ನಾಗಲಿ ಅಥವಾ ಅವರ ಇತರ ಸ್ವಂತ ಪದಾರ್ಥಗಳನ್ನಾಗಲಿ ಅಡಿಗೆ ಕೋಣೆಯಲ್ಲಿಡಲು ಅವಕಾಶಕೊಡಬಾರದು. ಅಲ್ಲದೆ ಅವರು ಅಡಿಗೆ ಕೋಣೆಯಲ್ಲಿ ತಲೆ ಬಾಚುವುದು, ತಮ್ಮ ಒಳ್ಳುಡುಪುಗಳನ್ನು ಒಗೆಯುವುದು ಅಥವಾ ಒಣಗಿಸುವುದನ್ನು ಮಾಡಲು ಅವಕಾಶ ಕೊಡಬಾರದು.

(6) ಅಡಿಗೆ ಕೋಣೆಯಲ್ಲಿ ಧೂಮಪಾನ ಮಾಡುವುದನ್ನು ನಿಷೇಧಿಸಬೇಕು.

(7) ತೊಳೆದು ಸ್ವಚ್ಛಪಡಿಸಿದ ಅಡಿಗೆ ಪಾತ್ರೆಗಳನ್ನು ಒರೆಸಲು ಸಾಕಷ್ಟು ಸ್ವಚ್ಛ ವಸ್ತ್ರಗಳನ್ನೊದಗಿಸುವುದು ಅಡಿಗೆ ಕೋಣೆಯ ಮೇಲ್ವಿಚಾರಕರ ಜವಾಬ್ದಾರಿಯಾಗಿರಬೇಕು. ಬಿಸಿ ಮತ್ತು ಮಸಿ ಪಾತ್ರೆಗಳನ್ನು ಹಿಡಿಯಲು ಉಪಯೋಗಿಸುವ ವಸ್ತ್ರಗಳನ್ನು ಪ್ರತ್ಯೇಕವಾಗಿ ಗುರುತಿಸುವಂತಿರಬೇಕು. ದಿನದ ಕೊನೆಯ ಊಟ ವಿತರಣೆಯಾದನ್ನು ಮಾಡಿದ ಬಳಿಕ ಈವರೆಲ್ಲಾ ವಸ್ತ್ರಗಳನ್ನು ಒಗೆಯಲು ಉಪಯೋಗಿಸುವ ಪೌಡ್ರ ಹಾಕಿದ ನೀರಿನಲ್ಲಿ ಚೆನ್ನಾಗಿ ಕುದಿಸಿ ಒಣಗಿಸಬೇಕು.

(8) ಅಡಿಗೆಗೆ ಉಪಯೋಗಿಸಿದ ಪಾತ್ರೆ ತಟ್ಟೆ ಮುಂತಾದುವುಗಳನ್ನು ದಿನದ ಕೊನೆಯ ಊಟ ವಿತರಣೆಯಾದ ಮೇಲೆ, ಅವುಗಳಲ್ಲಿರುವ ಜಿಡ್ಡನ್ನು ತೆಗೆದು ಸ್ವಚ್ಛವಾಗಿ ತೊಳೆದು ತೇವವಾಗಿರುವಾಗಲೇ ಒರೆಸಿ ಅವುಗಳ ಒಳಭಾಗದಲ್ಲಿ ಗಾಳಿಯಾಡುವಂತೆ ಮಾಡುಗಳಲ್ಲಿರಿಸಬೇಕು.

(9) ಅಡಿಗೆಗೆ ಉಪಯೋಗಿಸುವ ವಿಲ್ಲಾ ಪರಿಕರಣಿಗಳು ಎಂದರೆ ಮ್ಯಾಂಸ ಕತ್ತರಿಸುವ ಹಲಗೆ, ಇತರ ಹಲಗೆಗಳು ಚಮಚ, ಚಾಕು ಮುಂತಾದುವುಗಳು, ಅಲ್ಲದೆ ಅಡಿಗೆ ಮನೆಯಲ್ಲಿನ ತೊಳೆಯುವ ತಟ್ಟೆಗಳನ್ನು ದಿನದ ಕೊನೆಗಾದು ಊಟ ವಿತರಣೆಯಾದ ಬಳಿಕ ಸ್ವಚ್ಛವಾಗಿ ತೊಳೆಯಬೇಕು. ಪಾತ್ರೆಗಳು ಉಪಯೋಗದಲ್ಲಿಲ್ಲದಾಗ, ಬೇಕಾದಾಗ ವೀಕ್ಷಣೆಗೆ ಸಿಗುವಂತೆ ಅವುಗಳನ್ನು ನಿಗದಿಯಾದ ಸ್ಥಳದಲ್ಲಿರಿಸಬೇಕು.

(10) ತರಕಾರಿಗಳು ಮತ್ತು ಕತ್ತರಿಸಿದ ಹಣ್ಣುಗಳನ್ನು ಅಡಿಗೆಗೆ ಉಪಯೋಗಿಸುವ ಅಥವಾ ವಿತರಣೆ ಮಾಡುವ ಮೊದಲು ಒಂದು ಗ್ಯಾಲನ್ ನೀರಿಗೆ ಒಂದು ಟೀ ಚಮಚ ಬ್ಲೀಚಿಂಗ್ ಪುಡಿ ಬೆರೆಸಿದ ನೀರಿನಲ್ಲಿ ಚೆನ್ನಾಗಿ ತೊಳೆಯಬೇಕು.

(11) ಹಣ್ಣಿನ ಜೂರುಗಳು, ತರಕಾರಿ ಸಿಪ್ಪೆ ಮುಂತಾದ ಕಸದನ್ನು ನೆಲದ ಮೇಲೆ ಹಾಕದೆ ಮುಚ್ಚಿದ ಕಸದ ಪಬ್ಬಗಳಲ್ಲಿ ಹಾಕಬೇಕು.

(12) ಮ್ಯಾಂಸ ಕತ್ತರಿಸಲು ಅಥವಾ ಇತರ ಪಿಷ್ಟಾನ ಪದಾರ್ಥಗಳನ್ನು ಉಪಯೋಗಿಸುವಾಗ ಅದಕ್ಕೆ ನಿಗದಿ ಮಾಡಿದ ಹಲಗೆಗಳನ್ನೆ ಉಪಯೋಗಿಸಬೇಕು.

(13) ಕೆಲಸಗಾರರ ತಿಂಗಳ ಸಂಬಳದ ಪಟ್ಟಿಯನ್ನು ಅಡಿಗೆ ಮನೆಯಲ್ಲಿ ಪ್ರದರ್ಶಿಸಬೇಕು.

(14) ಅಡಿಗೆಗೆ ಉಪಯೋಗಿಸುವ ಸಾಧನಗಳಲ್ಲಿ ಅಥವಾ ಪಾತ್ರೆಗಳಲ್ಲಿ ತೊಂದರೆ ಇದ್ದಲ್ಲಿ ಮೇಲ್ವಿಚಾರಕರು ಕೂಡಲೇ ನಿರ್ವಹಣಗಾರರಿಗೆ ತಿಳಿಸಬೇಕು. ಅವರು ಅಂತಹ ತೊಂದರೆಯನ್ನು ಕೂಡಲೆ ದುರಸ್ತು ಪೂರೈಸಲು ಕ್ರಮ ತೆಗೆದುಕೊಳ್ಳಬೇಕು.

(15) ಅಡಿಗೆ ಮನೆಯ ನೆಲವನ್ನು ಪ್ರತಿದಿನವೂ ಚೆನ್ನಾಗಿ ಉಜ್ಜಿ ತೊಳೆದು ಒಣವಸ್ತ್ರ ದಿಂದ ಚೆನ್ನಾಗಿ ಒರೆಸಬೇಕು.

(16)ಅಡಿಗೆ ಮತ್ತು ಊಟದ ಕೋಣೆಗಳಲ್ಲಿ ವಾರಕೊಮ್ಮೆಯಾದರು ಬಾರಿ ಶೇ. 0.5 ರಷ್ಟು ಡಿ.ಡಿ.ಟಿ. ಕ್ರಿಮಿನಾಶಕ ಸಿಂಪಡಿಸಬೇಕು. ಮತ್ತು ಪ್ರತಿದಿನವೂ ಬೆಳಿಗ್ಗೆ 10 ಗಂಟೆಯಿಂದ 12 ಗಂಟೆಯ ಒಳಗೆ ಶೇ.0.1 ರಷ್ಟು ಪೈರಿಥ್ರಂ ದ್ರಾವಣವನ್ನು ಸಿಂಪಡಿಸಿ ಮಧ್ಯಾಹ್ನದ ಊಟ ವಿತರಣೆ ಸಮಯದ ವರೆಗೆ ಕಿಟಕಿ, ಬಾಗಿಲುಗಳನ್ನು ಮುಚ್ಚಿರಬೇಕು.

(17)ಊಟದ ಮತ್ತು ಕುಡಿಯಲು ಉಪಯೋಗಿಸುವ ಪಾತ್ರೆಗಳನ್ನು ಸ್ವಚ್ಛವಾಗಿ ತೊಳೆದು ಗಲಬರಿಗಲು ಮತ್ತು ಅಜೀರ್ವಿಕರಣಗೊಳಿಸಲು ಸಾಕಷ್ಟು ತಿನು ಕೂಲತೆಗಳನ್ನೊದಗಿಸಬೇಕು. ಈ ರೀತಿ ಅಜೀರ್ವಿಕರಣಗೊಳಿಸಲು ಒಂದು ಗ್ಯಾಲನ್ ನೀರಿಗೆ ಒಂದು ಟೀ ಚಮಚ ಬ್ಲೀಚಿಂಗ್ ಪುಡಿ ಬೆರಸಿದ ನೀರು ಸುರಕ್ಷಿತವಾದುದು.

—:—:—:—

ಆಹಾರ ವಿತರಣಾ ಮಂದಿರಗಳಲ್ಲಿ ಅಡಿಗೆ ಕೋಣೆಯಲ್ಲಿ ಕೆಲಸ ಮಾಡುವವರಿಗೆ ಸೂಚನೆಗಳು :—

(1) ವೈಯುಕ್ತಿಕ ತೋರಿಕೆ (ಚಹರೆ)

ಉಡುಪು :— ಕೆಲಸ ಮಾಡುವ ಕಾಲದಲ್ಲಿ ಸ್ವಚ್ಛವಾದ ಸಮವಸ್ತ್ರ ಮತ್ತು ಟೋಪಿಗಳನ್ನು ಧರಿಸಿರಬೇಕು, ಸಮವಸ್ತ್ರಗಳಿಲ್ಲದೆ ಯಾರನ್ನೂ ಕೆಲಸ ಮಾಡಲು ಬಿಡಬಾರದು.

(2) ವೈಯುಕ್ತಿಕ ಸ್ವತ್ತುಗಳು ಮತ್ತು ಸ್ವಚ್ಛತೆ:—

ಅ) ಕೋಟು, ಪಾದರಕ್ಷೆ ಮುಂತಾದ ಸ್ವಂತ ಉಡುಪುಗಳನ್ನು ಅವಕ್ಕೆ ನಿಗದಿಯಾದ ಸ್ಥಳದಲ್ಲಿಡಬೇಕು.

ಆ) ಕೈಗಳು ಮತ್ತು ಕೈ ಉಗುರುಗಳನ್ನು ಕೆಲಸ ಮಾಡಲು ಮುಂಚೆ ಸ್ವಚ್ಛವಾಗಿ ತೊಳೆದುಕೊಳ್ಳಬೇಕು.

ಇ) ಅಡಿಗೆಮಾಡುವಾಗ ಮುಖ, ಕೂದಲುಗಳನ್ನು ಮುಟ್ಟಬಾರದು. ಅದು ಅನಿವಾರ್ಯ ವಾದರೆ ಮುಟ್ಟಿದ ಕೂಡಲೇ ಕೈಗಳನ್ನು ಸ್ವಚ್ಛವಾಗಿ ತೊಳೆದುಕೊಳ್ಳಬೇಕು.

ಈ) ಕೆಲಸ ಮಾಡುವಾಗ ಅತ್ತಿಂದಿತ್ತ ಓಡಾಡುವುದನ್ನು ಕನಿಷ್ಠವಾಗಿರುವಂತೆ ಮಾಡಬೇಕು. ಅಲ್ಲದೆ ಕೆಲಸಕ್ಕೆ ಎಷ್ಟು ಬೇಕೋ ಅಷ್ಟೇ ಸಂಭಾಷಣೆ ಮಾಡಬೇಕು.

(3) ಕೆಲಸ ಮಾಡುವುದಕ್ಕೆ ತಯಾರಿಕೆ:—

ಕೈಗಳನ್ನು ಸ್ವಚ್ಛವಾಗಿ ತೊಳೆದು ಸ್ವಚ್ಛ ವಸ್ತ್ರಗಳಲ್ಲಿ ಒರೆಸಬೇಕು.

ಕೆಲಸದ ವ್ಯವಸ್ಥೆ (ವಿಧಾನ)

ಅ) ಕೆಲಸಕ್ಕೆ ಬೇಕಾದ ಪಾತ್ರೆ ಮತ್ತು ಇತರ ಪರಿಕರಗಳನ್ನು ಒಮ್ಮೆಗೆ ಒಂದು ಕಡೆಇಟ್ಟು ಕೊಳ್ಳಬೇಕು.

ಆ) ಪಾತ್ರೆಗಳನ್ನು ಬೇಗನೆ ಉಪಯೋಗಿಸಬೇಕು.

ಇ) ಕೆಲಸದ ಸ್ಥಳವನ್ನು ಚೊಕ್ಕಟವಾಗಿಡಬೇಕು.

ಈ) ಎಲ್ಲಾ ಧಾನ್ಯ ಮತ್ತು ತರಕಾರಿಗಳನ್ನು ಅಡಿಗೆಗೆ ಮುಂಚೆ ಸ್ವಚ್ಛಮಾಡಬೇಕು.

ಉ) ಕಟ್ಟಿಗೆ ಅಥವಾ ಉರಿಸಲು ಉಪಯೋಗಿಸುವ ವಿಷಯದಲ್ಲಿ ಎಚ್ಚರವಾಗಿರಬೇಕು.

ಊ) ಉಪಯೋಗಿಸದಿದ್ದ ಪದಾರ್ಥಗಳನ್ನು ಉಗ್ರಾಣಕ್ಕೆ ಹಿಂದಿರುಗಿಸಬೇಕು.

ಎ) ಮೇಲ್ವಿಚಾರಕರ ಅಡಿಗೆ ಮನೆಯ ಕೆಲಸಗಳೆಲ್ಲಾ ಮುಗಿದು ಅದನ್ನು ಸ್ವಚ್ಛ ಪಡಿಸಿದ ಮೇಲೆ ಅಡಿಗೆ ಮನೆಯನ್ನು ಬಿಡಬೇಕು. ಅಲ್ಲದೆ ಅಡಿಗೆ ಮನೆಯಲ್ಲಿ ಏನಾದರೂ ಒಡೆದರೆ ಅಥವಾ ದುರಸ್ತುಬೇಕಾದರೆ ವ್ಯವಸ್ಥಾಪಕರಿಗೆ ಕೂಡಲೇ ವರದಿಮಾಡಬೇಕು.

ಪಾತ್ರೆ ಮುಂತಾದುವುಗಳನ್ನು ತೊಳೆಯುವಿಕೆ :—

ಅ) ಎಲ್ಲಾ ಮುಸರೆ ಪಾತ್ರೆಗಳನ್ನು ಒಟ್ಟು ಹಾಕಬೇಕು.

ಆ) ಎಲ್ಲಾ ಮುಸರೆ ಪಾತ್ರೆಗಳನ್ನು ಬಿಸಿಯಾದ ಸೋಪುನೀರಿನಲ್ಲಾಗಲಿ ಅಥವಾ ಓಲೆಯ ಬೂದಿಯನ್ನುಪಯೋಗಿಸಿ ತೊಳೆಯಬೇಕು. ಪಾತ್ರೆ ತೊಳೆಯಲು ಮಣ್ಣನ್ನು ಉಪಯೋಗಿಸಬಾರದು.

ಇ) ಪಾತ್ರೆ ಪಡಗಗಳನ್ನು ಸ್ವಚ್ಛವಾಗಿ ತೆರೆದು ತೊಳೆಯಬೇಕು.

ಈ) ಪಾತ್ರೆಗಳನ್ನು ಕಾಲಮಾಡಿ ನೀರಿನಲ್ಲಿ ಚೆನ್ನಾಗಿ ನೆನೆಸಬೇಕು.

ಉ) ಪಾತ್ರೆ ಪರಿಕಾರಗಳನ್ನು ಸ್ವಚ್ಛವಾಗಿ ತೊಳೆದು ಒಂದೇ ರೀತಿಯ ಪಾತ್ರೆಗಳನ್ನು ಒಟ್ಟು ಹಾಕಬೇಕು.

ಊ) ಮುಸುರೆ ಪಾತ್ರೆಗಳನ್ನು ಮತ್ತು ಪರಿಕರಣಗಳನ್ನು ಶರಿಯಾದ ಸ್ಥಳದಲ್ಲಿಟ್ಟು ಆದಷ್ಟು ಅತ್ಯಂದಿತ್ತಹೆಬ್ಬ ಓಡಾಡುವುದನ್ನು ತಪ್ಪಿಸಬೇಕು.

ಎ) ಎಲ್ಲಾ ಸಾಮಾನುಗಳನ್ನು ಶರಿಯಾದ ಸ್ಥಿತಿಯಲ್ಲಿಟ್ಟಿರಬೇಕು. ಕಟ್ಟಿಗಳನ್ನು ಸ್ವಚ್ಛವಾಗಿ ತೊಳೆದು ಒಳಗೂ ಹೊರಗೂ ಒರೆಸಿಇಡಬೇಕು.

ಆಹಾರ ವಿವರಣಾಗಾರರ ಸ್ವಚ್ಛತೆಯ ನಿಯಮಗಳು :—

(9) ಕೈಗಳನ್ನು ಆಗಾಗ್ಗೆ ಅದರಲ್ಲಾ ಮುಖ್ಯವಾಗಿ ಶೌಚಗೃಹಕ್ಕೆ ಹೋಗಿ ಬಂದಮೇಲೆ ಸ್ವಚ್ಛವಾಗಿ ತೊಳೆಯಿಬೇಕು.

ಅ) ಆಹಾರ ವಸ್ತುಗಳನ್ನು ಆವಶ್ಯಕತೆಗಿಂತ ಹೆಚ್ಚಾಗಿ ಮುಟ್ಟಬಾರದು.

ಆ) ಆಹಾರ ವಿತರಣೆ ಮಾಡುವಾಗ ಶರೀರದ ಮೇಲಿರುವ ಗಾಯಗಳನ್ನು ಕೀವಹೀರದಂತಹ ಗಾಯಪಟ್ಟಿದಳಿಂದ ಮುಚ್ಚಿರಬೇಕು.

ಇ) ಆಹಾರ ಪದಾರ್ಥಗಳನ್ನು ಶೇಖರಿಸಿರುವಾಗ ಅವನ್ನು ತಂಪಾಗಿಟ್ಟಿರಬೇಕು. (ಹಿಮ ಪೆಟ್ಟಿಗೆಗಳಲ್ಲಿಡುವುದು ಉತ್ತಮ). ಬೇಯಿಸಿದ ಮಾಂಸ, ಮಾಂಸದ ಸಾರು ಮತ್ತು ಹಾಲಿನ ಕೆರೆ ಬೆರೆಸಿ ತಯಾರಿಸಿದ ಆಹಾರ ವಸ್ತುಗಳನ್ನು ತಂಪಾಗಿಡುವುದು ಮುಖ್ಯ.

ಈ) ಆಹಾರ ವಿಷತೆಗೆ ಕಾರಣವಾದಂತಹ ಜೀವಾಣುಗಳನ್ನು ಬೆಳವಣಿಗೆಗೆ ಅನುಕೂಲ ಮಾಡುವ ಮಾಂಸ, ಬಾತುಮೊಟ್ಟೆ ಮುಂತಾದುವುಗಳನ್ನು ಚೆನ್ನಾಗಿ ಬೇಯಿಸಬೇಕು.

ಉ) ಆಹಾರ ಪದಾರ್ಥಗಳನ್ನು ನೊಣ, ಇಲಿ ಮತ್ತು ಇತರಕ್ರಿಮಿ ಕೀಟಗಳಿಂದ ರಕ್ಷಿಸಬೇಕು.

ಊ) ಆಹಾರ ಪಾನೀಯಗಳ ವಿತರಣೆಯಲ್ಲಿ ಉಪಯೋಗಿಸುವ ಎಲ್ಲಾ ಪಾತ್ರೆಗಳನ್ನು ಸ್ವಚ್ಛವಾಗಿ ಬಿಸಿಯಾದ ಶುದ್ಧಾಸು ನೀರಿನಿಂದ ತೊಳೆದು ಮರಳುವ ನೀರಿನಲ್ಲಿ ಗಲಬರಿಸಿಡಬೇಕು.

ಆಹಾರ ವಿತರಣಾ ಗೃಹಗಳ ಸ್ವಚ್ಛತೆ ನಿಯಮಗಳು :—

ಕೆಲಸದ ಸ್ಥಳ :—

1) ಕೆಲಸ ಮಾಡುವ ಸ್ಥಳ ಮತ್ತು ಅದರಲ್ಲಿನ ಇತರ ಭಾಗಗಳನ್ನು ಸ್ವಚ್ಛವಾಗಿ ತೊಳೆಯುಲು ಅನುಕೂಲವಾಗುವಂತೆ ಕಟ್ಟಬೇಕು.

2) ಇಡೀ ಕಟ್ಟಡವು ಸುಲಭವಾಗಿ ಕೆಲಸಮಾಡಲು ಮತ್ತು ಅನಾವಶ್ಯಕವಾಗಿ ಓಡಾಡಲು ತೊಂದರೆಯಾಗದಂತೆ ವಿಶಾಲವಾಗಿರಬೇಕು.

3) ಆಡಿಗೆಯ ಪದಾರ್ಥಗಳನ್ನು ಗೋಡೆಯಿಂದ ಸ್ವಲ್ಪ ಸ್ಥಳಬಿಟ್ಟು ಜೋಡಿಸಬೇಕು. ಇದರಿಂದ ಗೋಡೆಯ ಪಕ್ಕ ಮತ್ತು ಪಾತ್ರೆಗಳನ್ನು ಚೊಕ್ಕವಾಡಲು ಅನುಕೂಲವಾಗುವುದು.

4) ನೆಲದಲ್ಲಿ ಬಿರುಕುಗಳಿಬಾರದು; ಎಲ್ಲಾ ಸಂದುಗಳನ್ನು ಮುಚ್ಚಿರಬೇಕು. ತೇವಹೀರದಂತೆ ಮತ್ತು ಜಾರಿಕೆ ಇಲ್ಲದೆ ಸುಲಭವಾಗಿ ತೊಳೆಯುವಂತಿರಬೇಕು, ನೆಲವು ನೀರು ಹೊರಗೆ ಹೋಗುವ ರಂದ್ರದ ಕಡೆಗೆ ಸ್ವಲ್ಪ ಇಳಿಜಾರಾಗಿರಬೇಕು.

5) ಗೋಡೆಗಳು ಭದ್ರವಾಗಿ ಕಟ್ಟಡವು ನೀರು ಹೀರದಂತೆ, ನುಣುಪಾಗಿ ಸ್ವಚ್ಛವಾಗಿ ತೊಳೆಯುಲು ಅನುಕೂಲವಾಗಿರಬೇಕು.

6) ಸೂರು ಧೂಳುರಹಿತವಾಗಿ ಮತ್ತು ಬಿರುಕುಗಳಿಲ್ಲದಂತಿರಬೇಕು.

7) ಕಟ್ಟಡವನ್ನು ಶರಿಯಾದ ದುರಸ್ತಿನಲ್ಲಿಟ್ಟು ಕ್ರಿಮಿ ಕೀಟಗಳು ಸೇರಲು ಅವಕಾಶವಿಲ್ಲದಂತೆ ರಕ್ಷಣೆ ಇರಬೇಕು.

8) ಕಟ್ಟಡದ ಒಳಗೆ ರಷಿತವಾದ ಜರಂಡಿ ವ್ಯವಸ್ಥೆ ಇರಬೇಕು. ಅಂಗಳವು ನೀರು ಹೀರದಂತೆ ಸಮತಟ್ಟಾಗಿದ್ದು ನೀರು ಹರಿದು ಹೋಗಲು ಅವಕಾಶವಿರಬೇಕು.

9) ಅಡಿಗೆ ಕೋಣೆ, ತೊಳೆಯುವ ಸ್ಥಳ, ಶಾಚಗೃಹ ಮತ್ತಿತರ ಸ್ಥಳಗಳಲ್ಲಿ ಕುಡಿಯಲು ಯೋಗ್ಯವಾದ ನೀರನ್ನು ಸಾಕಷ್ಟು ಪ್ರಮಾಣದಲ್ಲಿ ಕೊಳಾಯಿಗಳಿಂದ ಒದಗಿಸಬೇಕು.

10) ಕಪ್ಪು ಬಸಿ ಮುಂತಾದ ಪರಿಕರಣಗಳನ್ನು ತೊಳೆದು ಸ್ವಚ್ಛಪಡಿಸಲು ಅನುಕೂಲವಾಗುವಂತೆ ಸುಮಾರು 170 ಡಿಗ್ರಿ ಫ್ಯಾರನ್‌ಹೀಟ್‌ಷ್ ಶಾಖವಿರುವ ಬಿಸಿನೀರನ್ನು ಒದಗಿಸಬೇಕು.

11) ಆಹಾರ ಪದಾರ್ಥಗಳನ್ನು ತಂಪಾಗಿರಿಸುವ ಸ್ಥಳದಲ್ಲಿ ಸಾಕಷ್ಟು ಬೆಳಕಿರುವಂತೆ ವ್ಯವಸ್ಥೆಮಾಡಿರಬೇಕು.

12) ಅಡಿಗೆ ಕೋಣೆಯಲ್ಲಿ ಸಾಕಷ್ಟು ಗಾಳಿಸಂಚಾರಕ್ಕೆ ಅವಕಾಶವಿರಬೇಕು.

13) ಕೆಲಸಗಾರರು ತಮ್ಮ ಸ್ವಂತ: ವಸ್ತ್ರಗಳನ್ನಿಡಲು ಮತ್ತು ಸಮವಸ್ತ್ರಗಳಿಗೆ ಬದಲಾಯಿಸಲು ಪ್ರತ್ಯೇಕವಾದ ಮತ್ತು ಸಾಕಷ್ಟು ದೊಡ್ಡದಾದ ಕೊಠಡಿಯನ್ನು ಅಡಿಗೆ ಕೋಣೆಗೆ ಸಾಕಷ್ಟು ಹತ್ತಿರದಲ್ಲಿರಬೇಕು.

14) ಕೆಲಸಗಾರರಿಗೆ ಸಾಕಷ್ಟು ಶಾಚಗೃಹಗಳಿರಬೇಕು. ಅಲ್ಲದೆ ಅವುಗಳು ಬೆಳಕು ಬೆನ್ನಾಗಿ ಬರುವಂತಿದ್ದು ಸ್ವಚ್ಛವಾಗಿಟ್ಟಿರಬೇಕು.

15) ಶಾಚಗೃಹಗಳ ಪಕ್ಕದಲ್ಲಿ ಅಡಿಗೆ ಕೋಣೆಯಲ್ಲಿ ಮತ್ತು ಇತರ ಅನುಕೂಲ ಸ್ಥಳಗಳಲ್ಲಿ ಕೈತೊಳೆಯಲು ಸಾಕಷ್ಟು ಅನುಕೂಲತೆ ಇರಬೇಕು. ಕೈ ತೊಳೆಯುವ ಸ್ಥಳಗಳನ್ನು ಸ್ವಚ್ಛವಾಗಿಟ್ಟಿದ್ದು ತಣ್ಣೀರು ಮತ್ತು ಬಿಸಿನೀರಿನ ಶೌಲಭ್ಯದೊಂದಿಗೆ ಸಾಬೂನು, ಉಗುರು ತೊಳೆಯುವ ಕುಂಚಗಳು ಮತ್ತು ಕೈವಸ್ತ್ರಗಳನ್ನಿಟ್ಟಿರಬೇಕು.

ಪರಿಕರಣಗಳು :—

1) ಕಸ ಆಹಾರ ತುಣುಕುಗಳು ಮುಂತಾದುವುಗಳನ್ನು ಹಾಕಲು ತೀವ್ರಹೀರದಂತಹ ಮುಚ್ಚಳ ವಿರುವ ಡಬ್ಬಗಳನ್ನು ಸಾಕಷ್ಟು ಸಂಖ್ಯೆಯಲ್ಲಿ ಅಡಿಗೆ ಮಾಡುವ ಸ್ಥಳವನ್ನು ಬಿಟ್ಟು ಬೇರೆ ಸ್ಥಳಗಳಲ್ಲಿ ಇರಿಸಬೇಕು.

2) ವಿತರಣೆ ಮಾಡುವ ಆಹಾರ ಪದಾರ್ಥಗಳನ್ನಿರಿಸಲು ತೀವ್ರಹೀರದಂತಹ ಪದಾರ್ಥಗಳಿಂದ ಕಟ್ಟಿದ ಅಟ್ಟಲಿಗೆಗಳಿರಬೇಕು. ತರಕಾರಿಗಳನ್ನು ಬಿಟ್ಟು ಬಿಡಿಸ್ಕವುಗಳನ್ನು ಮುಚ್ಚಿಡಬೇಕು.

3) ಆಹಾರ ಪದಾರ್ಥಗಳನ್ನು ಅದರಲ್ಲಾ ದಿನವಹಿ ಉಪಯೋಗಿಸುವವುಗಳನ್ನು ಇಡಲು ತಂಪಾದ ಬೀರುವಿರಬೇಕು.

4) ಮೇಜು ಮತ್ತು ಬೆಂಚುಗಳ ಮೇಲೆ ಕೈನೀರನ್ನು ಹೀರದಂತಿದ್ದು ಬಿರುಕುಗಳಿಲ್ಲದಿರಬೇಕು.

5) ಪಾತ್ರೆಗಳನ್ನು ಇಡಲು ಸಾಕಷ್ಟು ಬೀರುಗಳಾಗಿರಬೇಕು ಕಪ್ಪು ಬಸಿ, ತಟ್ಟೆಗಳು, ಚಾಕು ಮುಚ್ಚಿತಾದುವುಗಳನ್ನು ಮುಚ್ಚಿದ ಬೀರುಗಳಲ್ಲಾ ಮತ್ತು ಬಡಿಸಲು ಉಪಯೋಗಿಸುವ ಪಾತ್ರೆಗಳನ್ನಿಡಲು ತಕ್ಕ ಅಟ್ಟಣಿಗೆಗಳಿರಬೇಕು.

6) ತರಕಾರಿಗಳನ್ನು ತೊಳೆದು ಸಿದ್ಧಪಡಿಸಲು ಬೇರೆ ಬಚ್ಚಲುಗಳಿರಬೇಕು.

7) ಒಲೆಯ ಶಾಖ, ಹೊಗೆ ಮತ್ತು ಆವಿಯನ್ನು ಹೊರಹೋಗಲು ಸರಿಯಾದ ವಿಧಾನಗಳನ್ನು ಅವಶ್ಯಕವಾದ ಸ್ಥಳಗಳಲ್ಲಿರಬೇಕು.

8) ಪಾತ್ರೆಗಳನ್ನು ತೊಳೆದು ಮರಳುವ ನೀರಿನಲ್ಲಿ ಸ್ವಚ್ಛಪಡಿಸಲು ಸಾಕಷ್ಟು ಉಪಕರಣಗಳಿರಬೇಕು ಪಾತ್ರೆ ತೊಳೆಯುವ ಯಂತ್ರವಿದ್ದಲ್ಲಿ ಅದು ಪಾತ್ರೆಗಳನ್ನೂ ಸ್ವಚ್ಛವಾಗಿ ತೊಳೆಯುವಂತೆ ಇಟ್ಟಿರಬೇಕು. ಪಾತ್ರೆಗಳನ್ನು ಕೈಇತರ ರೀತಿಯಲ್ಲಿ ತೊಳೆಯಲು ಈ ಕೆಳಕಂಡ ಕನಿಷ್ಠ ಅನುಕೂಲತೆಗಳಿರಬೇಕು.

ಅ) ಪಾತ್ರೆಗಳನ್ನು ತಣ್ಣಗಿನ ಮರು ಬಿಸಿನೀರಿನಲ್ಲಿ ತೊಳೆಯಲು ಸಾಕಷ್ಟು ತೊಟ್ಟಿಗಳಿರಬೇಕು.

ಆ) ತೊಳೆದ ಪಾತ್ರೆಗಳನ್ನು ಮರಳುವ ನೀರಿನಲ್ಲಿ ಸ್ವಚ್ಛವಾಗಲು ತಕ್ಕಂತೆ ಬೇರೆ ತೊಟ್ಟಿಗಳಿರಬೇಕು. ಈ ತೊಟ್ಟಿಗಳಿಗೆ ನೀರು ಸರಬರಾಜು ಬೇರೆ ಇದ್ದು ಆ ನೀರಿನ ಶಾಖವನ್ನು 170 ಡಿಗ್ರಿ ಫ್ಯಾರನ್ ಹೀಟ್ ರಷ್ಟಾದರೂ ಇರುವಂತೆ ಅನುಕೂಲವಿರಬೇಕು.

ಇ) ಪಾತ್ರೆಗಳನ್ನಿಟ್ಟು ಮರಳುವ ನೀರಿನಲ್ಲಿ ಅದಿದ್ದು ಸ್ವಚ್ಛಪಡಿಸಲು ಅನುಕೂಲವಾಗುವಂತೆ ಹಿಡಿಯುಳ್ಳ ಲೋಹದ ಪತ್ರಿಕೆಗಳು ಇರಬೇಕು.

(9) ಈ ಗಾಳಿಯಲ್ಲಿ ಪಾತ್ರೆಗಳು ತೇವವಾಗಿಸಲು ಅನುಕೂಲವಾಗುವಂತೆ ಸಾಕಷ್ಟು ಅಟ್ಟಣಿಗಳು, ಕೊಕ್ಕೆಗಳು ಅಥವಾ ಪತ್ರಿಗೆಗಳು ಇರಬೇಕು.

(10) ಒಡೆದುಹೋದ, ಬಿರುಕುಬಿಟ್ಟ ಅಥವಾ ಜೂರುಬಿಟ್ಟ ಕಪ್ಪು ಬಸಿಗಳನ್ನು ಬದಲಿಗೆ ಉಪಯೋಗಿಸಲು ಮತ್ತು ಹೆಚ್ಚು ಒತ್ತಡದ ಸಮಯದಲ್ಲಿ ಅವಶ್ಯಕವಾಗಿ ಸ್ವಚ್ಛ ಮಾಡಿದವುಗಳನ್ನು ಉಪಯೋಗಿಸುವುದನ್ನು ತಪ್ಪಿಸಲು ಸಾಕಷ್ಟು ಕಪ್ಪು ಬಸಿ, ಚಾಕು ಮುಂತಾದುವುಗಳನ್ನು ಕಾಯ್ದು ಇಟ್ಟಿರಬೇಕು.

(11) ಕೆಲಸಗಾರರಿಗೆ ಸಾಕಷ್ಟು ಟೋಪಿ, ಮೇಲ್ಬಟ್ಟೆ, ತೊಳೆಯಲು ಉಪಯೋಗಿಸುವ ಸಾಧನಗಳನ್ನು ಒದಗಿಸಬೇಕು.

(12) ಸಂಶ್ಲಿಂಯ ವಹಿವಾಟಿಕೆಗೆ ತಕ್ಕ ಆಕಾರದ ಹಿಮಪೆಟ್ಟಿಗೆಯೊಗಲು ಅಥವಾ ತಂಪುಕೋಣೆಯೊಗಲು ಇರಬೇಕು. ಮತ್ತು ಈ ಸಾದನಗಳ ಶಾಖವನ್ನು ಸರಿಯಾಗಿ ಇಡುವ ಸಾಧನವಿರಬೇಕು. (ತಂಪು ಕೋಣೆ ಶಾಖವು 40 ಡಿಗ್ರಿ ಫ್ಯಾರನ್-ಹೀಟನ ಒಳಗಿರಬೇಕು).

(13) ಪ್ರದರ್ಶನಕ್ಕಿರುವ ಆಹಾರ ವಸ್ತುಗಳನ್ನು ಸ್ವಚ್ಛವಾದ ಗಾಜಿನ ಬೀರುಗಳಲ್ಲಿಡಬೇಕು.

(14) ಕಟ್ಟಡದಲ್ಲಿ ಪ್ರಥಮ ಚಿಕಿತ್ಸೆಗೆ ಬೇಕಾದ ಅನುಕೂಲತೆಗಳಿರಬೇಕು.

ಆಡಳಿತಕ್ಕೆ ಅವಶ್ಯಕತೆಗಳು :—

1. ಕೊಂಡು ತಂದ ಆಹಾರ ಪದಾರ್ಥಗಳು ಸರಿಯಾಗಿ ಸ್ವಚ್ಛವಾಗಿವೆಯೋ ಇಲ್ಲವೋ ಎಂಬುದನ್ನು ತನಿಖೆ ಮಾಡಲು ನಿರ್ವಹಣಾಕಾರರು ಒಬ್ಬ ವ್ಯಕ್ತಿಯನ್ನು ಜವಾಬ್ದಾರಿಗೆ ಇರುವಂತೆ ನೇರ್ಪಡಿಸಬೇಕು.

2. ಮಾಂಸ, ಹಾಲು ಮುಂತಾದ ಕೆಡಬಹುದಾದಂತಹ ಪದಾರ್ಥಗಳನ್ನು ಅವು ಉಪಯೋಗಕ್ಕೆ ಬೇಕಾಗುವವರೆಬಿಗೂ ಹಿಮ ಪೆಟ್ಟಿಗೆಯಲ್ಲಾಗಲೀ ಅಥವಾ ನಾನ್ನಗಲ್ ಬೆನ್ನಾಗಿ ಮುಚ್ಚಿಟ್ಟಿರಬೇಕು.

3. ತಯಾರಿಸಿದ ಆಹಾರ ಪದಾರ್ಥಗಳನ್ನು ಕೈಯಿಯಲ್ಲಿ ಮುಟ್ಟುವುದನ್ನು ಆದಷ್ಟು ತಪ್ಪಿಸಬೇಕು.

4. ಆಹಾರ ಪದಾರ್ಥಗಳನ್ನು ತಯಾರಿಸುವಾಗ ಅಥವಾ ವಿತರಣೆ ಮಾಡುವಾಗ ಧೂಮಪಾನ ಮಾಡಬಾರದು.

5. ಆಹಾರ ಪದಾರ್ಥಗಳನ್ನು ತಯಾರಿಸುವ ಕೋಣೆಗಳಲ್ಲಿ ಪ್ರಾಣಿಗಳನ್ನಿಡಬಾರದು. ಅಲ್ಲದೆ ಯಾವಾಗಲೂ ಆಹಾರ ಪದಾರ್ಥಗಳು ಪ್ರಾಣಿಗಳಿಗೆ ಸಿಗುವಂತಿರಬಾರದು.

6. ಆಹಾರ ತಯಾರಿಕೆ ಮತ್ತು ವಿತರಣೆಗೆ ಸಂಬಂಧಪಡದ ಯಾವ ವಸ್ತುಗಳನ್ನು ಕಟ್ಟಡದಲ್ಲಿಡಬಾರದು.

7) ಆಡಿಗೆಗೆ ಉಪಯೋಗಿಸುವ ಪಾತ್ರೆಗಳು ಮುಂತಾದುವುಗಳನ್ನು ಸ್ವಚ್ಛವಾಗಿ ಒಳ್ಳೆಯು ದುರಸ್ತಿನಲ್ಲಿಡಬೇಕು. ಸಣ್ಣ, ಸಣ್ಣ ಪಾತ್ರೆಗಳನ್ನು ಉಪಯೋಗಿಸದಿರುವಾಗ ಅವಕ್ಕೆ ನಿಗದಿ ಮಾಡಿದ ಸ್ಥಳದಲ್ಲಿಡಬೇಕು ತಾಮ್ರದ ಪಾತ್ರೆಗಳನ್ನು ಉಪಯೋಗಿಸಿದಲ್ಲಿ ಅವುಗಳ ಒಳಭಾಗ ಸಂಪೂರ್ಣವಾಗಿ ಕಲಾಯಿ ಮಾಡಿರಬೇಕು.

8) ಕಟ್ಟಡದ ಒಳಭಾಗವನ್ನು ಸ್ವಚ್ಛಪಾಗಿಟ್ಟಿರಬೇಕು ನೆಲವನ್ನು ದಿನಕ್ಕೊಂದು ಬಾರಿ ತೊಳೆಯುಬೇಕು ಅಲ್ಲದೆ ಆಗಿಂದಾಗ್ಗೆ ಒದ್ದೆ ಬಟ್ಟೆಯಿಂದ ಒರೆಸಬೇಕು. ಗೋಡೆ ಮತ್ತು ಇತರ ಭಾಗಗಳನ್ನು ವಾರಕೊಂದಾವರ್ತಿಯಾದರೂ ತೊಳೆಯಬೇಕು. ಬೀರು, ಮೇಜಿನ ಅರೆಗಳು ಮುಂತಾದುವುಗಳನ್ನು ಸ್ವಚ್ಛವಾಗಿಟ್ಟಿರಬೇಕು.

9) ಕೆಲಸಗಾರರು ಉಚ್ಚಬಟ್ಟದ ವ್ಯೆಯುಕ್ತಿಕ ಸ್ವಚ್ಛತೆಯನ್ನು ಅನುಸರಿಸಬೇಕು, ಮೇಲು ಡುಪು ಮತ್ತು ಇತರ ಸ್ವಂತ ಉಡುಪುಗಳನ್ನು ಆಗಾಗ್ಗೆ ಬದಲಾಯಿಸಿ ಒಗೆದು ಸ್ವಚ್ಛ ವಾಗಿಟ್ಟಿರಬೇಕು. ಒಗೆದು ಸ್ವಚ್ಛಪಡಿಸಬಹುದಾದಂತಹ ಉಡುಪುಗಳನ್ನು ಧರಿಸಬೇಕು.

10) ಶಾಚಗೃಹದಿಂದ ಬಂದ ಮೇಲೆ ಕೈಗಳನ್ನು ಸ್ವಚ್ಛವಾಗಿ ತೊಳೆದುಕೊಳ್ಳುವುದರ ಅವಶ್ಯಕತೆ ಯನ್ನು ವಿವರಿಸಿ ಬರೆಸಿ ಮುಖ್ಯವಾದ ಸ್ಥಳಗಳಲ್ಲಿ ಇಟ್ಟಿರಬೇಕು.

11) ಸಾಧ್ಯವಾದ ಮಟ್ಟಿಗೂ ಅಂತಾದಿನದಲ್ಲಿ ಉಪಯೋಗಿಸಲು ಸಾಧ್ಯವಾಡಷ್ಟು ಆಹಾರ ವನ್ನು ತಯಾರಿಸಬೇಕು. ಇದು ಸಾಧ್ಯವಾಗದಿದ್ದಲ್ಲಿ ಆಹಾರ ಪದಾರ್ಥಗಳನ್ನು ಕೂಡಲೇ ಹಿಮಪೆಟ್ಟಿಗೆಯಲ್ಲಾಗಲಿ ಅಥವಾ ತಂಪು ಕೋಣೆಯಲ್ಲಾಗಲಿ ಇಟ್ಟು ಉಪಯೋಗಕ್ಕೆ ಬೇಕಾಗುವವರೆಗೂ ಹೊರತೆಗೆಯಬಾರದು. ಬಹಳ ಬಿಸಿಯಾದ ಆಹಾರ ಪದಾರ್ಥ ಗಳನ್ನು ಹಿಮಪೆಟ್ಟಿಗೆಯಲ್ಲಿಡುವ ಮೊದಲು ಸ್ವಚ್ಛವಾದ ಸ್ಥಳದಲ್ಲಿ ತಣ್ಣಗಾಗಲು ಇಟ್ಟು ತಣ್ಣಗಾದ ಮೇಲೆ ಹಿಮಪೆಟ್ಟಿಗೆಯಲ್ಲಿಡಬೇಕು, ಬಿಸಿಪದಾರ್ಥಗಳನ್ನು ಬೇಗ ತಣ್ಣಗಾಗು ವಂತೆ ಮಾಡಲು ಸಣ್ಣ ಸಣ್ಣದಾಗಿ ಮುದುಡಿ ಗಾಳಿಯಿಂದ ತಣ್ಣಗಾಗುವಂತೆ ಮಾಡಬೇಕು.

12) ಬಳಸದೆ ಉಳಿದ ಆಹಾರ ಪದಾರ್ಥಗಳನ್ನು ಸಾಧ್ಯವಾದಷ್ಟು ಮಟ್ಟಿಗೂ ವಂತೆ ಉಪಯೋಗಿಸ ಬಾರದು; ಅದನ್ನು ಉಪಯೋಗಿಸಲೇ ಬೇಕಾದ ಸಂದರ್ಭವಿದ್ದಲ್ಲಿ ಅದನ್ನು ಕೂಡಲೆ ಹಿಮ ಪೆಟ್ಟಿಗೆಯಲ್ಲಿಟ್ಟಿರಬೇಕು.

13) ತಯಾರಿಸಿದ ಆಹಾರವನ್ನು ಕೊಠಡಿಯ ಶಾಖದಲ್ಲಿಡುವುದು ಅಪಾಯ ಅವನ್ನು ಹಿಮ ಪೆಟ್ಟಿಗೆಯಲ್ಲಿಟ್ಟಿರಬೇಕು.

14) ಆಹಾರವನ್ನು ಹಿಮಪೆಟ್ಟಿಗೆಯಲ್ಲಿಟ್ಟಾಗ ಗಾಳಿ ಸಂಚಾರಕ್ಕೆ ಅವಕಾಶವಿರಬೇಕು. ಮಾಂಸ ವನ್ನು ಕೊಕ್ಕೆಗಳಿಗೆ ತೂಗುಹಾಕುವುದು ಸೂಕ್ತ. ಹಿಮಪೆಟ್ಟಿಗೆಯನ್ನು ಸ್ವಚ್ಛ ವಾಗಿಟ್ಟಿರಬೇಕು ಅಲ್ಲದೆ ಪ್ರತಿಬಾರಿ ಹಿಮವನ್ನು ತೆಗೆದಾಗಲೂ ಸಂಪೂರ್ಣವಾಗಿ ಸ್ವಚ್ಛ ಗೊಳಿಸಬೇಕು.

15) ಪಾತ್ರೆಗಳನ್ನು ತೊಳೆಯಲು ಉಪಯೋಗಿಸುವ ಸಾಧನಗಳು ಸಂದರ್ಭಕ್ಕೆ ಸರಿಯಾ ದುವುಗಳಾಗಿರಬೇಕು. ಅಲ್ಲದೆ ಅವುಗಳನ್ನು ಸರಿಯಾದ ಪ್ರಮಾಣದಲ್ಲಿ ಬಳಸಬೇಕು. ಯಾವ ಶುಚಿಕಪುಡಿಗಳನ್ನಾ ಉಪಯೋಗಿಸಬೇಕೆಂಬುದಕ್ಕೆ ಸ್ಥಳೀಯ ಅರೋಗ್ಯ ಧಿಕಾರಿಗಳ ಸಲಹೆ ಪಡೆಯಬೇಕು.

16) <u>ನೊಣ ಮತ್ತು ಇತರ ಕೀಟಗಳು</u> :—

ಇಲಿಗಳು :— ಇಲಿಗಳು ಮನುಷ್ಯರಿಗೆ ಸೋಂಕನ್ನು ಹರಡಬಹುದಾದ್ದರಿಂದ ಅವುಗಳ ಪಿಡುಗು ಅಪಾಯ, ಈ ಸೋಂಕನ್ನು ನಿವಾರಿಸಲು ಸಾಧ್ಯವಾದ ಎಲ್ಲಾ ಕ್ರಮಗಳನ್ನು ತೆಗೆದುಕೊಳ್ಳಬೇಕು. ಈ ಕೆಳಗಿನ ಕ್ರಮಗಳು ಮುಖ್ಯವಾರುವು.

ಅ) ಕಟ್ಟಡವನ್ನು ಸರಿಯಾದ ದುರಸ್ತಿಯಲ್ಲಿಟ್ಟು ಇಲಿಗಳು ಒಳಗೆ ಬರಬಹುದಾದ ಮತ್ತು ಸೇರಬಹುದಾದ ಸ್ಥಳಗಳಿಗೆ ಅವಕಾಶ ಕೊಡಬಾರದು.

ಆ) ಆಹಾರ ಚೂರು ಮುಂತಾದುವುಗಳನ್ನು ಕೂಡಲೆ ತೆಗೆದು ಕಟ್ಟಡವನ್ನು ಉಚ್ಚಮಟ್ಟದ ಸ್ವಚ್ಛತೆಯಲ್ಲಿಡಬೇಕು.

ಇ) ಇಲಿಗಳನ್ನು ಆಕರ್ಷಿಸುವ ಆಹಾರ ಪದಾರ್ಥಗಳನ್ನು ಬಿಗಿಯಾದ ಮುಚ್ಚಳಗಳಿರುವ ತೇವಹೀರದಂತ ಪಾತ್ರೆಗಲ್ಲಿಟ್ಟಿರಬೇಕು.

ಈ) ಇಲಿಗಳು ಕಂಡುಬಂದಲ್ಲಿ ಅವುಗಳ ನಿವಾರಣೆಗೆ ಸ್ಥಳೀಯ ಆರೋಗ್ಯಾಧಿಕಾರಿಗಳ ಸಹಾಯ ಪಡೆಯಬೇಕು.

<u>ನೊಣ, ಜಿರಲೆ ಮತ್ತು ಇತರ ಕೀಟಗಳು:—</u>

ಆಹಾರದ ಚೂರುಗಳನ್ನು ಶೀಘ್ರವಾಗಿ ಮತ್ತು ಯಶಸ್ವಿಯಾಗಿ ವಿನಿಯೋಗ ಮಾಡುವುದರಿಂದ, ಮತ್ತು ಆಹಾರ ಪದಾರ್ಥಗಳಿಗೆ ನೊಣಕೂರಲಾಗದಂತಹ ಮುಚ್ಚಳಗಳನ್ನು ಉಪಯೋಗಿಸುವುದರಿಂದ ಕಟ್ಟಡದಲ್ಲಿ ನೊಣಗಳ ಸಂಖ್ಯೆಯನ್ನು ಬಹಳ ಕಡಿಮೆ ಮಾಡಬಹುದು. ಕಟ್ಟಡದ ಸುತ್ತಮುತ್ತಲಿನಲ್ಲಿ ನೊಣಗಳು ಬೆಳೆಯಲವಕಾಶಕೊಡುವ ಗೊಬ್ಬರದ ಅಥವಾ ಕಸದ ಗುಪ್ಪೆಗಳಿದ್ದಲ್ಲಿ ಸ್ಥಳೀಯ ಆರೋಗ್ಯಾಧಿಕಾರಿಗಳಿಗೆ ತಿಳಿಸಬೇಕು. ಆರೋಗ್ಯನಿಯಮದ ಪಾಲನೆಯು ಕಡಿಮೆ ಮಟ್ಟದಲ್ಲಿದ್ದರೆ ಕಟ್ಟಡದಲ್ಲಿ ಜಿರಲೆಗಳು ಮತ್ತು ಇತರ ಕೀಟಗಳು ಸೇರಲು ಅವಕಾಶವಾಗುತ್ತದೆ., ಸಂಪೂರ್ಣ ಸ್ವಚ್ಛತೆ ಮತ್ತು ಆಹಾರ ಪದಾರ್ಥಗಳನ್ನಿಡಲು ಸರಿಯಾದ ಪಾತ್ರೆಗಳು ಇದಕ್ಕೆ ನಿವಾರಣೋಪಾಯಗಳು. ಇಷ್ಟಿದ್ದೂ ಈ ಪಿಡುಗು ಇದ್ದರೆ ಸ್ಥಳೀಯ ಆರೋಗ್ಯಾಧಿಕಾರಿಗಳಲ್ಲಿ ಚರ್ಚಿಸಬೇಕು. ಈ ರೀತಿಯ ಕ್ರಿಮಿ, ನೊಣ, ಜಿರಲೆಗಳ ನಾಶಕ್ಕೆ ಕ್ರಿಮಿನಾಶಕಗಳನ್ನು ಉಪಯೋಗಿಸುವಾಗ ಅದರಿಂದ ಆಹಾರ ಪದಾರ್ಥ, ಪಾತ್ರೆ ಮತ್ತು ಇತರ ಪರಿಕರಣಗಳು ಕಲುಷಿತವಾಗದಂತೆ ನೋಡಿಕೊಳ್ಳಬೇಕು.

17. ಆಹಾರ ವಿತರಣೆಗಾರರಲ್ಲಿ ಸೋಂಕು ಕಡಿಮೆ ಮಾಡುವ ಕ್ರಿಮಿಗಳು:—

ಅ) ಸೋರುತ್ತಿರುವ ಗಾಯಗಳು, ಕೈ ಅಥವಾ ಮುಂಗೈಮೇಲೆ ಹುಣ್ಣುಗಳಿರುವ, ಕಿವಿಯಲ್ಲಿ ಸೋರಿಕೆ ಇರುವ ಅಥವಾ ಆಗಾಗ್ಗೆ ಅತಿಸಾರದಿಂದ ಅಥವಾ ವಾಂತಿಯಿಂದ ನರಳುತ್ತಿರುವ ವ್ಯಕ್ತಿಗಳು ಆಹಾರ ಪದಾರ್ಥಗಳನ್ನು ಮುಟ್ಟುವುದು, ತಯಾರಿಸುವುದು ಅಥವಾ ವಿತರಣೆ ಮಾಡುವ ಕೆಲಸಗಳಲ್ಲಿ ತೊಡಗಬಾರದು.

ಆ) ಕೆಲಸಗಾರರು, ಮೇಲೆ ಹೇಳಿದ ವ್ಯಾದಿಗಳಲ್ಲಿ ಅಥವಾ ಇನ್ಯಾವ ವ್ಯಾಧಿಯಿಂದ ನರಳುತ್ತಿದ್ದರೆ ಮಾಲೀಕರಿಗಾಗಲಿ ಅಥವಾ ವ್ಯವಸ್ಥಾಪಕರಿಗಾಗಲಿ ಕೂಡಲೆ ತಿಳಿಸಬೇಕು.

ಇ) ಮಾಲೀಕರು ಅಥವಾ ವ್ಯವಸ್ಥಾಪಕರು ತಮ್ಮ ಕೆಲಸಗಾರರಲ್ಲಿ ಮೇಲೆ ತಿಳಿಸಿದ ಅಥವಾ ಇನ್ಯಾವ ವ್ಯಾಧಿಗಳಾಗಿರಲಿ ಇರುವೆವೆ ಎಂಬುದನ್ನು ತಿಳಿದುಕೊಳ್ಳಲು ಕ್ರಮ ತೆಗೆದು ಕೊಳ್ಳಬೇಕು.

ಈ) ಕೆಲಸಗಾರರಲ್ಲಿ ಯಾರಿಗಾದರೂ ಮೇಲೆ ತಿಳಿಸಿದ ವ್ಯಾದಿ ಇದೆ ಎಂದು ಕಂಡುಬಂದಲ್ಲಿ ಮಾಲೀಕರು ಅಥವಾ ನಿರ್ವಹಣೆಗಾರರು ಅಂತಹ ಕೆಲಸದವನನ್ನು ಆ ವ್ಯಾದಿಯು ಸಂಪೂರ್ಣವಾಗಿ ವಾಸಿಯಾಗುವವರೆಗಾಗಲಿ ಅಥವಾ ಸ್ಥಳೀಯ ಆರೋಗ್ಯಾಧಿಕಾರಿಗಳು ಅನುಮತಿ ಕೊಡುವವರಿಗಾದರೂ ಆಹಾರ ಪದಾರ್ಥಗಳನ್ನು ಮುಟ್ಟಲು ಬಿಡಬಾರದು.

ಉ) ಕೆಲಸಗಾರರಲ್ಲಿ ಕೆಲಸವನ್ನು ಮುಂದುವರಿಸಲು ಅನುಮಾನಾಸ್ಪದವಾದ ವ್ಯಾಧಿಯಿದೆಯೆಂದು ಅನುಮಾನಬಂದಲ್ಲಿ ಅಂತಹವನನ್ನು ಕೆಲಸಮಾಡಲು ಬಿಡುವ ಮೊದಲು ವೈದ್ಯರ ಬಳಿ ಕಳುಹಿಸಬೇಕು.

ಞ) ಕೆಲಸಕ್ಕೆ ಸೇರುವ ಮುಂಚೆ ವಿಷಮ ಶೀತಜ್ವರ ಅಥವಾ ಪ್ಯಾರಾಟೈಫಾಯಿಡ್ ಜ್ವರದಿಂದ ನರಳುತ್ತಿದ್ದರೆ ಅವರ ತೊಂದರೆಗಳನ್ನು ತಿಳಿಸಿ ಅವನು ಈ ಹಿಂದೆ ಅಂತಹ ವ್ಯಾಧಿಯಿಂದ ನರಳಿದ್ದಾನೆ ಎಂಬುದನ್ನು ವಿಚಾರಿಸಬೇಕು; ಹಾಗೇನಾದರೂ ನರಳಿದ್ದಲ್ಲಿ ಅದರ ವಿವರ ಗಳನ್ನು ಆರೋಗ್ಯಾಧಿಕಾರಿಗಳಿಗೆ ತಿಳಿಸಿ ಅವರ ಅನುಮತಿ ದೊರೆಯುವವರೆವಿಗೂ ಅಂತಹ ವನನ್ನು ಕೆಲಸಕ್ಕೆ ತೆಗೆದುಕೊಳ್ಳಬಾರದು.

ಟ) ಕೆಲಸಗಾರರನ್ನು ಕೆಲಸಕ್ಕೆ ತೆಗೆದುಕೊಳ್ಳುವ ಮೊದಲು ಆರೋಗ್ಯಾಧಿಕಾರಿಗಳಿಂದ ಅವರಲ್ಲಿ ಯಾವ ರೀತಿಯ ಸೋಂಕು ಇಲ್ಲವೆಂಬುದಕ್ಕೆ ಅಲ್ಲದೆ ಕಾಲಕಾಲಕ್ಕೆ ಪರೀಕ್ಷಿಸಿ ಅವರಲ್ಲಿ ಯಾವ ಸೋಂಕು ಕಂಡುಬಂದಿಲ್ಲವೆಂಬುದಕ್ಕೆ ಯೋಗ್ಯತಾಪತ್ರ ಪಡೆಯು ಬೇಕು.

18. ಕೆಲಸಗಾರರು ಈ ಮೇಲೆ ತಿಳಿಸಿದ ಆರೋಗ್ಯ ನಿಯಮಗಳನ್ನು ಪಾಲಿಸುವುದೇ ಶಾಲದು ಎಲ್ಲಾ ಕೆಲಸಗಾರರು, ನಿರ್ವಹಣಾಗಾರರು ಸಾರಿ ತಮ್ಮ ವಯುಕ್ತಿಕ ಸ್ವಚ್ಛತೆಯ ವಿಷಯವನ್ನು ಕಡ್ಡಾಯವಾಗಿ ಮನನ ಮಾಡಿಕೊಂಡು ಅವುಗಳನ್ನು ಸದಾ ಪಾಲಿಸಬೇಕು ಅಲ್ಲದೆ ಈ ವಿಷಯಗಳಲ್ಲಿ ತರಬೇತಿಗಳಿದ್ದಲ್ಲಿ ಅವುಗಳ ಪ್ರಯೋಜನ ಪಡೆಯಬೇಕು.

<u>ನಿರ್ವಹಣಾಧಿಕಾರಿಯ ಕರ್ತವ್ಯಗಳು :—</u>

1. ದಿನದಲ್ಲಿ ತಯಾರಿಸಬೇಕಾದ ಭಕ್ಷಗಳ ವಿವರಣೆ.
2. ಆಹಾರ ಪದಾರ್ಥಗಳನ್ನು ಖರೀದಿಸುವುದು.
3. ಬೇಕಾದ ಸಲಕರಣೆಗಳನ್ನು ಖರೀದಿಸುವುದು ಅಥವಾ ಪಡೆಯುವುದು.
4. ಆಹಾರ ಪದಾರ್ಥಗಳನ್ನು ಸುರಕ್ಷಿತವಾಗಿಡುವುದು.
5. ಆಹಾರ ಪದಾರ್ಥಗಳ ತಯಾರಿಕೆಯನ್ನು ಮೇಲ್ವಿಚಾರಣೆ
6. ಆಹಾರ ವಿತರಣೆಯ ಮೇಲ್ವಿಚಾರಣೆ
7. ಕೆಲಸಗಾರರ ಆಯ್ಕೆ ಕೆಲಸವಹಿಸುವಿಕೆ ತರಬೇತಿ ಮತ್ತು ಮೇಲ್ವಿಚಾರಣೆ. ಕಟ್ಟಡದ ಸ್ವಚ್ಛತೆ ಬಗ್ಗೆ ನಿಗಾಕೊಡುವುದು.

<u>ಮೇಲ್ವಿಚಾರಕರ ಕರ್ತವ್ಯಗಳು :—</u>

1. ಅಡಿಗೆ ಕೋಣೆಯಲ್ಲಿ ಕೆಲಸ ಮಾಡುವ ಕೆಲಸಗಾರರ ಆರೋಗ್ಯದ ಬಗ್ಗೆ ನಿಗಾ ಇಡುವುದು.
2. ಅಡಿಗೆ ಕೆಲಸಮಾಡುವವರ ವಯುಕ್ತಿಕ ಸ್ವಚ್ಛತೆ ಮತ್ತು ಸಮವಸ್ತ್ರಗಳ ಬಗ್ಗೆ ಪ್ರತಿ ದಿನವೂ ನಿಗ ಇಡುವುದು.
3. ಆಹಾರ ತಯಾರಿಸುವ ಮತ್ತು ವಿತರಣೆ ಮಾಡುವ ಪಾತ್ರೆಗಳು ಆಗಾಗ್ಗೆ ನಿಯಮಬಗಳಿಗೆ ಸರಿಹೊಂದಿರುವ ಬಗ್ಗೆ ನಿಗಾ ಇಡುವುದು.
4. ಆಹಾರ ಪದಾರ್ಥಗಳನ್ನು ಇಡುವ ಬೀರು ಮುಂತಾದುವುಗಳು, ಅಡಿಗೆ ಕೋಣೆಯಲ್ಲಿ ಉಪಯೋಗಿಸುವ ಪರಿಕರಣಗಳು ಮತ್ತು ವಸ್ತ್ರಗಳ ಸ್ವಚ್ಛತೆ ಬಗ್ಗೆ ನಿಗಾ ಇಡುವುದು.
5. ತರಕಾರಿ ಸಿಪ್ಪೆ ಮತ್ತು ಇತರ ಕಸಗಳನ್ನು ಸರಿಯಾಗಿ ಶೇಖರಿಸಿ ವಿಸಿಯೋಗ ಮಾಡುವುದು
6. ಅದರ ಕೋಣೆಯಲ್ಲಿ ಆಹಾರ ತಯಾರಿಸುವ ಬಗ್ಗೆ ನಿಗಾ ಇಡಬೇಕು.
7. ಆಹಾರ ವಿತರಣೆ ಬಗ್ಗೆ ನಿಗಾ ಇಡುವುದು.

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8) ಉಗ್ರಾಣಾಧಿಕಾರಿಯು ಗೈರುಹಾಜರಿಯಲ್ಲಿ ಅತನ ಕೆಲಸ ನಿರ್ವಹಣೆ ಮಾಡುವುದು.

9) ಆಹಾರ ತಂಯಾರಿಕೆಯಿಂದ ಕ್ರಮಗಳ ಪಾಲನೆಯಲ್ಲಿ ನಿಗಾ ಇಡುವುದು.

10) ಪಾತ್ರೆ ಪಪ್ಪ ಬಸಿಗಳ ತೊಳೆಯುವ ಶಧಳ, ವಹಾರ, ಕೆಲಸಗಾರರ ಕೊಠಡಿಗಳು, ಶೌಚಗೃಹಗಳು ಮತ್ತು ಕಟ್ಟಡದ ಸುತ್ತಮುಯತ್ತಲ ಜಾಗ ಸ್ವಚ್ಚವಾಗಿರುವಂತೆ ನೋಡಿಕೊಳ್ಳುವುದು.

11) ಯಾರಾದರೂ ಕೆಲಸಗಾರರಿಗೆ ಸಣ್ಣಪಟ್ಟ ಅಪಘಾತಗಳಾದಲ್ಲಿ ಅದಕ್ಕೆ ಪ್ರಥಮ ಚಿಕಿತ್ಸೆ ಕೊಟ್ಟು ನಿರ್ವಹಣಾಧಿಕಾರಿ ಅಥವಾ ಮೂಲೀಕರಿಗೆ ಕೂಡಲೆ ತಿಳಿಸುವುದು.

12) ಆಹಾರ ವಿತರಣಾ ಕಾಲದಲ್ಲಿ ಆಗಾಗ್ಗೆ ಆ ಕೋಷ್ಠಗಳ ಬಗ್ಗೆ ನಿಗಾ ಇಡುವುದು.

ಉಗ್ರಾಣಾಧಿಕಾರಿಯ ಕರ್ತವ್ಯಗಳು :—

(1) ದಿನಸಿ ಆಹಾರ ಪದಾರ್ಥಗಳನ್ನು ಸ್ವೀಕರಿಸಿ ಉಗ್ರಾಣದಲ್ಲಿಡುವುದು.

(2) ಶರಬರಾಜಿನಲ್ಲಿ ನ್ಯೂನತೆಯಿದ್ದಲ್ಲಿ ಕೂಡಲೆ ನಿರ್ವಹಣಾಧಿಕಾರಿ ಅಥವಾ ಮೂಲೀಕರಿಗೆ ತಿಳಿಸುವುದು.

(3) ಪ್ರೀಲಿಯಿಂದ ಕೊಂಡು ತಂದ ದಿನಸಿಗಳನ್ನು ನಿರ್ವಹಣಾಧಿಕಾರಿ ಅಥವಾ ಮೂಲೀಕರಿಗೆ ತೋರಿಸಿ ಅವುಗಳ ಗುಣಮಟ್ಟದ ಬಗ್ಗೆ ಅವರ ಅವರ ಅನುಮತಿ ಪಡೆಯುವುದು.

(4) ಕಿಮಪಟ್ಟಿಗೆ ಮತ್ತು ಉಗ್ರಾಣದ ಬಗ್ಗೆ ನಿಗಾ ಇಡುವುದು.

(5) ಉಗ್ರಾಣದ ಬಗ್ಗೆ ಕಾಗದಪತ್ರಗಳನ್ನು ಸರಿಯಾಗಿಡುವುದು.

(6) ದಿನಸಿ ಮತ್ತು ಇತರ ವಸ್ತುಗಳ ಶರಬರಾಜಿನ್ನು ಪರಿಶೀಲಿಸಿ ನಿರ್ವಹಣಾಧಿಕಾರಿ ಅಥವಾ ಮೂಲೀಕರಿಗೆ ತಿಳಿಸುವುದು.

(7) ಉಗ್ರಾಣದ ಸ್ವಚ್ಚತೆಯ ಬಗ್ಗೆ ನಿಗಾ ಇಡುವುದು.

(8) ಪಾತ್ರೆ ಮುಂತಾದುವುಗಳ ಬಗ್ಗೆ ಲೆಕ್ಕ ಬಿಡುವುದು ಅಲ್ಲದೆ ಅವುಗಳಿಗೆ ದುರಸ್ತಿ ಬೇಕಾದಲ್ಲಿ ನಿರ್ವಹಣಾಧಿಕಾರಿ ಅಥವಾ ಮೂಲೀಕರಿಗೆ ಕೂಡಲೆ ತಿಳಿಸಿ ಸರಿಪಡಿಸುವುದು.

(9) ಮೇಲ್ವಿಚಾರಕರ ಗೈರು ಹಾಜರಿಯಲ್ಲಿ ಅವರ ಕೆಲಸಗಳನ್ನು ನಿರ್ವಹಿಸುವುದು.

(10) ಆಹಾರ ವಿತರಣೆಯ ಸಂಬಂಧದ ವಸ್ತ್ರಗಳ ಬಗ್ಗೆ ನಿಗಾ ಇಡುವುದು.

(11) ಕಳಿತ ಅಥವಾ ಒಡೆದ ವಸ್ತುಗಳ ಯಾದಿಯನ್ನು ವಾರಕ್ಕೊಂದು ಭಾರಿ ನಿರ್ವಹಣಾಧಿಕಾರಿ ಅಥವಾ ಮೂಲೀಕರಿಗೆ ತಿಳಿಸಬೇಕು.

(12) ಬೇಕಾದ ದಿನಸಿ ಅಥವಾ ಇತರ ಪದಾರ್ಥಗಳಿಗೆ ಯಾದಿ ಕೊಡುವುದು.

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—: ಆಹಾರ ಸಂರಕ್ಷಣೆ :—

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ಆಹಾರವನ್ನು ಸುರಕ್ಷಿತಪಡಿಸುವ ಸಮಸ್ಯೆ ಬಹಳ ದೊಡ್ಡದು, ಏತಕ್ಕೆಂದರೆ, ಆಹಾರವನ್ನು ಸುರಕ್ಷಿತ ಪಡಿಸಬೇಕಾದರೆ ಪೊಟ್ಟಣಪೊರಲು ನಾವು ಸೇವಿಸುವ ಆಹಾರ ಮತ್ತು ಪಾನೀಯಗಳು ಕೇಗೆ ಮಲಿನವಾಗುತ್ತವೆ ಎಂಬುದನ್ನು ತಿಳಿಯಬೇಕು. ಆಹಾರ ಪಾನೀಯ ಮಲಿನ ವಾಗುವು ದನ್ನು ಸಂಪೂರ್ಣವಾಗಿ ತಡೆಗಟ್ಟಲು ಸಾಧ್ಯವಾಗದಿದ್ದರೂ, ಅದಷ್ಟು ಮಟ್ಟಿಗೆ ಕಡಿಮೆ ಮಾಡುವ ವಿಧಾನಗಳನ್ನು ತಿಳಿದಿರಬೇಕು. ವಿವರಗಳನ್ನು ಅನೇಕ ಉಪಶಿರೋನಾಮೆಗಳಲ್ಲಿ ಸಂಕ್ಷಿಪ್ತವಾಗಿ ಕೊಡಲಾಗಿದೆ. ಆದರೆ ಈ ಶಿರೋನಾಮೆಗಳಲ್ಲಾಗಲೀ, ಉಪಶಿರೋನಾಮೆಗಳಲ್ಲಾಗಲಿ ವಿವರಿಸಿ ರುವಷ್ಟೆ ಕ್ರಮಗಳು ಪರಿಪೂರ್ಣವೆಂದು ತಿಳಿಯಬಾರದು. ಓದುಗರಿಗೆ ಇದೊಂದು ಮಾರ್ಗ ದರ್ಶಕ ಮಾತ್ರ. ಅವರವರ ಅನುಭವದ ಮೇಲೆ ವಿಷಯಗಳನ್ನು ಇನ್ನೂ ಹೆಚ್ಚಿಗೆ ತಿಳಿದು ವಿಷದ ಪಡಿಸಿಕೊಳ್ಳಲು ಅವಕಾಶವಿದೆ. ತರಬೇತಿ ಪಡೆಯಲು ಬರುವ ಅಭ್ಯರ್ಥಿಗಳು ವಿವಿಧ ಉದ್ಯೋಗ್ಯಗಸ್ಥರು ಮತ್ತು ಕಾರ್ಮಿಕ ವರ್ಗದವರಾಗಿರುವುದರಿಂದ, ಎಲ್ಲರಿಗೂ ಅನ್ವಯಿಸುವಂತೆ ಒಂದೇ ವಿಧವಾದ ಪಾಠ ಕ್ರಮವನ್ನು ರೂಪಿಸುವುದು ಕಷ್ಟಸಾಧ್ಯ. ಇತರರಿಗೆ ಆಹಾರವನ್ನು ಅದಷ್ಟು ಮಲಿನವಾಗದಂತೆ ಒದಗಿಸಬೇಕೆಂಬ ಮಹತ್ವಾಕಾಂಕ್ಷೆಯೇ ಈ ತರಬೇತಿ ಪಡೆಯಲು ಬರುವ ಪ್ರತಿಯೊಬ್ಬರ ಮನೋಭಾವನೆಯಾಗಿರಬೇಕು.

ಇಲ್ಲಿ ಕೊಟ್ಟಿರುವ ವಿಷಯಗಳ ವಿವರ ಮತ್ತು ಕ್ರಮಗಳಷ್ಟಕ್ಕೇ ನಿಮ್ಮ ತಿಳುವಳಿಕೆ ಸೀಮಿತವೆಂದು ಭಾವಿಸಬಾರದು. ಆಹಾರವು ಉತ್ಪನ್ನವಾಗುವ ಮೂಲದಿಂದ ಮನುಷ್ಯ ಸೇವಿ ಸುವ ಹಂತದವರೆವಿಗೆ ಆಹಾರವನ್ನು ಸುರಕ್ಷಿತಪಡಿಸಬೇಕು. ಆದರೆ ಅನೇಕ ವೇಳೆ ಬೇರೆ ಬೇರೆ ಕೆಲಸಗಾರರು, ಬೇರೆ ಬೇರೆ ಹಂತಗಳಲ್ಲಿ ತಮ್ಮ ತಮ್ಮ ಜವಾಬ್ದಾರಿಯನ್ನು ನಿರ್ವಹಿಸುತ್ತಾರೆ. ಆದ್ದರಿಂದ ಯಾವ ಒಬ್ಬ ಕೆಲಸಗಾರನಿಗೂ ಎಲ್ಲಾ ಹಂತಗಳ ಮೇಲೆನ ನಿಯಂತ್ರಣ ಸಾಧ್ಯವಿಲ್ಲ.

ಆಹಾರ ಉತ್ಪನ್ನವಾದ ಸ್ಥಳದಿಂದ ಸೇವನೆಯವರೆಗೆ ಅನೇಕ ಹಂತಗಳಲ್ಲಿ ಮಲಿನ ವಾಗಲು ಸಂದರ್ಭಗಳು ಸಾಕಷ್ಟಿವೆ. ಈ ಸರಣಿಯಲ್ಲಿ ಒಂದಕ್ಕಿಂತ ಹೆಚ್ಚುಸಾರಿ ಮಲಿನ ವಾಗುವ ಅವಕಾಶಗಳೂ ಇವೆ. ಉದಾ: ಬಾತುಕೋಳಿ ಮೊಟ್ಟೆಯಿಂದಾಗುವ ''ಸಾಲ್ಮೊನೆಲ್ಲ'' ಅಪಾಯ.

—: ಆಹಾರದ ಸ್ವಭಾವಸಿದ್ಧ ಚರಿತ್ರೆ :—

(ಅ) <u>ಮೂಲಾಲಸ್ಥಾನ ಅಥವಾ ಉಗಮ :—</u>

<u>ಸಾಧ್ಯವಿರುವ ನಿಯಂತ್ರಣ ಅಂಶಗಳು :—</u>

1. ಮಾಂಸ: ಕಸಾಯಿಖಾನೆಗಳ ಪರೀಕ್ಷೆ, ಹೊರಗಿನಿಂದ ಬಂದ ಮಾಂಸದ ಪರೀಕ್ಷೆಗಾಗಿ ಅದರ ಭಾಗಾಂಶ ಪಡೆಯುವಿಕೆ.

2. ಕೋಳಿಸಾಕಾಣಿಕೆ: ಸಾಕಾಣಿಕೆಯ ಮೇಲೆ ನಿಯಂತ್ರಣ.

3. ಮೊಟ್ಟೆಗಳು: ಹೊರಗಿನಿಂದ ಆಮದಾದ ಊ ಮೊಟ್ಟೆಗಳ ಮೇಲೆ ವಿಧಿಸಬೇಕಾದ ನಿಯಂತ್ರಣ — ಬಾತುಕೋಳಿ ಮೊಟ್ಟೆಗಳಿಂದ ''ಸಾಲ್ಮನೆಲ್ಲ'' ಸೋಂಕಿನ ಅಪಾಯವನ್ನು ಗಮನದಲ್ಲಿಟ್ಟುಕೊಳ್ಳಿರಿ.

4. ಹಾಲು: ''ಬ್ರೂಸಿಲ್ಲೋಸಿಸ್'' ಸೋಂಕು ಇಲ್ಲದ ಹಸು ಮತ್ತು ಎಮ್ಮೆಗಳ ತಂಡ.

ಕ್ಷಯಾಣುಸಾರ ಕ್ಷಯರೋಗವಿದೆಯೇ ಎಂದು ಪರೀಕ್ಷಿಸಲ್ಪಟ್ಟ ಹೈನು.

5. ತರಕಾರಿಗಳು: ಹೆಚ್ಚಾಗಿ ಮಣ್ಣಿನಿಂದ ಸಾಗುವ ರೋಗದ ಸೋಂಕನ್ನು ದೂರವಿಡಿ. ಕ್ರಿಮಿನಾಶಕಗಳ ಸಿಂಪಡಿಸುವಿಕೆಯಿಂದಾಗುವ ಅಪಾಯಗಳ ಸಾಧ್ಯತೆ, ಮಲದಿಂದ ಮಲಿನತೆಯಾದರೆ, ಕರಳು ಬೇನೆಗಳ ಅಪಾಯ ಇವುಗಳನ್ನೂ ನೆನಪಿನಲ್ಲಿಡಿ.

ಉದಾ:— ಮಲದಿಂದ ಮಲಿನತೆಯಾಗಿದ್ದರೆ ಕರಳು ಬೇನೆಗಳ ಅಪಾಯ, ಹಸಿ ತರಕಾರಿಗಳ ಉಪಯೋಗದಿಂದ:

6. ನೀರು:— ಕರಳು ಜಾಡ್ಯ ಮತ್ತು ಸೋಂಕಂಟುವ ಅಪಾಯ — ಮಲದಿಂದ ಹರಡುವ ಕಾಲರ, ವಿಷಮಶೀತಜ್ವರ, ಆಮಶಂಕೆ ಇತ್ಯಾದಿ.

ಆ) <u>ಸಾರಿಗೆ</u>:—

1. ದೂರದ ಪ್ರಯಾಣ, ಅಥವಾ ಪ್ರಾಣಿಗಳನ್ನು ಹೆಚ್ಚಿಗೆ ಪ್ರಮಾಣದಲ್ಲಿ ಸಾಗಿಸುವಾಗ ''ಸಾಲ್ಮನೆಲ್ಲ'' ಸೋಂಕು ಅಡ್ಡ ಹಾಯುವ ಅಪಾಯ.
2. ಪ್ರಾಣಿಗಳ ಮಲದಿಂದ ಆಹಾರವು ಮಲಿನವಾಗಿ ಅಡ್ಡ ಹಾಯುವಿಕೆ.
3. ಮಾಂಸವನ್ನು ಶೀತಾಗಾರದಲ್ಲಿಡದಿದ್ದರೆ ಕೆಡುವುದು ಮತ್ತು ರೋಗ ಕ್ರಿಮಿಗಳು ವೃದ್ಧಿಯಾಗುವುದು.

ಇ) <u>ಆಹಾರವನ್ನು ಮಲಿನವಾಗಲವಕಾಶವಿಲ್ಲದಂತೆ ನೋಡಿಕೊಳ್ಳುವ ರೀತಿ</u>:—

ಆಹಾರವನ್ನು ಸಂರಕ್ಷಿಸುವ ಮತ್ತು ಆಹಾರವನ್ನು ಕ್ರಿಮಿಗಳ ಮತ್ತು ಇತರೆ ವಿಧದ ಮಲಿನತೆಯಿಂದ ದೂರವಿಡಲು ಅನೇಕ ವಿಧಾನಗಳಿವೆ.

1. ಆರೋಗ್ಯ ನಿಯಮಗಳಿಗನುಸಾರವಾಗಿ ಕಸಾಯಿಖಾನೆ ಮತ್ತಿತರ ಜಾಗಗಳಲ್ಲಿ ಪ್ರಾಣಿಗಳ ವಧೆ (ಮೇಲಿನ ಆ (1) ನೋಡುವುದು)
2. ಡಬ್ಬಗಳಲ್ಲಿ ತುಂಬಿ ಮೊಹರು ಮಾಡುವುದು —
   ರೋಗಕಾರಕ ಕ್ರಿಮಿನಾಶಕ್ಕೆ ಸಾಕಷ್ಟು ಉಷ್ಣಾಂಶ ಅಗತ್ಯ.
   ಉದಾ:— ''ಬೋಟುಲಿನಮ್ ಕುಕ್''
   ಡಬ್ಬಗಳನ್ನು ಸರಿಯಾಗಿ ಮೊಹರು ಮಾಡುವುದು.
   — ಅಬರ್ಡೀನ್ ವಿಷಮಶೀತಜ್ವರ ಹರಡಿದ್ದು ಮಲಿನವಾದ ದನದ ಮಾಂಸದಿಂದ.
3. ಜಾಗ್ರತೆ ಅತಿ ಶೈತ್ಯಸ್ಥಿತಿಗೊಳಪಡಿಸುವುದು ಒಂದು ಮುಖ್ಯವಾದ ವಿಧಾನ. ಆದರೆ ಇದು ಎಲ್ಲಾ ರೋಗಕಾರಕ ಕ್ರಿಮಿಗಳನ್ನೂ ನಾಶಪಡಿಸುವುದಿಲ್ಲ.
4. ಹೆಚ್ಚು ಹೆಚ್ಚು ವೇಗದಿಂದ ಅತಿ ಶೈತ್ಯಸ್ಥಿತಿಗೊಳಪಡಿಸಿ ಒಣಗಿಸುವುದು.
5. ಪದಾರ್ಥದಲ್ಲಿರುವ ನೀರನ್ನು ಹೊರಹೀರುವುದು (ನೀರ್ಗಳಕೆ)
6. ಹೊಗೆಯನ್ನೂ ಉಪಯೋಗಿಸುವುದು ಮತ್ತು ಹದಮಾಡುವುದು.
7. ಉಪ್ಪನ್ನು ಬೆರೆಸುವುದು ಮತ್ತು ಉಪ್ಪಿನಕಾಯಿ ತಯಾರಿಕೆ.
8. ಪ್ಯಾಸ್ಚರಿನ ಸಂಸ್ಕರಣೆ:— ಉದಾ: ಹಾಲು ಡಬ್ಬದಲ್ಲಿ ಮೊಹರಾದ ಮಾಂಸ — ರೋಗಕಾರಕಗಳನ್ನು ಮಾತ್ರ ನಾಶ ಪಡಿಸುತ್ತದೆ. ಆದರೆ ಆಹಾರವನ್ನು ಕೆಡಿಸುವ ಇತರೆ ಏಕಾಣು ಜೀವಿಗಳು ಜೀವದಿಂದ ಇರಬಹುದು.

9. ಕ್ರಿಮಿಶುದ್ಧಿ :— ಉದಾ : ಹಾಲು :— ಎಲ್ಲಾ ಕ್ರಿಮಿಗಳ ನಾಶ ಕೇವಲ ರೋಗಕಾರಕ ಕ್ರಿಮಿಗಳು ಮಾತ್ರವಲ್ಲ.

10. ಆತ್ಯಧಿಕ ಉಷ್ಣಾಂಶ ಪರಿಸರಕೊಳ್ಳಪಡಿಸುವುದು
(ಅಲ್ಪ) ಹೀಟ್ ಟ್ರೀಟ್‌ಮೆಂಟ್

11. ಆಹಾರ ಸಂರಕ್ಷಣೆ ಮಾಡುವ ರಸಾಯನಗಳನ್ನು ಸೇರಿಸುವುದು :—

ಉದಾ : ಸಾಸೇಜಗಳ ಸಂರಕ್ಷಣೆಗೆ ರಂಜಕದ ಡೈ ಆಕ್ಸೈಡ್ ಸೇರಿಸುವುದು; ಇದು ತಾತ್ಕಾಲಿಕ ಪರಿಣಾಮಕಾರಿ.

(ಈ) ಶೇಖರಿಸಿಡುವುದು — ಪ್ರೋಪಾನಮ್ಮಾಡುವುದು :—

1. ಶೈತ್ಯಾಗಾರ :—(ರೆಫ್ರಿಜರೇಟರ್) ಇದರಲ್ಲಿ ಮಂಜುಗಡ್ಡೆಯ ''ತಾಪನಿಯಂತ್ರಣ''
(ಅ) ಅತಿ ಶೈತ್ಯಾವಸ್ಥೆಗೊಳಪಡಿಸಿಡುವುದು.
(ಆ) ಅತಿ ಶೈತ್ಯಾವಸ್ಥೆಯಲ್ಲಿಯ ಆಹಾರ ಪದಾರ್ಥಗಳು — ಇದರಲ್ಲಿ ತುಂಬುವ ಆಹಾರ ಗಳ ವಿವರಿಯಕಡೆ ಗಮನವಿರಲಿ.
(ಇ) ಮನೆಯಲ್ಲಿ ಉಪಯೋಗಿಸುವ ಶೈತ್ಯಾಗಾರಗಳು — ಹೆಚ್ಚಿಗೆ ಪದಾರ್ಥಗಳನ್ನು ತುಂಬಬಾರದು ಮತ್ತು ಆಹಾರಗಳು ಬಿಸಿಯಾಗಿರುವಾಗಲೇ ಶೈತ್ಯಾಗಾರದಲ್ಲಿ ಡುವುದು — ಇವುಗಳನ್ನು ಮಾಡಕೂಡದು.

2. ಪೀಡೆ ಮತ್ತು ಪೀಡೆಗಳ ನಿಯಂತ್ರಣ —

ಇಲಿ ಸೆಗಣಿ ಮಲಿನತಾದವು, ನೊಣಗಳು ಇತ್ಯಾದಿ.

3. ಸಂಗ್ರಹ ಮಾಡಿಟ್ಟಿರುವುದರ ಕಾಲ ಗ್ಞಾನೆಯಲ್ಲಿಟ್ಟು ಬಳಕೆ ಮಾಡುವುದು :—

ಕೊಂಡಿಟ್ಟ ತಾರೀಖಿನ ಮೊಹರನ್ನು ಪದಾರ್ಥಗಳ ಮೇಲೆ ನಮೂದಿಸುವುದರ ಪ್ರಾಮುಖ್ಯತೆ.

(ಉ) ಆಹಾರ ಸಜ್ಜುಗೊಳಿಸುವುದು :—

1. ಆವರಣದ ಮತ್ತು ಕಟ್ಟಡ ಕಟ್ಟುವಿಕೆ ಮತ್ತು ಅವುಗಳ ಉಪಯೋಗ

2. ಆಹಾರ ಕೈ ಬಳಸುವವರು (ಮನುಷ್ಯನೇ ಮನುಷ್ಯನ ಶತ್ರು)
ಧರಿಸುವ ಬಟ್ಟೆ, ಸ್ವಚ್ಛತೆ, ಗಂಟಲು, ಮೂಗು, ಬೆರ್ಮ ಮತ್ತು ಮಲದಲ್ಲಿ ಸೋಂಕು ಇಲ್ಲದಂತೆ ಎಚ್ಚರವಹಿಸುವುದು; ಆರೋಗ್ಯ ನಿಯಮಗಳ ಪಾಲನೆ.

3. ಆಹಾರ ತಯಾರಿನಂತರ ಶೇಖರಣೆ :—
ಕ್ರಿಮಿವೃದ್ಧಿ ಮತ್ತು ಮಲಿನತೆಯಾಗದಂತೆ ನೋಡಿಕೊಳ್ಳುವುದು.

4. ಅನುಮಾನಾಸ್ಪದವಾದ ಆಹಾರವನ್ನು ಬಿಸಾಡುವುದು.

(ಊ) ಸಜ್ಜುಗೊಳಿಸಿದ ಆಹಾರದ ವಿತರಣೆ :—

1. ಆಹಾರ ಕೈ ಬಳಸುವವರ ಸ್ವಚ್ಛತೆ.

2. ಪಾತ್ರೆಗಳ ಸ್ವಚ್ಛತೆ — ತೊಳೆಯುವ ಕ್ರಮಗಳು.

(ಎ) ಬೇಡದ ಆಹಾರದ ವಿಲೇವಾರಿ :—

1. ಕಸದ ತೊಟ್ಟಿಗಳು — ಕಸದ ಶೇಖರಣೆ
2. ಚರಂಡಿಗಳು
3. ನೊಣಗಳು ಮತ್ತಿತರ ಪೀಡೆ, ಕ್ರಿಮಿ ಕೀಟಗಳು.

(ಏ) ಆಯುಷ್ಯನ್ ಕಾರ್ಯಕ್ರ ನಿರ್ವಹಣೆ ಮತ್ತು ನೂತನತೆಗಳಿಲ್ಲದಂತೆ ಗಮನಿಸ :—

1. ಸಂಸ್ಥೆಯಿಂದ ಆಯುಷ್ಯನ್ ಮೇಲ್ಚಿಕಾರಣಿ — ಆಗಾಗ್ಗೆ ಸರಿಸೋಡುವುದು.

2. ಹೊರಗಿನವರಿಂದ ಮೇಲ್ವಿಚಾರಣೆ — ಸ್ಥಳೀಯ ಸಂಸ್ಥೆಗಳ ಆಹಾರ ಮೇಲ್ವಿಚಾರಕರಿಂದ.

(ಐ) ಗುರಿ :— ಸೋಂಕು ಹರಿದು ಮುಂದೆ ಮುಂದೆ ಸಾಗುವ ಸರಣಿಗೆ ತಡೆಹಾಕುವುದು.

1. ಆಹಾರ ಮಲಿನವಾಗದಂತೆ ನೋಡಿಕೊಳ್ಳುವುದು.

2. ರೋಗಕಾರಕ ಕ್ರಿಮಿಗಳ ಉತ್ಪನ್ನವನ್ನು ತಡೆಯುವುದು.

ಈ ಎಲ್ಲಾ ನೂತನತೆಗಳಿಗೂ ಕೊನೆಯಲ್ಲಿ ಉತ್ತರ ''ಆರೋಗ್ಯ ಶಿಕ್ಷಣ''

2. —: ಏಕಾಣು ಜೀವಿ ಪ್ರಪಂಚದ ಪರಿಚಯ :—

ಕೆಲವು ವೇಳೆ ನಾವು ಏಕಾಣುಜೀವಿ ಅಥವಾ ಸೂಕ್ಷ್ಮ ಜೀವಿಗಳು ಎಂದು ಕರೆಯುವ ಜೀವಿಗಳು ಅತಿ ಚಿಕ್ಕವು, ಅವುಗಳು ಕೋಳಿಮೊಟ್ಟೆಯಲ್ಲಿರುವ ಬಿಳಿ ದ್ರವವನ್ನು ಹೋಲುವ ಜೀವರನ (ಪ್ರೊಟೋಪ್ಲಾಸಮ್) ದಿಂದ ಮಾಡಲ್ಪಟ್ಟಿವೆ. ಒಂದು ಮುಖ್ಯ ವ್ಯತ್ಯಾಸವೇ ನೆಂದರೆ ಈ ಜೀವರನದಲ್ಲಿ ಜೀವಾಂಶ ತುಂಬಿದೆ. ಇದರ ನೈಜಿಕ ಅವಸ್ಥೆ ಮೊಟ್ಟೆರದು ಬಿಳಿಯ ದ್ರವಕ್ಕಿಂತ ಅತಿ ಜಟಿಲವಾದದ್ದು. ಈ ಏಕಾಣುಜೀವಿಗಳು ಮಣ್ಣು, ಗಾಳಿ, ನೀರು, ಸಸ್ಯ ಮತ್ತು ಪ್ರಾಣಿಗಳಲ್ಲಿ ಎಲ್ಲೆಡೆಗಳಲ್ಲಾ ವ್ಯಾಪಿಸಿವೆ.

ಇತರೆ ಜೀವ ವಸ್ತುಗಳಿಗೆ ಹೋಲಿಸಿದರೆ ಏಕಾಣುಜೀವಿಗಳು ರಚನೆಯಲ್ಲಿ ಬಹಳ ಸರಳ ಮತ್ತು ಜೀವವಿಂಡುಳಿದು ವ್ಯವಿಧ್ಯಯುತಾಗಲು ಉಷ್ಣಾಂಶ ಮತ್ತು ಕೆಲವು ಸಾಮಾನ್ಯ ಆಂಶಗಳು ಸಾಕು. ಆದರೆ ಇತರೆ ಕೆಲವು ಏಕಾಣುಜೀವಿಗಳಿಗೆ ಆದರಲ್ಲಾ ರೋಗಕಾರಕಗಳ ಬೆಳವಣಿಗೆಗೆ ಸವಿಶೇಷಿತ ಸಸಾರಜನಕ ಜೀವನತ್ವ ಇತ್ಯಾದಿಗಳು ಅತ್ಯಗತ್ಯ. ವಿವಿಧ ಏಕಾಣು ಜೀವಿಗಳು ಜೀವಿಸಲು ಬೇರೆ ಬೇರೆ ಮಟ್ಟದ ಉಷ್ಣಾಂಶ ಬೇಕು ಅಂಥಹ ಉಷ್ಣಾಂಶಗಳು ಅವುಗಳ ಬೆಳವಣಿಗೆಗೂ ಅತ್ಯುತ್ತಮವಾದದ್ದು. ಮಣ್ಣಿನಲ್ಲಿರುವ ಏಕಾಣುಜೀವಿಗಳು ಅವುಗಳು ಕಡಿಮೆ ಉಷ್ಣಾಂಶವಿರುವ ಕಡೆ ಕಾಣಿಸಿಕೊಳ್ಳುತ್ತವೆ. ಬಿಸಿನೀರು ಬುಗ್ಗೆಯಲ್ಲಿರುವ ಅಣುಜೀವಿಗಳು ಹೆಚ್ಚಿಗೆ ಉಷ್ಣಾಂಶದಲ್ಲಿ ಜೀವವಿದಿರಬಲ್ಲ ಏಕಾಣುಜೀವಿಗಳು. ಅವುಗಳನ್ನು ತಾಪ ತಡೆಯುವ ಏಕಾಣುಜೀವಿ (ಥರ್ಮೋಫಿಲಿಕ್) ಎಂದು ಕರಿಯುತ್ತೇವೆ. ಸಾಮಾನ್ಯವಾಗಿ ಮಣ್ಣಿನ ಮತ್ತು ತಾಪ ತಡೆಯುವ ಏಕಾಣು ಜೀವಿಗಳು ರೋಗಗಳನ್ನು ಉಂಟುಮಾಡುವುದಿಲ್ಲ. ಆದ್ದರಿಂದ ಅವುಗಳು ಕೊಳಪಜೀ ಸಸಿಗಳು (ಸಾಫ್ರೋಫೈಟ್ಸ್) ಎಂದು ಕರೆಯಲ್ಪಟ್ಟಿವೆ. ರೋಗಕಾರಕ ಏಕಾಣುಜೀವಿಗಳು ''ಪ್ಯಾಥೋಜೆನ್ಸ್'' ಎಂದು ಕರೆಯಲ್ಪಟ್ಟಿವೆ. ಮತ್ತು ಅವುಗಳು ಮನುಷ್ಯ ಶರೀರದ ಉಷ್ಣಾಂಶ ಅಂದರೆ 37 ಡಿಗ್ರಿ (98.6 ಎಫ್) ನಲ್ಲಿ ಅಭ್ಯಕ್ಷಾಗಿ ಜೀವಿಸುತ್ತವೆ ಮತ್ತು ಅತ್ಯುತ್ತಮವಾಗಿ ವ್ಯವಿಧ್ಯಯುತಾಗುತ್ತವೆ. ಅವುಗಳ ಬೆಳವಣಿಗೆ ಶೀತಾಗಾರದಲ್ಲಾ ಕುಂಠಿತವಾಗುತ್ತದೆ. ಮತ್ತು ಆಹಾರದಲ್ಲಿ ಇವುಗಳ ಸಂಖ್ಯೆ ವ್ಯವಿಧ್ಯಯುತಾಗದಂತೆ ಆಹಾರವನ್ನು ಶೀತಾಗಾರದಲ್ಲಿಡುತ್ತೇವೆ.

ಏಕಾಣು ಜೀವಿಗಳು ಬಹಳ ಚಿಕ್ಕವು 1 ರಿಂದ 3 ಮೈಕ್ರಾನ್ ಅಗಲ ಅಥವಾ 1:25,000 ದಿಂದ 3:25,000 ಇಂಚಿನಷ್ಟು ಇರುತ್ತವೆ. ಒಂದು ಗುಂಡು ಸೂಜಿಯ ತಲೆಯನ್ನು ಮುಚ್ಚಲು ಸುಮಾರು 10 ಲಕ್ಷ ಏಕಾಣು ಜೀವಿಗಳು ಬೇಕಾಗುತ್ತವೆ. ಪ್ರಯೋಗ ಶಾಲೆಗಳಲ್ಲಿ ಏಕಾಣು ಜೀವಿಗಳನ್ನು ಆವಿಗಳ ಬೆಳವಣಿಗೆಗೆ ಬೇಕಾಗುವ ಪೋಷಾಹಾರ ಪದಾರ್ಥಗಳನ್ನೊಳಗೊಂಡ ಬೊಯ್ಲು ಅಥವಾ ಜೆಲ್ಲಿಗಳ ಮೇಲೆ ಬೆಳಸಲಾಗುವುದು, ಪ್ರತಿ ಏಕಾಣುಜೀವಿಯೂ ಈ ತನ್ನಿವೇಶಗಳಲ್ಲಿ ಅತಿ ಜಾಗ್ರತೆ ವ್ಯದ್ಧಿಗೊಳ್ಳುತ್ತವೆ, ಪ್ರತಿ 20 ನಿಮಿಷದಲ್ಲಿ ಇದರ ಸಂಖ್ಯೆ ದ್ವಿಗುಣವಾಗುತ್ತದೆ. ಈ ರೀತಿ ಒಂದೇ ಒಂದು ಏಕಾಣುಜೀವಿ ಒಂದು ಘಂಟೆಯಲ್ಲಿ ೨೦ಬಾಗುತ್ತದೆ, ಎರಡು ಘಂಟೆಯಲ್ಲಿ 64 ಮತ್ತು 3 ಘಂಟೆಯಲ್ಲಿ 512 ಆಗುತ್ತದೆ. ಈ ಲೆಕ್ಕಾಚಾರದಂತೆ ಪ್ರತಿ ಏಕಾಣುಜೀವಿ 6 ಘಂಟೆ ಸಮಯದಲ್ಲಿ 2,50,000 ಕ್ಕೂ ಹೆಚ್ಚು ಸಂಖ್ಯೆಯಲ್ಲೂ ಮತ್ತು 10 ಘಂಟೆ ಸಮಯದಲ್ಲಿ 1,000 ದಶಲಕ್ಷಕ್ಕೂ ಹೆಚ್ಚು ಸಂಖ್ಯೆಯಲ್ಲಿ ವ್ಯದ್ಧಿಯಾಗುತ್ತವೆ. ಏಕಾಣು ಜೀವಿ ಶಾಸ್ತ್ರಜ್ಞರು 18 ಘಂಟೆಗಳ ನಂತರ ಸಾಕಣಿ ಮಧ್ಯಪಾಗಳನ್ನು ಪರೀಕ್ಷಿಸುತ್ತಾರೆ. ಆ ವೇಳೆಗೆ ಒಂದು ಏಕಾಣುಜೀವಿ ಲಕ್ಷೋಪಲಕ್ಷ ವ್ಯದ್ಧಿಗೊಂಡು ಗುಂಪುಗುಂಪಾಗಿ ವಸಾಹುತಗಳಂತಾಗಿ ಕಣ್ಣುಗಳಿಂದಲೇ ನೋಡುವಷ್ಟು ದೊಡ್ಡದಾಗಿರುತ್ತವೆ. ಈ ರೀತಿ ಕಾಣಿಸುವ ಗುಂಪು, ಗುಂಪುಗಳಿಗೆ ಏಕಾಣುಜೀವಿಗಳ ವಸಾಹುತುಗಳು (ಕಾಲೋನೀಸ್) ಎಂದು ಹೆಸರು.

ಈ ರೀತಿ ಬೇರೆ ಬೇರೆ ಏಕಾಣುಜೀವಿಗಳ ವಸಾಹುತುಗಳು ಒಂದಕ್ಕೊಂದು, ಆಕಾರ, ಗಾತ್ರ, ಬಣ್ಣ ಮತ್ತು ತೆಳ್ಳಾರುಬಿಕೆ ಮತ್ತು ಸಾಮಾನ್ಯವಾಗಿ ಕಾಣುಪುದರಲ್ಲಿ ವಿಭಿನ್ನವಾಗಿರುತ್ತವೆ. ನುರಿತ ಏಕಾಣು ಶಾಸ್ತ್ರಜ್ಞರು ಇವುಗಳ ಮೇಲೆ ಕಣ್ಣಾಡಿಸಿ ಅವುಗಳ ಹೆಸರು ಅಥವಾ ಯಾವ ಗುಂಪಿಗೆ ಸೇರಿದೆಂದು ಗುರುತಿಸಬಲ್ಲರು.

ಏಕಾಣುಜೀವಿಗಳು ಆಕಾರ ಮತ್ತು ಗಾತ್ರದಲ್ಲಿ ವಿಭಿನ್ನವಾಗಿರುತ್ತವೆ. ''ಕಾಕೈ'' ಗೋಳಾಕಾರವಾಗಿರುತ್ತವೆ. ''ಬ್ಯಾಸಿಲೈ'' ಉದ್ದುದ್ದವಾಗಿರುತ್ತವೆ ಮತ್ತು ಮುರಿದ ಕಡ್ಡಿಯ ತುಂಡಿನಂತಿರುತ್ತವೆ. ಆಹಾರವು ಏಕಾಣು ಜೀವಿಯಿಂದ ವಿಷಪೂರಿತವಾಗಲು ಕಾರಣವಾದದ್ದು ''ಸ್ಪಷ್ಟಲೋ ಕಾಕೈ'' ಏಕಾಣು ಜೀವಿಗಳು. ಇವುಗಳನ್ನು ಸೂಕ್ಷ್ಮ ದರ್ಶಕ ಯಂತ್ರದಿಂದ ನೋಡಿದರೆ ದ್ರಾಕ್ಷಿ ಹಣ್ಣಿನ ಗೊಂಚಲನ್ನು ಹೋಲಲುತ್ತದೆ. ಕೆಲವು ''ಕಾಕೈ'' ಮಣಿಗಳನ್ನು ಪೋಣಿಸಿದ ದಾರದಂತೆ ಇರುತ್ತವೆ, ಇವುಗಳು ''ಸ್ಟ್ರೆಪ್ಟೋಕಾಕೈ'' ಇತರೆಯವು ಯಾವಾಗಲೂ ಜೊತೆ ಜೊತೆಯಾಗಿರುತ್ತವೆ. ಅವುಗಳನ್ನು ''ಡಿಪ್ಲೋಕಾಕೈ'' ಎಂದು ಕರೆಯುತ್ತೇವೆ. ಉದಾ: ನ್ಯೂಮೋಕಾಕೈ (ನ್ಯೂಮೋನಿಯಾ ರೋಗಕಾರಕ) ಮೆನಿನ್ ಜೂ ಕಾಕೈ (ಮೆನಿನ್ ಜೈಟೀಸ್ ರೋಗಕಾರಕ) ಮತ್ತು ಗೋನೋ ಕಾಕೈ (ಗನೋರಿಯಾ ರೋಗಕಾರಕ)

ಕೆಲವು ಏಕಾಣು ಜೀವಿಗಳು ಮುರಿದ ಕಡ್ಡಿಯ ತುಂಡುಗಳಂತೆ ಇರುತ್ತವೆ. ಅವು ಗಳನ್ನು ''ಬ್ಯಾಸಿಲೈ'' ಎಂದು ಕರಿಯುತ್ತೇವೆ. ಇವುಗಳು ಒಂದೊಂದಾಗಿ ಅಥವಾ ಅಂಟಿಕೊಂಡು ಸರಪಳಿಯಂತೆ ಇರುತ್ತವೆ. ಆಹಾರ ವಿಷಪೂರಿತವಾಗಲು ಕಾರಣವಾದ ''ಸಾಲ್ಮೊನೆಲಾ'' ಬ್ಯಾಸಿಲೈ ಈ ಗುಂಪಿನವು.

ಬೆಳವಣಿಗೆಗೆ ಸನ್ನಿವೇಶ ಅನುಕೂಲವಾಗಿಲ್ಲದಿದ್ದರೆ ಕೆಲವು ''ಬ್ಯಾಸಿಲೈ'' ಬೀಜಕಣಗಳಾಗಿ (ಸ್ಪೋರ್ಸ್) ಅನಾನುಕೂಲ ಸನ್ನಿವೇಶಗಳನ್ನು ಎದುರಿಸುತ್ತವೆ. ಇದಕ್ಕೆ ''ಸ್ಪೋರ್ಸ್'' ಎಂದು ಹೆಸರು. ಇವುಗಳು ಏಕಾಣುಜೀವಿಯ ಕಣಗಳಿಗಾಗಿಂದ ಉತ್ಪನ್ನವಾದ ಗಟ್ಟಿ ಕವಚವುಳ್ಳವು ಗಳು. ಆಕಾರಗೋಳ. ಸ್ಪೋರ್ಸ್‌ಗಳು ಉಷ್ಣಾಂಶ ನಂಜುಹಾರಕ ಔಷಧೆಗಳನ್ನು ಎದುರಿ ಸುವ ಶಕ್ತಿ ಹೊಂದಿರುತ್ತವೆ. ಮತ್ತು ಸ್ಪೋರ್ಸ್ ರೂಪವನ್ನೂ ತಾಳಲಾದ ಏಕಾಣು ಜೀವಿಗಳಿಗೆ ಅನಾಧ್ಯವಾದ ಮಟ್ಟಿನ ಪ್ರತಿಕೂಲಕರವಾದ ಸನ್ನಿವೇಶಗಳಲ್ಲಿ ಜೀವಿಸಬಲ್ಲವು. ಈ ರೀತಿ ''ಸ್ಪೋರ್ಸ್'' ಅವಸ್ಥೆ ಹೊಂದಬಲ್ಲ ಏಕಾಣುಜೀವಿಗಳಲ್ಲಿ ಧನುರ್ವಾಯು, ಆಂತ್ರಾಕ್ಸ್, ಮತ್ತು ಗ್ಯಾಸ್ ಗ್ಯಾಂಗ್ರೀನ್ ಮತ್ತು ಆಹಾರ ವಿಷ ಉತ್ಪನ್ನ ಮಾಡಲು ಕಾರಣವಾದ ಏಕಾಣು ಜೀವಿಗಳೂ ಸೇರಿವೆ (ಬೋಟುಲಿನಮ್ ಮತ್ತು ಕ್ಲೊಸ್ಟ್ರಿಡಿಯಂ ವೆಲ್ಚಿ ಆಹಾರ ವಿಷ) ಸ್ಪೋರ್ಸ್‌ಗಳು ಅನೇಕ ದಿವಸ ಆಹಾರ ನೀರು ಇಲ್ಲದೆ ಜೀವಿಸಬಲ್ಲದು, ಮತ್ತು ಅನುಕೂಲ ಕರವಾದ ಸನ್ನಿವೇಶ ಒದಗಿದಾಗ ಮತ್ತೆ ಏಕಾಣು ಜೀವಿ (ಬ್ಯಾಸಿಲೈ) ಗಳಾಗಿ ಮೊಳಕೆಯೊಡುತ್ತವೆ. ಅವುಗಳು ಬೊಣ್ಣಂ ಧೂಳು ಶುದ್ಧೀಕರಿಸಿದ ಹತ್ತಿಯಂಯೂ ಸೇರಿದಂತೆ ಅನೇಕ ಸ್ಥಳಗಳಲ್ಲಿ ರುತ್ತವೆ. ಅವುಗಳನ್ನು ನಾಶಪಡಿಸುವುದು ಕಷ್ಟ, ಅವುಗಳಿಂದ ಮಲಿನವಾದ ಪದಾರ್ಥಗಳನ್ನು ಶುದ್ಧೀಕರಿಸಲು ಬಹಳ ಸಮಯ ಹಾಗೂ ಹೆಚ್ಚಿಗೆ ಉಷ್ಣಾಂಶದಲ್ಲಿ ಕಾಯಿಸುವುದರಿಂದಲೇ ಸಾಧ್ಯ (ಉದಾ: ಹೆಚ್ಚಿಗೆ ಒತ್ತಡದ ಆವಿ).

ಏಕಾಣು ಜೀವಿಗಳನ್ನು ಹೊಂದಿರುವ ಮನುಷ್ಯನಿಂದ ಪಡೆದು ಗುರುತಿಸುವುದು :—

ಏಕಾಣು ಜೀವಿಗಳನ್ನು ಮನುಷ್ಯ ವಿಸರ್ಜಿಸಿದಾಗ (ಮಲ ಮೂತ್ರ ಸ್ಪೋಶ್ಮ ಇತ್ಯಾದಿ) ಅಥವಾ ದೇಹದ ಅಂಗಾಂಗಗಳಿಂದ ಹೊರಬಿದ್ದ ರಸಗಳಿಂದ (ಏಂಜಲು, ಬೆವರು, ರುಗ್ಣಗ್ರಂಥಿ ಇತ್ಯಾದಿ) ಪಡೆದು ಗುರುತಿಸಲು ಸಾಧ್ಯ. ಉದಾಹರಣೆಗೆ ಅವುಗಳನ್ನು ಚರ್ಮ, ಮೂಗು, ಮತ್ತು ಗಂಟಲು ಕೀವು, ಸ್ಪೋಶ್ಮ, ಅಥವಾ ತೊಂಡೆ ಮತ್ತು ಮಲ ಮತ್ತು ರೋಗಗ್ರಸ್ತರಿಂದ ಮೂತ್ರದಿಂದ ಪಡೆಯಬಹುದು. ಏಕಾಣು ಜೀವಿ ಪರೀಕ್ಷೆಗಾಗಿ ಶರೀರದ ವಿಸರ್ಜನೆ ಇತ್ಯಾದಿಗಳನ್ನು ಅನೇಕ ವಿಧವಾಗಿ ಶೇಖರಿಸುವುದುಂಟು. ಗಂಟಲು ಕಣ್ಣ ಅಥವಾ ಧ್ವಾಂಯ ಇವುಗಳಿಗೆ ಅಂಟಿದ ಸೋಂಕನ್ನು ಹತ್ತಿಯ ಕಡ್ಡಿಯಿಂದ ತೆಗೆದು ಪರೀಕ್ಷೆಗೊಳಪಡಿಸಬಹುದು. ಅಥವಾ ಮೂತ್ರ ಮಲ ಸ್ಪೋಷ್ಮ (ತೊಂಟೆ) ಇವುಗಳನ್ನು ಶುದ್ಧೀಕರಿಸಿದ ಗಾಜಿನ ಅಥವಾ ಫ್ಲಾಸ್ಟಿಕ್ ಡಬ್ಬಿಗಳಲ್ಲಿ ಶೇಖರಿಸಿ ಪ್ರಯೋಗ ಶಾಲೆಗೆ ಪರೀಕ್ಷೆಗಾಗಿ ಕಳುಹಿಸಬಹುದು.

ಪ್ರಯೋಗ ಶಾಲೆಯಲ್ಲಿ ಮೊದಲನೆಯದಾಗಿ ಈ ರೀತಿ ಶೇಖರಿಸಿದ ಸೋಂಕು ವಸ್ತುವಿನ ಸ್ವಲ್ಪಭಾಗವನ್ನು ಒಂದು ಗಾಜಿನ ಮೇಲೆ ಹಾಕಿ ಅದನ್ನು ಹರಡುವ ಮೂಲಕ ಒಂದು ಒಂದು ತೆಳುವಾದ ಪದರವನ್ನು ಮಾಡುತ್ತಾರೆ. ಈ ಗಾಜನ್ನು ಅದರ ಮೇಲೆ ಇರಬಹುದಾದ ಇತರೆ ಏಕಾಣು ಜೀವಿಗಳನ್ನು ನಾಶಮಾಡಲು ಮತ್ತು ಆ ಪದರ ಗಟ್ಟಿಯಾಗಿ ಅಂಟಿಕೊಳ್ಳಲು ಕಾಯಿಸುತ್ತಾರೆ. ನಂತರ ವಿವಿಧವಾದ ರಂಗುಗಳನ್ನು ಹಾಕಿ ಅವುಗಳನ್ನು ಸರಿಯಾಗಿ ಗುರುತಿ ಸಲು ಅಳವಡಿಸುತ್ತಾರೆ. ನಂತರ ಗಾಜನ್ನು ತೊಳೆದು, ಒಣಗಿಸಿ, ಸೂಕ್ಷ್ಮದರ್ಶಕ ಯಂತ್ರದ ಮೂಲಕ ಪರೀಕ್ಷೆ ಮಾಡುತ್ತಾರೆ.

ಏಕಾಣು ಜೀವಿಗಳು ಅತಿ ಸೂಕ್ಷ್ಮ ಮತ್ತು ಅಗೋಚರ ಆದ್ದರಿಂದ ಇವುಗಳು ಗೋಚರವಾಗಲು ಸೂಕ್ತವಾದ ಸಾಧನಗಳಿಂದ ಪರೀಕ್ಷಿಸಬೇಕು. ಪರೀಕ್ಷಿಸಲು ಸಂಯುಕ್ತ ಬಿಂಬ ದರ್ಶಕ (ಕಾಂಪೌಂಡ್ ಮೈಕ್ರೋಸ್ಕೋಪ್) ಗಳನ್ನು ಉಪಯೋಗಿಸುತ್ತಾರೆ. ಏಕಾಣು ಜೀವಿ ತಜ್ಞರು ಈ ಗಾಜಿನ ಮೇಲಿರುವ ಈ ಜೀವಿಗಳನ್ನು ಪರೀಕ್ಷೆ ಮಾಡಿ, ಅದರ ಸಂಖ್ಯೆ, ಆಕಾರ ಗಾತ್ರ ಮತ್ತು ಅವುಗಳು ಹೊಂದಿರುವ ಅಥವಾ ಹೊಂದದಿರುವ ರಂಗುಗಳನ್ನು ಪರೀಕ್ಷಿಸಿ ನಿರ್ಧಾರಕ್ಕೆ ಬರುತ್ತಾರೆ. ಬೇರೆ ಬೇರೆ ಏಕಾಣು ಜೀವಿಗಳು ಬೇರೆ ಬೇರೆ ವಿಧವಾದ ಬಣ್ಣವನ್ನು ಹೀರುತ್ತವೆ ಅಥವಾ ತ್ಯಜಿಸುತ್ತವೆ. ಇದರಿಂದ ಇವುಗಳನ್ನು ಪತ್ತೆಹಚ್ಚುವ ಕೆಲಸ ಸುಲಭವಾಗುತ್ತದೆ.

ಇವುಗಳನ್ನು ಪತ್ತೆ ಹಚ್ಚುವ ಕಾರ್ಯದಲ್ಲಿ ಎರಡನೇ ಹಂತವೆಂದರೆ, ಇವುಗಳನ್ನು ಸಾಕಣೆ ಮಾಧ್ಯಮದ ಮೇಲೆ ಬೆಳೆಸುವರು. ಈ ಸಾಕಣೆ ಮಾಧ್ಯಮವು ಪುಷ್ಠಿಕರ ಪದಾರ್ಥಗಳು ಅನ್ನಾಂಗಗಳು, ಖನಿಜಾಂಶಗಳು ಇವುಗಳಿಂದ ಕೂಡಿದ್ದು ಶುದ್ಧೀಕೃತವಾಗಿರುತ್ತದೆ. ಇದನ್ನು ದ್ರವ ರೂಪದಲ್ಲಿ ಉಪಯೋಗಿಸಬಹುದು. ಆದರೆ ಸಾಮಾನ್ಯವಾಗಿ ''ಅಗರ್'' ನಿಂದ ಮಾಡಿದ ಜೆಲ್ಲಿ ರೂಪದಲ್ಲಿ ಉಪಯೋಗಿಸುತ್ತಾರೆ. ಇದರ ಮೇಲೆ ಚೆನ್ನಾಗಿ ಕಾಣುವಂತೆ ಏಕಾಣುಜೀವಿಗಳು ಗುಂಪು ಗುಂಪಾಗಿ ಕಾಣಿಸುತ್ತವೆ. ಇದರಿಂದ ಏಕಾಣು ಜೀವಿಗಳನ್ನು ಬೇರೆ ಬೇರೆ ಜಾತಿಯುದಾಗಿ ವಿಂಗಡಿಸಬಹುದಾಗಿದೆ. ಕೆಲವು ನಿರ್ದಿಷ್ಟ ಏಕಾಣು ಜೀವಿಗಳನ್ನು ಬೆಳೆಸಲು ಅದಕ್ಕೆ ಅನುಕೂಲಕರವಾದ ಸಾಕಣೆ ಮಾಧ್ಯಮವನ್ನೇ ಉಪಯೋಗಿಸಬೇಕು. ಅದರಂತೆ ಕೆಲವು ಸಕ್ಕರೆ ಮತ್ತು ಆಮ್ಲದೊಂದಿಗೆ ಬಣ್ಣ ಬದಲಾಯಿಸುವ ಕೆಲವು ಸೂಚಕ ವಸ್ತುಗಳನ್ನು ಉಪಯೋಗಿಸುತ್ತಾರೆ. ಅದರಲ್ಲಿರುವ ಸಕ್ಕರೆ ಮಾರ್ಪಾಡಾಗುವುದರಿಂದ ಆಮ್ಲ ಉತ್ಪತ್ತಿಯಾಗುತ್ತದೆ. ಮತ್ತು ಬಣ್ಣ ಬದಲಾಯಿಸುತ್ತದೆ. ಮಲದಲ್ಲಿರುವ ಅನೇಕ ಏಕಾಣು ಜೀವಿಗಳಲ್ಲಿ ಈ ಸಕ್ಕರೆ ಬದಲಾಯಿಸುವ ಶಕ್ತಿ ಇದೆ. ಆದರೆ ಸಾಲ್ಮೊನೆಲ್ಲಾ ಲ್ಯಾಕ್ಟೋಸ್ ಅಥವ ಸುಕ್ರೋಸ್ ಸಕ್ಕರೆಗಳನ್ನು ಮಾರ್ಪಡಿಸುವುದಿಲ್ಲ.

ಕೆಲವು ಸಾಕಣೆ ಮಾಧ್ಯಮಗಳಿಗೆ ರಕ್ತ ಬೆರಸಿ ತಯಾರ್ಮಾಡುತ್ತಾರೆ. ಇದು ಕೆಲವು ಏಕಾಣು ಜೀವಿಗಳಿಂದ **ಬದಲಾವಣೆ ಹೊಂದುತ್ತದೆ.** ಮತ್ತು ಈ ಬದಲಾವಣೆ ಪತ್ತೆಹಚ್ಚಲು ಸಹಾಯಕವಾಗಿದೆ. ಕೆಲವು ಮಾಧ್ಯಮಗಳು ಕೆಲವು ಏಕಾಣು ಜೀವಿಗಳ ಬೆಳವಣಿಗೆಯನ್ನು ಕುಂಟಿತಗೊಳಿಸುತ್ತದೆ ಮತ್ತು ಇತರೆ ಏಕಾಣು ಜೀವಿಗಳ ಬೆಳವಣಿಗೆಗೆ ಹೆಚ್ಚು ಅವಕಾಶ ಮಾಡಿಕೊಡುತ್ತದೆ. ಇದರಿಂದ ನಾವು ಕಾಣಬೇಕೆಂದಿರುವ ಏಕಾಣುಜೀವಿಗಳು ಹೆಚ್ಚಿಗೆ ಬೆಳೆದು ಅವುಗಳನ್ನು ಬೇರ್ಪಡಿಸಿ ನೋಡಲು ಸಹಾಯವಾಗುತ್ತದೆ.

ಇವುಗಳನ್ನು ಬೆಳಸುವ ವಿಧಾನ ಅಂದರೆ ಸೋಂಕಿನಿಂದ ಕೂಡಿದ ವಸ್ತುವಿನ ಸ್ವಲ್ಪ ಭಾಗವನ್ನು ಆಯುದ ಬೆಳಸುವ ಮಾಧ್ಯಮಕ್ಕೆ ಹಾಕುವುದು. ಬೆಳಸುವ ವಿಧಾನ ಘನ ರೂಪದ್ದಾದರೆ ಒಂದು ಶುದ್ಧೀಕರಿಸಿದ ತಂತಿಯ ಕುಣಿಕೆ ಮೂಲಕ ಹರಡುವುದು. ಹೀಗೆ ಹರಡಿದ ನಂತರ ಆ ಗಾಜಿನ ಮಾಧ್ಯಮವನ್ನು ಮೊಹರು ಮಾಡಿದ ಕಾವು ಪೆಟ್ಟಿಗೆಯಲ್ಲಿ ಒಂದು ರಾತ್ರಿ ಇಡುತ್ತಾರೆ. ಮಾರನೆ ದಿವಸ ಅದನ್ನು ಪರೀಕ್ಷೆ ಮಾಡುತ್ತಾರೆ. ಒಂದು ರಾತ್ರಿಯಲ್ಲಿ ಬೆಳೆದಿರುವ ಏಕಾಣುಜೀವಿಗಳ ವಸಾಹುತದಿಂದ ಆಯ್ದು ಗಾಜಿನ ಮೇಲೆ ಹರಡಿ ಅದಕ್ಕೆ ಬಣ್ಣ ಕಟ್ಟಿ ಪರೀಕ್ಷಿಸುತ್ತಾರೆ ಮತ್ತು ಮುಂದೆ ಉಪ ಬೆಳಸುವ ಸಾಧನಗಳನ್ನು ಉಪಯೋಗಿಸಿ

ಇದನ್ನು ನಿರ್ದಿಷ್ಟವಾಗಿ ಇಂಥದೇ ಏಕಾಣುಜೀವಿಯೆಂದು ಪತ್ತೆ ಮಾಡುತ್ತಾರೆ. ಈ ರೀತಿ ಮಾಡುವುದರಿಂದ ಅಂತಿಮವಾಗಿ ಏಕಾಣು ಜೀವಿಗಳು ಯಾವುದೆಂಬುದನ್ನು ನಿರ್ದಿಷ್ಟವಾಗಿ ಗೊತ್ತುಪಡಿಸಲು ಸಾಧ್ಯವಾಗುತ್ತದೆ. ನಂತರ ಅನೇಕ ವಿಧವಾದ (ಪೆನಿಸಿಲಿನ್, ಟೆಟ್ರಸೈಕ್ಲಿನ್, ಸಲ್ಫಾನ ಮೈಡ್ಯ ಇತ್ಯಾದಿ) ಔಷಧಿಗಳನ್ನು ಪ್ರಯೋಗ ಮಾಡುತ್ತಾರೆ. ಇದರಿಂದ ಯಾವ ಔಷಧಿ ಇದರ ಬೆಳವಣಿಗೆಯನ್ನು ಅಡ್ಡಿ ಗೊಳಿಸುತ್ತದೆ, ಯಾವ ಔಷಧಿ ಬೆಳವಣಿಗೆಗೆ ಅವಕಾಶಕೊಡುತ್ತದೆ ಎಂಬ ವಿಷಯವನ್ನು ತಿಳಿಯುತ್ತಾರೆ. ಇದರಿಂದ ರೋಗಿಯ ಚಿಕಿತ್ಸೆಗೆ ಸಹಾಯವಾಗುತ್ತದೆ:

<u>ಏಕಾಣು ಜೀವಿಗಳಿಂದ ಉಂಟಾಗುವ ಕೆಲವು ರೋಗಗಳು :—</u>

ಟಾಕ್ಸಿನ್ ಎಂಬ ನಂಜನ್ನು ಉತ್ಪತ್ತಿ ಮಾಡುವುದರಿಂದ ಏಕಾಣು ಜೀವಿಗಳು, ಮನುಷ್ಯನ ವೇಲೆ ರುಷ್ಪರಿಣಾಮಗಳನ್ನು ಬೀರುತ್ತವೆ. 'ಟಾಕ್ಸಿನ್' ಗಳಲ್ಲಿ "ಎಂಡೊಟಾಕ್ಸಿನ್" (ಏಕಾಣು ಜೀವಿಗಳ ಒಳಭಾಗದಲ್ಲಿ ಉತ್ಪತ್ತಿಯಾಗುವ ನಂಜು) ಮತ್ತು ಎಕ್ಸೊಟಾಕ್ಸಿನ್ (ಏಕಾಣುಜೀವಿಗಳ ಹೊರಭಾಗದಲ್ಲಿ ಉತ್ಪತ್ತಿಯಾಗುವ ನಂಜು) ಎಂದು ಎರಡು ವಿಧ. ಅಣುಜೀವಿಗಳ ಜೀವಿತಕಾಲದಲ್ಲಿ ಎಕ್ಸೊಟಾಕ್ಸಿನ್ ನನ್ನಾ ಉತ್ಪನ್ನವಾಗಿ ಹೊರಗೆಡವುತ್ತವೆ. ಸಾಮಾನ್ಯವಾಗಿ ಈ ನಂಜು ಅತಿ ಉಷ್ಣಾಂಶಕ್ಕೆ ಒಳಪಡಿಸುವುದರಿಂದ ನಾಶ ಹೊಂದುವುದಿಲ್ಲ. ಆಹಾರ ವಿಷವಾಗುವುದರಲ್ಲಿ "ಸ್ಟೆಫೈಲೊಕಾಕಲ್" ಆಹಾರ ವಿಷ ಮತ್ತು ಬೊಟುಲಿಸಮ್ ಇದಕ್ಕೆ ಉದಾಹರಣೆಗಳು. ಏಕಾಣುಜೀವಿಗಳು ಸತ್ತ ನಂತರವೇ "ಎಂಡೊಟಾಕ್ಸಿನ್" ಹೊರಬರುತ್ತದೆ. ಇವುಗಳು ಅತಿ ಉಷ್ಣಾಂಶ ಸ್ಥಿತಿಯಲ್ಲಿ ನಾಶವಾಗುತ್ತದೆ. "ಸಾಲ್ಮೊನೆಲ್ಲಾ" ಆಹಾರ ವಿಷ ಇದಕ್ಕೆ ಉದಾಹರಣೆ.

ಸಾಮಾನ್ಯವಾಗಿ ಏಕಾಣು ಜೀವಿಗಳು ಚರ್ಮಕೂದಲು ಮತ್ತು ಮನುಷ್ಯನ ನವದ್ವಾರಗಳ ಬಳಿ ಹೇರಳವಾಗಿರುತ್ತವೆ. ಸಾಮಾನ್ಯವಾಗಿ ಚರ್ಮದಲ್ಲಿ ಕಂಡುಬರುವ ಏಕಾಣುಜೀವಿ "ಸ್ಟಫೈಲೊಕಾಕೈ" ಬಾಯಿ ಮೂಗು ಮತ್ತು ಗಂಟಲುಗಳಲ್ಲಿರುವುದು ಸ್ಟಫೈಲೊ ಕಾಕೈ, ಸ್ಟ್ರೆಪ್ಟೊಕಾಕೈ, ಪ್ನ್ಯೂಮೊಕಾಕೈ ಮತ್ತು ಡಿಫ್ತೀರಿಯಾ ಅಣುಜೀವಿಯನ್ನು ಹೊಲುವ ಏಕಾಣುಜೀವಿಗಳು. ಗುದದ್ವಾರ, ದೊಡ್ಡಕರಳು, ಗುದದ್ವಾರದ ಸುತ್ತಲಿನ ಚರ್ಮ ಇವುಗಳಲ್ಲಿ ಸಾಮಾನ್ಯವಾಗಿ ಮಲದಲ್ಲಿರ ಬಹುದಾದ ಏಕಾಣು ಜೀವಿಗಳೇ ಇರುತ್ತವೆ. ಇವುಗಳಲ್ಲಿ ಬಹುತೇಕ ಕೋಲಾಕಾರ ಏಕಾಣುಜೀವಿ ಮತ್ತು ಕೆಲವು ಸ್ಪೈರೊಷೀಟಕೈ ಇರಲು ಸಾಧ್ಯ. ಹೆಂಗಸರಲ್ಲಿ ಯೋನಿಯಲ್ಲಿ ಕೆಲವೇ ಏಕಾಣು ಜೀವಿಗಳು ಇರುತ್ತವೆ. ಏಕೆಂದರೆ ಆದರಲ್ಲಿ ಉತ್ಪತ್ತಿಯಾಗುವ ರನ ಇದರ ಬೆಳವಣಿಗೆಯನ್ನು ಕುಂಠಿತಗೊಳಿಸುತ್ತದೆ. ಗರ್ಭಕೋಶ, ಮೂತ್ರ ಕೋಶಗಳಲ್ಲಿ ಏಕಾಣುಜೀವಿಗಳು ಇರುವು ದಿಲ್ಲ. ಇದರಿಂದ ಸ್ವಾಭಾವಿಕವಾದ ಮೂತ್ರವು ಶುದ್ಧವಾಗಿರುತ್ತದೆ.

ಈ ಏಕಾಣು ಜೀವಿಗಳು ಸಾಮಾನ್ಯವಾಗಿ ಅವುಗಳು ಆವರಿಸಿರುವ ಜಾಗದಲ್ಲಿ ರೋಗಗಳನ್ನು ಉಂಟುಮಾಡುವುದಿಲ್ಲ. ಇವುಗಳನ್ನು "ಕಾಮನ್ಸೆನ್ಸಾಲ್" ಎನ್ನುತ್ತಾರೆ. ಅನೇಕವು ರೋಗ ವನ್ನು ಉಂಟುಮಾಡತಕ್ಕವುಗಳಲ್ಲಿ, ಕೆಲವು ರೋಗವನ್ನು ಉಂಟು ಮಾಡುವವುಗಳು (ರೋಗಕಾರಕ ಗಳು) ಮನುಷ್ಯನು ಗಾಯಗೊಂಡಾಗ ಮತ್ತು ರೋಗ ತಡೆಯುವ ಶಕ್ತಿ ಕುಂದಿರುವಾಗ ಅವುಗಳು ಸಾಮಾನ್ಯವಾಗಿ ಆಕ್ರಮಿಸಿರುವ ಸ್ಥಳಗಳನ್ನು ಬಿಟ್ಟು ಬೇರೆ ಭಾಗಗಳನ್ನು ಆವರಿಸಿ ರೋಗೋತ್ಪತ್ತಿ ಮಾಡುತ್ತವೆ. ಈ ರೀತಿ ಕೆಲವು ಏಕಾಣು ಜೀವಿಗಳು ಚರ್ಮದ ಮೇಲಾಗುವಿಂದ

ಜರ್ಮದಲ್ಲಿ ಅಳವಾಗಿ ಬೊಕಳ್ಕ, ಪೊಡವೆ, ಕುರು ಮತ್ತು ''ಕಾರಬಲಿಕಲ್'' ಗಳನ್ನು ಉಂಟು ಮಾಡುತ್ತವೆ.

ಏಕಾಣು ಜೀವಿಗಳ ಚಾಯು ಮೂತ್ರ ಮತ್ತು ಗಂಟಲುಗಳನ್ನು ನೋಡಿದರೆ ವನ್ನಡಿನ ಉರಿ ಊತ, ಗಂಟಲಿನ ಉರಿತ ಇತ್ಯಾದಿ ರೋಗಗಳನ್ನು ಉಂಟು ಮಾಡುತ್ತವೆ. ಗುದದ್ವಾರ ಮತ್ತು ಜನನೇಂದ್ರಿಯಗಳ ಭಾಗದಲ್ಲಿ ಮೂಲವ್ಯ ಮೂಲಕ ನಿರುವ ಏಕಾಣು ಜೀವಿಗಳು ಮೂತ್ರ ಕೋಶದ ಉರಿತವನ್ನುಂಟು ಮಾಡುತ್ತದೆ. ಇದು ಮೂತ್ರ ಕೋಶದವರೆಗೂ ಪಸರಿಸಬಹುದು. ಸಾಮಾನ್ಯವಾಗಿ ಶುದ್ಧವಾಗಿರುವ ಅಂಗಾಂಗಗಳನ್ನು ಮತ್ತು ಅಂಗಾಂಶಗಳನ್ನು ಹೊಕ್ಕು ಆಯಾ ಭಾಗಗಳ ಉರಿತವನ್ನುಂಟು ಮಾಡುತ್ತವೆ. ಇವುಗಳಿಗೆ ಆಯಾ ಅಂಗಾಂಗಗಳಿಗೆ ಅನುಗುಣವಾದ ಹೆಸರನ್ನು ಕೆಳುತ್ತಾರೆ. ಇದೇ ರೀತಿ ಶ್ವಾಶಕೋಶದ ಉರಿತ ಊತಕ್ಕೆ ನ್ಯೂಮೋನಿಯಾ ಮತ್ತು ಪ್ಲೆದ್ರುಳ ಪದರಗಳ ಉರಿತಕ್ಕೆ ಪ್ಲೆರಿನ ಜ್ವಟ್ಟೀಸ ಇತ್ಯಾದಿ ಅನ್ನುತ್ತಾರೆ.

ಕೆಲವು ಏಕಾಣು ಜೀವಿಗಳು ಯಾವಾಗಲೂ ರೋಗವನ್ನುಂಟು ಮಾಡುತ್ತವೆ ಎಂದು ಹೇಳಬಹುದು. ಆದರೆ ಇವು ರೋಗವಾಹಕದಲ್ಲಿದ್ದರೆ ವ್ಯಕ್ತಿಗಳಿಗೆ ರೋಗ ಬೇರೆ ಕಾಣಿಸಿಕೊಳ್ಳದಂತೆ ಅವರಲ್ಲೇ ಆಡಗಿ ಜೀವಿಸಲು ಅಭ್ಯಾಸ ಮಾಡಿಕೊಂಡಿರುತ್ತವೆ. ಅಂಥ ಏಕಾಣು ಜೀವಿಗಳಲ್ಲಿ ''ಸ್ಟಫೈಲೊ'' ಸಾಲ್ಮೊನೆಲ್ಲಾ ಅದರಲ್ಲಾ ಟೈಫಾಯ್ಡ ಉಂಟು ಮಾಡುವ ಸಾಲ್ಮೊನೆಲ್ಲಾ ಟೈಫಿ ಸೇರಿವೆ.

—: <u>ಮನುಷ್ಯನಿಗೆ ಸೋಂಕು ಅಂಟುವಿಕೆ</u> :—

ಮನುಷ್ಯನಿಗೆ ಸೋಂಕು ಎಷ್ಟಾವರ್ತಿ ಅಂಟುತ್ತದೆ ? ಯಾವ ವರ್ಗದ ಜನರಿಗೆ ಅಂಟುತ್ತದೆ ? ಮತ್ತು ಶರೀರದ ಯಾವ ಭಾಗಗಳು ಸೋಂಕಿಗೆ ಒಳಪಡುತ್ತವೆ ಎಂಬುದು ಸೋಂಕಿನ ಮೂಲಸಾಧನ ನಿರ್ಧಾರ ಪಡಿಸುತ್ತದೆ. ಮಲೇರಿಯಾ ಸೊಳ್ಳೆಯು ಮೂಲಕ ಹರಡುತ್ತದೆ. ಆದ್ದರಿಂದ ಸೋಂಕಿಗೆ ಒಳಪಟ್ಟಿರುವ ಸೊಳ್ಳೆಗಳಿರುವ ಪ್ರದೇಶದಲ್ಲಿ ರೋಗ ಹರಡಲು ಸಾಧ್ಯ. ಇಲಿ ಕಡಿತದ ಜ್ವರ, ಒಳಚರಂಡಿ ಕೆಲಸಗಾರರಲ್ಲೇ ಸಾಮಾನ್ಯ. ಮೂತ್ರ ಕೋಶದ ರೋಗ ಸಾಮಾನ್ಯವಾಗಿ ಮಲದಿಂದ ಹರಡುವ ಏಕಾಣು ಜೀವಿಗಳಿಂದ ಹರಡುತ್ತದೆ ಏಕೆಂದರೆ, ಮೂತ್ರನಾಳ ಗುದದ್ವಾರಕ್ಕೆ ಅತೀ ಸಮೀಪದಲ್ಲಿದೆ.

<u>ಸೋಂಕಿನ ಮೂಲಸ್ಥಾನಗಳು</u> :—

(1) <u>ರೋಗಗ್ರಸ್ತ ಮನುಷ್ಯ</u> :— ಏಕಾಣು ಜೀವಿಗಳಿಂದ ಉಂಟಾದ ರೋಗದಿಂದ ನರಳುತ್ತಿರುವವರು ರೋಗವನ್ನು ಇತರರಿಗೆ ಹರಡಬಹುದು. ಷಂಡ, ಸ್ತ್ರೀ ಸಂಬಂಧವಾದ ರೋಗಗಳು, ಸಿಡುಬು, ವಿಷಮ ಶೀತಜ್ವರ, ಇನ್ಫ್ಲೂಯೆಂಜ, ಇತ್ಯಾದಿ ರೋಗಗಳು ಇದರಲ್ಲಿ ಸೇರಿವೆ.

(2) <u>ಸ್ವಾಸ್ಥ್ಯ ವಾಹಕರು</u> :— ರೋಗದಿಂದ ನರಳದೇ ಅವರ ಶರೀರದಲ್ಲಿ ರೋಗಕಾರಕ ಏಕಾಣು ಜೀವಿಗಳನ್ನು ಹೊಂದಿ, ಬೇರೆಯವರಿಗೆ ರೋಗವನ್ನು ಹರಡಬಲ್ಲವರು ಇದರಲ್ಲಿ ಎರಡು ವಿಧ.

(ಅ) <u>ಗುಣಹೊಂದಿರುವ ಸುಪ್ತವಾಹಕರು</u> :—

ಇತ್ತೀಚೆಗೆ ರೋಗದಿಂದ ನರಳಿ ಗುಣ ಹೊಂದಿರುವವರು, ಆದರೆ ಇನ್ನು ಅವರ ದೇಹದಲ್ಲಿ ಏಕಾಣು ಜೀವಿಗಳು ಇರುತ್ತವೆ.

(ಆ) <u>ಆರೋಗ್ಯವಂತ ಸುಪ್ತವಾಹಕರು</u> :—

ತಮಗೆ ತಿಳಿದಿರುವಂತೆ ಈ ವ್ಯಕ್ತಿಗಳು ರೋಗದಿಂದ ನರಳಿರುವುದಿಲ್ಲ. ಆದರೆ ರೋಗ ಕಾರಕ ಏಕಾಣು ಜೀವಿಗಳನ್ನು ಹೊಂದಿರುವವರು (ಹೇಗೆಂದರೆ ರೋಗಕಾರಕ ಅತಿ ಸ್ವಲ್ಪ ಸ್ವಲ್ಪ ಪ್ರಮಾಣದಲ್ಲಿ ರೋಗ ಕಾಣಿಸದಂತೆ ದೇಹದಲ್ಲಿ ಸೇರಿರುತ್ತವೆ)

ಕೊನೆಯ ಗುಂಪಿನ ಜನರು ಅಪಾಯಕಾರಿ, ಏಕೆಂದರೆ ಇವರನ್ನು ಸಾಮಾನ್ಯವಾಗಿ ಅನುಮಾನಾಸ್ಪದವಾಗಿ ನೋಡುವುದಿಲ್ಲ. ಇಂಥಹವರಿಂದ ರೋಗವು ವ್ಯಾಪಕವಾಗಿ ಹರಡಬಹುದು. ಮೆನಿನ್ ಜೈಟೀಸ್, ವಿಷಮ ಶೀತಜ್ವರ, ಆಮಶಂಕರೆ ಪೋಲಿಯೋ, ಮೈಲೇಟಿಸ್, ಸ್ಟೆಫೈಲೋ ಕಾಕಲ್ ಆಹಾರ ವಿಷ ಮತ್ತು ಸಾಲ್ಮೊನೆಲ್ಲಾ ಆಹಾರ ವಿಷವಾಗುವಿಕೆ ಇವುಗಳು ಈ ತರಹದ ರೋಗಗಳಲ್ಲಿ ಸೇರಿವೆ.

(3) <u>ಪ್ರಾಣಿಗಳು</u>:— ಇವುಗಳೆಲ್ಲಾ ರೋಗಗ್ರಸ್ತವಾಗಿರಬಹುದು ಅಥವಾ ಬರೀ ಸುಪ್ತವಾಹಕರಾಗಿರಬಹುದು. ಬೆಕ್ಕುಗಳು, ನಾಯಿಗಳು, ದನಕರುಗಳು, ಹಂದಿಗಳು ಮತ್ತು ಹೆಗ್ಗಣಗಳು ಸೇರಿದಂತೆ ಅನೇಕ ಪ್ರಾಣಿಗಳು ಮನುಷ್ಯನಿಗೆ ರೋಗವನ್ನು ಹರಡಬಲ್ಲವು. ಅವುಗಳು ಹರಡಬಹುದಾದ ರೋಗಗಳನ್ನು ಈ ಕೆಳಗೆ ಕೊಟ್ಟಿದೆ:—

ಕ್ಷಯರೋಗ	ಹಸುಗಳ ಹಾಲಿನಿಂದ
ಬ್ರೂಸೆಲ್ಲೋಸಿಸ್	ಹಸುಗಳ ಹಾಲಿನಿಂದ
ರೇಬಿಸ್ (ನಾಯಿ ಹುಚ್ಚು)	ನಾಯಿಗಳು
ಸಾಲ್ಮೊನೆಲ್ಲಾ ಸೋಂಕುಗಳು	ಹೆಗ್ಗಣಗಳು, ಹಕ್ಕಿಗಳು ಮತ್ತು ಕೋಳಿ, ದನಗಳು (ದನದ ಮಾಂಸ) ಇತ್ಯಾದಿ
ಪ್ಲೇಗ್	ಇಲಿಗಳು.
ಲೆಪ್ಟೋಸ್ಪೈರಲ್ ಕಾಮಾಲೆ	ಇಲಿಗಳು.

(4) <u>ಮಣ್ಣು</u> :— ಮಣ್ಣು ರೋಗಕಾರಕ ಏಕಾಣುಜೀವಿಗಳನ್ನು ಸಾಮಾನ್ಯವಾಗಿ ಹೊಂದಿರುತ್ತದೆ. ಮುಖ್ಯವಾಗಿ ಗಾಯಗಳು ಮಣ್ಣಿನಿಂದ ಮಲಿನವಾದರೆ ಧನುರ್ವಾಯು ಅಥವಾ ಗ್ಯಾಸ್ ಗ್ಯಾಂಗ್ರಿನ್ ಬರುವ ಸಂಭವವಿದೆ.

(5) <u>ಸ್ವತಃ ರೋಗಿ</u>:— ಹಾನಿಕಾರವಿಲ್ಲದೆ ರೋಗವನ್ನುಂಟು ಮಾಡದೇ ಇರುವ ಏಕಾಣು ಜೀವಿಗಳು, ಕೆಲವು ಸಂದರ್ಭದಲ್ಲಿ ಬೇರೆ ದೇಹ ಭಾಗವನ್ನು ಹೊಕ್ಕಾಗ ರೋಗವನ್ನುಂಟು ಮಾಡಬಹುದು ಉದಾಹರಣೆ

(ಅ) ಮಲದಲ್ಲಿರುವ ಕ್ರಿಮಿಗಳು ಮೂತ್ರ ಕೋಶವನ್ನು ಹೊಕ್ಕು ಮೂತ್ರ ಕೋಶದ ಉರಿ ಊತ (ಸಿಸ್ಟೈಟೀಸ್) ಉಂಟು ಮಾಡುತ್ತದೆ.

(ಆ) ಸಾಮಾನ್ಯವಾಗಿ [illegible] ಚರ್ಮದ ಮೇಲೆ ಇರುವ ಸ್ಟೆಫೈಲೋ ಕಾಕೈ, ಚರ್ಮದ ಒಳಭಾಗವನ್ನು ಹೊಕ್ಕು ಕುರುಗಳನ್ನುಂಟು ಮಾಡುತ್ತದೆ.

ಇಂಥಹ ಸ್ವಯಂ ಸೋಂಕಿಗೆ ಎಂಡೋಜೆನಸ್ ಸೋಂಕೆಂದು ಹೆಸರು.

ಸೋಂಕು ಹರಡುವಿಕೆ :—

ಸೋಂಕು ಹರಡುವ ವಿಧಾನವನ್ನು ಯಾವ ವಿಧವಾದ ಸೋಂಕು ಹರಡಿದೆ ಎನ್ನುವುದರಿಂದ ತಿಳಿಯಬಹುದು.

(1) ಆಹಾರ ವಿಷವಾಗುವಿಕೆಯನ್ನೂ ನೇರವಿದಂತೆ ಕರುಳಿನ ಬೇನೆಗಳು :—

ಆಗಾಗೆ ಈ ರೀತಿ ರೋಗಗಳು ಮನುಷ್ಯ ತನ್ನ ಸೋಂಕಂಟಿರುವ ಮಲ, ಆಹಾರ ಮತ್ತು ಪಾನೀಯಗಳನ್ನು ಮಲಿನ ಮಾಡಿ ಅದನ್ನು ನೇವಿನುವುದರ ಮೂಲಕ ಉಂಟಾಗುತ್ತವೆ. ಹೀಗೆ ಆಹಾರ ತಯಾರಿ ಮಾಡುವವರು, ವಿತರಣೆ ಮಾಡುವವರು ಅಥವಾ ತಟ್ಟೆ ವಗೈರೆ ಮುಟ್ಟುವವರು, ಆಹಾರವನ್ನು ಮಲದಿಂದ ಮಲಿನಗೊಳಿಸುವುದರಿಂದ, ಮಾಂಸವು ಪ್ರಾಣಿ ವಧೆ ಸಮಯದಲ್ಲಿ ಪ್ರಾಣಿ ಮಲದಿಂದ ಮಲಿನವಾಗಿರಬಹುದು. ಮಲದಿಂದ ಮಲಿನವಾದ ನೊಣಗಳು ಆಹಾರದ ಮೇಲೆ ಕೂತು ಮಲಿನಗೊಳಿಸಬಹುದು. ಅಡಿಗೆ ಮಾಡುವವರ ಮೂಗು, ಜರ್ಮದಲ್ಲಿರುವ ''ಸ್ಟಫೈಲೊಕಾಕೈ'' ಆಹಾರವನ್ನು ಸೇರಬಹುದು. ಮಲವು ನದಿ ನೀರನ್ನು ಮಲಿನಗೊಳಿಸಬಹುದು. ಇಂಥಹ ನೀರನ್ನು ಕುಡಿಯುವವರು ಸೋಂಕಿಗೆ ಒಳಗಾಗಬಹುದು.

(2) ಉಸಿರಾಟದ ಸೋಂಕುಗಳು :—

ಇವುಗಳು ಮೂಗು, ಗಂಟಲು, ಉಸಿರಾಟದ ನಾಳಗಳು ಮತ್ತು ಶ್ವಾಶಕೋಶದ ರೋಗಗಳು ಶೀತ, ಇನ್ಫ್ಲೂಯಂಜ, ಬ್ರಾಂಕೈಟೀಸ ಮತ್ತು ನ್ಯೂಮೋನಿಯಾ ಇದರಲ್ಲಿ ಸೇರಿದೆ. ಒಬ್ಬ ನಿಂದ ಮತ್ತೊಬ್ಬನಿಗೆ ಹರಡುವಿಕೆ :—

(ಅ) ನೇರ ಸಂಪರ್ಕ : ಕೈಕಲುಕುವುದು, ಮುತ್ತಿಕ್ಕುವುದು ಇತ್ಯಾದಿ

(ಆ) ರೋಗಗ್ರಸ್ತನು ಉಪಯೋಗಿಸಿದ ಪದಾರ್ಥಗಳ ಮೂಲಕ : ಉದಾ : ಅಂಗವಸ್ತ್ರ, ಊಟದ ತಟ್ಟೆ, ಚಮಚ ವಗೈರೆ ಹಾಸಿಗೆ ಬಟ್ಟೆ ಇತ್ಯಾದಿ.

(ಇ) ರೋಗಿಯಿಂದ ಹೊರಬಂದ ಏಕಾಣು ಜೀವಿಯಿಂದ ಮಲಿನವಾದ ಧೂಳನ್ನು ಸೇವಿಸುವುದರಿಂದ.

(ಈ) ರೋಗಿಯು ಮಾತನಾಡುವಾಗ, ಕೆಮ್ಮುವಾಗ ಅಥವಾ ಸೀನುವಾಗ ಹೊರಬೀಳುವ ತುಂತುರುಹನಿಗಳನ್ನು ಉಸಿರೆಳೆಯುವಾಗ.

(3) ಚರ್ಮ, ಗ್ರಂಥಿ ಮತ್ತು ಸ್ನಾಯು ಸೋಂಕುಗಳು :—

ಮಲಿನವಾದ ಕೈಗಳು, ಬಟ್ಟೆ, ಗಾಳಿಯಲ್ಲಿರುವ ಧೂಳು ಅಥವಾ ತುಂತುರು ಎಂಜಲು ಇವುಗಳ ಸಂಪರ್ಕದಿಂದ

(4) ಮೇಹ ರೋಗಗಳು :— ರೋಗಿಯೊಡನೆ ಸಂಭೋಗ ಮಾಡುವುದರಿಂದ

(5) ಸೊಳ್ಳೆ ಮೊದಲಾದುವುಗಳಿಂದ ಹರಡುವ ರೋಗಗಳು :—

ಬಹುತೇಕ ಉಷ್ಣದೇಶಗಳಲ್ಲಿ ಈ ಕೆಳಗಿನವು ಹೆಚ್ಚಿಗೆ ತಲೆದೋರುತ್ತವೆ :—

ಮಲೇರಿಯಾ ಸೊಳ್ಳೆಯಿಂದ ಹರಡುತ್ತದೆ.

ಪ್ಲೇಗ ಇಲಿಯಲ್ಲಿರುವ ಚಿಗಟದಿಂದ ಹರಡುತ್ತದೆ.

...

ಟೈಫನ್ ಹೇನಿನಿಂದ ಹರಡುತ್ತದೆ.

ಸ್ಲೀಪಿಂಗ್ ಸಿಕ್‌ನೆಸ್ ಟಿಟ್ಸೆ ನೊಣಗಳಿಂದ ಹರಡುತ್ತದೆ.

(6) <u>ಪ್ರಯೋಗ ಶಾಲೆಯಲ್ಲಿ ಹರಡುವ ರೋಗಗಳು</u> :-

ಪ್ರಯೋಗಶಾಲೆಯಲ್ಲಿ ವಿಕಾಣುಗಳನ್ನು ಬೆಳೆಸಲು ಉಪಯೋಗಿಸುವ ಸಾಧನಗಳು, ಮರಣಾನಂತರದ ದೇಹದ ಭಾಗಗಳು ಪರಿಶೋಧನೆಗೆ ಉಪಯೋಗಿಸುವ ರೋಗಗ್ರಸ್ತ ಪ್ರಾಣಿಗಳು ಇವುಗಳ ಸಂಪರ್ಕದಲ್ಲಿ ಕೆಲಸ ಮಾಡುವವರಿಗೆ ಕೆಲವೊಂದು ರೋಗಗಳು ಹರಡುತ್ತವೆ.

3:- -: <u>ಆಹಾರ ವಿಷವಾಗುವಿಕೆ</u> :-

ಆಹಾರ ಸೇವನೆಯಿಂದ ಆಗಾಗ್ಗೆ ಇದ್ದಕ್ಕಿದ್ದಹಾಗೆ ಉಂಟಾಗುವ ಕೆಲವು ಪರಿಸ್ಥಿತಿಗಳಿಗೆ ಆಹಾರ ವಿಷ ಎಂದು ಕರಿಯಬಹುತ್ತದೆ. ಅದು ಸಾಮಾನ್ಯವಾಗಿ ಜಠರ ಮತ್ತು ಕರುಳಿನ ಭಾಗಗಳಲ್ಲಿ ಪರಿಣಾಮ ಬೀರುತ್ತವೆ, ಅಪರೂಪವಾಗಿ ಇತರೆ ಭಾಗಗಳಲ್ಲಾ ಆಗುವುದುಂಟು, ಈ ಇತರೆ ಭಾಗಗಳಲ್ಲಿ ಉಂಟಾಗುವುದಕ್ಕೆ ಉದಾಹರಣೆಯಾಗಿ '' ಬೊಟುಲಿಸಮ್'' ಹೇಳಬಹುದು. ಇದರಲ್ಲಿ ಬಹುತೇಕ ಲಕ್ಷಣಗಳು ನರಮಂಡಲವನ್ನು ನಾಶಪಡಿಸುವಂಥಹವುಗಳು, ಆಹಾರ ವಿಷವಾಗುವಿಕೆಯು, ರಾಸಾಯನಿಕ, ಸಸ್ಯಗಳ ಅಥವಾ ವಿಕಾಣು ಜೀವಿಗಳ ಮೂಲದಿಂದ ಉಂಟಾಗಬಹುದು. ಜಠರ ಮತ್ತು ಕರುಳಿಗೆ ಸಂಬಂಧಪಟ್ಟದ್ದಾದರೆ, ವಾಕರಿಕೆ, ಹೊಟ್ಟೆನೋವು, ವಾಂತಿ ಮತ್ತು ಭೇದಿ ಕಾಣಿಸಿಕೊಳ್ಳುತ್ತದೆ. ಇಂಥಹ ಪರಿಸ್ಥಿತಿಗಳಲ್ಲಿ ಯಾವ ವಿಧದಾದ ವಿಷನೀವನೆಯಾಗಿದೆ; ಎಂಬುದರ ಮೇಲೆ ಆಹಾರವನ್ನು ತೆಗೆದುಕೊಂಡ 10 ನಿಮಿಷಗಳಿಂದ 48 ಘಂಟೆಗಳ ಸಮಯದಲ್ಲಿ ಲಕ್ಷಣಗಳು ಹೊರಬೀಳುವುದು.

<u>ವಿ ಧ ಗ ಳು</u>:-

''ಆಹಾರ ವಿಷ'' ಘಟನೆಗಳನ್ನು ಮೂರಾರು ಗುಂಪಾಗಿ ವಿಂಗಡಿಸಲಾಗಿದೆ.

(1) ಜನಸಾಮಾನ್ಯರಲ್ಲಿ ತಲೆದೋರುವ ಸನ್ನಿವೇಶಗಳು.

— ಬೇರೆ ಬೇರೆ ಕುಟುಂಬಗಳಲ್ಲಿ ಎರಡು ಅಥವಾ ಮೂರು ಮಂದಿಗೆ ತಗಲುವುದು.

(2) ಕುಟುಂಬದವರಲ್ಲೇ ತಲೆದೋರುವ ಸನ್ನಿವೇಶಗಳು:-

— ಒಂದೇ ಕುಟುಂಬದಲ್ಲಿ ಎರಡು ಅಥವಾ ಮೂರು ಜನರಿಗೆ ತಗಲುವುದು.

(3) ಆಲ್ಲಲ್ಲಿ ಒಂದು ಎರಡು ಕಾಣಿಸಿಕೊಳ್ಳುವ ಸನ್ನಿವೇಶಗಳು :-

— ಕುಟುಂಬದಲ್ಲಿ ಅಥವಾ ಸುತ್ತಮುತ್ತಲು ಯಾರಿಗೂ ಇಲ್ಲದೆ ಒಬ್ಬರಿಗೆ ಮಾತ್ರ ಕಾಣಿಸಿರುವ ಘಟನೆ, ನರಳುತ್ತಿರುವ ರೋಗಿ ಯಾರಿಂದಿಗೆ ಆಥವಾ ರೋಗಗಾಹಕರಿಗೆ ಏನೂ ಸಂಬಂಧವಿರುವುದಿಲ್ಲ.

ಕೆಲವೊಂದು ಅಪರೂಪವಾದ ಘಟನೆ ಬಿಟ್ಟರೆ, ಇದರಿಂದ ಮರಣ ಸಂಭವಿಸುವುದು ಕಡಿಮೆ. ಮತ್ತು ಹೊಗೊಂದು ವೇಳೆ ಮರಣವಾದರೆ ಅದು ಅತಿ ವಯಸ್ಕರಿಗೆ ಅಥವ ಅತೀ ಚಿಕ್ಕಮಕ್ಕಳಿಗೆ ಸೀಮಿತವಾಗಿರುತ್ತದೆ. ''ಆಹಾರ ವಿಷ'' ಎಂಬ ನಾಮಧೇಯವನ್ನು ಸಾಮಾನ್ಯವಾಗಿ ಮತ್ತು ಅತಿ ಹೆಚ್ಚಾಗಿ ತೋರುವ ಕ್ರಿಯೆಗಳಿಂದುಟಾದ ಪರಿಣಾಮಕ್ಕೆ ಸೀಮಿತ ಮಾಡಲಾಗುತ್ತಿದೆ.

1975 ರಲ್ಲಿ ಇಂಗ್ಲೆಂಡ್ ದೇಶದಲ್ಲಿ ಅತ್ಯಂತ ಹೆಚ್ಚಿನ ಸಂಖ್ಯೆಯಲ್ಲಿ ಅಂದರೆ 10,936 ''ಆಹಾರ ವಿಷ'' ಘಟನೆಗಳು ಉಂಟಾದವು, ಅವುಗಳಲ್ಲಿ 230 ಜನ ಸಾವಿಗೀಡಾಗಲ್ಪಟ್ಟರು. 765 ಕುಟುಂಬಗಳವರಲ್ಲಿ ಒಬ್ಬರೇ ತಲೆದೋರಿದವು ಮತ್ತು 4,144 ಅಲ್ಲಲ್ಲಿ ಪ್ರತ್ಯೇಕ ವ್ಯಕ್ತಿಗಳಲ್ಲಿ ಮಾತ್ರ ಸಂಭವಿಸಿದ ಪರಿಸ್ಥಿತಿಗಳು. ಇದಕ್ಕೆ ಕಾರಣ 1975 ರಲ್ಲಿ ಬೇಸಿಗೆ ತಾಪ ಬಹಳ ಹೆಚ್ಚಾಗಿದ್ದು, ಹೆಚ್ಚಿನ ಜನರು ಮನೆಗಳಲ್ಲಿ ಊಟಮಾಡದೆ ಹೊರಗಡೆ ಹೋಗಿ ತಿನ್ನುತ್ತಿದ್ದರು. ಈ ಜನಗಳಿಗೆ ಸ್ವಾಭಾವಿಕವಾಗಿಯೇ ''ಆಹಾರವಿಷ'' ಸಂಭವಿಸುವ ಆಪಾಯ ಅಧಿಕವಾಗಿತ್ತು. ಈ ರೀತಿ ಕೆಲವು ಘಟನೆಗಳನ್ನು ರೇಡಿಯೋ, ಟೆಲಿವಿಷನ್ ಇತ್ಯಾದಿ ಪ್ರಸಾರ ಮಾಧ್ಯಮಗಳ ಮೂಲಕ ಪ್ರಚುರಪಡಿಸಲಾಗಿ ಘಟನೆಗೆ ಸಂಭಂದಿಸಿದ ಅನೇಕ ರೋಗಿಗಳು ಅವರ ವೈದ್ಯರುಗಳಲ್ಲಿ ಚಿಕಿತ್ಸೆಗೆ ಹೋಗುತ್ತಿದ್ದುದು ಮತ್ತೊಂದು ವಿಷಯ.

ರಸಾಯನಿಕ ವಸ್ತುಗಳಿಂದ ಆಹಾರ ವಿಷವಾಗುವಿಕೆ :—

ಖನಿಜ ಸಂಭಂಧವಾದ ವಸ್ತುಗಳಿಂದ ರಸಾಯನಿಕ ವಿಷವಾಗುವಿಕೆ ಇತ್ತೀಚೆಗೆ ಬಹಳ ವಿರಳ, ನೀರಿನ ಕೊಳಾಯಿಯ ಮತ್ತು ಟ್ಯಾಂಕಗಳಲ್ಲಿ ಸೀಸದ ಸಂಭಂಧವಾದ ವಿಷವಾಗುವಿಕೆ ಈಗ ಆಗುವುದಿಲ್ಲ. ಕಾನೂನು ರೀತ್ಯಾ ''ಆರ್ಸೆನಿಕ್'' ನ್ನೂ ರಕ್ಷಣಾ ಸಾಧಕವಾಗಿ ಉಪಯೋಗಿಸುವುದನ್ನು ನಿರ್ಭಂದ ಪಡಿಸಲಾಗಿದೆ. ಹಣ್ಣು ತರಕಾರಿಗಳನ್ನು ವಿಷವಿಶ್ರಿತ ಕ್ರಿಮಿನಾಶಕಗಳಿಂದ ಸಿಂಪಡಿಸುವುದನ್ನು ಕಡಿಮೆ ಮಾಡಲಾಗುತ್ತಿದೆ. ಇತ್ತೀಚೆಗೆ ಅಮೇರಿಕಾದಿಂದ ಬಂದಿರುವ ವರದಿಯಂತೆ, ಒಂಭಾರು ಮನೆಯಂಬಲ್ಲಿ ಹೆಚ್ಚಿಗೆ ಡಿ.ಡಿ.ಟಿ. ಮೊದಲಾದ ಕ್ರಿಮಿನಾಶಕಗಳನ್ನು ಉಪಯೋಗಿಸುತ್ತಾರೆಯೂ, ಅವರ ಶರೀರದಲ್ಲಿಯೂ ಅದಕ್ಕೆ ಸಮನಾದ ಕ್ರಿಮಿನಾಶಕವು ಇರುತ್ತದೆ. ಪಿತ್ತಜನಕಾಂಗ ನಾಶವಾಗುವಿಕೆಗೂ, ಕ್ರಿಮಿನಾಶಕ ಮತ್ತು ಕೀಟನಾಶಕಗಳ ಉಪಯೋಗಕ್ಕೂ ಸಂಬಂಧವಿದೆಯೆಂದು ಇತ್ತೀಚಿನ ಪರಿಶೋಧನೆಗಳಿಂದ ವಿಶ್ವ ಆರೋಗ್ಯ ಸಂಸ್ಥೆ ಮತ್ತು ಆಹಾರ ಮತ್ತು ಕೃಷಿ ವಿಜ್ಞಾನ ಸಂಸ್ಥೆಗಳು ವರದಿ ಮಾಡಿದೆ. ಈ ಕ್ರಿಮಿನಾಶಕ ಮತ್ತು ಕೀಟನಾಶಕಗಳನ್ನು ಪ್ರಪಂಚದಲ್ಲೆಲ್ಲಾ ಉಪಯೋಗಿಸುತ್ತಿರುವುದರಿಂದ, ಆಹಾರವು ವಿಲಿನವಾಗುವ ಸಾಧ್ಯತೆಗಳಿವೆ.

ಈ ರೀತಿ ವಿಲಿನವಾಗಲು ಆಲ್ಡ್ರಿನ್, ಡೈಲ್ಡ್ರಿನ್, ರೋಡೇನ್ ಮತ್ತು ಎಂಡೋಸಲ್ಫಾನ್ ಎಂಬ ವಸ್ತುಗಳು ಮುಖ್ಯಕಾರಣ.

1965 ರಲ್ಲಿ ಬ್ರಿಟನ್ನಿನ ಕೃಷಿ, ವಿಮಾನಯಾನಕ್ಕೆ ಮತ್ತು ಆಹಾರ ಇಲಾಖಾ ಸಚಿವಾಲಯವು ಈ ಕೀಟನಾಶಕಗಳನ್ನು ಕೈತೋಟಗಳಲ್ಲಿ ಉಪಯೋಗಿಸಬಾರದೆಂದೂ, ಡಿ ಡಿ ಟಿ ಮತ್ತು ಬಿ ಹೆಚ್ ಸಿ ಗಳನ್ನು ಬಹಳವಿತವಾಗಿ ಉಪಯೋಗಿಸಬೇಕೆಂದೂ ಆದೇಶನೀಡಿದೆ.

ಇತ್ತೀಚಿನ ದಿನಗಳಲ್ಲಿ ರಸಾಯನಿಕ ವಸ್ತುಗಳಿಂದ ಆಹಾರ ವಿಷವಾಗುವಿಕೆ ವಿರಳವಾಗಿದ್ದರೂ, ಆಗಾಗ್ಗೆ ಇಂತಹ ಘಟನೆಗಳು ಇದ್ದಕ್ಕಿದ್ದಹಾಗೆ ಕಾಣಿಸಿಕೊಳ್ಳುವುದು ತಪ್ಪಿಲ್ಲ, ಉದಾಹರಣೆಗೆ 1965 ರಲ್ಲಿ ಎಪಾಕ್ಸಿನೆಸಿನ್ ಬದಲು ಕೆಮಿಕಲ್ ಹಾರ್ಮೋನಿನಿಂದ ಮಲಿನವಾದ ರೊಟ್ಟಿಯಿಂದನ್ನು ತಿಂದು 84 ಜನರು ರೋಗಗ್ರಸ್ಥರಾಗಿದ್ದರು. ಹಿಟ್ಟಿನ ಬೀಲಗಳನ್ನು ಈ ರಸಾಯನಿಕ ಬೆಲ್ಲದ ಒಂದೇ ಲಾರಿಯಲ್ಲಿ ಸಾಗಿಸಲಾಗಿತ್ತು. ಈ ಘಟನೆಯಿಂದ ರಸಾಯನಿಕ ವಿಷಗಳು ಬೇಯಿಸುವುದರಿಂದ ನಾಶವಾಗುವುದು ಬಹಳ ಅಪರೂಪವೆಂದು ತಿಳಿಯುತ್ತದೆ.

ಅನೇಕ ರಸಾಯನಿಕ ವಸ್ತುವಿನಿಂದ ಆಹಾರ ವಿಷವಾಗುವ ಪ್ರಕರಣಗಳು ಮನೆ ಅಥವಾ ಕೈಗಾರಿಕಾ ಸ್ಥಳಗಳಲ್ಲಿ ಆಗುತ್ತವೆ. ಇವುಗಳಲ್ಲಿ ಕೀಟ ನಾಶಕಗಳನ್ನು ಪ್ಯಾರಫಿನೆನನ್ನು ಶುದ್ಧೀಕರಣ ವಸ್ತುಗಳನ್ನು ಬೇಜವಾಬ್ದಾರಿಯಿಂದ ಇಡುವುದರಿಂದ, ಅವುಗಳು ಜೆಲ್ಲಿ ಆಹಾರ ಪದಾರ್ಥಗಳ ಸಂಪರ್ಕವನ್ನು ಹೊಂದುತ್ತವೆ. ಅಥವಾ ಗುರುತು ಹಚ್ಚದೆ ಇರುವ ಹಳೆಯ ಆಹಾರ ಡಬ್ಬಗಳಲ್ಲಿ ಇವುಗಳನ್ನು ಇಡುವುದರಿಂದಲೂ ಸಂಭವಿಸಬಹುದು. ಆದ್ದರಿಂದ ಇಂತಹ ವಿಷವಸ್ತುಗಳನ್ನು ಹೆಚ್ಚಿಗೆ ತಂದು, ಅವುಗಳನ್ನು ದಿನವಹಿ: ಬಳಕೆಗೆ ಚಿಕ್ಕ ಡಬ್ಬಗಳಲ್ಲಿಡುವಾಗ ಅದರ ಮೇಲೆ ಕಡ್ಡಾಯವಾಗಿ ಅದರ ಹೆಸರನ್ನು ನಮೂದಾಡಿಸುವ ಚೀಟಿಯನ್ನು ಅಂಟಿಸಿರಬೇಕು ಮತ್ತು ಅವುಗಳನ್ನು ಚಿಕ್ಕಮಕ್ಕಳಿಗೆ ಸಿಗದಂತೆಯೂ, ಆಹಾರ ಪದಾರ್ಥಗಳಿಗೆ ದೂರವಾಗಿಯೂ ಇಡಬೇಕು.

ಸಸ್ಯಗಳಿಂದ ವಿಷವಾಗುವಿಕೆ :—

ಅನೇಕ ಸಸ್ಯಗಳನ್ನು ತಿಂದರೆ ವಿಷವಾಗಿ ಪರಿಣಮಿಸುವುದು ಈ ರೀತಿಯಾಗುವುದು ಅಕಸ್ಮಿಕ ಏಕೆಂದರೆ ಕೆಲವು ಗಿಡ ಹುಣ್ಣು, ಕಾಯಿ ವಗೈರೆಯನ್ನು ತಿನ್ನಲು ಯೋಗ್ಯವಾದವೆಂಬ ತಪ್ಪು ಭಾವನೆಯಿಂದ ಸೇವಿಸುವುದರಿಂದ ಹೀಗಾಗುತ್ತದೆ. ಇವಕ್ಕೆ ಉದಾಹರಣೆಗಳು ಹೆಮಲಾಕ್, ಆಕೋನೈಟ್ ಮತ್ತು ಅಪಾಯಕಾರಿ ನೈಟ್ ಶೇಡ್ ಎಂಬುದು. ನಾಯಿ ಕೊಡೆಗಳನ್ನು ಉಪಯೋಗಿಸುವಾಗ ಅವುಗಳನ್ನು ಸರಿಯಾಗಿ ಗುರುತಿಸುವುದನ್ನು ತಿಳಿದು, ಅವು ಅಪಾಯಕಾರಿಯಲ್ಲದ ಗುಂಪಿಗೆ ಸೇರಿದ್ದೆಂದು ತಿಳಿದು ಉಪಯೋಗಿಸಬೇಕು.

ಏಕಾಣು ಜೀವಿಗಳಿಂದ ವಿಷವಾಗುವಿಕೆ :—

ಏಕಾಣು ಜೀವಿಗಳಿಂದ ವಿಷವಾಗುವಿಕೆಯು, ಸಾಮಾನ್ಯವಾಗಿ ಅವುಗಳಿಂದ ಮಲಿನವಾದ ಆಹಾರ ವಸ್ತುಗಳಿಂದ ಆಗುತ್ತವೆ. ಇತ್ತೀಚೆಗೆ ಹಾಲು ಮತ್ತು ನೀರನ್ನು ಸಾರ್ವಜನಿಕರ ಉಪಯೋಗಕ್ಕೆ ಬಿಡುಗಡೆಯಾಗುವ ಮುನ್ನ ಸುರಕ್ಷಿತಗೊಳಿಸಿ ನಂತರ ಉಪಯೋಗಕ್ಕೆ ಬಿಡುಗಡೆ ಮಾಡಲಾಗುತ್ತಿದೆ.

ಏಕಾಣು ಜೀವಿಗಳು ಅಥವಾ ಕ್ರಿಮಿಗಳು ಅತಿ ಸೂಕ್ಷ್ಮ ಸುಮಾರು 10 ಲಕ್ಷದಷ್ಟು ಕ್ರಿಮಿಗಳನ್ನು ಇಟ್ಟರೆ ಅವು ಒಂದು ಗುಂಡುಸೂಜಿ ತಲೆಯಷ್ಟು ಸ್ಥಳವನ್ನು ಆಕ್ರಮಿಸಿಕೊಳ್ಳುತ್ತವೆ. ಅವು ಸಜೀವಿಗಳು ಮತ್ತು ಸಾಮಾನ್ಯವಾಗಿ 1—2, 2—4 ಇತ್ಯಾದಿಯಾಗಿ ಬಹುಬೇಗ ವೃದ್ಧಿಗೊಳ್ಳುತ್ತವೆ. ಈ ಕ್ರಿಯೆ ಪ್ರತಿ 20—30 ನಿಮಿಷಗಳಿಗೊಮ್ಮೆ ಆಗುತ್ತಿರುತ್ತದೆ. ಈ ರೀತಿ ಲೆಕ್ಕಹಾಕಿದರೆ ಒಂದೇ ಒಂದು ಏಕಾಣುಜೀವಿ 12 ಘಂಟೆಗಳಲ್ಲಿ 500 ರಿಂದ 1000 ದಶಲಕ್ಷ ಏಕಾಣುಜೀವಿಗಳಾಗುತ್ತವೆ.

ಏಕಾಣುಜೀವಿಗಳು ಬೆಳೆದು ವೃದ್ಧಿಯಾಗುವುದಕ್ಕೆ ಕೆಳಗೆ ನಮೂದಿಸಿರುವ ಸ್ಥಿತಿಗತಿಗಳು ಅತ್ಯಗತ್ಯ :—

(1) ಶಾಖ : ಇವು ಬದುಕಿ ಹೇರಳವಾಗಿ ವೃದ್ಧಿಯಾಗಲು ಅನುಕೂಲಕರ ತಾಪವೆಂದರೆ ಸುಮಾರು 37·ಸಿ (98·6 ಎಫ್).

(2) ಕಾಲಾವಕಾಶ :— ರೋಗಾಣುಗಳು ಬಹಳ ಜಾಗ್ರತೆ ವ್ಯಧಿಯಿಂದಾದರೂ ರೋಗವನ್ನು ಹೊರಗೆಡಹುವಷ್ಟು ಬೆಳೆಯಲು ಕಾಲಾವಕಾಶಬೇಕು.

(3) ತೇವ :— ಎಲ್ಲಾ ಜೀವಿಗಳಂತೆ ರೋಗಾಣುಗಳಿಗೂ ನೀರು ಬೇಕೇ ಬೇಕು.

(4) ಆಹಾರ :— ನಾವು ಸೇವಿಸುವ ಆಹಾರವನ್ನು ವಿಷವಾಗಿಸಬಲ್ಲ ಏಕಾಣು ಜೀವಿಗಳು ಮನುಷ್ಯ ರಂತಾವ ಆಹಾರ ಅತಿ ರುಚಿಯೆಂದು ಸೇವಿಸುತ್ತಾನೊ ಅದೇ ಆಹಾರಗಳಲ್ಲೇ ಈ ಏಕಾಣುಜೀವಿಗಳು ಜೆನ್ನಾಗಿ ಬೆಳೆಯುತ್ತವೆ. ಇದು ಮಾನವನ ದುರಾದೃಷ್ಟ ಉದಾ :— ಮಾಂಸ, ಕೋಳಿಮಾಂಸ ಹಾಲು ಮತ್ತು ಬೆಣ್ಣ ಇತ್ಯಾದಿ.

ಆಹಾರವನ್ನು ವಿಷವಾಗಿಸುವ ಏಕಾಣು ಜೀವಿಗಳು ರೋಗವನ್ನು ಹೇಗೆ ಉಂಟುಮಾಡುತ್ತವೆ :—

ಹಾನಿಕಾರಣ ಏಕಾಣುಜೀವಿಗಳು ಮನುಷ್ಯನಲ್ಲಿ ರೋಗವನ್ನುಂಟುಮಾಡಬಲ್ಲ ''ಟಾಕ್ಸಿನ್'' ಎಂಬ ವಿಷವನ್ನು ಉತ್ಪಾದಿಸಬಲ್ಲದು. ಈ ವಿಷವನ್ನು ಎರಡು ವಿಧವಾಗಿ ಉತ್ಪತ್ತಿಮಾಡಬಲ್ಲದು. ಕೆಲವು ರೋಗಾಣುಗಳು ಅವುಗಳ ಸುತ್ತಮುತ್ತಲೂ ಸ್ವೇಚ್ಛೆಯಂತೆ ಬೆರೆಯುವಂತೆ, ಅವುಗಳ ದೇಹದ ಹೊರಭಾಗದಲ್ಲೇ ವಿಷವನ್ನು (ಎಕ್ಸೊಟಾಕ್ಸಿನ್) ಉತ್ಪನ್ನ ಮಾಡುತ್ತವೆ. ಉಳಿದವುಗಳು ವಿಷವನ್ನು ಅವುಗಳ ಶರೀರದ ಒಳಗೇ ಉತ್ಪನ್ನಮಾಡುತ್ತದೆ (ಎಂಡೊಟಾಕ್ಸಿನ್) ಮತ್ತು ಈ ವಿಷವು ರೋಗಾಣುಗಳು ಸಾಂಯುವವರೆವಿಗೂ ಹೊರಗೆ ಬರುವುದಿಲ್ಲ.

ಈ ರೀತಿ ಎರಡು ಬಗೆಯ ವಿಷಗಳೂ ಬೇರೆ ಬೇರೆ ವಿಧವಾದ ರೋಗಗಳನ್ನುಂಟು ಮಾಡುತ್ತವೆ. ಆಹಾರದಲ್ಲಿ ಬೆಳೆಯುವ ಏಕಾಣುಜೀವಿಗಳು ವಿಷವನ್ನು (ಎಕ್ಸೊಟಾಕ್ಸಿನ್) ಉತ್ಪನ್ನ ಮಾಡಿದರೆ ಆಹಾರವೇ ವಿಷಪೂರಿತವಾಗುತ್ತದೆ ಮತ್ತು ಇದನ್ನು ಸೇವಿಸಿದ ಸ್ವಲ್ಪವೇ ಸಮಂಯದಲ್ಲಿ ರೋಗದ ಲಕ್ಷಣಗಳಿಗೆ ಕಾರಣವಾಗುತ್ತದೆ. ಆದರೆ ಆಹಾರದಲ್ಲಿ ಬೆಳೆಯುವ ಏಕಾಣುಜೀವಿಗಳು ''ಎಂಡೊಟಾಕ್ಸಿನ್'' ಉತ್ಪನ್ನ ಮಾಡುವುದಾದರೆ, ರೋಗದ ಲಕ್ಷಣಗಳು ಹೊರಬೀಳುವುದಕ್ಕೆ ಅವು ಕರುಳನ್ನು ಹೊಕ್ಕು ನೆಲಸುವವರೆವಿಗೂ ನಿಧಾನವಾಗುತ್ತದೆ ಮತ್ತು ರೋಗಾಣುಗಳ ಸಂಖ್ಯೆ, ಸಾಂಯುತ್ತಿರುವ ರೋಗಾಣುಗಳಿಂದ ಹೊರಬರುವ ವಿಷವು ರೋಗವನ್ನುಂಟುಮಾಡಲು ಸಾಕಾಗುತ್ತದೆ.

ಈ ಸಂಧಿಗ್ಧದಲ್ಲಿ ತಿಳಿದಿರಬೇಕಾದ ಒಂದು ಮಖ್ಯವಾದ ವಿಷಯವೆಂದರೆ ಆಹಾರವನ್ನು ವಿಷವಾಗಿಸುವ ''ಸ್ಟಫೈಲೋಕಾಕಸ್'' ಎಂಬ ಏಕಾಣುವಿನಿಂದ ಉಂಟಾಗುವ ''ಎಕೊಸ್ಟಾಕ್ಸಿನ್'' ಕಾಂಯಿಸಿದಾಗ ನಾಶಹೊಂದುವುದಿಲ್ಲ ಮತ್ತು ಎದುರಿಸುವ ಶಕ್ತಿ ಹೊಂದಿರುತ್ತದೆ, ಹಾಗೂ ಸ್ವಲ್ಪಕಾಲ ಕುದಿಸಿದರೂ ನಾಶವಾಗದೇ ಇರಬಹುದು. ಇದೇರೀತಿ ವಿಷವಿಶ್ರಿತ ಸಾರು ಮತ್ತು ಹುಳಿ ಇವುಗಳನ್ನು ಬಿಡಿಸುವ ಮುನ್ನ ಕುದಿಯುವ ಮಟ್ಟಕ್ಕೆ ಕಾಂಯಿಸಿದ್ದರೂ, ಆವು ರೋಗವನ್ನು ಉಂಟುಮಾಡಬಲ್ಲವು.

ಆಹಾರ ವಿಷವಾಗುವುದಕ್ಕೆ ಸಾಧಾರಣವಾಗಿ ಕಾರಣವಾದ ಏಕಾಣುಜೀವಿಗಳೆಂದರೆ ''ಸಾಲ್ಮೊನೆಲ್ಲಾ'' ಕ್ಲೊಸ್ಟ್ರಿಡಿಯಂ ವೆಲ್ ಚಿ'' ''ಸ್ಟಫೈಲೊಕಾಕಸ್ ಆರಿಯಸ್'' ಬ್ಯಾಸಿಲಸ್ ಸೀರಿಯಸ್ ಮತ್ತು ಬಹಳ ಅಪರೂಪವಾಗಿ ಕ್ಲೊಸ್ಟ್ರಿಡಿಯಮ್ ''ಬೋಟುಲಿನಮ್

ರೋಗಕಾರಕ	ರೋಗ ಲಕ್ಷಣಗಳು ಹೊರ ಕಾಣುವ ಕಾಲಾವಕಾಶ	ರೋಗ ಲಕ್ಷಣಗಳು.
ಸಾಲ್ಮೊನೆಲ್ಲೀ	12 — 48 ಘಂಟೆಗಳು	ಹೊಟ್ಟೆನೋವು ಭೇದಿ, ವಾಂತಿ, ಜ್ವರ.
ಕ್ಲೋ. ವೆಲ್ ಚೈ	8 — 24 ಘಂಟೆಗಳು	ಹೊಟ್ಟೆನೋವು, ಬೇಧಿ ಸಾಮಾನ್ಯವಾಗಿ ಲಘು ತಲೆಸುತ್ತುವುದು.
ಸ್ಟಫೈ. ಆರಿಅಸ್	1 6 ಘಂಟೆಗಳು	ಜೊಲ್ಲು ಸುರಿಯುವುದು ವಾಕರಿಕೆ, ವಾಂತಿ, ಹೊಟ್ಟೆನೋವು, ಸುಸ್ತು; ಮತ್ತು ಸಾಧಾರಣಕ್ಕಿಂತ ಕಡಿಮೆ ಉಷ್ಣಾಂಶ.
ಕ್ಲೋ. ಬೋಟುಲಿನಮ್	12—36 ಘಂಟೆಗಳು	ಧ್ವನಿ ಬದಲಾವಣೆ, ದೃಷ್ಟಿಯಲ್ಲಿ ಎರಡೆರಡು ಕಾಣುವುದು, ಪಂಚೇಂದ್ರಿಯ ನರಗಳಿಗೆ ಲಕ್ವ, ಜಗ್ಗದ ಮಲಬದ್ಧತೆ.
ಬ್ಯಾಸಿಲಸ್ ಸೆರಿಅಸ್	8—24 ಘಂಟೆಗಳು	ಹೊಟ್ಟೆನೋವು, ಭೇದಿ ಮತ್ತು ಆಗಾಗ್ಗೆ ತಲೆಸುತ್ತು.

<u>ಹರಡುವ ವಿಧಾನ</u>:—

ನಮಗೆ ರೋಗಾಣುಗಳ ವಾಸಸ್ಥಾನಗಳು ತಿಳಿದಿದ್ದರೆ ಅವು ಹರಡುವ ವಿಧಾನವನ್ನು ಪತ್ತೆಹಚ್ಚಿ ಅದನ್ನು ತಡೆಗಟ್ಟಲು ಸೂಕ್ತ ಕ್ರಮಗಳನ್ನು ತೆಗೆದುಕೊಳ್ಳಬಹುದು.

''<u>ಸಾಲ್ಮೊನೆಲ್ಲೀ</u>''

ಸಾಲ್ಮೊನೆಲ್ಲ ಮನುಷ್ಯನ ಕರುಳು ಮತ್ತು ಬೆಕ್ಕು ನಾಯಿ ಇಲಿ ಮತ್ತು ದನ ಮತ್ತು ಹಂದಿ ಕರುಳಿನಲ್ಲೂ ಇರಬಹುದು. ಕಕ್ಕಸ್ಸಿನ ಬಾಗಿಲು, ಕೂಡುವ ಸ್ಥಳ ಇತ್ಯಾದಿಗಳನ್ನು ಆಗಾಗ್ಗೆ ಶುದ್ಧಪಡಿಸಬೇಕು. ಪ್ರತಿಸಾರಿ ಮಲವಿಸರ್ಜನೆ ನಂತರ ಕೈಗಳನ್ನು ಚೆನ್ನಾಗಿ ಉಜ್ಜಿ ಸಬಕಾರ (ಸೋಪು) ಮತ್ತು ಬಿಸಿ ನೀರಿನಿಂದ ತೊಳೆಯಬೇಕು. ಕರವಸ್ತ್ರಗಳು ಈ ಸೋಂಕನ್ನು ಹರಡಬಲ್ಲದು.

ಪ್ರಾಣಿಗಳ ಅಥವ ಮನುಷ್ಯರ ಸೋಂಕು ಅಂಟಿದ ಮಲದ ಮೇಲೆ ಕುಳಿತು ಅದನ್ನು ಸೇವಿಸಿದನಂತರ, ನಾವು ತಿನ್ನುವ ಆಹಾರ ಪದಾರ್ಥಗಳ ಮೇಲೆ ಕೂರುವುದರ ಮೂಲಕ ನೊಣಗಳು ಸೋಂಕನ್ನು ಹರಡಬಹುದು. ಮನೆಯಲ್ಲಿ ಸಾಕುವ ಪ್ರಾಣಿಗಳು ಅದಿಗೆ ಮನೆಯಲ್ಲಿ ಅಪಾಯಕಾರಿ. ಮುಚ್ಚಳವಿಲ್ಲದ ಕಸದ ಡಬ್ಬಗಳು ಅಲ್ಲಲ್ಲಿ ಬಿಸಾಡಿರುವ ಕಸಕಡ್ಡಿಗಳು ನೊಣಗಳ ಉತ್ಪತ್ತಿಗೆ ಕಾರಣವಾಗುತ್ತದೆ.

ಸಾಲ್ಮೊನೆಲ್ಲಾ ಕ್ರಿಮಿಗಳು ಬಾತುಗಳಿಗೆ ಸೋಂಕುಂಟುಮಾಡಬಹುದು. ಆ ರೀತಿ ರೋಗ ಹತ್ತಿದ ಬಾತುಗಳು ಹಾಕುವ ಮೊಟ್ಟೆಗಳೂ ರೋಗಗ್ರಸ್ಥವಾಗಿರುತ್ತವೆ. ರೋಗಗ್ರಸ್ತವಲ್ಲದ ಮೊಟ್ಟೆಗಳೂ ಕೊಳಕು ಸನ್ನಿವೇಶಗಳಲ್ಲಿ ರೋಗ ಸುರಕ್ಷಿತ ಏಕೆಂದರೆ ಅದನ್ನು

ಬೀಯಿಸುವಾಗ ಅದು ಕ್ರಿಮಿ ಶುದ್ಧಿಯಾಗುತ್ತದೆ. ಇಡೀ ಬಾತು ಮೊಟ್ಟೆಯನ್ನು ತಿನ್ನ ಬೇಕಾದರೆ ಇದನ್ನು ಸುವಾರು ಎಂಟು ನಿಮಿಷವಾದರೂ ಕುದಿಸಬೇಕು.

ಪ್ರಾಣಿಗಳ ಆಹಾರದಲ್ಲಿ ನಾಲ್ಕೂನೆಲ್ಲಾ ಸೋಂಕಿದರೆ ಅದನ್ನು ಸೇವಿಸುವ ಪ್ರಾಣಿಗಳಿಗೆಲ್ಲಾ ಸೋಂಕು ಅಂಟಬಹುದು. ಇದರ ಹರಡುವಿಕೆಯು ಕೃಷಿ ಕ್ಷೇತ್ರದಲ್ಲಿನ ಪರಿಸರಾಂಶ ನಾಗಿಸುವಾಗ ಇರುವ ಸ್ಥಿತಿಗತಿಗಳು ಕಸಾಂಬುಖಾನೆ ನನ್ನುವೇಶಗಳನ್ನವಲಂಬಿಸುತ್ತದೆ. ಆಂತಾನ, ಶೀತ, ಆಹಾರ ಮತ್ತು ನೀರು ಕೊಡದಿರುವುದು ಇತ್ಯಾದಿಗಳು ಪ್ರಾಣಿಗಳ ಶರೀರದೊಳಗೇ ರೋಗಹರಡಲು ಅವಕಾಶವಾಗುತ್ತದೆ. ಬಹಳ ದೂರದ ಸಾಗಾಣಿಕೆ ಬಹಳ ಕಾಂಯಿಸುವುದು, ಹೆಚ್ಚಿಗೆ ಸಾಂಯುವ ಪ್ರಮಾಣ ಇವುಗಳು ನಾಲ್ಕೂನೆಲ್ಲಾ ಕ್ರಿಮಿಗಳು ಹೊರಬಂದು ಇತರರಿಗೆ ಹರಡಲು ಸಹಾಂಯವಾಗುತ್ತವೆ. ದನಕರುಗಳು ಮತ್ತು ಹಂದಿಗಳು ಈ ಸೋಂಕನ್ನು ಹೊಂದಿರುವ ಮುಖ್ಯಪ್ರಾಣಿಗಳು. ಕಸಾಂಯ ಖಾನೆಗಳಲ್ಲಿ ನಿರ್ಮಲೀಕರಣದ ಕೊರತೆ ಇದ್ದರೆ ಪ್ರಾಣಿಗಳ ಮೃತ ದೇಹಗಳು ಮಲಿನವಾಗಿ ಅದರಿಂದ ತಂಯಾರಾದ ಆಹಾರ ವಸ್ತುಗಳೂ ಮಲಿನವಾಗುತ್ತವೆ. ಉದಾ: ''ಸಾನೇಜಸ್''

ಕಸಾಂಯ ಅಂಗಡಿಯಲ್ಲಿ ದನಗಳ ಮತ್ತು ಹಂದಿಗಳ ಹಸಿ ಮಾಂಸವನ್ನು ಕತ್ತರಿಸಲು ಉಪಂಯೋಗಿಸುವ ಚಾಕುವನ್ನೇಬೇಯಿಸದ ಮಾಂಸವನ್ನು ಕತ್ತರಿಸಲೂ ಉಪಂಯೋಗಿಸುವುದರಿಂದ ಸೋಂಕು ಹರಡಬಹುದು. ಮುಖಾಂತರ ಪ್ರಾಣಿಗಳ ಆಹಾರ ''ನಾಲ್ಕೂನೆಲ್ಲಾ'' ಕ್ರಿಮಿಗಳಿಂದ ಬಹಳವಾಗಿ ಮಲಿನವಾಗಬಹುದು ಮತ್ತು ಮನೆಯಲ್ಲಿ ಇದರ ಸೋಂಕು ಮನುಷ್ಯನ ಆಹಾರಕ್ಕೆ ಆಡ್ಡಹಾಯಬಹುದಂತೆ, ನೋಡಿಕೊಳ್ಳಬೇಕು; ಒಣಗಿಸಿದ ತೆಂಗಿನಕಾಯಿಯ ಸಾಮಾನ್ಯವಾಗಿ ''ನಾಲ್ಕೂನೆಲ್ಲಾ'' ಸೋಂಕಿಗೆ ಮೂಲವಾಗಿತ್ತು ಆದರೆ ಶ್ರೀಲಂಕಾ ಸರ್ಕಾರ ಕೆಲವು ಖಾನೂನುಗಳನ್ನು ಮಾಡಿರುವುದರಿಂದ ಈ ಸೋಂಕು ಬಹಳಷ್ಟು ಕಡಿಮೆಯಾಗಿದೆ. ಹಬೆಯಿಂದ ತೆಂಗಿನಕಾಯಿಯಂತುನ್ನು ನಮ್ಮ ಅನೇಕ ರೋಟ್ಟಿ ಮಾಡುವವರು ಪರಿಶುದ್ಧಗೊಳಿಸುತ್ತಾರೆ.

ಬ್ರಿಟನ್ನು ನೀರಿದಂತೆ ಪ್ರಪಂಚದ ಅನೇಕ ಭಾಗಗಳಲ್ಲಿ ಪ್ರಾಣಿಗಳು ಜಾಗ್ರತೆ ಬೆಳೆದು ಕೊಬ್ಬಿನಿಂದ ಕೂಡಿದ್ದಾಗಿರುವಂತೆ ಮಾಡಲು, ಪ್ರಾಣಿಗಳ ಆಹಾರಕ್ಕೆ ಜೀವಿರೋಧಕ (ಆಂಟಿಬಂಯೋಟಿಕ್ಸ್) ವಸ್ತುಗಳನ್ನು ಸೇರಿಸುತ್ತಾರೆ (ಬಹುಶ: ಪ್ರಾಣಿಗಳ ಶರೀರದಲ್ಲಿ ವಿಷವನ್ನು ಉತ್ಪತ್ತಿಮಾಡಿ ಪ್ರಾಣಿಗಳ ಬೆಳವಣಿಗೆಯನ್ನು ಕುಂಠಿತಗೊಳಿಸಬಹುದಾದ ಏಕಾಣುಜೀವಿಗಳನ್ನು ನಾಶಗೊಳಿಸಲು) ಜೀವಿರೋಧಕಗಳನ್ನು ಪ್ರಾಣಿಗಳ ರೋಗಗಳ ಚಿಕಿತ್ಸೆಗೂ ಉಪಂಯೋಗಿಸುತ್ತಾರೆ. ಆದರಿಂದ ಸೋಂಕನ್ನುಂಟು ಮಾಡುವ ಕ್ರಿಮಿಗಳು ಈ ಜೀವಿರೋಧಕಗಳನ್ನು ಎದುರಿಸುವ ಶಕ್ತಿಯುಳ್ಳದ್ದಾಗಿರುತ್ತದೆ. ಮತ್ತು ಅಂತಹ ಎದುರಿಸುವ ಶಕ್ತಿಯುಳ್ಳ ಏಕಾಣುಜೀವಿಗಳು ಮನುಷ್ಯನನ್ನು ಪ್ರಾಣಿ ಗಳ ಸಂಪರ್ಕದಿಂದ ಅಥವಾ ಪ್ರಾಣಿಮೂಲವಾದ ಮಲಿನವಾದ ಆಹಾರನೇವನೆಯಿಂದ, ಸೋಂಕಿಗೆ ಒಳಪಡಿಸಬಹುದು. ಇತ್ತೀಚೆಗೆ ಪತ್ತೆಹಚ್ಚಲ್ಪಟ್ಟಿರುವ ಅತಿ ಮುಖ್ಯವಾದ ವಿಷಯ ಮತ್ತು ಹಾಲಿ ತೀವ್ರ ಪರಿಶೋಧನೆಗೆ ಒಳಪಟ್ಟಿರುವ ವಿಷಯವೆಂದರೆ, ಮನುಷ್ಯನ ಕರುಳಿನಲ್ಲಿ ಅಂಥಹ ಜೀವಿರೋಧಕಗಳನ್ನು ಎದುರಿಸಬಲ್ಲ ಶಕ್ತಿಯುಳ್ಳ ಏಕಾಣುಜೀವಿಗಳು ಒಂದು ಜಾತಿಯ ಏಕಾಣುಜೀವಿಯಿಂದ ಮತ್ತೊಂದು ಜಾತಿಯ ಏಕಾಣುಜೀವಿಗೆ ವರ್ಗಾಯಿಸಲ್ಪಡಬಹುದು.

ಇದರಿಂದ ಜೀವಿರೋಧಕಗಳನ್ನು ಎದುರಿಸಬಲ್ಲ ಏಕಾಣುಜೀವಿಗಳೊಂದಿಗೆ, ಸೋಂಕು ಅಡ್ಡ ಹಾಯುದ್ದ ಹರಡುವಿಕೆಯ ಪ್ರಾಮುಖ್ಯತೆಯನ್ನು ಅರಿಯಬಹುದು.

—: ರೋಗಕ್ಕೆ ಈಡಾಗಬಲ್ಲ ಶಕ್ತಿ (ಸಸೆಪ್ಟಿಬಲಿಟಿ) :—

ವ್ಯಕ್ತಿಯು ಸೋಂಕಿಗೆ ಒಳಪಡಬೇಕಾದರೆ ಎರಡು ಮುಖ್ಯ ಅಂಶಗಳನ್ನು ಗಮನಿಸಬೇಕು :—

(1) ಅವರವರ ವಯುಕ್ತಿಕ ನಿರೋಧಕ ಶಕ್ತಿ :—

ಇದು ಅವರು ಅನುವಂಶಿಕವಾಗಿ ಪಡೆದಿರಬಹುದು. (ಜಾತಿ, ಆರೋಗ್ಯಸ್ಥಿತಿ, ಮತ್ತು ಕೆಲವು ರೋಗಗಳಿಗೆ ಚುಚ್ಚುಮದ್ದು ಹಾಕಿಸಿ ಕೊಳ್ಳುವುದರಿಂದ ಕೃತಕವಾಗಿ ತಡೆಯುವ ಶಕ್ತಿಯನ್ನು ಪಡೆಯಬಹುದು)

(2) ರೋಗಾಣುಗಳ ಸಂಖ್ಯೆ :—

ಕೆಲವೇ ರೋಗಾಣುಗಳು ಇದ್ದರೆ ಸಾಮಾನ್ಯವಾಗಿ ದೇಹದ ರಕ್ಷಣಾ ವ್ಯವಸ್ಥೆಯಿಂದ ನಾಶಹೊಂದುತ್ತವೆ ಅಥವಾ ಹಾಗೂ ಒಂದು ವೇಳೆ ಬದುಕಿದ್ದರೆ ಗಮನಾರ್ಹವಾದ ರೋಗದ ಲಕ್ಷಣಗಳನ್ನು ಉಂಟುಮಾಡುವುದಿಲ್ಲ.

ಮೇಲೆ ಕಾಣಿಸಿಕೊಳ್ಳದಿರುವ ಸೋಂಕುಗಳು '' ಸಬ್‌ಕ್ಲೀನಿಕಲ್ '' ಸೋಂಕು ಆಗಿರಬಹುದು. ಇವುಗಳು ಬಹಳ ಸೂಕ್ಷ್ಮವಾಗಿದ್ದು ಸೋಂಕಿಗೆ ಒಳಪಟ್ಟಿರುವ ವ್ಯಕ್ತಿಯು ಯಾವ ವಿಧವಾದ ರೋಗ ಲಕ್ಷಣಗಳನ್ನು ಹೊಂದಿರುವುದಿಲ್ಲ.

ಕ್ಲಾಸ್ಟ್ರೀಡಿಯಂ ವೇಲ್ಚಿ:—

ಕ್ಲ. ವೇಲ್ಚಿ ರೋಗಕಣ (ಸ್ಪೋರ್) ರೂಪತಾಳಬಲ್ಲದು. ಈ ಸ್ಪೋರ್‌ಗಳು ಬಹಳ ಗಡುಸಾಗಿರುತ್ತದೆ ಮತ್ತು ಹೆಚ್ಚಾಗಿ ಉಷ್ಣಾಂಶ ಮತ್ತು ಒಣಗುವಿಕೆ ಇತ್ಯಾದಿ ಯಾವುದೇ ಭೌತಿಕ ಪ್ರತಿರೋಧಕ ಸನ್ನಿವೇಶಗಳನ್ನು ಎದುರಿಸಿ ಜೀವಿಸಬಲ್ಲದು. ಅವುಗಳು ಧೂಳು ಕೊಳಕುಗಳಲ್ಲಿ ಬಹಳ ಕಾಲ ಜೀವಿಸಬಲ್ಲವು ಮತ್ತು ಬೇಯಿಸಿದ ನಂತರವೂ ಆಹಾರದಲ್ಲಿ ಬದುಕಿರಬಹುದು. ಹಸಿಮಾಂಸ ಮತ್ತು ಕೋಳಿಮಾಂಸ ಈ ರೋಗಾಣುಗಳಿರುವ ಮೂಲಸ್ಥಾನಗಳು ಆದರೆ ಶೇಕಡ 25 ರಷ್ಟು ಭಾಗ ಅವುಗಳು ಮನುಷ್ಯ ಮತ್ತು ಪ್ರಾಣಿಗಳ ಮಲದಲ್ಲೂ ಮತ್ತು ಮಣ್ಣಿನಲ್ಲೂ ಇರುತ್ತವೆ. ಈ ಕ್ಲ. ವೇಲ್ಚಿ ಯಿಂದಾಗುವ ಆಹಾರ ವಿಷ ಸಾಮಾನ್ಯವಾಗಿ, ಆಸ್ಪತ್ರೆಗಳು, ಕ್ಯಾಂಟೀನ್‌ಗಳು, ಪಾಠಶಾಲೆಗಳು, ಹೋಟೇಲ್‌ಗಳಲ್ಲಿ ಉಂಟಾಗುತ್ತದೆ ಮತ್ತು ಇದಕ್ಕೆ ಮುಖ್ಯಕಾರಣ ಮಾಂಸ, ಕೋಳಿ (ಇವುಗಳನ್ನು ಸಾಮಾನ್ಯವಾಗಿ ಮೊದಲೇ ಬೇಯಿಸಿದ್ದನಂತರ ಶಾಖಮಾಡುತ್ತಾರೆ)

ಮಾಂಸದ ಊಟದಲ್ಲಿ ಮಾಂಸವು ಬೇಯಿಸಿದ ನಂತರ ತಣ್ಣನೇ ಅಥವಾ ಪುನ: ಬಿಸಿ ಮಾಡಿ ಉಪಯೋಗಿಸಿದಾಗ ಈ ಕ್ಲಾಸ್ಟ್ರೀಡಿಯಂ ವೇಲ್ಚಿ ಆಹಾರ ವಿಷ ಉಂಟಾಗಿದೆ. ದೊಡ್ಡಪ್ರಮಾಣದ ಕ್ಯಾಂಟೀನ್‌ಗಳ ಅಡಿಗೆ ಮನೆಗಳಲ್ಲಿ ಮಾಂಸವನ್ನು ಆಗಾಗ್ಗೆ ಬೇಯಿಸಿ, ಕೊಠಡಿ ಉಷ್ಣಾಂಶದಲ್ಲಿ ನಿಧಾನವಾಗಿ ಆರಿಸಿ, ತಣ್ಣನೆ ಕೊಠಡಿಯಲ್ಲಿ ರಾತ್ರಿಯೆಲ್ಲಾ ಶೇಖರಿಸಿ ಇಟ್ಟಿರುತ್ತಾರೆ. ಮಾರನೆ ದಿವಸ ಅದನ್ನು ತಣ್ಣಗೋ ಬಿಸಿಮಾಡಿಯೋ ವಿವಿಧ ಆಹಾರ ರೂಪದಲ್ಲಿ ಉಪಯೋಗಿಸುತ್ತಾರೆ. ಈ ಪದ್ಧತಿ ಅಪಾಯಕಾರಿ, ಏಕೆಂದರೆ 100 ಸಿ.(212 ಎಫ್) ಉಷ್ಣಾಂಶಕ್ಕಿಂತ ಕಡಿಮೆ ಉಷ್ಣಾಂಶದಲ್ಲಿ ಬೇಯಿಸಿದಾಗ ಈ ಕ್ಲ.ವೇಲ್ಚಿ ಬೇಯಿಸಿದ ನಂತರವೂ ಜೀವಂತವಾಗಿರುತ್ತವೆ ಮತ್ತು ನಿಧಾನವಾಗಿ ಅದನ್ನು ತಣ್ಣಗೆ ಮಾಡಿದಾಗ ಆಹಾರ ವಿಷಾಗಲು

ಸಾಕಷ್ಟು. ಈ ಕ್ರಿಮಿಗಳು ಮೊಳಕೆತು ಜುರುಕಾಗಿ ವೃದ್ಧಿಯಾಗುತ್ತದೆ. ಮೂಂಸದ ದೊಡ್ಡ ತೂರುಗಳು ಅಪಾಯಕಾರಿ ಏಕೆಂದರೆ ಶಾಖವು ತುಂಡಿನ ಮಧ್ಯಕ್ಕೆ ಅಂದರೆ ಅದರೊಳಗೆ ನಿಧಾನವಾಗಿ ಪ್ರಸರಿಸುತ್ತದೆ. ಈ ರೀತಿಯಾಗಿ ಪುನ: ಕಾಯಿಸಿದ ಮೂಂಸವು ಕೆಲ್ಲಾ ವೇಳೆ ಆಹಾರ ವಿಷಕ್ಕೆ ಕಾರಣವಾಗುತ್ತವೆ.

<u>ಬ್ಯಾಸಿಲೆಸ್ಸ ಸಿರಿಅಸ್:—</u>

ಇದು ಸ್ಪೋರ್ ರೂಪತಾಳಬಲ್ಲ ಏಕಾಣುಜೀವಿಯಾಗುತ್ತ ಇದು ವಣ್ಣಿಸಲ್ಲಿರುತ್ತದೆ. ಇದು ನಾಮಾನ್ಯವಾಗಿ ಧಾನ್ಯಗಳನ್ನು ಮಲಿನಗೊಳಿಸುತ್ತದೆ. ಎರಡು ಮೂರು ವರ್ಷಗಳಿಂದ ಬ್ರಿಟನ್ನಿನಲ್ಲಿ ಈ ಕ್ರಿಮಿಯಿಂದಾಗುವ ಆಹಾರ ವಿಷದ ಪ್ರಕರಣಗಳು ಪದೇ ಪದೇ ವರದಿಯಾಗುತ್ತಿವೆ. ಅದರಲ್ಲಾ ಚೀನಿಯರ ಹೋಟೆಲ್‌ಗಳಲ್ಲಿ ಸ್ಪೋರಿಂಗೆಗೊಳಪಟ್ಟಿರುವ ಅನ್ನವನ್ನು ತಿನ್ನುವುದರಿಂದ ಹೆಚ್ಚಾಗಿ ಉಂಟಾಗುತ್ತವೆ, ಸ್ಪೋರ್‌ಗಳು ಅನ್ನ ಮಾಡುವಾಗ ಕುದಿಯುವ ಶಾಖವನ್ನು ಪ್ರತಿರೋಧಿಸಬಲ್ಲದು. ನಾಮಾನ್ಯವಾಗಿ ಇದನ್ನು ನಾಯಂಕಾಲದ ವೇಳೆ ಮಾಡುತ್ತಾರೆ. ಮತ್ತು ಈ ರೀತಿ ಕುದಿಸಿದ ಅನ್ನವನ್ನು ಬೇಬಲ್ ಮೇಲೆ ರಾತ್ರಿಯೆಲ್ಲಾ ಇಡುತ್ತಾರೆ. ಸ್ಪೋರ್‌ಗಳು ಬೆಳೆಯುತ್ತವೆ ಮತ್ತು ಜಾಗ್ರತೆ ವೃದ್ಧಿಗೊಳ್ಳುತ್ತವೆ. ಮಾರನೆದಿನ ಈ ಅನ್ನವನ್ನು ಪುನ: ಬಿಸಿಮಾಡಿ ಉಪಯೋಗಿಸುತ್ತಾರೆ, ಆದರೆ ಈ ಶಾಖವು ಸ್ಪೋರ್ಸ್‌ಗಳನ್ನಾ ನಾಶಪಡಿಸಲಾರವು. ಇದರ ಸಮಸ್ಯೆ ಕೆಲ್ಲಾ — ವೇಳೆ ಚೈನಂತೆಯೇ ಆದರೆ ಇದರಲ್ಲಿ ಮೂಂಸದ ಬದಲು ಅನ್ನದ ಪಾತ್ರವಿದೆ. ಇದೆರಡರಲ್ಲಾ ತಡೆಹಿಡಿಯುವ ಕ್ರಮಗಳೊಂದೇ. ಪುನ: ಕಾಯಿಸಿ ಉಪಯೋಗಿಸಬೇಕಾದಲ್ಲಿ ಆಹಾರವು ತಂಪಾಗಾದೊಡನೇ ಶೈತ್ಯಾಗಾರದಲ್ಲಿಡಬೇಕು ಮತ್ತು ಪುನ: ಕಾಯಿಸುವ ತಾಪ ನಾಕಷ್ಟು ಇರಬೇಕು. ಇದೆರಡರಲ್ಲಾ ಮಲಿನವಾದ ಮೇಲ್ಮಾಗಗಳು ಮತ್ತು ಪರಿಕರಣಗಳಿಂದ ಮಲಿನತೆ ಅಡ್ಡಾ ಹಾಂತುವ ಸಾಧ್ಯತೆಗಳಿವೆ.

<u>ಸ್ಟ್ಯಫೈಲೊಕಾಕೈ:—</u>

ಸ್ಟ್ಯಫೈಲೊಕಾಕೈ ನಿಂದಾಗುವ ಆಹಾರ ವಿಷವು ಬಹುತೇಕ ಆಹಾರದಲ್ಲಿರುವ ''ಎಕೊ ನ್ಟಾಕ್ಸಿನ್'' ವಿಷದಿಂದ ಮತ್ತು ಆಯಾಂಯ ವ್ಯಕ್ತಿಯಂತ ಗ್ರಾಹಕ ಶಕ್ತಿಯಂತ ಮೇಲೆ ಪರಿಣಮಿಸುತ್ತದೆ. ಮನುಷ್ಯ ಶರೀರದಲ್ಲಿ ಹೆಚ್ಚಾಗಿ ಮೂಲಸ್ಥಾನಗಳೆಂದರೆ ಮೂಗು, ಗಂಟಲು, ಚರ್ಮ ಮತ್ತು ನಂಜಾಗಿರುವ ಗಾಯಗಳು ಆದ್ದರಿಂದ ಈ ''ಸ್ಟ್ಯಫೈಲೊಕಾಕೈ'' ಆಹಾರದಲ್ಲಿ ಬೆಳೆಯುವುದಂತೆ ನೋಡಿಕೊಳ್ಳಲು, ಆಹಾರ ಕೈ ಬಳಸುವವರ ವ್ಯಯಂಯಕ್ತಿಕ ನೈರ್ಮಲ್ಯಕಡೆ ಹೆಚ್ಚಾಗಿ ಗಮನ ಕೊಡಬೇಕು. ಅಷ್ಟು ಅಲ್ಲದೆ ಶೈತ್ಯಾಗಾರದ ಬಳಕೆಯಂತನ್ನು ಹೆಚ್ಚು ಹೆಚ್ಚು ಮಾಡುವುದು ಮುಖ್ಯ. ಬಹುತೇಕ ಪ್ರಕರಣಗಳು ತಲೆದೋರುವುದಕ್ಕೆ ಕಾರಣ, ಬೇಯಿಸಿದ ಆಹಾರ ನೇರವಾಗಿ ಮಲಿನವಾದ ಕೈಗಳು ಮತ್ತು ಮೂಗಿನಿಂದ ಸೋರುವಿಕೆ, ಬಾಯಿ ಮತ್ತು ಚರ್ಮದ ಗಾಯಗಳ ಸಂಪರ್ಕ ಹೊಂದುವುದರಿಂದ ಆಗಾಗ್ಗೆ ಬೇಯಿಸಿದ ಆಹಾರವನ್ನು ಬಿಚ್ಚಿಗಿರುವಾಗ ಮುಟ್ಟುವುದರಿಂದ ಮತ್ತು ನಂತರ ಅದನ್ನು ಶೇಖರಿಸಿರುವ ವಿಧಾನಗಳಿಂದ ''ಸ್ಟ್ಯಫೈಲೊಕಾಕೈ'' ಬೆಳೆಯಲಾ ಮತ್ತು ವಿಷವನ್ನುಂಟು ಮಾಡಲು ಉತ್ತೇಜಿತವಾಗುತ್ತದೆ. ಸ್ಟ್ಯಫೈಲೊಕಾಕೈನಿಂದ ಉತ್ಪನ್ನವಾಗುವ ''ಎಕೊ ನ್ಟಾಕ್ಸಿನ್'' ಉಷ್ಣಾಂಶವಳ್ಳು ಎದುರಿಸುತ್ತವೆ, ಇದರಿಂದಾಗಿ ಆಹಾರವನ್ನು ಜೆನ್ನಾಗಿ ಕಾಯಿಸಿ ಎಲ್ಲಾ ಸ್ಟ್ಯಫೈಲೋ ಕಾಕೈ ಗಳನ್ನು ನಾಶಪಡಿಸಿದಾಗ್ಯಾ, ಈ

ಎಕ್ಸೊಟಾಕ್ಸಿನ್ ಉಳಿದು ಆಹಾರ ವಿಷವನ್ನುಂಟುಮಾಡುತ್ತದೆ, ಹಸಿಮಾಂಸದ ಮಾದರಿಗಳಲ್ಲಿ ಶೇಕಡಾ 38 ರಲ್ಲಿ ''ಸ್ಟೆಫೈಲೊ ಕಾಕೈ'' ಇರುತ್ತದೆ. ''ಸಾಲ್ಮೊನೆಲ್ಲ'' ನಲ್ಲಿ ಹೇಳಿದಂತೆ ಇದರಲ್ಲೂ ಸಹ ಮಲಿನತೆಯು ಹಸಿ ಮಾಂಸದಿಂದ ಬೇಯಿಸಿದ ಮಾಂಸಕ್ಕೆ ಮಲಿನತೆ ಅದ್ದಹಾಯುವುದುಂಟು.

ಪಶು ಸಂಗೋಪನಾ ಇಲಾಖೆಯವರು ರೋಗಗಳ ಚಿಕಿತ್ಸೆಯಲ್ಲಿ ಹೆಚ್ಚು ಹೆಚ್ಚು ಜೀವನಾಶಕಗಳನ್ನು ಬಳಸುತ್ತಿರುವುದರಿಂದ ಕೆಲವು ''ಸ್ಟೆಫೈಲೋ ಕಾಕೈ'' ಗಳು ಈ ಜೀವಿರೋಧಕಗಳನ್ನು ವಿರೋಧಿಸುವ ಶಕ್ತಿಯನ್ನು ಹೊಂದುತ್ತವೆ. ಆದ್ದರಿಂದ ಇವುಗಳು ಹಾಗೇ ಇದ್ದು ಹಸಿಹಾಲು, ಹಾಲಿನಿಂದ ಉತ್ಪನ್ನವಾದ ವಸ್ತುಗಳಲ್ಲಿಯೂ ಇರುತ್ತವೆ, ಮತ್ತು ಶೇಖರಣೆಯಲ್ಲಿ ಲೋಪದೋಷಗಳಿದ್ದಾಗ ಆಹಾರ ವಿಷಮಿಸುವುದಕ್ಕೆ ಕಾರಣವಾಗುತ್ತದೆ. ಬೆಣ್ಣೆ ಮಾಡಲು ಪ್ಯಾಸ್ಚುರೀಕರಣ ಮಾಡಿದ ಹಾಲನ್ನೇ ಉಪಯೋಗಿಸಿದರೆ ಇಂತಹ ಪ್ರಕರಣಗಳನ್ನು ತಪ್ಪಿಸಬಹುದು.

<u>ಕ್ಲಾಸ್ಟ್ರಿಡಿಯಂ ಬೊಟುಲಿನಮ್:—</u>

''ಕ್ಲೋ. ಬೋಟುಲಿನಮ್'' ವಿಷ ಬಹಳ ವಿಷಕಾರಿ ಇದು ನರಮಂಡಲವನ್ನು ಪೀಡಿಸುತ್ತದೆ. ಮತ್ತು ಮರಣಾಂತಕವಾಗಿ ಪರಿಣಮಿಸಬಹುದು. ಸರಿಯಾಗಿ ಬೇಯಿಸದ, ಕಡಿಮೆ ಬೇಯಿಸಿದ ಅಥವಾ ಕೊಳೆತ ಮೀನು ಇವುಗಳ ಸೇವನೆಯೇ ಇದಕ್ಕೆ ಕಾರಣ. ಡಬ್ಬದಲ್ಲಿ ಶೇಖರಿಸಿದ ಮತ್ತು ಹೊಗೆಯಿಂದ ಶೇಖರಿಸಿದ ಮೀನುಗಳು ಇವುಗಳಿಂದ ಅನೇಕ ದೇಶಗಳಲ್ಲಿ ವಿಷ ತಲೆದೋರಲು ಕಾರಣವಾಗಿದೆ. ಮತ್ತು ಮನೆಯಲ್ಲಿ ಶೇಖರಿಸಿದ ಆಹಾರ, ಅಂದರೆ ಮಾಂಸ ತರಕಾರಿ ಇವುಗಳಿಂದಲೂ ಇವು ತಲೆದೋರಿದೆ.

<u>''ಆಹಾರ ವಿಷ'' ತಡೆಯುವಿಕೆ:—</u>

ಈ ಕೆಳಗೆ ಹೇಳಿರುವ ಕ್ರಮಗಳಿಂದ ಆಹಾರ ವಿಷವಾಗುವಿಕೆಯನ್ನು ತಡೆಯಬಹುದು.

(1) ಕ್ರಿಮಿಗಳು ಆಹಾರವನ್ನು ಸೇರದಂತೆ ತಡೆಹಿಡಿಯುವುದು.

(2) ಕ್ರಿಮಿಗಳು ವೃದ್ಧಿಗೊಳ್ಳದ ರೀತಿಯಲ್ಲಿ ಆಹಾರವನ್ನು ಶೇಖರಿಸುವುದು.

(3) ಇರಬಹುದಾದ ಎಲ್ಲಾ ಕ್ರಿಮಿಗಳೂ ನಾಶವಾಗುವ ರೀತಿಯಲ್ಲಿ ಆಹಾರವನ್ನು ಚೆನ್ನಾಗಿ ಬೇಯಿಸುವುದು.

ಇವು ಮೂರರಲ್ಲಿ ಆಹಾರವನ್ನು ಸುರಕ್ಷಿತವಾಗಿ ಶೇಖರಿಸಿ ಜೋಪಾನಮಾಡುವುದು ಬಹಳ ಮುಖ್ಯವಾದದ್ದು. ಈ ಅವಧಿಯಲ್ಲಿ ಕ್ರಿಮಿಗಳಿಗೆ ಬೆಳೆಯಲು ಮತ್ತು ವೃದ್ಧಿಗೊಳ್ಳಲು ಬೇಕಾಗುವ ಎಲ್ಲಾ ಪದಾರ್ಥಗಳನ್ನೂ ನಾಶಪಡಿಸಲು, ಸಾಧ್ಯವಾದ ಎಲ್ಲಾ ಪ್ರಯತ್ನವನ್ನೂ ಪಡಬೇಕು.

(1) <u>ಕಾವು</u>:—

ತಣ್ಣನೆಯ ಸ್ಥಿತಿಯಲ್ಲಿ ಆಹಾರ ವಿಷಮಿಸುವ ಕ್ರಿಮಿಗಳು ವೃದ್ಧಿಯಾಗುವುದಿಲ್ಲ. ಶೀತಗಾರದಲ್ಲಿ ಶೇಖರಿಸುವುದರಿಂದ ಅದರ ಬೆಳವಣಿಗೆಗೆ ಕುಂಟಿತವಾಗುತ್ತದೆ. ಅತಿ ತಣ್ಣನೆ ಸ್ಥಿತಿ ಅದರ ಬೆಳವಣಿಗೆಯನ್ನೇ ತಡೆಯುತ್ತದೆ. ಯಾವುದೇ ವಿಧವಾದ ಶೀತ ಸ್ಥಿತಿ ಕ್ರಿಮಿಗಳನ್ನು ಸಾಯಿಸುವುದಿಲ್ಲ ಮತ್ತು ಆಹಾರವನ್ನು ಬಿಸಿಮಾಡಿದ ಕೂಡಲೇ ಅವು ಬೆಳೆಯಲು ಪ್ರಾರಂಭಿಸುತ್ತವೆ.

(2) <u>ಕಾಲಾವಕಾಶ</u> :—

ಕ್ರಿಮಿಗಳು ಬೀಜಗಳಂತೆ, ಹೆಚ್ಚಿಗೆ ನೆಟ್ಟಷ್ಟೂ ಹೆಚ್ಚಿಗೆ ಬೆಳೆಯುವುದನ್ನು ಕೊಡುತ್ತದೆ. ಅಥವಾ ಕ್ರಿಮಿಗಳ ವಿಷಯದಲ್ಲಿ ಹೇಳುವುದಾದರೆ, ಹೆಚ್ಚು ಸೋಂಕನ್ನು ಹರಡುತ್ತದೆ. ಕ್ರಿಮಿಗಳಿಗೆ ವೃದ್ಧಿಯಾಗಲು ಕಾಲಾವಕಾಶಬೇಕು. ಆದ್ದರಿಂದ ಆಹಾರವು ತರಿಯಾರಾದ ಸ್ವಲ್ಪವೇ ಸಮಯದಲ್ಲಿ ತಿಂದರೆ ಆಹಾರ ವಿಷವಾಗುವಿಕೆಯಾಗುವುದಿಲ್ಲ. ತಡವಾದರೆ ಬಹಳಮಟ್ಟಿಗೆ ಕಡಿಮೆಯಾಗುತ್ತದೆ.

(3) <u>ತೇವ</u> :—

ಕ್ರಿಮಿಗಳು ಒಣಗಿದ ಪದಾರ್ಥಗಳಲ್ಲಿ ವೃದ್ಧಿಯಾಗುವುದಿಲ್ಲ.

ಉದಾ : ಒಣಗಿಸಿದ ಪೌಡ್ರ ಮತ್ತು ಒಣಗಿಸಿದ ಹಾಲು (ಹಾಲಿನ ಪುಡಿ) ಆದರೆ ಇವುಗಳನ್ನು ನೀರಿನಲ್ಲಿ ವಿಶ್ರಾಣಮಾಡಿದಾಗ ಕ್ರಿಮಿಗಳು ವೃದ್ಧಿಯಾಗಬಹುದು, ಅಂತಹ ಆಹಾರಗಳನ್ನು ವಿಶ್ರಾಣ ಮಾಡಿದ ಅತೀ ಶೀಘ್ರದಲ್ಲೇ ಉಪಯೋಗಿಸಬೇಕು.

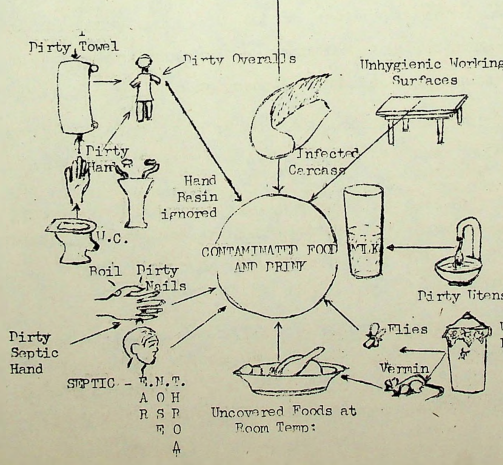
(4) <u>ಆಹಾರ</u> :—

ಶೇಖರಿಸಿದ ಆಹಾರವನ್ನು ಎಲ್ಲಾ ವಿಧವಾದ ಮಲಿನತೆಯಿಂದ ರಕ್ಷಿಸಬೇಕು.

(5) <u>ಮನುಷ್ಯನಿಗೆ ಸಂಬಂಧಪಟ್ಟಿರುವ ಅಂಶ</u> :—

ಮನುಷ್ಯನು ಆಹಾರವನ್ನು ವಿಷವಾಗಿಸುವ ಕ್ರಿಮಿಯಿಂದನ್ನು ಹೇಗೆ ಹರಡಬಲ್ಲನುಎಂಬುದನ್ನು ಅರಿತಾಗ, ಮನುಷ್ಯನು ತನ್ನ ದೈರ್ಯಯುಕ್ತ ನೈರ್ಮಲ್ಯವನ್ನು ಕಾಪಾಡುವುದು ಅತಿ ಮುಖ್ಯವೆಂದು ಸಹಜವಾಗಿ ಗೊತ್ತಾಗುತ್ತದೆ.

<u>ಆಹಾರ ವಿಷವಾಗುವಿಕೆಗೆ ಹರಡು ಉತ್ತೇಜಕನಾದ ಸಂದರ್ಭಗಳು</u> :—



ಶುಭ್ರವಾದ ಉಡುಪನ್ನು ಧರಿಸುವುದು ಮತ್ತು ಶುಭ್ರವಾಗಿರುವ ಕನದ ತೊಟ್ಟಿಂತುವೇಲೆ ಮುಚ್ಚಳವನ್ನು ಮುಚ್ಚುವುದು ಆಹಾರವನ್ನು ಶುಚಿಯಾಗಿಡು, ಮುಚ್ಚಿಡು ಮತ್ತು ಶೀತಲ ಸ್ಥಿತಿಯಲ್ಲಿ ಅಥವಾ ಅತಿ ಬಿಸಿ ಪರಿಸರದಲ್ಲಿಡು.

ಕಾನೂನಿನ ಪ್ರಕಾರ ಆಹಾರ ತಂತ್ರಾರಿಕೆಗೆ, ಸುಸಜ್ಜಿತಗೊಳಿಸಿದ, ಗಾಳಿ ಬೆಳಕಿನಿಂದ ಕೂಡಿದ, ಜೊಕ್ಕಟವಾದ ಸನ್ನಿವೇಶ ಬೇಕೆಂಬುದನ್ನು ನೆನಪಿನಲ್ಲಿಡಿ,

ಆಹಾರ ತಂತ್ರಾರ್ಹಾಡುವ ಶೀಲಿಸುವ ಕೊಠಡಿಯಲ್ಲಿ ಧೂಮಪಾನ ಕಾನೂನುಬಾಹಿರ ಮತ್ತು ಅಪಾಯಕಾರಿ ಎಂಬುದನ್ನು ಜ್ಞಾಪಕದಲ್ಲಿಡಿ.

ಸಾಧ್ಯವೆಂದ ಮಟ್ಟಿಗೂ ಆಹಾರದಲ್ಲಿ ಕೈ ಹಾಕುವುದನ್ನು ಕಡಿಮೆಮಾಡಿ, ಆಹಾರದ ಪಾತ್ರೆಗಳನ್ನು ಜೊಕ್ಕಟವಾಗಿಡಿ.

ಆಹಾರದ ಕೊಠಡಿಗೆ ಹೋಗುವಾಗ ಶುಭ್ರವಾಗಿರಿ.

ನಿನಗಿರಬಹುದಾದ ಚರ್ಮವ್ಯಾಧಿ, ಮೂಗು, ಗಂಟಲು ಅಥವಾ ಕರುಳಿನ ಸಂಬಂಧವಾದ ಬೇನೆಗಳ ವಿಷಯವನ್ನು ನಿನ್ನ ಮೇಲ್ವಿಚಾರಕರಿಗೆ ಕೂಡಲೇ ತಿಳಿಸು.

ತೊಳೆದ ನಂತರ ಆಹಾರ ಬಳಕೆಗೆ ಉಪಯೋಗಿಸುವ ತಟ್ಟೆಗಳು, ಬಟ್ಟಲು ವಗೈರೆಗಳನ್ನು ನೀರು ಹೋಗುವಂತೆ ಇಡು. ಒಣಗಿದ ಬಟ್ಟಿಂತುನ್ನು ಉಪಯೋಗಿಸಿದರೆ, ಅದು ಪರಿಶುದ್ಧವಾಗಿದೆಯೇ ಎಂಬುದನ್ನು ಚೊಡಲು ನೋಡಬೇಕು.

ಉಳಿದಿರುವ ಮರುಕಾಯಿಸಿದ ಆಹಾರವನ್ನು ಜೆನ್ನಾಗಿ ಕಾಯಿಸಬೇಕು. ಇದೇ ರೀತಿ, ಪೊಟ್ಟಣಗಳಲ್ಲಿರುವ ಆಹಾರವನ್ನು ಬಿಸಿಯಾಗಿ ತಿನ್ನವಾಗಲೂ, ಮಾಡುವುದು.

ಮನೆಯಲ್ಲಿ ಜೊಕ್ಕಟವಾದ ಪಾತ್ರೆಗಳನ್ನು ಉಪಯೋಗಿಸಿರಿ, ನಿಮ್ಮ ಶೀತಾಗಾರವನ್ನು ಸರಿಯಾದ ರೀತಿಯಲ್ಲಿ ಉಪಯೋಗಿಸಿರಿ ಅನುಮಾನವಾದಲ್ಲಿ, ಸರಿಯಾದದ್ದನ್ನು ತಿಳಿದು ಮುಂದುವರಿಯಿರಿ. ಆಹಾರವನ್ನು ಜೊಕ್ಕಟವಾದ ಸ್ಥಳಗಳಲ್ಲೇ ಕೊಳ್ಳಿರಿ ಮನೆಗೆ ತರುವಾಗಲೂ ಜೊಕ್ಕಟವಾದ ಸ್ಥಿತಿಯಲ್ಲಿ ತನ್ನಿರಿ.

ಆಹಾರವನ್ನು ತಯಾರುಮಾಡುವ ಮುನ್ನ ಯಾವಾಗಲೂ ನಿಮ್ಮ ಕೈಗಳನ್ನು ತೊಳೆಯಿರಿ, ಮಲವಿಸರ್ಜನೆ ನಂತರವೂ ಇದೇ ರೀತಿ ಮಾಡಿ ನಿಮ್ಮ ಮಕ್ಕಳು ಇದೇ ರೀತಿ ಮಾಡುವಂತೆ ನೋಡಿಕೊಳ್ಳಿರಿ.

ಮನೆಯಂದಿ ಬಳಸುವ ಆಹಾರವನ್ನು ಸಾಕು ಪ್ರಾಣಿಗಳ ಆಹಾರದಿಂದ ಯಾವಾಗಲೂ ದೂರವಿರಿಸಿರಿ. ಪ್ರತ್ಯೇಕ ಪಾತ್ರೆ ಮತ್ತು ಚಮಚ ಇತ್ಯಾದಿಗಳನ್ನು ಉಪಯೋಗಿಸಿರಿ.

ಜಾಕುವಿನಿಂದಾದ ಗಾಯವನ್ನು ಮತ್ತು ಹುಣ್ಣುಗಳನ್ನು ನೀರು ಹೀರದಿರುವ ಪಟ್ಟಿಯಿಂದ ರಕ್ಷಿಸಿ. ನೀನು ಅನಾರೋಗ್ಯನಾಗಿದ್ದು, ನಿನ್ನ ಬದಲು ಅಡಿಗೆ ಮನೆಯಲ್ಲಿ ಕೆಲಸ ಮಾಡಲು ಯಾರೂ ಇಲ್ಲದಾಗ ವೈಯಯಕ್ತಿಕ ನೈರ್ಮಲ್ಯದ ಬಗ್ಗೆ ಹೆಚ್ಚಿಗೆ ಗಮನ ಕೊಡುವುದು.

ಕೆಲಸ ಮಾಡುವ ಸ್ಥಳಗಳನ್ನು ಚೊಕ್ಕಟವಾಗಿಡು, ಸೋಪಿನಿಂದ ಕೂಡಿದ ಬಿಸಿನೀರನ್ನೇ ಉಪಯೋಗಿಸಬೇಕು. ಬಟ್ಟೆಯಿಂದ ಸುಮ್ಮನೇ ಒರೆಸುವುದು ಸಾಲದು.

(4) —: ಆಹಾರ ವಿಷವಾಗುವಿಕೆ :—

ವಿಷಗಳ ವಿವಿಧ ಮೂಲಸಾಧನ ಮತ್ತು ನಿಯಂತ್ರಣ ಕ್ರಮಗಳನ್ನು ಈ ಕೆಳಗೆ ಸಂಕ್ಷಿಪ್ತವಾಗಿ ಕೊಡಲಾಗಿದೆ:—

—: ಸಾಲ್ಮೊನೆಲ್ಲ :—

ಮೂಲಸಾಧನ :—	ನಿಯಂತ್ರಣ :—
ಮನುಷ್ಯನ ಮಲ ಮತ್ತು ಕೈ	ವೈಯುಕ್ತಿಕ ನೈರ್ಮಲ್ಯ ಮತ್ತು ಆಹಾರದಲ್ಲಿ ಕೈ ಬಳಸುವಾಗ ಜಾಗರೂಕತೆಯಿಂದಿರುವುದು.
ಪ್ರಾಣಿಗಳ ಮಲ, ಗೊರಸು, ಪಂಜಗಳು	ವ್ಯವಸಾಯ ಕ್ಷೇತ್ರ ಮತ್ತು ಕಸಾಯಿ ಖಾನೆ ನೈರ್ಮಲ್ಯ, ಪ್ರಾಣಿಗಳ ಆಹಾರ ಪದಾರ್ಥಗಳು.
ಪ್ರಾಣಿ ಮಾಂಸ ಮತ್ತು ಹಾಲು	ಆರೋಗ್ಯ ನಿಯಮಗಳಿಗನುಗುಣವಾಗಿ ತಯಾರಿಸುವುದು.
ತಿನ್ನುವ ಆಹಾರ	ರಕ್ಷಿಸಲು ಸೂಕ್ತ ಕ್ರಮ ತೆಗೆದುಕೊಳ್ಳುವುದು.
ಮೊಟ್ಟೆ ಮತ್ತು ಅದರಿಂದ ಮಾಡಿದ ಪದಾರ್ಥಗಳು ಹಸಿಹಾಲು	ಶೀತಗಾರದಲ್ಲಿಡುವುದು.
ಆಹಾರ ತಯಾರಿಕೆ ಪರಿಸರ:	ಸಲಕರಣೆಗಳ ಮತ್ತು ಮೇಲ್ಭಾಗಗಳ ಶುಚಿತ್ವ

—: ಕ್ಲೊ. ವೇಲ್ಚೈ :—

ಮನುಷ್ಯನ ಮಲ ಮತ್ತು ಕೈ	ಬೇಯಿಸುವ ಮತ್ತು ಮರು ಕಾಯಿಸುವ ತಾಂತ್ರಿಕ ಪಾಂಡಿತ್ಯ ಕ್ರಮಗಳನ್ನು ಅನುಸರಿಸುವುದು.
ಪ್ರಾಣಿಗಳ ಮಲ	
ಮಾಂಸ	ಶೀತಾಗಾರ
ಆಹಾರ ತಯಾರಿಕೆ ಪರಿಸರ	ಸಲಕರಣೆಗಳ ಮತ್ತು ಮೇಲ್ಭಾಗಗಳ ಶುಚಿತ್ವ

— : ಬಾ. ಸೆರಿಯುಸ್ :—

ಮಣ್ಣು, ಧೂಳು ಧಾನ್ಯಗಳು (ಅಕ್ಕಿ)	ಬೇಯಿಸುವ ಮತ್ತು ಮರು ಕಾಯಿಸುವ ತಾಂತ್ರಿಕ ಪಾಂಡಿತ್ಯ ಕ್ರಮಗಳನ್ನು ಅನುಸರಿಸುವುದು.
ಆಹಾರ ತಯಾರಿಕೆ ಪರಿಸರ	ಶೀತಾಗಾರ ಸಲಕರಣೆಗಳ ಮತ್ತು ಮೇಲ್ಭಾಗಗಳ ಶುಚಿತ್ವ

—: ಸ್ಟಫೈಲೋಕಾಕೈ :—

ಮನುಷ್ಯನ :— ಮೂಗು, ಗಂಟಲು ಕೈ ಮತ್ತು ಗಾಯಗಳು·	ಆಹಾರ ಕೈ ಬಳಸುವವರ ವೈಯುಕ್ತಿಕ ನೈರ್ಮಲ್ಯ
ಪ್ರಾಣಿಗಳು :— ಹಸುಗಳು ಮತ್ತು ಆಡುಗಳು	ಮೊಲೆ ಬಾವಿಗೆ ಸೂಕ್ತ ಕ್ರಮ ತೆಗೆದುಕೊಳ್ಳುವುದು·
ಆಹಾರ ಪದಾರ್ಥಗಳು :— ಹಾಲು ಹಾಲಿನ ಕೆನೆ, ಗಿಣ್ಣ	ಹಾಲು ಉತ್ಪಾದನೆಯನ್ನು ಆರೋಗ್ಯ ನಿಯಂತ್ರಗಳಿಗನುಗುಣವಾಗಿ ರೂಢಿಸಿಕೊಳ್ಳುವುದು· ಶೀತಗಾರ ಹಾಲಿನ ಪಾಶ್ಚರೀಕರಣ·

—: <u>ಕ್ಲೋ·ಬೋಟ್ಯುಲಿನಮ್</u> :—

ಮಣ್ಣು ಮತ್ತು ಕೆಸರು ಮೀನು ಮತ್ತು ತರಕಾರಿಗಳು	ತಯಾರಿಸುವ ಮತ್ತು ಬೇಯಿಸುವ ತಾಂತ್ರಿಕ ಪಾಂಡಿತ್ಯ ಕ್ರಮಗಳನ್ನು ಅನುಸರಿಸುವುದು·

—: —:—:—

ಪರಿಶುದ್ಧಪಡಿಸುವ ಪ್ರಾಥಮಿಕ ದಿನಚರಿ :—

ವ್ಯಾಪಾರ ಅಥವಾ ವಾರುವ-ಸನ್ನಿವೇಶಗಳಿಗನುಗುಣವಾಗಿ, ಎಲ್ಲಾ ವ್ಯಾಪಾರ ತಂತ್ರಜ್ಞರು, ಪರಿಶುದ್ಧಪಡಿಸಲು ವೈಶಿಷ್ಟ್ಯವಾದ ರೀತಿಯಲ್ಲಿ, ಪರಿಶುದ್ಧಪಡಿಸುವ ತಾಂತ್ರಿಕತೆಯನ್ನು ಹೊಂದಲು ಇಷ್ಟಪಡುತ್ತಾರೆ. ಈ ಕೆಳಗೆ ಅಂಥಹ ಒಂದು ಮಾದರಿಯ ದಿನಚರಿಯನ್ನು ಉದಾಹರಣೆಯಾಗಿ ಕೊಡಲಾಗಿದೆ.

ಪ್ರಾಥಮಿಕ ದಿನಚರಿಯಾಗಿ ಶುಚಿಗೊಳಿಸುವ ಕ್ರಮದ ತತ್ವ :—

ಸಜ್ಜುಗೊಳಿಸುವುದು ಅಥವಾ ಪ್ರದೇಶ	ಅನುಸರಿಸಬೇಕಾದ ಪ್ರಾಥಮಿಕ ದಿನಚರಿ	ಎಷ್ಟು ವರ್ತಿ ಪರಿಶುದ್ಧಗೊಳಿಸಬೇಕು :
ಸಾಮಾನ್ಯ ಪದಾರ್ಥಗಳ ಕೊಠಡಿ :—	ಗುಡಿಸುವುದು	ಪದೇ ಪದೇ ಮತ್ತು ಕ್ರಮವಾಗಿ.
ಗೋಡೆಗಳು ಮತ್ತು ಕವಾಟಗಳು	ಸಬಕಾರವನ್ನೊಳಗೊಂಡ ಬಿಸಿನೀರಿನಿಂದ ತೊಳೆಯುವುದು	ಕೊನೆಯಪಕ್ಷ ವಾರಕ್ಕೊಮ್ಮೆ
ನೆಲ	ಗುಡಿಸುವುದು	ಪದೇ ಪದೇ ಮತ್ತು ಕ್ರಮವಾಗಿ
	ಸಬಕಾರ ಅಥವಾ ಜಿಡ್ಡನ್ನು ಹೋಗಲಾಡಿಸುವ ಪದಾರ್ಥವನ್ನೊಳಗೊಂಡ ಬಿಸಿನೀರಿನಿಂದ ತೊಳೆಯುವುದು	ಪ್ರತಿದಿನ.
ಪದಾರ್ಥಗಳನ್ನು ವಿತರಣೆ ಮಾಡುವ ಕೋಣೆ	ಗುಡಿಸುವುದು ಆಹಾರ ಪದಾರ್ಥದ ಸಂಪರ್ಕಕ್ಕೆ ಒಳಪಡುವ ಸ್ಥಳವನ್ನು ಬಿಸಿನೀರಾ ಮತ್ತು ಸಬಕಾರದಿಂದ ತೊಳೆಯುವುದು	ಪ್ರತಿದಿನ.
ಗೋಡೆಗಳು ಮತ್ತು ಕವಾಟಗಳು	ಬಿಸಿನೀರು ಮತ್ತು ಸಬಕಾರದಿಂದ ತೊಳೆಯುವುದು ಅಥವಾ ಅವಕಾಶವಿರುವಲ್ಲಿ ಹಬೆಯಿಂದ ಸ್ವಚ್ಛಪಡಿಸುವುದು	ಪ್ರತಿದಿನ ಪದೇ ಪದೇ ಮತ್ತು ಕ್ರಮವಾಗಿ.
ನೆಲ	—: ಟಿಟೋ :—	ಪ್ರತಿದಿನ.
ಆಡುಮಾಡುವಿಕೆ ಪಾತ್ರೆಗಳು ಮತ್ತು ವಿತರಣಾ ಪಾತ್ರೆಗಳು	ಜಿಡ್ಡು ತೆಗೆಯುವ ಪದಾರ್ಥದೊಂದಿಗೆ ಬಿಸಿನೀರಿನಿಂದ ತೊಳೆಯುವುದು. ಗಲಬರಿಸುವುದು ಮತ್ತು ಒಣಗಿಸುವುದು, ಮಾಂಸ, ಬೆಣ್ಣೆ ಅಥವಾ ಮೊಟ್ಟೆ ಇವುಗಳಿಗೆ ಉಪಯೋಗಿಸುವ ಪಾತ್ರೆಗಳನ್ನು ಬಿಸಿನೀರು ಕ್ರಿಮಿಶುದ್ಧಿ ಪದಾರ್ಥವಿರುವ (ನೈಲಿಲೆಂಫ್) ಸಬಕಾರದಿಂದ ತೊಳೆಯುವುದು.	ಕೊನೆಯಪಕ್ಷ ದಿನ ಕ್ಕೊಂದು ಸಲ ಬೇಕಾದಲ್ಲಿ ಇನ್ನೂ ಹೆಚ್ಚು ಪದೇ ಪದೇ.
ಆಳತೆಗಳು ಮುತ್ತು ತಕ್ಕಡಿ.	ಸರಿಯಾಗಿ ಬೊಕ್ಕಗೊಳಿಸಿ ಸಬಕಾರವುಳ್ಳ ಬಿಸಿನೀರಿನಿಂದ ತೊಳೆಯುರಿ ಗಲಬರಿಸಿ, ಒಣಗಿಸಿ, ಆಳತೆಗಳನ್ನು ಮಾಂಸ ಮೊಟ್ಟೆ, ಬೆಣ್ಣೆ ವಗೈರೆಗೆ ಉಪಯೋಗಿಸಿದಲ್ಲಿ ಕ್ರಿಮಿಶುದ್ಧಿ ಪದಾರ್ಥವಿರುವ ಸಬಕಾರ ಮತ್ತು ಬಿಸಿನೀರಿನಿಂದ ತೊಳೆಯಬೇಕು	ಪದೇ ಪದೇ ಮತ್ತು ಕ್ರಮವಾಗಿ.

ಪಾಯು ಶಂಚಾರ ಮಾಡುವ ಕೊಳವೆಗಳು ಮತ್ತು ಬೀಜಾಣುಕೆಗಳು	ಕೊಳವೆಗಳ ಹೊರಭಾಗ ವನ್ನು ಕುಚ್ಚುಗಳಿಂದ ಹೊಕ್ಕಳಗೊಳಿಸುವುದು	ಸಂಬಂಧಪಟ್ಟ ಕೊಠಡಿಯಲ್ಲಿರುವಾಗ ಶುದ್ಧಗೊಳಿಸುವುದು
	ಸಬಕಾರ ಮತ್ತು ಬಿಸಿ ನೀರಿನಿಂದ ತೊಳೆಯುವುದು	ಕ್ರಮವಾಗಿ ಇತರೆ ಭಾಗಗಳಿಗಾಂದಿಗೆ.
	ಆದೇರೀತಿ ಗಾಳಿ ಹೊಕ್ಕುವ ಸೂಕ್ಷ್ಮದ ಜರಡಿಗಳನ್ನು ಪರಿಶುದ್ಧ ಗೊಳಿಸುವುದು	ಕೊನೆಯಪಕ್ಷ ವಾರಕೊಮ್ಮೆ.
ಶೇಖರಣಾ ಟ್ಯಾಂಕ್ (ಸಂಪೂರ್ಣವಾಗಿ ಮುಚ್ಚಬಿರುವುದು)	ನೀರನ್ನು ಸಂಪೂರ್ಣ ಖಾಲಿ ಮಾಡಿ, ಸಬಕಾರ ಮತ್ತು ಬಿಸಿನೀರಿನಿಂದ ತೊಳೆಯುವುದು. ಸರಿಯಾಗಿ ಗಲಬರಿಸುವುದು ಪುನ:ನೀರನ್ನು ತುಂಬುವಾಗ ಸಾಕಷ್ಟು ನೀರನ್ನು ಹೊರಗೆ ಬಿಡುವುದು	ಕೊನೆಯ ಪಕ್ಷ 6 ತಿಂಗಳಿಗೊಮ್ಮೆ.
ಹೆಚ್ಚು ಮೊಟ್ಟೆಗಳನ್ನು ಶೇಖರಿಸುವ ಟ್ಯಾಂಕ್	ತಣ್ಣೀರಿನಿಂದ ತೊಳೆದು ಬಾಕಿ ಇರುವ ಕಲ್ಮಷಗಳನ್ನು ತೆಗೆದುಹಾಕುವುದು. ಕ್ರಿಮಿ ಶುದ್ಧವಿರುವ ಸಬಕಾರ ಮತ್ತು ಬಿಸಿನೀರಿನಿಂದ ತೊಳೆಯುವುದು. ತಣ್ಣೀರಿನಿಂದ ಗಲಬರಿಸುವುದು.	ಪ್ರತಿಸಾರಿ ಮತ್ತೆ ಭರ್ತಿಮಾಡುವ ಮುನ್ನ.
ಬ್ಲಾಕಿಂಗ್, ಸ್ಯಾಂಪಿಂಗ್ ಮತ್ತು ಫಾರಿಮ್ಮಿಂಗ್ ವಿಷಸಿಗಳು	ಬಿಡಿಭಾಗಗಳನ್ನು ಬೇರೆ ಬೇರೆ ಪ್ರತ್ಯೇಕಿಸುವುದು ಜಿಡ್ಡಿನ ಪದಾರ್ಥಗಳನ್ನು ತೆಗೆಯುವುದು ಮತ್ತು ಸರಿಯಾಗಿ ಜೋಕ್ಕಟ ಪಡಿಸುವುದು. ಕುದಿಯುವ ನೀರಿನಲ್ಲಿ ಬಿಡಿ ಭಾಗಗಳನ್ನು ಇಡುವುದು ಅಥವಾ ಸಬಕಾರ ದೊಂದಿಗೆ ಬಿಚ್ಚಗಿರುವ ನೀರಿನಿಂದ ಒರೆಸುವುದು ಬೆನ್ನಾಗಿ ಗಲಬರಿಸಿ ಒಣಗಿಸಿ ಮತ್ತೆ ಜೋಡಿಸುವುದು	ಪದೇ ಪದೇ ಮತ್ತು ಕ್ರಮವಾಗಿ
ಹೋಮೋಜಿನೈಜರ್ಸ್	ಬಿಡಿಭಾಗಗಳಾಗಿಸುವುದು ಅವುಗಳನ್ನು ಬಿಚ್ಚನೆಂತು ನೀರು ಸಬಕಾರದಿಂದ ತೊಳೆಯುವುದು ಸ್ಪೈರಿಲಿಂಟಿನಿಂದ ಗಲಬರಿಸುವುದು ಮತ್ತೆ ಜೋಕ್ಕಟವಾದ ನೀರಿನಿಂದ ಗಲಬರಿಸಿ ಜೋಡಿಸುವುದು.	ಪ್ರತಿನಿತ್ಯದ ಕೆಲಸದವೇಳೆ ಮುಗಿದ ನಂತರ.
ತಣ್ಣಗಾಗಿಸುವ ಪಾತ್ರೆಗಳು	43·5 ಡಿಗ್ರಿ ಸೆಂಟಿಗ್ರೇಡ್ ಉಷ್ಣಾಂಶ ವಿರುವ ನೀರಿನಿಂದ ತೊಳೆಯುವುದು ಸ್ಪೈರಿಲಿಂಟ ಒಳಗೊಂಡ ಜಿಡ್ಡು ನಿವಾರಣಾ ಸಬಕಾರ ಮತ್ತು ಬಿಚ್ಚಗಿರುವ ನೀರಿನಲ್ಲಿ ಮುಳುಗಿಸಿ ಡುವುದು ಗಲಬರಿಸುವುದು ಮತ್ತು ಣಗಿಸುವುದು	ಪ್ರತಿ ಸಲ ಉಪಯೋಗಿಸಿದನಂತರ.
ಸಾಗಣೆ ಬೆಲ್ಟ್‌ಗಳು	ಬಿದ್ದಿರುವ ಪದಾರ್ಥಗಳನ್ನು ಶುದ್ಧ ಪಡಿಸುವುದು. ಸಬಕಾರದೊಂದಿಗೆ ಬಿಚ್ಚಗಿರುವ ನೀರಿನಿಂದ ಒರೆಸುವುದು ರೋಲರ್‌ಗಳ ಮೇಲಲ್ಯಾಗವನ್ನು ಶುದ್ಧಪಡಿಸುವುದು.	ಪದೇ ಪದೇ ಮತ್ತು ಕ್ರಮವಾಗಿ. ಕೊನೇಪಕ್ಷ ದಿನಕೊಮ್ಮೆ. ಕೊನೆಯಪಕ್ಷ ದಿನಕೊಮ್ಮೆ.
ಹಿಟ್ಟನ್ನು ಕಲಿಸುವ ಮತ್ತು ಬೆರೆಸುವ ಯಿಶ್ರಣ ಯಂತ್ರಗಳು	ಹೊರಗೆ ಬಿಲ್ಲಿರುವ ಹೊರಬಂದಿರುವ ಪದಾರ್ಥಗಳನ್ನು ತೆಗೆಯುವುದು ಸಬಕಾರವುಳ್ಳ ಬಿಚ್ಚನೆ ನೀರಿನಿಂದ ತೊಳೆಯುವುದು ನುತ್ತು ತಣ್ಣೀರಿನಿಂದ ಗಲಬರಿಸಿ ಒಣಗಿಸುವುದು.	ಉಪಯೋಗದಲ್ಲಿರುವಾಗ ಪದೇ ಪದೇ ಮತ್ತು ಕ್ರಮವಾಗಿ ಪ್ರತಿನಿತ್ಯದ ಕೆಲಸ ಮುಗಿದ ನಂತರ.

ವಾಸನೆ, ಬಣ್ಣ ವಗೈರೆ ಎಸೆನ್ಸ್‌ಗಳನ್ನು ಇಡುವ ಡಬ್ಬಗಳು	ಡಬ್ಬಿಗಳ ಹೊರಭಾಗವನ್ನು ಶುದ್ಧಪಡಿಸುವುದು	ಅವುಗಳನ್ನು ಉಪಯೋಗಿಸಿದ ಪ್ರತಿಸಲ.
ನಾದುವ ಹಲಗೆ ಮತ್ತು ಮೇಜುಗಳು	ಉಪಯೋಗದಲ್ಲಿರುವಾಗ ಚೊಕ್ಕಟವಾಗಿಡುವುದು ಸಕ್ಕರೆ, ಹಿಟ್ಟಿನ ಉಳಿಕೆ ಭಾಗಗಳನ್ನು ತೆಗೆಯುವುದು ಬೋರ್ಡ್‌ಗಳನ್ನು ಸ್ಟೆಂಲೆಂಟ್ ಒಳಗೊಂಡ ಸಬಕಾರವುಳ್ಳ ಬೆಚ್ಚನೆ ನೀರಿನಲ್ಲಿ ಮುಳುಗಿಸುವುದು, ಯಾವಾಗಲೂ ಮರದಿಂದ ಮಾಡಿದ ಮೇಲ್ಭಾಗಗಳನ್ನು ಚೆನ್ನಾಗಿ ಉಜ್ಜಿ ತೊಳೆಯುವುದು.	ಪ್ರತಿಸಾರಿ ಕೆಲಸದ ವೇಳೆಯ ನಂತರ.
ತಕ್ಕಡಿ ತಟ್ಟೆಗಳು ಮತ್ತು ತೂಕದ ಅಳತೆಗಳು	ಹೊರಚೆಲ್ಲಿರುವ ತುತ್ತು ಅಂಟಿಕೊಂಡಿರುವ ಪದಾರ್ಥಗಳನ್ನು ತೆಗೆಯುವುದು	ಉಪಯೋಗದಲ್ಲಿರುವಾಗ ಪದೇ ಪದೇ ಮತ್ತು ಕ್ರಮವಾಗಿ
	ಸಬಕಾರವುಳ್ಳ ಬೆಚ್ಚನೆ ನೀರಿನಿಂದ ತೊಳೆಯುವುದು ಗಲಬರಿಸುವುದು ಮತ್ತು ಒಣಗಿಸುವುದು	ಪ್ರತಿದಿನದ ಕೆಲಸದ ವೇಳೆ ನಂತರ.
ಚಾಕು ವಗೈರೆ	43·5 ಡಿಗ್ರಿ ಸೆಂಟಿಗ್ರೇಡ್ ಅಥವಾ ಮೇಲ್ಪಟ್ಟ ಉಷ್ಣಾಂಶವಿರುವ ನೀರಿನಲ್ಲಿ ತೊಳೆಯುವುದು. ಸ್ಟೆರಿಲೆಂಟ್ ಒಳಗೊಂಡ ಸಬಕಾರ ಮತ್ತು ಬೆಚ್ಚಗಿರುವ ನೀರಿನಿಂದ ತೊಳೆಯುವುದು ಗಲಬರಿಸುವುದು ಮತ್ತು ಒಣಗಿಸುವುದು ಅದಕ್ಕಾಗಿ ಗೊತ್ತುಪಡಿಸಿರುವ ಸ್ಥಳಗಳಲ್ಲಿ ಇಡುವುದು	ಉಪಯೋಗಿಸಿದ ನಂತರ.
ಮರದ ತಟ್ಟೆಗಳು	ಸಬಕಾರ — ಬೆಚ್ಚಗಿರುವ ನೀರಿನಿಂದ ಗುಂಜಿನಿಂದ ಚೆನ್ನಾಗಿ ಉಜ್ಜಿ ತೊಳೆಯುವುದು ಗಲಬರಿಸುವುದು ಮತ್ತು ಒಣಗಿಸುವುದು	ಪದೇ ಪದೇ ಮತ್ತು ಕ್ರಮವಾಗಿ
	ಸ್ಟೆರಿಲೆಂಟ್‌ನಿಂದ ಕೂಡಿದ ಸಬಕಾರ ಮತ್ತು ಬೆಚ್ಚಗಿರುವ ನೀರಿನಿಂದ ತೊಳೆಯಿರಿ. ಗಲಬರಿಸಿ ಒಣಗಿಸುವುದು	ಉಪಯೋಗಿಸುವ ತಟ್ಟೆಗಳು ಪ್ರತಿದಿವಸ ಕೆಲಸ ಪ್ರಾರಂಭವಾಗುವ ವೇಳೆ ಚೊಕ್ಕಟವಾಗಿರಬೇಕು.
ಒರೆಸುವ ಪದಾರ್ಥಗಳು ಮತ್ತು ಬಟ್ಟೆಗಳು	(ಅ) ಬಳಕೆಯನಂತರ ಬಿಸಾಡುವಂತ ಪದಾರ್ಥಗಳನ್ನು ಉಪಯೋಗಿಸುವುದು	ಅನುಕೂಲವಾದ ಸ್ಥಳದಲ್ಲಿಟ್ಟಿರುವ ಡಬ್ಬಗಳಲ್ಲಿ ಹೊರ ಹಾಕುವುದು.
	ಅ ಥ ವಾ	
	(ಆ) ಪ್ರತಿಸಲ ಉಪಯೋಗಿಸುವುದರ ಮಧ್ಯೆ ಕೆಮಿಕಲ್ ಸ್ಟೆರಿಲೆಂಟ್‌ನಲ್ಲಿಡುವುದು ಬದಲಾಯಿಸುವಾಗ ಕುದಿಸುವುದು	(ಆ) ದಿನದಲ್ಲಿ ಅನೇಕಾವರ್ತಿ ಬದಲಾಯಿಸುವುದು.
ಸವಾಂಯ್ ಚೀಲಗಳು: (ಮಂಜುಗಡ್ಡೆಯಿಂದ ಶೈತ್ಯೋಪಚಾರಮಾಡುವ ಚೀಲ)	ತಿರುಗು ಮುರುಗು ಮಾಡಿ, ಹಚ್ಚಿನ ಕೆನೆ ಅಂಟಿರುವ ಭಾಗವನ್ನು ತೊಳೆಯುವುದು ಒಳಭಾಗವನ್ನು ಚೆನ್ನಾಗಿ ಉಜ್ಜುವುದು (ಬೆಚ್ಚಗಿರುವ ನೀರು ಸ್ಟೆರಿಲೆಂಟ್ ಉಳ್ಳ ಸಬಕಾರದಿಂದ) ಬಿಸಿನೀರಿನಲ್ಲಿ ಗಲಬರಿಸುವುದು. 5 ನಿಮಿಷ ಕುದಿಸುವುದು ನಾಜಲ್‌ಗಳನ್ನು ಶುದ್ಧೀಕರಿಸುವುದು. ಗಲಬರಿಸುವುದು ಮತ್ತು ಒಣಗಿಸುವುದು	ಉಪಯೋಗದ ನಂತರ

ಹೊರವಲಯದ ಮೋರಿಗಳು	ಗ್ರೀಸ್ ಟ್ರಾಪ್ ತೆಗೆದು ಬೊಕ್ಕಗೊಳಿಸುವುದು ಗ್ರೀಸ್ ಟ್ರಾಪ್‌ನ್ನು ಬಿಸಿನೀರು, ಸೋಪಿನಿಂದ ಕೂಡಿದ ಸಬಕಾರದಿಂದ ತೊಳೆದಿಡುವುದು ಸೋಸುವಿಕೆಯ ಪದಾರ್ಥಗಳನ್ನು ಬದಲಾಯಿಸಿ.	ಪದೇ ಪದೇ ಮತ್ತು ಕ್ರಮವಾಗಿ
ತೆರೆದ ಮೋರಿಯಿಂದ ದೊಣಿಗಳು	ಮೇಲಿರಬಹುದಾದ ಕಡಡಾ ಪದಾರ್ಥಗಳನ್ನು ತೆಗೆಯುವುದು. ಮೋರಿಯನ್ನು ಜಿಜ್ಞ ತೊಳೆಯುವುದು (ಬಿಸಿನೀರು, ಸೋಪಿಲಿಂಟಿ ಸಬಕಾರ ಉಪಯೋಗಿಸುವುದು)	ಪ್ರತಿ ದಿವಸದ ಕೆಲಸ ಮುಗಿದ ಮೇಲೆ
ಕಸದ ತೊಟ್ಟಿಗಳು	ಸೋಡ್ಡ ಮತ್ತು ಬಿಸಿ ನೀರಿನಿಂದ ತೊಳೆಯುವುದು, ಒಣಗಲು ಅದನ್ನು ತಲೆಕೆಳಕಾಗಿ ಇಡುವುದು	ಪ್ರತಿನಲ ಖಾಲಿಯಾದ ನಂತರ.
ವಾಹನಗಳು	ಉಪಯೋಗದಲ್ಲಿರುವಾಗ ಬೆಲ್ಲರಿಯುವುದನ್ನು ತೆಗೆಯುವುದು.	ಪದೇ ಪದೇ
ಆಹಾರ ಸಂಪರ್ಕಪಡೆಯುವ, ಸಜ್ಜುಗೊಳಿಸುವ ಪದಾರ್ಥಗಳು ಮತ್ತು ಸಲಕರಣೆಗಳ ಮೇಲ್ಮಾಗಗಳು	ಜೆನ್ನಾಗಿ ಶುದ್ಧಪಡಿಸುವುದು. ಕೊಬ್ಬುರಹಿತ ಪದಾರ್ಥ ಮತ್ತು ಹೆಚ್ಚಿನಿಂದ ಕೊಳೆಯನ್ನಾಗಿರು ಮೇಲ್ಮಾಗವನ್ನು ಕುಚ್ಚಿದಿಂದ ಶುದ್ಧಗೊಳಿಸುವುದು.	ಪ್ರತಿನಿತ್ಯ
ಉಳಿದ ವಾಹನಗಳ ಒಳಭಾಗಗಳನ್ನು ಮತ್ತು ಇತರೆ ಸಲಕರಣೆಗಳ ಒಳಭಾಗಗಳು	ಜಿಡ್ಡನ್ನು ತೆಗೆಯುವ ಪದಾರ್ಥ ಮತ್ತು ಬೆಚ್ಚಗಿರುವ ನೀರಿನಿಂದ ತೊಳೆಯಿರಿ.	ಕೊನೆಯ ಪಕ್ಷ ವಾರಕೊಮ್ಮೆ.

—: ಸಮತೋಲನ ಆಹಾರ :—

ಪಟ್ಟಿ :— 1 ಪುರುಷರಿಗೆ ಸಮತೋಲನ ಆಹಾರ (ಸಾಮಾನ್ಯ ಕೆಲಸ ಮಾಡುವವರಿಗೆ)

ಆಹಾರ ಪದಾರ್ಥ (1)	ಪ್ರಮಾಣ (2)	ನಂಬ್ಯೆ (3)
1. ಧಾನ್ಯಗಳು :—		
(ಅ) ಅಕ್ಕಿ	335	
(ಆ) ಗೋಧಿಹಿಟ್ಟು	140	
2. ದ್ವಿದಳ ಧಾನ್ಯಗಳು :—		
(ಅ) ತೊಗರಿ ಬೇಳೆ	50	
(ಆ) ಉದ್ದಿನ ಬೇಳೆ	30	
3. ಹಸಿರು ಸೊಪ್ಪುಗಳು :—		
(ಅ) ದಂಟಿನ ಸೊಪ್ಪು	125	3 ಕಟ್ಟುಗಳು.
4. ಇತರೆ ತರಕಾರಿಗಳು :—		
ಹುರುಳಿಕಾಯಿ	75	12—15 ಅಥವಾ ಒಂದು ಹಿಡಿ
5. ಹಣ್ಣು :—		
ಕಿತ್ತಳೆ	30	3 ತೊಳೆಗಳು.
6. ಹಾಲು :—	200	—
7. ಕೊಬ್ಬು ಮತ್ತು ಎಣ್ಣೆಗಳು :—	40	—
8. ಸಕ್ಕರೆ ಮತ್ತು ಬೆಲ್ಲ :—	40	—

ಪಟ್ಟಿ : 2 ಸ್ತ್ರೀಯರಿಗೆ ಸಮತೋಲನ ಆಹಾರ (ಸಾಮಾನ್ಯ ಕೆಲಸ ಮಾಡುವವರಿಗೆ :—

1. ಧಾನ್ಯಗಳು :—		
1. ಅಕ್ಕಿ	230	
2. ಗೋಧಿ	120	
2. ದ್ವಿದಳ ಧಾನ್ಯಗಳು :—		
1. ತೊಗರಿಬೇಳೆ	45	—
2. ಉದ್ದಿನ ಬೇಳೆ	25	—
3. ಹಸಿರು ಎಲೆ ತರಕಾರಿ :—		
ದಂಟಿನ ಸೊಪ್ಪು	125	3 ಕಟ್ಟುಗಳು,
4. ಗೆಡ್ಡೆ ಗೆಣಸುಗಳು :—		
ಆಲೂಗೆಡ್ಡೆ	75	1
5. ಇತರೆ ತರಕಾರಿಗಳು :—		
ಹುರುಳಿಕಾಯಿ	75	12—15 ಅಥವಾ ಒಂದು ಹಿಡಿ —ಂಯಷ್ಟು
6. ಹಣ್ಣು :— ಕಿತ್ತಳೆ	30	$\frac{1}{4}$ 3 ತೊಳೆಂಯಷ್ಟು ಅಥವಾ ಭಾಗದಷ್ಟು

(1)	(2)	(3)
7. ಹಾಲು :—	200	—
8. ಕೊಬ್ಬು ಮತ್ತು ಎಣ್ಣೆ	35	—
9. ಸಕ್ಕರೆ ಮತ್ತು ಬೆಲ್ಲ :—	30	—

ಪಟ್ಟಿ 3 — ಗರ್ಭಿಣಿಸ್ತ್ರೀ ಮತ್ತು ಹಾಲುಣಿಸುವ ತಾಯಿಯಂದಿರಿಗೆ ಕೊಡಿಸುವ ಅವಕಾಶ :—

ಆಹಾರ ಪದಾರ್ಥಗಳು	ಗರ್ಭಿಣಿಯರಿಗೆ		ಹಾಲುಣಿಸುವ ತಾಯಿಯಂದಿರಿಗೆ	
	ಪ್ರಮಾಣ (ಗ್ರಾಂ)	ಸಂಖ್ಯೆ	ಪ್ರಮಾಣ (ಗ್ರಾಂ)	ಸಂಖ್ಯೆ
1. ಧಾನ್ಯಗಳು :—				
ಅಕ್ಕಿ	50	—	40	
ಗೋಧಿ			60	
2. ದ್ವಿದಳ ಧಾನ್ಯಗಳು :—				
ತೊಗರಿಬೇಳೆ	—	—	20	
3. ಹಸಿರು ಎಲೆ ತರಕಾರಿ :—	25	$\frac{3}{4}$ ಕಟ್ಟುಗಳು	25	$\frac{3}{4}$ ಕಟ್ಟುಗಳು
4. ಹಾಲು :—	125	—	125	—
5. ಕೊಬ್ಬು ಮತ್ತು ಎಣ್ಣೆ :—	—	—	15	—
6. ಸಕ್ಕರೆ ಮತ್ತು ಬೆಲ್ಲ	10	—	20	—

ಪಟ್ಟಿ :— 4 3–6 ವರ್ಷದ ಮೊಗುವಿಗೆ ಸಮತೋಲನ ಆಹಾರ (ರೆಫರೆನ್ಸ್: 6 ವರ್ಷದ ಮೊಗು)

ಆಹಾರ ಪದಾರ್ಥ	ಪ್ರಮಾಣ (ಗ್ರಾಂ)	ಸಂಖ್ಯೆ :
1. ಧಾನ್ಯಗಳು :—		
1. ಅಕ್ಕಿ	140	—
2. ಗೋಧಿಹಿಟ್ಟು	60	—
2. ದ್ವಿದಳ ಧಾನ್ಯಗಳು :—		
1. ತೊಗರಿಬೇಳೆ	30	—
2. ಉದ್ದಿನಬೇಳೆ	15	—
3. ಇತರೆ ಬೇಳೆಗಳು	15	—
3. ಹಸಿರು ಎಲೆ ತರಕಾರಿ :—		
ದಂಟಿನ ಸೊಪ್ಪು	75	$\frac{1}{2}$ ಕಟ್ಟು.
4. ಗೆಡ್ಡೆ ಗೆಣಸುಗಳು :—		
ಆಲೂಗೆಡ್ಡೆ	50	1 ಸುಮಾರು ದಪ್ಪದು.
5. ಇತರೆ ತರಕಾರಿಗಳು :—		
ಹುರುಳಿಕಾಯಿ	50	8–10
6. ಹಣ್ಣು :— ಕಿತ್ತಳೆ	50	5 ತೊಳೆಗಳು.

(1)	(2)	(3)
7. ಹಾಲು	250	—
8. ಕೊಬ್ಬರಿ ಮತ್ತು ಎಣ್ಣೆ	25	—
9. ಸಕ್ಕರೆ ಮತ್ತು ಬೆಲ್ಲ	40	—

ಪಟ್ಟಿ 5: 1 — 3 ವರ್ಷದ ಮೊಗುವಿಗೆ ಸಮತೋಲನ ಆಹಾರ (ರೆಫರೆನ್ಸ್ : 3 ವರ್ಷದ ಮಗು)

1. ಧಾನ್ಯಗಳು :—		
1. ಅಕ್ಕಿ	90	
2. ಗೋಧಿ	60	—
2. ದ್ವಿದಳ ಧಾನ್ಯಗಳು :—		
1. ತೊಗರಿಬೇಳೆ	25	
2. ಉದ್ದಿನ ಬೇಳೆ	10	
3. ಹೆಸರು ಬೇಳೆ	15	
3. ಹಸಿರು ಎಲೆ ತರಕಾರಿ :—		
ದಂಟಿನ ಸೊಪ್ಪು	50	1 ಕಟ್ಟು
4. ಗೆಡ್ಡೆ ಗೆಣಸುಗಳು :—		
ಆಲೂಗೆಡ್ಡೆ	30	1 ಚಿಕ್ಕದು
5. ಇತರೆ ತರಕಾರಿ :—		
ಹುರುಳಿಕಾಯಿ	30	5—7
6. ಹಣ್ಣುಗಳು :—		
ಕಿತ್ತಳೆ	50	5 ತೊಳೆ
7. ಹಾಲು :—	300	—
8. ಕೊಬ್ಬರಿ ಮತ್ತು ಎಣ್ಣೆ	20	—
9. ಸಕ್ಕರೆ ಮತ್ತು ಬೆಲ್ಲ	30	—

WHO Chronicle, 31: 143-149 (1977)

KEEPING FOOD SAFE FROM HARMFUL GERMS

The health of people depends to a large extent on the food they eat. Keeping food safe from harmful germs and their toxic products is therefore an important problem, which over the years has engaged the attention of various WHO expert committees concerned with different aspects of food hygiene. The latest report of the WHO Expert Committee on microbiological aspects of food hygiene, which met in Geneva in March 1976 (with the participation of FAO), has recently been published[1] and it describes the microbiological agents of food-borne disease and the microbiological hazards in relation to foods. The article below, which is adapted from the second part of the report, describes the microbiological hazards related to food processing, handling and storage, population movements, tourism, etc., as well as the measures available to control them.

Hazards related to food preparation

The largest proportion of food-borne disease is probably caused not by commercially processed foods but by food prepared at home, in institutions, or in food catering establishments. Food-processing plants were implicated in 6% of food-borne disease outbreaks in the USA during the period 1968-73 and in nearly 25% of outbreaks in Denmark during 1954-63. The commonest causes of disease resulting from food prepared in kitchens of private homes or institutions in the USA are unexpected contamination of the raw food material and faulty preparation techniques. One study of disease outbreaks that could be attributed to food processing plants suggested that most of the outbreaks were due to contaminated raw materials (for products not given a terminal heat process) and to faulty applications of processing and packaging techniques.

.. 2

Common faults in the handling and processing of food in homes, restaurants, and other food catering establishments, which led to disease outbreaks, are given in Table 1. In some cases several faults were found without the possibility of identifying the importance of each one. Several outbreaks of food poisoning, usually caused by salmonellae, were found to be due to the transfer of organisms from contaminated raw food to cooked food by hands, utensils, and unclean surfaces.

Table-1. Factors contributing to 493 outbreaks of disease caused by foods processed in homes or in food catering establishments[a]

Factor	No. of outbreaks
Inadequate refrigeration	336
Food preparation far in advance of serving	156
Infected persons and poor personal hygiene	151
Inadequate cooking or heating	140
Food kept "warm" at a wrong temperature	114
Contaminated raw materials in uncooked foods	84
Inadequate reheating	66
Cross-contamination	58
Inadequate cleaning of equipment	52
Other conditions	160

[a] Adapted from BRYAN, F.L. Microbiological food hazards today-based on epidemiological information. Food technology, 28(9): 52(1974)

Hazards related to storage

Hazards related to the storage of food are determined by various combinations of factors-length of storage, type of food, methods of processing and preservation, types and relative proportions of organisms present, PH, water activity, and temperature.

1 WHO Technical Report Series, No.598, 1976 (Microbiological aspects of food hygiene). Report of a WHO Expert Committee with the participation of FAO), 103 pages, Price; Sw. fr. 9.-.

Temperature control is of major importance in reducing hazards from pathogenic bacteria, limiting spoilage, and keeping food safe. In countries where refrigeration facilities are available perishable foods should be stored at temperatures that inhibit the growth of pathogenic bacteria, i.e., less than 4°C (or alternatively above 60°C). The low temperatures must be achieved quickly after processing in order to obtain the greatest benefit from refrigeration. Slow cooling may allow heat-injured spores to recover and subsequently to grow before the temperature reaches an inhibiting level.

At low temperatures, particularly under chilled storage, changes may occur in food usually as a result of the growth of psychrophilic bacteria such as Pseudomonas, Achromobacter, Flavobacterium, and Alcaligenes and certain yeasts and moulds.

Hazards related to food habits

Food habits vary from one country to another and even within a country, but these habits are subject to change. In countries where environmental sanitary conditions are poor, gastroenteric diseases are one of the most important causes of morbidity and mortality. Food and water are important channels of transmission of these diseases.

The following factors tend to increase food-borne diseases:

(1) Intensive production of livestock and the use of contaminated feeds.

(2) Consumption of raw or undercooked meat or poultry. This increases the risk of parasitic diseases and bacterial infections and intoxications, e.g., salmonellosis, toxoplasmosis, human linguatulosis, Taenia saginata and T. solium infestations, and trichinosis. Even in countries where meat is thoroughly inspected to prevent transmission, mild infections of carcases can still be missed. The habit of cooking large cuts of meats into which heat cannot adequately penetrate may sometimes be responsible for these infections.

(3) Consumption of raw milk, either from choice or for economic reasons.

(4) Consumption of raw or undercooked fish. Infections due to Vibrio parahaemolyticus, Diphyllobothrium latum or other cestodes, trematodes, and nematodes may result.

(5) Consumption of wild animal meat. Out-breaks of trichinosis have occurred through consumption of wild boar and bear meat.

(6) Improper home canning of foods. In the USA the majority of outbreaks of botulism occur as a result of home canning of vegetables and fruits where adequate processing has not been carried out.

(7) Preparation of ready-to-eat foods in bulk and mass feeding, where under certain conditions normal habits of food hygiene are relaxed.

(8) Consumption of traditional food delicacies. Utijak, an Eskimo delicacy prepared by keeping seal flippers soaking in oil until rotten, has been responsible for whole families dying from botulism.

Hazards related to population movements and travel

With improvements in the speed and safety of travel, more and more people now visit other countries; in the case of "package" tours, organized to attract tourists, a considerable number of people are exposed to environmental hazards which they would not experience in their own countries or homes.

Outbreaks of food-borne disease due to Staphylococcus aureus, Clostridium perfringens, salmonellae, V. parahaemolyticus, cholera and non-cholera international air travel. Strict control of food hygiene in flight kitchens as well as on board aircraft is essential.

Numerous outbreaks of enteric infection have been recorded on passenger ships; several of these have been reported on cruise ships. Replenishment of ships' water supplies during a voyage has always presented a particular hazard since many opportunities exist for contamination of water between ship and shore. An additional hazard is cross contamination of drinking-water with bilge or waste water. Several outbreaks of V. parahaemolyticus gastroenteritis were reported on cruise ships sailing from ports in the USA in 1975. In one of these outbreaks V. parahaemolyticus serotype $O_8:K_{22}$ was isolated

from sick passengers and seafood cocktail was implicated. It was thought that the food was contaminated with polluted sea water. In another investigation of the incidence of gastroenteritis on a passenger ship, Escherichia coli Ø27 was the individual predominant organism isolated from patients with diarrhoea.

In addition to the specific hazards of well-known enteric infections and intoxications, travellers and holiday-makers are exposed to other infections usually classed as "travellers' diarrhoea"; such infections are of limited duration. There is evidence that travellers' diarrhoea is associated with strains of enterotoxigenic E. coli new to the individual and acquired through the medium of food and water. Amoebiasis and giardiasis may also be involved in tourists' gastroenteritis originating from food and water.

Owing to the influx of large numbers of people to sites of pilgrimages and refugee camps, the threat of cholera and other enteric diseases in these places is very real. Camping and caravan sites, fairs, and festivals can also present hazards of food-borne disease outbreaks if the sanitary arrangements are not satisfactory.

Hazards related to imported foods

Large quantities of foods for human consumption and for feeding animals are transported from one country, or from one part of the world, to another. The exporting country may have no knowledge of the ways in which their products are used in importing countries, and foods that are considered safe in the country of origin may provoke disease in the importing country as a consequence of different food habits. The importing country, on the other hand, often has insufficient knowledge about the production and processing of the food, and public health authorities are concerned about the unknown risks. This has led to the setting up of control systems or requests for guarantees on wholesomeness, absence of pathogens, etc., which information many exporting countries are generally unable to give. Import control based only on sampling and testing of lots is often ineffective and has not been able to prevent several outbreaks of disease due to imported foods in various countries.

Eliminating harmful germs

Different processing methods, e.g., heat treatment, refrigeration; etc., are available for combating food-borne disease agents such as bacteria, parasites, and viruses, The effects of such treatment on these agents or on toxins produced by them are summarized below.

Effect of heat processing

(1) Non-spore-forming bacteria. Officially approved heat treatment of moist foods for the purpose of eliminating non-spore-forming bacteria, notably salmonellae, ranges from 3.5 minutes at 61.1°C for liquid whole egg to 1 second at 132.2°C or over for ultra-high temperature treatment of milk. Foods with low water activity or high fat content require more intense heat treatment than foods with high water activity or low fat content. Such treatment can be expected to effectively eliminate salmonellae, staphylococci, pathogenic streptococci, brucellae, etc. Studies of the heat resistance of V. parahaemolyticus have shown that this organism is killed as easily as other non-spore-forming bacteria.

(2) Spore-forming bacteria. The heat resistance of spores of C.botulinum type A has been the basis for calculating minimum heat processes for low-acid canned food for half a century. Spores of C. botulinum types B and F may have a heat resistance approaching that of type A; spores of most type E strains are destroyed at temperatures below 100°C and strains C and D barely survive heating to 100°C. The spores of type G seem to be as resistant as types C and D.

The heat resistance of C. perfringens type A spores may approach that of C. botulinum type A, which means that they are not killed by normal cooking (boiling) of food. The resistance of spores of non-haemolytic strains is generally higher than that of B-haemolytic strains. Heat-shocked C. perfringens spores, when ingested, germinate in the intestine. Later sporulation of these vegetative forms gives a greater yield of spores and therefore more toxin.

(3) Parasites. Trichina and several other parasites are killed by exposure to a temperature of 58°C and all food-borne parasites seem to be destroyed by boiling (100°C) for a short time.

(4) Viruses. Oncogenic viruses in ice-cream mixes were effectively destroyed by standard pasteurization (68.3°C for 30 minutes or 79.4°C for 25 seconds). Pasteurization of liquid whole egg at 60°C for 3.5 minutes resulted in a million-fold or tenthousand-fold decrease in poliovirus and echoviruses, respeqtively. Studies of survival of poliovirus and Coxsackie viruses during broiling of hamburgers showed that 4 minutes at u71°C and 76.7°C respectively were required for 90% reduction. For complete destruction of some viruses it may be necessary to boil the food.

(5) Microbial toxins. Most fungal toxins, including the aflatoxins, are not destroyed by boiling or autoclaving. Staphylococcal enterotoxins are also very heat-resistant; more than 9 minutes at 121.1°C may be required for 90% destruction. Boiling readily destroys botulinal toxins as well as C.perfringens toxin, but the latter is never or only rarely present in foods.

(6) Microwave heating. Microwave heating of food has become widespread in recent years. Frequencies of 915 or 1450 MHz are most often used. Microwaves generate heat in foods and it has been suggested that their effect is solely due to the generated heat. There are indications of additional modes of action when vegetative cells are killed by microwave. However, microwaves do not effectively kill spores at temperatures below 100°C.

Effects of irradiation

Resistance of food-borne pathogens to ionizing radiation might be a problem in irradidation preservation of foods. Low doses of irradiation have been suggested as a means of prolonging the shelf-life of food and eliminating radiation-sensitive disease agents such as salmonellae. Large doses (4.8×10^4 Gy (gray) 4.8 megarad) or more) have been recommended for sterilizing canned foods.

(1) Non-spore-forming bacteria. Irradiation of food with doses of up to 1×10^4 Gy(1 megarad) will effectively eliminate bacteria such as salmonellae, staphylococci, vibrio, and others.

(2) Spores. Spores of C. botulinum are among the most radiation-resistant microbial forms. The dose required to destroy 90% of spores is a little more than 3×10^3 Gy (0.3 megarad) for the most resistant strains of types A and B and more than 6×10^3 Gy (0.6 megarad) for proteolytic type F. In the USA, 4.8×10^4 Gy (4.8 megarad) has become the accepted sterilizing dose for food.

(3) Parasites, viruses, toxins. Parasites are rather sensitive to irradiation. Larvae of Trichinella spiralis may survive as much as 1×10^4 Gy (1 megarad) but 1×10^2 Gy (0.01 megarad) suffices to sterilize the female larvae and thus interrupt the infection cycle. Viruses are quite resistant but it is believed that a sterilizing dose (4.8×10^4 Gy or 4.8 megarad) will inactive viruses naturally present in food. Toxins in food cannot be inactivated by irradiation.

Refrigeration:

(1) Non-spore-forming bacteria. The growth of salmonellae is arrested at temperatures below 5.2°C and above 44-47°C. Whether they will actually grow at these temperature extremes depends on other factors; low pH or water activity narrows the range of growth. Staphylococci can grow at temperatures between 6.7°C and 45.4°C and enterotoxin production can occur at temperatures ranging from 10°C to 46°C. The lowest reported temperature permitting growth of V. parahaemolyticus is 3°C and the maximum 44°C.

(2) Spore-forming bacteria. While the growth of proteolytic strains of C. botulinum is arrested at temperatures below 10°C it has repeatedly been confirmed that non-proteolytic E and F strains grow and produce toxins at temperatures down to 3.3°C. The minimum growth temperature for C. perfringens is 6.5°C but growth is slowed down considerably at temperatures b below 20°C. No clostridia have been found to multiply at temperatures higher than 50°C. Bacillus cereus can multiply in the temperature range 7-49°C. Pathogenic bacteria may remain viable, but without growth, for a long time in refrigerated foods.

(3) Parasites, viruses, toxins. These agents do not multiply in foods but may remain active indefinitely at refrigeration temperatures.

(4) Moulds. The majority of fungal toxins may be produced in food kept at temperatures between 4°C and 40°C, but fungi that produce alimentary toxic aleukia can grow and produce toxin in the range of -2°C to - 10°C with an optimum temperature for toxin production of 1.5-4°C.

Freezing

(1) Non-spore-forming bacteria. Freezing not only results in arrest of growth but also in destruction of some cells. However, like salmonellae and staphylococci, V. parahaemolyticus shows better survival at low freezing temperatures. At - 30°C, they may survive for longer than 4 months.

(2) Spore-forming bacteria. While the vegetative cells of bacilli and clostridia are not much more resistant to freezing than non-spore-forming organisms, their spores are highly resistant.

(3) Parasites. Protozoa are generally destroyed by freezing. Trichinella spiralis, Anisakis, and Toxoplasma cysts can be killed by exposure to freezing temperatures for long enough periods of time. The same is true for intermediate stages of Taenia and Diphyllobothrium latum in fish.

(4) Viruses, toxins, moulds. These agents are generally very resistant to freezing.

Water activity, pH, and other factors

Different types of microorganism have characteristic ranges of growth with respect to the water activity in foods. The latter is reduced by increasing the concentration of solutes, which can be accomplished by drying and/or the addition of agents such as sodium chloride, sucrose, glucose, glycerol, and propylene glycol. The type of agent used influences the response of microorganisms to variations in water activity. Values that are inhibitory to the growth of microorganisms do not necessarily destroy them or viruses or toxins. However, trichina and possibly other parasites die in heavily salted foods. Minimum and optimum levels of water activity that favour the growth of different bacteria and moulds may be found in the report on which this article is based.

The effect of the acidity (or pH) of food on the growth of different organisms, etc., may be summarized as follows:

(1) Non-spore-forming bacteria. Staphylococci can grow under aerobic conditions in food within the pH range 4.3-8.0 or higher, but enterotoxin production (with the possible exception of type C enterotoxin) does not occur at pH values below 4.5. The limiting acidity for anaerobic enterotoxin production is pH 5.3.

Salmonellae can grow in the pH range 4.1-8.0 and V.parahaemolyticus in the range pH 4.8-11.0. Values below pH 4 are lethal to most vegetative cells of pathogenic food-borne bacteria. The lethal effect and the growth inhibitory effect depend on temperature, pH, and on the acids used.

(2) Spore-forming bacteria. Growth of C. botulinum in foods does not occur at pH values below 4.6. At this pH value the growth of C. perfringens and B. cereus is also inhibited although the latter may grow slowly at pH 4.4. in certain types of food. Bacterial spores die out slowly in foods with pH levels too low to permit growth.

(3) Parasites, viruses, toxins. Little or no information seems to be available about the effect of acids on parasites in foods. Some viruses are sensitive to acids but others are very resistant. Most toxins are quite resistant.

(4) Moulds. Aflatoxins can be produced in grapefruit juice (pH 3.3) and at even lower pH values in laboratory media. The fungi neutralize (metabolize) the organic acids during growth.

Fermentation, often combined with other means (especially salt), is used for preserving many types of food. The main preserving effect of fermentation is due to acid production, but other compounds inhibitory to food-borne pathogens may be formed by fermenting organisms. The growth of pathogens may be inhibited through competition for essential nutrients. The only effect of fermentation that can fairly accurately be predicted is the one based on acidity; the other effects are still not well understood.

Other factors in food processing or preservation, e.g., oxidation/reduction potential or the presence of carbon dioxide, exert small but important effects on pathogenic organisms in foods. The widespread use of plastic materials (with low oxygen permeability) for packaging has been discussed in recent years. Vacuum packaging prolongs the shelf-life of various products but does not offer protection against growth of all food-borne pathogens.

Combined effect of preservation methods

The preserving effect of high and low temperatures, low pH, low water activity, irradiation, and curing salts is increased when these act together, as is very often the case in food preservation. The combined effect may be additive or there may be interaction producing a greater than additive total effect. These combined effects are difficult to predict quantitatively because of the complexity of the required experiments. Even in the case of cured meats where the combined effect of different treatments (each used at a subinhibitory level) is crucial, it is not possible to predict accurately the minimum changes required to ensure safety if any part of the treatment is reduced.

Influence of food habits

Microbiological hazards tend to be reduced by certain food habits, such as:

(1) Pasteurization or boiling of milk. In many tropical and subtropical countries, milk is boiled before consumption, thus reducing the risk of milk-borne disease. Where pasteurization can be enforced, the effectiveness of the treatment must be carefully and continuously controlled. For small and rural communities, vat pasteurization is recommended in the initial stages. Modern methods of pasteurization (HTST, high temperature, short time; and UHT, ultra-high temperature) should be used in urban areas.

(2) Use of fermented milk. Fermented milk is a common food in certain parts of Asia and in central and southern Europe. The concentration of lactic acid in fermented milks is sufficiently high to kill or inhibit the growth of salmonellae, shigellae, and other food-poisoning organisms.

(3) Prolonged cooking of foods. Except when a heat-stable toxin is present, food that is adequately cooked and eaten while hot is safe. After cooking, prolonged storage without refrigeration must be avoided because heat-activated spores of C. perfringens and B. cereus may germinate and multiply.

(4) Vegetarianism. As meat, meat products, fish, and eggs are important media for food-poisoning organisms, the omission of these products from diets diminishes the risk of food-borne disease. However, the risk of infection with shigellae, E. coli, parasites, and other intestinal pathogens originating from vegetable foods remains.

Importance of health education in food hygiene

Preventive measures in all countries should include health education to discourage unhygienic food habits. Health education should start in the schools. Adult education may be provided in maternal and child health centres and teacher training colleges, as well as by mobile teams, radio and television broadcasting, and other means of mass communication.

Travellers, particularly those going to countries with a low standard of hygiene, should be given information on the precautions to be taken. The inclusion of such information in travel brochures and similar literature, as is done by some travel agencies, should be standard practice; this information could be combined with details about vaccination requirements. This matter is discussed with special reference to air travel in the second edition of Guide to hygiene and sanitation in aviation.[2]

General measures for controlling food-borne microbiological hazards include the sanitary production of raw materials, cleaning and disinfection of food processing plants, and hygienic practices by personnel, especially when handling food. These measures are described in most reference works on food hygiene and in the Joint FAO/WHO Food Standards Programme code of practice in food hygiene, which is now under revision.[3]

2BAILEY, J. Guide to hygiene and sanitation in aviation. Second edition. Geneva, World Health Organization (in press).

[3]CODEX ALIMENTARIUS COMMISSION. Recommended international code of practice: General principles of food hygine. Rome, FAO and WHO, 1969 (Ref. No. CAC/RCP 1-1969).

ST JOHN'S MEDICAL COLLEGE AND HOSPITAL, BANGALORE

ROSS INSTITUTE UNIT OF OCCUPATIONAL HEALTH

CERTIFICATE COURSE IN FOOD HYGIENE AND THE HANDLING OF FOOD

EXAMINATION SYLLABUS

1. Making food safe

The natural history of food. Source. Transport. Treatment. Storage.
Preparation.
Serving.
Waste Disposal.
Monitoring.
Aims.

2. Introduction to Bacteriology

Nature of bacteria and their recovery from man and identification.
Bacterial diseases.
Sources of infection. The spread of infection.

3. Food Poisoning

Types of "incident".
Chemical, vegetable and bacterial food poisoning. Needs of bacteria, and types causing food poisoning. Their methods of spread.
The body's defences against food poisoning and food borne disease.
Natural immunity, immunisation. Defences in acute infections.
The prevention of food poisoning and factors which encourage its spread.
Foods which commonly cause food poisoning and those which rarely do so.

4. Practical Control of Bacterial Food Poisoning

Consideration of the sources and control of Salmonellae, Clostridium Welchii, Clostridium Botulinum, Baccilus Cereus and Staphylococci.

5. Bacterial Food Poisoning (continued)

The incidence of causative organisms.
The investigation of an outbreak of food poisoning.
The law relating to food hygiene and the role of the Environmental Health Officer.
Possible future legal controls.
The inter-related agencies concerned with the control of food.

6. Examples of Outbreaks of Food Poisoning and Food Borne Diseases

Examples of Salmonella, Staphylococci, Clostridial and Bacillus Cereus food poisoning outbreaks. Viruses.
Enteric Fever. Brucellosis. Tuberculosis. Cholera.
The Dysentries. Parasitic Worms.

NOTES FOR GUIDANCE OF STUDENTS

EXAMINATION SYLLABUS

This covers the subjects on which questions will be asked in both oral and written examinations. It is of course necessary for the student to show that he or she has sufficient knowledge of the subjects to obtain a pass. The following points should give some guidance on the level of knowledge required for each subject covered by the syllabus. The student should have enough knowledge to deal confidently with all the following points and questions:-

1. The Digestive Process

a) What is food, what are the component parts? Students should be able to give examples of carbohydrates, proteins and fats and the functions they perform in the human body. Also examples and functions of minerals and vitamins.

b) What happens to food when it is consumed? What chemical processes take place and where in the body do they occur?

c) Students should be able to re-produce the drawing of the digestive system as shown on page 5 of the lecture notes.

d) What is peristalsis and what happens in the body when vomiting and diarrhoea occurs?

2. Food Poisoning and Food Borne Diseases and their Prevention

a) What is food poisoning and what different types of outbreaks occur?

What is toxin, extoxin and endotoxin?

b) How can chemical, vegetable or bacterial food poisoning be caused? The student must be able to give examples of each type of poisoning.

c) In bacterial food poisoning, what do germs need to grow and multiply?

d) What are the symptoms in human beings of the different types of bacterial food poisoning and how are these different types spread?

e) How can the different types of food poisoning be prevented? e.g. in looking at the problem from the point of view of preventing contamination of food, premises and food handlers.

f) Typhoid, paratyphoid, brucellosis, tuberculosis and dysentary and trichinosis are food borne diseases. How is each disease passed on to food and how dangerous are these diseases?

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3. Bacteriology

a) What do you understand by terms such as;- micro-organism, pathogen, bacilli, cocci, colony, vibrio, spore?

b) Where are bacteria found, how do they live and how are they destroyed?

4. Transmission of infection

a) How are food poisoning organisms actually passed on to the food from the sources of contamination? e.g. From person to food, from rodent to food, from slaughterhouse floor surface to food?

b) What are convalescent and healthy carriers?

c) What are the environmental sources of food contamination and what diseases can be caused by them? e.g. What food poisoning organisms can orginate from the soil?

d) How widespread is food poisoning? Is the number of cases increasing or decreasing? Are there any new types of food poisoning being experienced? Has, for example, the increase in size of the broiler chicken industry any significance in food poisoning patterns?

e) Has the change in public eating habits over the years affected the number of food poisoning cases?

5. Investigation of an outbreak of food poisoning or food borne disease

a) What do you understand by "high risk" food, bacteriological analysis of food and faeces specimens, exclusion from work, incubation period and onset of symptoms?

b) Students must know the roles played by the MOH and the Health Inspector in the investigation of food poisoning cases.

6. The law relating to food hygiene

Detailed knowledge of the Food Hygiene Regulations, Milk & Dairies Regulations and Food and Drugs Act etc. is not required but students must know the following:-

a) Responsibility for inspection of food premises, stalls and vehicles of the Health Inspector and what this Officer's general powers are.

b) Responsibility of MOH relating to notification and investigation of food poisoning and food borne disease.

c) Responsibility of the employees in food premises regarding food hygiene practices and notification of food poisoning and food borne diseases.

7. The Protection of Food

a) Why is hand washing particularly important after use of the W.C. and after coughing or sneezing?

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b) What is cross contamination, and how many forms can it take in passing food poisoning from a contaminated source to a healthy human being?

c) What water temperatures are effective for:-

i washing food room surfaces and equipment surfaces
ii sterilising food room surfaces and equipment surfaces?

d) Students must be able roughly to describe a standard type of washing machine used in a large catering kitchen, and what the correct water temperatures should be.

e) What dangers-bacterial and otherwise, arise from infestations of rats, mice, flies, wasps and cockroaches in food premises? What dangers can arise from the presence of domestic pets or birds?

f) What preventive measures can be taken to keep infestations out of food premises, when new premises are constructed, or where existing premises have been cleared of an infestation?

g) Students should have some knowledge of the materials used in the construction of food premises and particularly the surface finishes of walls, ceilings and floors in food rooms. Surface types of preparation tables, chopping blocks and cold storage rooms should also be known.

h) What is cooking, pasteurisation and sterilisation of food? What significance does pasteurisation have as regards milk, ice-cream and liquid eggs? What basically happens in the canning of food?

i) What are the dangers associated with re-heating of foods which have been cooked? What re-heating temperatures are satisfactory and what other conditions should apply in making re-heated foods acceptable?

j) Why must food awaiting immediate consumption in catering premises be kept either under 50°F or above 145°F?

k) In which foods is there bacterial growth which is likely to cause food poisoning? What types of common foods are hardly ever associated with bacterial food poisoning, and why?

l) At what temperature does a domestic refrigerator, a deep freeze and an ice-cream conservator normally operate?

What happens when food, contaminated with bacteria, is placed in a domestic refrigerator or deep freeze?

What should a housewife do to maintain properly a domestic refrigerator, and to obtain the maximum benefit from it?

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7. The Protection of Food

The transmission of bacteria to food.
Personal hygiene.
Cross contamination.
Cleaning surface and equipment.
The design of equipment and premises.
Infestation.
The destruction of germs in food.
The prevention of bacterial multiplication, including refrigeration.

8. Health Education

Definition. Principles. Problems of Health Education.
Methods.
Evaluation.

ST JOHN'S MEDICAL COLLEGE AND HOSPITAL, BANGALORE 560034

CERTIFICATE COURSE IN FOOD HYGIENE AND HANDLING OF FOOD (CFH)

to & to

Introduction

The St John's Medical College is instituting special courses leading to the Certificate in Food Hygiene and Handling of Food. The course will be conducted in collaboration with the Royal Institute of Public Health & Hygiene, London, which has done pioneering work in such courses. Certificates issued at the termination of the course will be of two types--one for participating in the Course, which will be given to all candidates and the other given to those candidates only who come out successful at the Certificate Examination in Food Hygiene and Handling of Food of the Royal Institute of Public Health & Hygiene.

Objectives

1. To highlight the importance of ensuring the safety and wholesomeness of food at all stages from its growth and production until its final consumption
2. To instruct on the causes, consequences and prevention of infections transmitted through food
3. To make aware the legal provisions for ensuring safety of food
4. To highlight the causes, effects and prevention of food-poisoning
5. To impart knowledge of the various measures employed in the protection and preservation of food stuffs
6. To obtain improvement in the handling and distribution of food through persuasion, consent and Health Education of the managements and their staff

Course components: As per attached syllabus

Fees

(a) Tuition fee: Rs.150/- per candidate (payable by all candidates participating in the course)

(b) Examination Fee: Rs.100/- per candidate for the Certificate Examination in Food Hygiene and the Handling of Food of the Royal Institute of Public Health & Hygiene, London, (payable by those candidates who sit for the Certificate Examination. This amount has to be remitted to the Royal Institute of Public Health & Hygiene by St John's Medical College, on behalf of the candidate)

p.t.o.

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Entry to examination: All candidates must have attended the approved course full-time, before taking the examination.

Eligibility: These courses are open to restaurant managers, catering administrators, canteen managers, food and beverage managers, area managers/supervisors and kitchen superintendents.

Venue: St John's Medical College, Bangalore

Faculty: The faculty of the Departments of St John's Medical College and Hospitals, Medical Officer of Health of Bangalore City Corporation, Deputy Director of Public Health Institute of Karnataka Government and Chief Medical Officers of Factories, will participate in the teaching.

Duration of the Course: 2 weeks (16 hours)

These classes will be conducted between 3.00 pm & 5.00 pm from Monday through Thursday for two weeks to suit the convenience of managers and prevent dislocation of their work. The course will terminate with an examination (theory and oral) for the award of the Certificates by St John's Medical College and Royal Institute of Public Health & Hygiene.

Course capacity: 25

Transport: For trips between college and other institutions for instructional purposes, transport will be provided by St John's Medical College.

Library facilities: The course participants will be given temporary loan cards for reference in the St John's Medical College Library during the period of the course.

Associateship of Royal Institute of Public Health & Hygiene

Successful candidates are eligible to apply for the Associateship of Royal Institute of Public Health & Hygiene, after payment of entrance and annual subscription fees. This entitles them to receive the Journal on Health and Hygiene, published by the Royal Institute of Public Health, London.

Programme Director Director of Rural Health Services and Training Programmes
St John's Medical College & Hospital
Bangalore 560034

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APPLICATION FORM FOR CERTIFICATE COURSE IN FOOD HYGIENE AND THE HANDLING OF FOOD (CFH-)

CONDUCTED BY ST JOHN'S MEDICAL COLLEGE & HOSPITAL, BANGALORE IN COLLABORATION WITH THE ROYAL INSTITUTE OF PUBLIC HEALTH & HYGIENE, LONDON

to & to

Date:

The Dean
St John's Medical College
Bangalore 560034

Dear Sir,

I hereby request that I may be enrolled as a participant in the Certificate Course in Food Hygiene and the Handling of Food being organized by St John's Medical College during the period _____to_____&_____to_____.

Please find enclosed a draft for Rs.150/- drawn in favour of Dean, St John's Medical College, toward tuition fees.

Yours faithfully,

Name in full:

Address:

Qualification: Age: Sex: Male/Female

Present appointment (period of service as Manager/Catering Administrator/ Supervisor in Catering Establishments)

Details of previous training received (In the field of Processing, Distribution and Sale of Food including Food Hygiene and Handling of Food)

Indicate special areas of interest in the subject of Food Hygiene and Handling of Food:

P.T.O.

Note: Participants are requested to bring with them blue prints/ sketches of the location, size and design of their premises where food is handled including list of equipments, furniture and utensils used for cooking, storage, serving and washing. These and future plans could be discussed by participants, including their individual hotel problems related to Food Hygiene, with faculty members and themselves, resulting in an interaction of ideas with benefit to all concerned.

Signature of sponsoring authority, if any, with address

FOOD HANDLERS

Food sanitation rests directly upon the state of personal hygiene and habits of the personnel working in the food establishements. Proper handling of foods, utensils and dishes together with emphasis upon the necessity for good personal hygiene are of great importance. The infections which are likely to be transmitted by the food handlers are diarrhoeas, dysenteries, typhoid and para-typhoid fevers, entero-virus, viral hepatitis, protozoal cysts, eggs of helminths, strepto and staphylococcal infections, and salmonellosis.

The first essential is to have a complete medical examination carried out of all food handlers at the time of employment. Any person with a history of typhoid fever, diphtheria, chronic dysentery, tuberculosis or any other communicable disease should not be employed. Persons with wounds, otitis media or skin infections should not be permitted to handle food or utensils. The day to day health appraisal of the food handlers is also equally important; those who are ill should be excluded from food handling. Iti is also important that any illness which occurs in a food handler's family should at once be notified.

Education of food handlers in matters of personal hygiene, food handling, utensil, dish-washing, and insect and rodent control is the best means of promoting food hygiene. Many of the food handlers have little educational background, Certain aspects of personal hygiene are therefore required to be continually impressed upon them: (a) Hands: The hands should be clean at all times. Hands should be scrubbed and washed. with soap and water immediately after visiting a lavatory and as often as necessary at other times. Finger nails should be kept trimmed and free from dirt. (b) Hair: Head coverings should be provided, particularly in the case of females to prevent loose hairs obtaining entrance to food-stuffs. (c) Overalls: Clean white overalls should be worn by all food handlers. (d) Habits: Coughing and sneezing in the vicinity of food, licking the fingers before picking up an article of food, smoking in food premises are to be avoided.

/ or scratching any part of the

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SOURCE: PREVENTIVE AND SOCIAL MEDICINE

by

J.E. PARK

K. PARK

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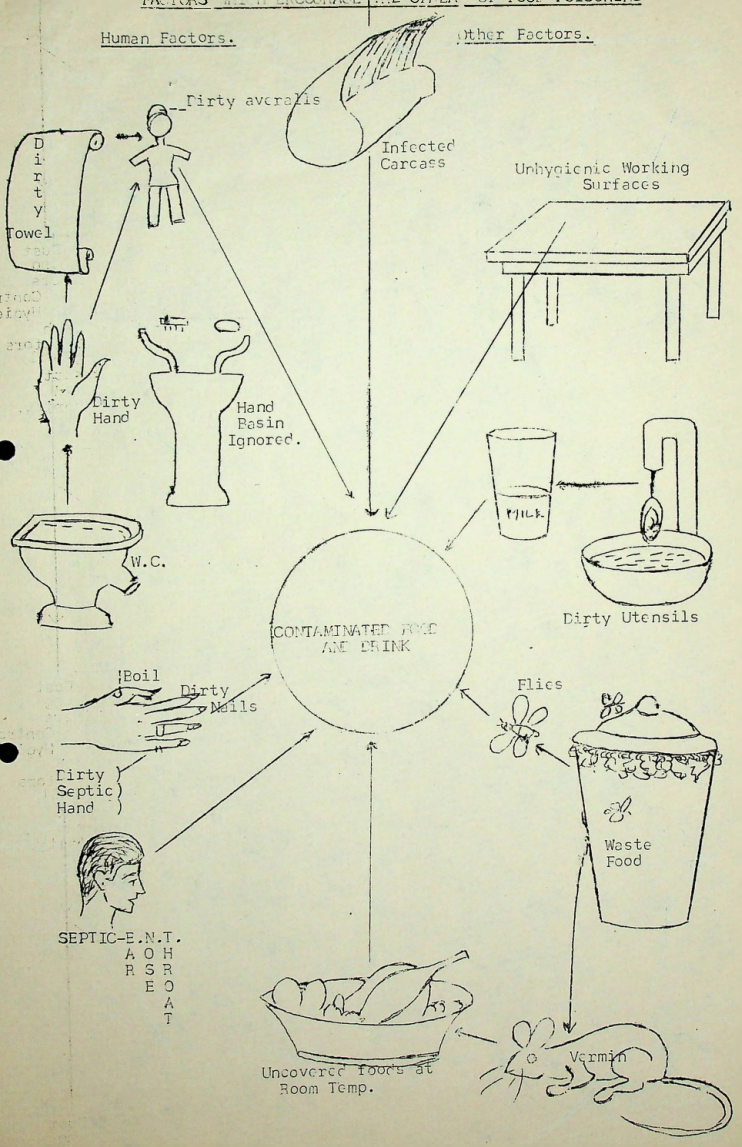
FACTORS WHICH ENCOURAGE THE SPREAD OF FOOD POISONING



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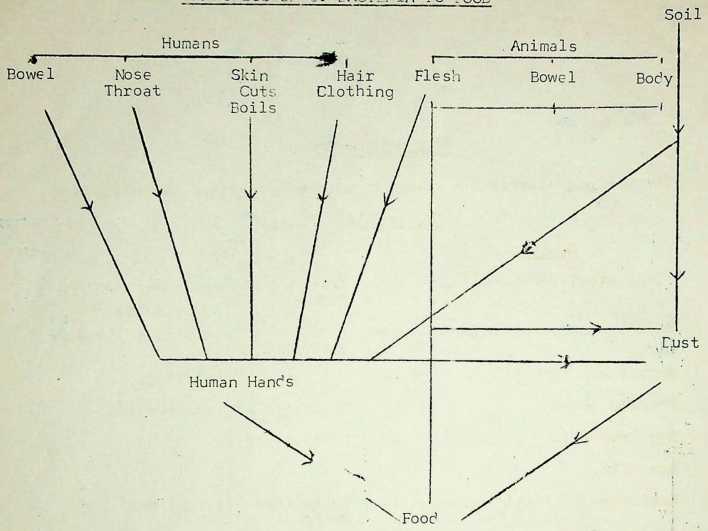
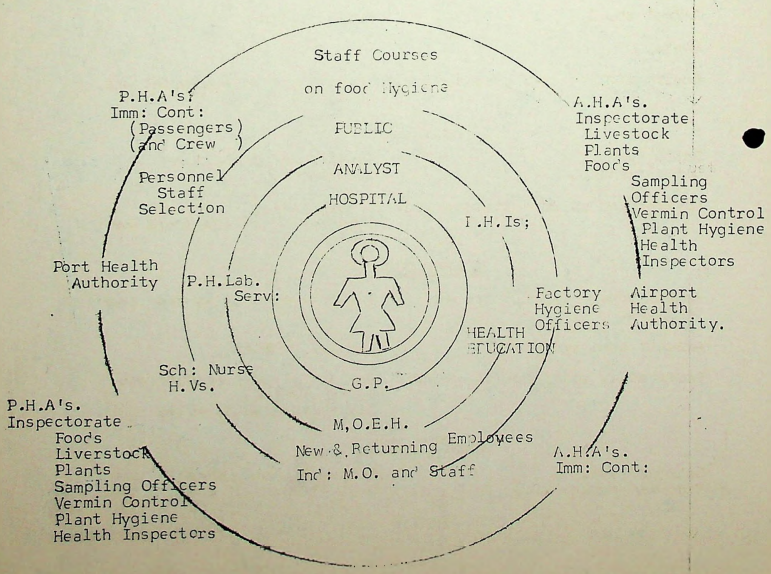


INTER-RELATED AGENCIES CONCERNED WITH THE CONTROL OF CONTROL OF FOOD



FOOD POISONING

The various sources and controls may be summarized as follows:

SALMONELLAE

Source	Control
Human stool and hand.	Personal hygiene and care in handling food.
Animal stool, coat, hooves, paws.	Farm and slaughterhouse hygiene. Feeding stuffs.
Animal meat anf offal.	Hygiene of production.
Feeding meals.	Treatment to render safe.
Egg Products.	Refrigeration.
Raw milk.	
Environment of food preparation.	Cleanliness of equipment and surfaces.

CL. WELCHI

Human stool and hand.	Cooking and re-heating techniques.
Animal stool	Refrigeration.
Meat.	
Environment of food preparation.	Cleanliness of equipment and surfaces.

B. CEREUS

Soil, dust, Cereals(rice).	Cooking and re-heating techniques.
Environment of food preparation.	Refrigeration Cleanliness of equipment and surfaces.

STAPHYLOCOCCI

Human; nose, throat, hand and lesions.	Personal hygiene by food handlers.
Animal; cows and goats.	Care of Mastitis.
Foodstuffs; milk, cream, cheese.	Hygiene of milk production. Refrigeration. Pasteurisation of milk.

CL.BOTULINUM

Soil and mud. Fish and vegetables.	Processing and cooking techniques.

Wear clean clothing and be clean.

Keep the lid on the dustbin.

Keep food clean, covered and either cool or piping hot.

Remember the law requires clean, fully equipped, well lit and airy conditions for food preparation.

Remember smoking in a food room is illegal and dangerous. Never cough or sneeze over food.

Keep your hands off food as far as possible. Keep food utensils clean.

"Clean as you go", in food rooms.

Tell your supervisor at once of any skin, nose, throat or bowel trouble.

Stack washed and rinsed crockery and pans to drain. If you use drying cloths be sure they are clean.

Reheated leftovers must be made really hot right through. Do the same with ready packed foods intended to be eaten hot.

Use clean containers in your home. Use your refrigerator properly. If in doubt, find out.

Buy only from clean places. Get the food home clean.

Wash your hands always before preparing food, always after using the W.C. See your children do too.

Keep family foods away from food for pets. Use separate utensils and crockery.

Cover cuts and sores with waterproof dressings. If you are not well with no one to take your place in the kitchen then be extra careful about personal cleanliness.

Keep working surfaces clean. Use really hot, soapy water. A wipe with a dish cloth is not enough.

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THE LOCATION AND DESIGN OF PREMISES, EQUIPMENT, AND UTENSILS

Premises:

There are basic similarities in the construction of all premises where food is handled. These are found whether the premises be a small home kitchen, a small food shop, or a huge food factory. The use of good construction principles, and of materials that assist the maintenance of cleaning routines, thus become major factors in obtaining practical food hygiene.

Before the 'Example' code is read it is necessary to indicate some general principles in regard to the siting and location of food premises and the correct allocation of working space for food handlers. Badly located sites hinder the proper observance of basic food-hygiene ideals, and as such they should, in theory, be avoided. Where it is not possible to obey this precept, all cleaning and food-handling routines should be carefully worked out to compensate for site and location difficulties. Adequate water supplies, lighting services, and ventilation must always be available. The immediate surroundings should be examined for the presence of noxious trades and practices. An unpleasant smell is not so important as whether the air is charged with smoke or other dirty particles, or whether the surroundings contain potential or actual breeding-grounds for rats or harmful insects.

If prospective premises form part of a large building the location of the water supply and other common services should be examined; and it should be ascertained whether the sanitary conveniences and wash basins to be used by the staff are conveniently sited and adequate in number. Attention should be given to the facilities for handling and storing foodstuffs and to the routes by which the foods reach the establishment and the refuse is removed. The inward route, at least, should be under the trader's own control; dark and potentially dirty passages and alleyways should never be used as food rooms.

Underground food rooms present special difficulties, It is important that their windows should not open on to areas or forecourts so narrow that dirt of noxious matter can be kicked, thrown, dropped, or blown into uncleanable recesses or even on to the food. Underground premises may be liable to flooding and drainage backflow, and they also need special ventilation and lighting. Premises where food is stored need to be cool and dry.

All food-handling or service premises should be extensive enough to allow all work chores to be carried out without congestion on the lines of work flow. Food handlers should never be crowded at work-tables or have to queue for the use of food-cleaning or washing facilities or facilities for personal hygiene. At the same time the premises should not be so large as to entail unnecessary walking about by workers. Food handlers have been observed to neglect hygienic practices if they involve additional walking, waiting, or working uncomfortably close to a colleague. There must be sufficient table and shelf space to alllow used and unused utensils to be kept apart from each other and from food in course of preparation.

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Food-preparation and washing-up rooms or zones should occupy a space equal to approximately half the sales area, but rather more than this is necessary in very small establishments. Every food establishment should contain a room used solely as a food work room not less than 8ft. (2.43 m.) in height and with a minimum floor area of 100ft.^{2}(9.3 m.2) clear of furniture, fittings, and stored goods. If more than three people are employed in the room there should be an additional 33ft.^{2} (3 m.^{2}) of floor area similarly clear for each person above three in number.

The greater the distance over which food has to be carried, and the more often it has to be handled, the greater the chance of its becoming contaminated. Therefore, the ideal to aim at is to have everything moving forward in orderly progression- from delivery area to sales area.

Temperature and Relative Humidity. As this section proceeds the terms 'cool' and 'dry' will increasingly occur, and it is therefore useful to explain those terms.

Cool is actually coupled with the idea of hot food being piping hot. At first glance that may seem a contradiction in terms, but it is understandable when it is made clear that the object is to keep foods outside the danger range of temperatures 10°-63°C. There is a range of food, such as bread, pastries, etc., that may be within this range with safety. There are other foods which need to be always in sub-zero conditions, such as frozen foods and ice-creams. One of the greatest problems facing the food-hygiene worker is the ready plated meal held until the consumer arrives and kept for this purpose in so-called 'hot' cupboards, which are usually found to operate around 37°C. Plated food so held for 30 minutes has almost become the equivalent of a laboratory culture plate if there is original bacterial contamination of the plated meal. The aim must therefore be to keep food cool or piping hot, in hot cupboards above 63°C.

Relative humidity is the degree of available moisture in the air at any given temperature, and it is evaluated by taking contrasting readings of two thermometers, one kept dry and the other with its bulb covered by a wick immersed in water.

Lay-out. The lay-out should be planned with a clear idea of the purpose of every part of the food premises. A goods entrance, separate from the customer's entrance, is essential for hygienic planning. The most convenient arrangement is for this goods entrance to open from a yard so situated that delivery vans can pull right up to the door of the building. The yard should have an impervious and even surface, a water standpipe, tap and washing-down hose, raised and covered accommodation for refuse bins and swill bins, and adequate drainage. If solid fuel is used the store should be in the yard, and bulk oil fuel should be kept completely separate from any food or utensil store.

Vegetable and Root-drop Storage. If root crops and un-cleaned farm produce are being handled on any food premises they should be stored in a purpose-designed room which should be near the goods delivery point and is cool, dry, well ventilated, and large enough to allow for orderly storage. It is convenient in this room to arrange that water used for washing down drains to a gulley. Thus the room is best planned with and entrance direct from the yard-which will keep some dirt off the rest of the premises. Vegetables require ventilation.

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They should be stored on racks-preferably wire or metal- so arranged that air can circulate freely under and around them. The racks should be high enough off the ground so as not to be readily accessible to vermin. Potatoes and root vegetables should normally be stored in sacks as delivered; but if they have been bagged in wet weather they may be subject to disease, and they should be turned out, dried, and examined. The defective ones should be removed at once. Other fresh vegetables should be used the day they are received. If this is impossible they should be emptied out on to the racks, but new deliveries should not be emptied on top of older ones. Stored vegetables should be inspected frequently and premises should come the dry food store, which should be flyproofed by fixing removable screens over windows and door openings; in addition, the walls should be treated with residual insecticides. The room should be dry, well lit and ventilated, and at least 7 ft. 6 in. (2.3m.) high. This room should be used exclusively as a store, and therefore an internal water supply is not essential, but water for cleaning should be close at hand. Prepacked deep-frozen vegetables received into stock mean that sub-zero holding cabinets must be available. These cabinets should be such as allow for rotation of stock, and have a plainly marked effective loading line above which stock should not be placed. Rooms where food is 'worked' should never be used as thoroughfares to other parts of any building, and it is an advantage to study the processes and 'zone' the areas of floor space allocated to each. This,as a reduction of cleaning problems, is to be preferred against a multiplicity of small work-rooms. Full advantage should always be taken of natural lighting and existing mains services supplies, and the real aim should be to achieve cleanliness and supervision rather than pure design symmetry.

Siting of Equipment. All food equipment should be so placed as to allow room for cleaning around and behind, as well as in front. Where equipment and cupboards and store places are 'built in' the object must be to have them free of un-necessary ornamentation and finished to an even surface with surrounding wall surfaces or floor surfaces to obviate uncleanable ledges and areas.

Personal Hygiene Facilities. Sanitary accommodation must be provided for the staff, and should also be provided for customers. It is usually inconvenient for the same accommodation to be used both by staff and customers, except in quite small establishments. In larger establishments it is more satisfactory to combine the staff conveniences in a group with the staff washrooms and cloakrooms. It is important that the sanitary accommodation available to workers should be readily accessible. Although no general rule can be laid down, no worker should have to go more than thirty steps from the room where he is working to reach sanitary accommodation. The compartment containing the sanitary convenience should be separated from any working room and from the dining-room by an intervening ventilated space and should be wellllit; this point is most important, as otherwise it may not be properly cleaned. There should be separate sanitary accommodation for each sex, with separate approaches.

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There should be fully equipped wash-hand basins within any compartment containing sanitary conveniences or close to them, for example, in the intervening space referred to above.

The basic requirements of sanitary accommodation-ready accessibility, good light, and proximity to washing facilities-can be fulfilled in many different ways; only after consideration of all the circumstances can a decision be made on whether the provision in a particular instance is suitable and sufficient.

Where there is no water supply or when a water-carriage sewage-disposal system cannot be used for other reasons-for example at fair-grounds or at remote tourist centres-some form of chemical closet is needed. Whichever type is used should be fitted with a cover or otherwise constructed so that the contents are protected from flies. Care must be exercised to see that the equipment is kept as clean as possible. It should be situated as far from the food room as reasonable, and it should have hand-washing facilities adjacent.

It is never impossible to provide hot water, soap, nail brushes, and towels. Wall-cabinet roller towels which present each user with a fresh surface or, alternatively, paper towels for single use are preferable. Electric hot-air hand driers are also available.

Water Supply and Hot-water Apparatus. Ample and immediately available supplies of both hot and cold running water are essential. Where the food establishment occupies part of a building, it is desirable for it to have its own independent hot-water supply. All water used for food preparation and cooking, for drinking, for washing-up, and for cleaning utensils and surfaces with which food or utensils may come in contact should be public-supply-main water or of equivalent quality. Rain-water, river water, well water, and water from other non-purified sources should be used only for such outdoor purposes as washing down yards and swilling out dust-bins, except on the advice of the local health department.

It is not advisable to compromize over water taps and piping. All sinks, wash-hand basins, and other fixed receptacles should receive their water supplies direct from taps appropriately placed. For internal piping copper is best; and where the course of the piping is not dictated either by the existing mains and tanks or by the siting of sinks and other appliances, it is worth while to give some thought to its arrangements. Pipes tend to collect dust, and horizontal or sloping overhead pipes are not only difficult to clean but may also accumulate moisture, which drips on to the food.

Whenever possible, pipes should either be run outside the kitchen (for example, under the floor or above the ceiling) or else they should be sunk into the wall. When they must come into the open they should for preference run vertically rather than horizontally, bringing the water straight down to the tap from the overhead pipes or straight up from the supply beneath the floor. In any case, they should be held at least 2 or 3 in. (5-8 cm.) away from the wall by pipe clips, so that they can be cleaned all round and do not create crevices in which insects or vermin may breed. If cold service pipes have to be run at high level they should be lagged to prevent condensation and the dripping which results.

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Hot-water pipes should be lagged to conserve heat and so reduce the consumption of fuel. The methods of lagging pipes and storage tanks is important, as cases have occurred of mice burrowing into soft lagging and nesting in it. Pipes should be protected with a fine wire mesh to prevent this, and the lagging round tanks should be enclosed with materials which cannot be gnawed.

Hot Water. Many water-heating systems produce water which, although hotter than the 43.5°C., which is about the most that normal human hands can stand, is never as hot as the 77°C. necessary for the proper sterilizing rinse of cockery, cutlery, and utensils. Such systems are satisfactory enough in smaller establishments which can carry out the sterilizing by steam or by water heated as required for sterilization purposes. Larger establishments which have a constant demand for washing-up water 77°C. should be careful to ensure that their systems can provide water at 77°C.

Wash Basins. Workers should be encouraged to wash their hands both after visiting the sanitary convenience and whenever necessary during the course of work. They should not use the wash-up sinks for this purpose, as this may infect the sinks with germs which can later find their way on to food. Moreover, the sinks will usually not be free at the time when hands need to be washed. Accordingly, wash-hand basins with hot and cold water laid on, and with good lighting overhead, should be provided in or adjoining the food room and also in immediate proximity to the sanitary conveniences.

Sinks. Sinks and draining boards should have a smooth hard, even surface, and are best constructed of porcelain-finish fireclay, non-corrosive metal (for example stainless steel), virteous enamel or plastic, with one-piece tops welded to the sinks and draining boards harbour germs in the cracks and joints Aluminium sinks scratch easily, are not robust, and are difficult to keep clean.

Sinks used for washing up should be small enough to ensure frequent replenishing with hot water but large enough to take the largest dishes comfortably. For washing pots and pans galvanized-iron sinks are suitable, as they are robust and withstand heavy cleaning.

It is desirable to have the sink fitted with a spray hose for washing down the sink and draining boards, and with a removable strainer in the waste pipe for trapping crumbs, tea-leaves, etc. A built-in, but removable refuse container is also an advantage.

The number of sinks required will necessarily depend largely on the trade. In general, it may be said that fish should never be washed in the same sink as vegetables, and a separate sink should therefore be reserved for fish. The meat-preparation room also needs a separate sink. All these sinks should have hot and cold water laid on.

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Drains: Drains should be adequate to remove all waste water without risk of flooding. Normal-sized drains are 4 in. (10.2 cm.) in diameter. These are large enough to deal with a considerable flow of drainage, and may be suitable for some food establishments; but many establishments will need 6-in. (12.7 cm.) drain pipes. Grease traps are valuable because they prevent grease from congealing in the drain pipes. The grease tray should be removed regularly and washed out.

Many establishments have channelling covered with steel grids round the grease-producing areas. The tops of these grids and the channels themselves are likely to become dirt-traps unless they are very regularly cleaned. They are difficult to clean. Drainage should be adequate to remove all waste water without risk of 'pooling' at gully traps.

Source: The Theory & Practice of Public Health

By

W. Hobson

ms*/29/1/80/

INCIDENCE OF FOOD POISONING AND FOOD HYGIENE LEGISLATION:

The primary aim of food hygiene is to prevent food poisoning and, other food borne diseases. Statistics available in our country on the incidence of these diseases is unfortunately meagre, although the morbidity due to the same is high, Further,

Food Hygiene Legislation in most States is inadequate, except for the Prevention of Food Adulteration Act of 1976.

Accurate data of such outbreaks including Food Hygiene Legislation in the United Kingdom, are available, which are shown below, to serve as a guide.

Synopsis;

(a) The incidence of Food Poisoning in the population
(b) The investigation of an outbreak of Food poisoning.
(c) The change in eating habits of the population.
(d) A brief history of Food Hygiene legislation (see the Appendix).

A. THE INCIDENCE OF FOOD POISONING:

The size of the problem

It has been estimated that disease of all types in the United Kingdom may account for an average loss of up to two weeks work per person per year. This does not include illnesses which result from industrial accidents or industrial disease.

The incidence of most types of infectious disease has shown a marked decrease in recent years. There are, however, two notable exceptions; one is bronchitis and the other is various forms of food poisoning.

Outbreaks of Food Poisoning:

It will be seen (Table A) that there was a fall in incidents of food poisoning in England and Wales between 1970 and 1972, and then a steady increase until 1975.

TABLE A

OUTBREAKS OF FOOD POISONING

Year	General Outbreaks Incidents	Family Outbreaks Incidents	Sporadic Cases	Total Cases
1970	175	708	3,358	8,088
1971	164	671	2,977	6,910
1972	138	510	2,483	5,958
1973	147	576	2,918	6,763
1974	184	617	2,963	7,295
1975	230	765	4,144	10,936

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CAUSATIVE ORGANISMS RESPONSIBLE FOR OUTBREAKS OF FOOD POISONING:

The causative organisms responsible for outbreaks of food poisoning during 1975 are set out in Table B below. The previous year's figures (for 1974) are shown in brackets.

TABLE -- B (FOOD POISONING IN ENGLAND-1975)

Causative Agent	General Incidents	Outbreaks cases	Family Incidents	Outbreaks Cases	Sporadic Cases	Total Incidents Sporadic Cases	Total Cases
Salmonella	42	594	229	589	1107	1378	2290
Typhimurium	(40)	(292)	(142)	(411)	(787)	(969)	(1490)
Other	97	1910	397	1067	2262	2756	5299
Salmonella	(55)	(860)	(210)	(534)	(1192)	(1457)	(2586)
Clostridium	41	1441	11	95	35	89	1571
Welchii	(30)	(890)	(10)	(36)	(19)	(59)	(943)
Staphylococcus	17	256	4	9	35	56	300
Aureus	(6)	(96)	(4)	(14)	(31)	(41)	(131)
Other Causes	7	41	16	39	69	86	143
	(11)	(298)	(13)	(69)	(102)	(126)	(469)
Causes unknown	16	453	108	292	642	776	1393
	(22)	(421)	(138)	(421)	(832)	(1012)	(1674)
Totals	219	4695	765	2097	4144	5139	11,936
	(114)	(2847)	(517)	(1485)	(2963)	(3664)	(7245)

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B. INVESTIGATION OF AN OUTBREAKS OF FOOD POISONING:

During an outbreak of food poisoning all persons suffering from diarrhoea and vomiting are traced and questioned about food they have recently eaten. Particular attention is paid to any food substance which has been eaten by the majority of the sufferers within the preceding 12 to 48 hours. The remains of any suspected food are recovered if possible, and they are also subjected to bacteriological examination. Experience has shown that certain "high risk" foods always warrant special attention; these include processed meats, egg and milk products. Where possible faecal (stool) specimens obtained from everyone who has symptoms of food poisoning are also bacteriologically examined. The bacteriological analysis of both the food substance and the stool specimens are compared. The type of the bacteria and their possible source is noted. When the organism in the food and the stools is the same, stool specimens should be obtained from all the persons who have helped to prepare the particular food substance contaminated. The investigation involves the bacteriological examination of the premises as well as the staff, canteens, food shops and food preparation areas. Anyone suffering from diarrhoea or vomiting may be excluded from work as a food handler until the local Medical Officer for Environmental Health considers it is safe to allow him to resume. Investigation of an outbreak of food poisoning is carried out by local authority Public Health Officers. These officers study the hygienic techniques employed by the food handlers, methods of food storage, methods of washing up, methods of disposal of waste food, the method employed to prevent food substances from becoming contaminated by vermin and flies, as well as the general state of repair and cleanliness of the food premises. Failure to find a bacteriological basis for an outbreak of food poisoning focuses the need to evaluate possible chemical causes arising from production techniques.

C. THE CHANGE IN EATING HABITS OF THE POPULATION:

Formerly general outbreaks of food poisoning tended to occur in institutions. Since the first and second World Wars, however, there has been an increase in communal feeding in Europe, and at the same time there has been a considerable increase in the bulk manufacture of food. Food hygiene education has resulted in a much increased appreciation and awareness of the need to prevent the bacterial contamination of food substances. Detailed and far reaching legislation has been introduced to provide suitable safeguards in the preparation and storage of food. Today, except at the weekends, fewer people eat their mid-day meal at home. During the week, mid-day meals are often eaten in canteens, restaurants, snack-bars, public houses, etc.

Many meals are now prepared at local central depots for the Armed Services, hospitals, the School Meals Service, the Welfare Service (i.e. "Meals on Wheels" for the elderly), etc. The cook-freeze operation in mass catering is now widespread.

The large-scale movement of holiday populations during the summer months imposes an extra strain on catering services in restaurants, in railway stations, coach stations, airports and aboard ships, so that good hygiene may be prejudiced. During the summer there is an increased tendency to use pre-packed food substances. Many of these are eaten by customers who may be caravanning or picnicking. In such circumstances the consumer usually gives very little thought to the safe storage of the food which may be left too long in warm, moist conditions, ideal for the multiplication of food poisoning bacteria.

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The sale of pre-packed food substances from shops and supermarkets calls for a high degree of quality control at every stage of production, from the food factory to the consumer.

Finally, casual labour is often employed in the food industry during the summer holidays. Such unskilled and untrained staff require very close supervision when engaged in food preparation since they do not normally know the basic principles of food hygiene.

Table C shows the probable location and type of organism causing general outbreaks of food poisoning in England and Wales in 1966. The micro-organisms most frequently found were salmonellae, Cl. welchii and staphylococci. Although these figures are somewhat old, the distribution details are still relevant.

TABLE-C

GENERAL OUTBREAKS OF FOOD POISONING

	Salmonellae	Staphylococci	Cl. Welchii	Chemical	Not discovered	All Agents
Hospitals ..	64	-	2	-	-	66
Restaurants, Clubs, Hotels, Holiday Camps	14	4	6	-	12	36
Canteens	-	-	18	1	7	26
Institutions	11	3	6	-	5	25
Schools	3	-	8	-	10	21
Shops:						
Butchers	3	2	-	-	-	
Chicken Barbeque	5	-	-	-	-	
Fish	-	-	-	-	1	14
Others	2	1	-	-	-	
Farms	11	-	-	-	-	11
Dinners, Dances Receptions	2	1	-	-	5	
Infected Abroad	3	-	-	-	1	4
Others and Not Stated	19	3	3	1	8	34
All Places	137	14	43	2	49	245

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Vernon, Enid (1970) Public Health 84:239

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APPENDIX

BRIEF HISTORY OF THE LAW RELATING TO FOOD HYGIENE

Public Health Act 1848 and 1875.

The Industrial Revolution resulted in large numbers of people moving from rural communities into towns. Living conditions deteriorated and disease of all types was rife. Parliament set up several Royal Commissions to report on "The Sanitary Conditions of the Labouring Population of Great Britain" in 1842-45. The reports revealed extremely poor sanitary conditions which prevailed in most main cities.

The report of these Commissions resulted in the appointment of the first Medical Officer of Health in 1847, followed by the Public Health Act of 1848. This dealt with certain Public Health measures related to the sale of food.

1. Public Health Act, 1875. This dealt with various nuisances and their batement, some of which were indirectly concerned with the production and control of food substances.

2. The Food and Drugs Act, 1938. Section 13 of this Act referred to the standard of cleanliness to be maintained in food premises. The Act was subsequently repealed by the Food and Drugs Act of 1955.

3. The Public Health Act, 1936. Under this Act additional powers were granted to Local Authorities relating to the supervision of food premises.

4. The Food and Drugs Act, 1955. Various Food Hygiene Regulations were made in connection with this Act. Local Authorities were empowered to make certain bye-laws regarding the handling, wrapping and delivery of food substances. The scope of these Regulations made under this Act were briefly as follows:-

General Requirements:

(a) Regulations concerning the cleanliness of equipment

(b) Regulations relating to persons engaged in food handling, i.e. personal cleanliness, the carriage of food, the notification of certain infectious diseases occurring in food handling staff by an employer, to their Local Medical Officer for Environmental Health.

The Medical Officer for Environmental Health was empowered to decide whether such affected persons should be excluded from food handling duties under the Public Health (Infectious Diseases) Regulations 1968.

(c) Regulations relating to premises, i.e. details of water supply, hand washing facilities, lighting, ventilation, the state of cleanliness of premises and the accumulation of refuse, etc.

(d) Regulations relating to the sale of food substances.

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(e) Regulations relating to the transport of meat.

(f) Regulations relating to premises used for the manufacture of "at risk foods", i.e. ice cream, sausages, pickled meats, etc.

Such premises must be registered by the Local Authority under Section 16 of the 1955 Act.

5. The milk and Dairies Regulations, 1959. These Regulations make it obligatory for Dairies, Dairymen, and Milk Distributors to be registered. The Local Authority is empowered to grant licences to persons who sell designated milk (i.e. pasteurised, sterilised, untreated and ultra heat treated).

6. The Food Hygiene (General) Regulations, 1970. Extended the powers given to Local Authorities under the Food and Drugs Act, 1955 with particular reference to the preparation of food as well as the supervision of food handlers and the hygienic transport of meat. Requirements were also incorporated with regard to the preparation of food on ships working in coastal waters.

7. The Food and Drugs (Control of Food Premises) Act, 1976. This gives local authorities powers to take action leading to the closure of food premises where conditions are such as to be dangerous to health.

8. The Food Hygiene (Market Stalls and Delivery Vehicles Regulations, 1966). Under the provisions of the above Regulations, special problems relating to market stalls and delivery vehicles were dealt with. It was considered desirable to separate particular functions from the Provisions in the General Regulations.

9. The Health Services and Public Health Act, 1968. Part III of this Act deals with the notifiable diseases and food poisoning. Every outbreak of food poisoning is now subject to detailed investigation and is fully reported to the D.H.S.S. The Provisions relating to notification procedures for both notifiable disease and food poisoning had previously been set out in the Public Health Act, 1936, and also the Food and Drugs Act, 1955. The 1968 Act repealed the method of notification and set out a new unified procedure for both. It included provision regarding the medical examination of a person suffering from (or believed to be the cause of) a notifiable disease. Part III of this Act(and also Sections 69 and 70 and Part V of the Act together), was brought into force on 1st October 1968, together with a Statutory Instrument consolidating and bringing up to date in one document, existing Statutory Instruments relating to infectious diseases.
The D.H.S.S. sent Local Authorities a comprehensive circular explaining the effects of the provision in this part of the Act. The Circular included a single, complete list of all diseases which are notifiable, either under the Act or under the above mentioned Statutory Instrument.

10. There are certain regulations applied to the import of food substances and the sale of shell fish. There are further regulations relating to the standard of hygiene that is to be maintained in slaughter houses.

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The following Regulations deal with the hygiene standards which are to be observed in the treatment and handling of specific food substances:

(a) Ice Cream (Heat Treatment) Regulations, 1959 and 1963.

(b) Liquid Egg (Pasteurisation) Regulations, 1963.

(c) Imported Food Regulations, 1968.

(d) Meat (Sterilisation) Regulations, 1969.

FUTURE DEVELOPMENTS:

Britain's entry to the E.E.C. has brought major implications in the field of food legislation, both as regards food, subject to intra-Community and Domestic Trade. E.E.C. Directives relating to such foods as poultry meat, meat products, preserved milk and fruit juices cover hygienic and quality standards requiring new legislation in Britain.

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Source: ROYAL INSTITUTE OF PUBLIC HEALTH & HYGIENE
- LONDON.

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STANDING ORDERS FOR KITCHEN AND DINING HALL OF PRIVATE MESS/CANTEENS

a) No one who may be a carrier of typhoid or paratyphoid or suffering from or under treatment for dysentery, diarrhoea or other communicable disease will be employed in any capacity in the kitchen or in handling food. He must be examined and certified as fit by a medical officer before being so employed.

b) An updated nominal roll of all men employed in the kitchen showing the inoculation and vaccination record and the date of medical inspection will be maintained and displayed prominently in the kitchen.

c) Personnel employed in cooking of food will be provided with the authorised special clothing. Aprons will always be worn at work, kept clean and changed and washed when dirty.

d) Running clean water (hot during winter), soap, and a nail brush and a clean towel will be provided in each kitchen. Cooks should keep their nails clipped short and invariably wash their hands before they handle the food and after visits to latrines.

e) No personal clothing, accessories or private property of men employed in the kitchen will be permitted to be kept there; nor will they perform their toilet or washing or drying of their underclothing in the kitchen. Personal clothing on the body will be removed and kept in the place provided for the purpose before overalls are put on.

f) Smoking in the kitchen is prohibited.

g) The Supervisor incharge will be responsible to ensure that there is always a sufficient supply of clean cloth dusters available for drying washed dishes and cooking utensils. The cloth dusters used for handling hot and sooty vessels will be separate and distinct. After the last meal these cloths must be boiled in water containing washing soda and hung up to dry.

h) All pots and pans will be freed from grease, cleaned and dried after the last meal, and placed on a shelf on their sides with their interiors exposed to the air and to view.

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i) The kitchen sinks, tables, meat chopping blocks, cutting-up boards, pastry slabs, mincing machines, knives, forks and spoons and all other utensils will be kept clean when in use and will be thoroughly cleaned after the last meal. All utensils, when not in use, will be kept in the places allocated for them and will be available for inspection at any time.

j) Vegetables and uncut fruits should be first washed with Bleaching Powder (one teaspoon full of Bleaching powder to a gallon of water) before cooking/consumption.

k) Only food which is to be used during the current day will be kept in the kitchen. When not in the process of cooking or in preparation for cooking, it will be protected from flies in flyproofed food safes.

l) Food scraps, vegetable peelings and such like refuse will not be thrown on the floor, but directly deposited in covered refuse bins provided for the purpose.

m) All cutting up of meat and pastry will be done on the cutting up boards and pastry slabs provided for the purpose.

n) Adequate arrangements will be made for the washing, rinsing and sterilising of eating and drinking utensils. The use of Bleaching Powder (one tea spoon full for one gallon of water) is a very safe sterilising medium. This is preferable to Potassium Permanganate (pinky lotion).

o) The bill of fare for the week be displayed in the kitchen.

p) Any defect in the cooking apparatus or in the utensils will be reported at once by the Supervisor incharge to the Manager who will take the necessary steps to have the defects remedied.

q) The floors of kitchen will be scrubbed daily and excess water must be dried up by mopping.

r) The kitchen and dining-hall should be sprayed weekly with a 5 per cent FPT suspension, and with 0.1 per cent pyrethrum solution daily from 1000 hours to 1200 hours and kept closed thereafter until lunch is over.

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(Source: Manual of Health for the Armed Forces - 1964)

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NUTRITIVE VALUE OF SOME COMMON FOODSTUFFS (PER 100 GRAMS

Foodstuffs	Calories	Proteins	Calcium	Iron	Vitamin A	Vitamin B_1 (Thiamine)	Vitamin B_2 (Riboflavine)	Niacin	Vitamin C
		g.	mg.	mg.	I.U.	mg	mg	mg	mg
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
CEREALS:									
Wheat	346	11.8	41	4.9	108	0.45	0.17	5.0	0
Jowar	349	10.4	25	5.8	79	0.37	0.13	2.8	0
Rice (parboiled)	345	6.4	9	4.0	0	0.21	0.05	3.8	0
Rice (handpounded)	346	7.5	13	3.2	4	0.21	0.04	3.9	0
Rice (milled)	345	6.8	10	3.1	0	0.06	0.04	1.9	0
Maize	125	4.7	9	1.1	54	0.11	0.11	0.6	6
Wheat-flour (refined)	348	11.0	10	2.5	43	0.12	0.08	0.9	0
Ragi	328	7.3	344	17.4	70	0.42	0.19	1.1	0
Bajra	361	11.6	42	13.3	220	0.33	0.25	3.2	0
PULES:									
Red gram dhal	335	22.3	73	5.8	220	0.45	0.15	2.6	0
Green gram dhal	348	24.5	75	8.5	83	0.72	0.21	2.4	0
Peas (dry)	315	19.7	75	5.1	66	0.47	0.19	1.9	0
Lentil	343	25.1	69	4.8	450	0.45	0.20	1.5	0
Black gram dhal	347	24.0	154	9.1	64	0.42	0.20	2.0	0
Bengal gram, whole	360	17.1	202	10.2	316	0.30	0.15	2.1	3
Bengal gram, dhal	372	20.8	56	9.1	216	0.48	0.16	2.4	1
Bengal gram roasted	369	22.5	58	9.5	189	0.20	0.16	1.3	0
Kesaridhal (Lathyrus sativus)	345	28.2	90	6.3	120	0.39	0.17	2.9	0
LEAFY VEGETABLES:									
Onion tops	61	4.7	78	-	0	-	-	-	-
Curry leaves	108	6.1	830	7.0	12,600	0.08	0.21	2.3	4
Cauliflower leaves	66	5.9	626	40.0	-	-	-	-	-
Cabbage	27	1.8	9	0.8	2,000	0.06	0.09	6.4	120

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(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Gogu	56	1.7	172	5.0	4,830	0.07	0.39	1.5	20
Tamarind Leaves tender	115	5.8	101	5.2	418	0.24	0.[illegible]7	4.1	3
Ambat chuka	15	1.6	63	8.7	6,1000	0.03	0.06	0.2	12
Amaranth	46	4.0	397	25.5	9,200	0.03	0.30	1.0	99
Mint	48	4.8	200	15.6	2,700	0.05	0.26	0.4	27
Ponnanganni	73	5.0	510	16.7	3,210	-	0.14	1.2	17
Spinach	26	2.0	73	10.9	9,300	0.03	0.26	0.5	28
Drumstick leaves	92	6.7	440	7.0	11,300	0.06	0.05	0.8	220
Fenugreek leaves	49	4.2	395	16.5	3,900	0.04	0.31	0.8	53
Bathua leaves	30	3.7	150	4.2	1,740	0.01	0.14	0.6	35
Bengal gram leaves	97	7.0	340	23.8	978	0.09	0.10	0.6	61
Coriander leaves	44.	3.3	184	18.5	6,918	0.05	0.06	0.8	135
Mustard leaves	34.	4.0	155	16.3	2,622	0.03	-	-	33
Radish leaves	28	3.8	265	3.6	5,295	0.18	0.47	0.8	81
ROOTS AND TUBERS									
Onion	49	1.4	180	0.7	0=	0.08	0.01	0.4	11
Yam	111	1.4	60	1.3	130	0.07	-	0.7	-
Carrot	48	0.9	80	2.2	3,150	0.04	0.02	0.6	3
Sweet potato	120	1.2	20	0.8	10	0.08	0.04	0.7	24
Colocasia	97	3.0	40	1.7	40	0.09	0.03	0.4	0
Knol-khol	92	1.1	70	1.4	-	-	0.01	0.4	11
Potato	97	1.6	10	0.7	40	0.10	0.01	1.2	17
Beet root	43	1.7	200	0.1	0	0.04	0.09	0.4	88
Radish	17	0.7	50	0.4	5	0.06	0.02	0.5	15
Turnip	29	0.5	30	0.4	0	0.04	0.04	0.5	43
Tapioca	157	0.7	0	0.9	-	0.05	0.10	0.3	25
OTHER VEGETABLES:									
Plantain, raw	64	1.4	10	0.6	50	0.05	0.02	0.3	24
Plantain flower	34	1.7	32	1.6	46	0.05	0.02	0.4	16
Plantain stem	42	0.5	10	1.1	0	0.02	0.01	0.2	7

.....3

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Indian Gooseberry (Amla)	58	0.5	50	1.2	15	0.03	0.01	0.2	600
Bittergourd	25	1.6	20	1.8	210	0.07	0.09	0.5	88
Cauliflower	30	2.6	33	1.3	21	0.04	0.10	1.0	56
Cluster beans	60	3.2	130	4.5	330	0.09	0.03	0.6	49
Pumpkin	25	1.4	10	0.7	84	0.06	0.04	0.5	2
Field beans	158	7.4	50	2.6	57	0.34	0.19	0	27
Amaranth stalks	19	0.9	260	1.8	425	0.01	0.18	0	10
Cucumber	13	0.4	10	1.5	0	0.03	0.01	0.2	7
Jack fruit, raw	51	2.6	30	1.7	0	0.05	0.04	0.2	14
Snake-gourd	18	0.5	50	1.1	160	0.04	0.06	0.3	0
French beans	48	3.8	50	1.7	221	0.08	0.06	0.3	14
Ridge gourd	17	0.5	40	1.6	56	0.07	0.01	0.2	5
Ladies fingers	35	1.9	66	1.5	88	0.07	0.10	0.16	13
Mango, raw	44	0.7	10	5.4	150	0.04	0.01	0.2	3
Chillies, green	29	2.9	30	1.2	292	0.19	0.39	0.9	111
Chillies, giant	25	1.3	10	1.2	712	0.55	0.05	0	137
Drumsticks	26	2.5	30	5.3	184	0.05	0.07	0.2	120
Brinjal	24	1.4	18	0.9	124	0.04	0.11	0.9	12
Olabarh cucumber	12	0.2	20	0.7	0	0.03	0.01	0.2	6
Papaya Green	27	0.7	28	0.9	0	0.01	0.01	0.1	12
Tomato green	23	1.9	20	1.8	192	0.07	0.01	0.4	31
NUTS AND OILSEEDS:									
Coconut, dry	662	6,8	400	2.7	0	0.8	0.01	0.6	7
Cashew nut	596	21.2	50	5	100	0.63	0.16	2.1	0
Gingelly seeds	563	18.3	450	10.5	100	1,01	0.34	4.5	0
Ground nut	549	26.7	50	1.6	63	0.90	0.13	14.1	0
FRUITS:									
Plaiain	104	1.1	10	0.5	124	0.05	0.08	0.3	6
Pineapple	46	0.4	20	1.2	30	0.20	0.12	0.1	39

.....p.t.o...4

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Apple	55	0.3	9	1.0	0	0.12	0.03	0.2	2
Orange (loose packed)	53	0.9	50	0.1	326	0.12	0.06	0.3	68
Guava, country	51	0.9	10	1.4	0	0.03	0.03	0.4	212
Cashew fruit	53	0.8	10	0.2	39	0.02	0.05	0.4	180
Tomato, ripe	20	0.9	48	0.4	585	0.12	0.06	6.4	27
Pomegranate	65	1.6	10	0.3	0	0.06	0.10	0.3	14
Lime	59	1.5	90	0.3	26	-	-	-	-
Jack Fruit	88	1.9	20	0.5	292	0.03	0.13	0.4	7
Water-melon	16	0.2	11	7.9	0	0.02	0.04	0.1	1
Papaya, ripe	32	0.6	17	0.5	1,110	0.04	0.25	0.2	57
Mango, ripe	51	0.6	10	0.3	4,800	0.04	0.05	0.3	13
Wood apple	134	7.1	130	0.6	102	0.04	0.17	0.8	3
Sapota	110	0.8	31	0.1	117	-	-	0.1	6
Custard apple	114	1.6	398	0.3	0	0.33	0.17	1.3	16
Apricot (Fresh)	53	1.0	20	2.2	2,160	0.04	0.13	0.6	6
Dates (fresh)	144	1.2	22	-	-	-	-	-	-
Figs	37	1.3	80	1.0	162	0.06	0.05	0.6	5
Grapes (blue variety)	58	0.6	20	0.5	3.0	0.04	0.07	0.2	1
Lemon (citrus)	57	1.0	70	2.3	0.0	0.02	0.01	0.1	39
Lichi	61	1.1	10	0.7	0.0	0.02	0.06	0.4	31
Lime sweet (Musambi)	43	0.8	40	0.7	0.0	-	-	0.0	50
Plums	52	0.7	10	0.6	166	0.04	0.1	0.3	5
Raisins	308	1.8	87	7.7	2.4	0.07	0.19	0.7	1
Seethaphal	104	1.6	17	1.5	0.0	0.33	0.44	1.3	37
MILK AND MILK PRODUCTS:									
Cow's milk	67	3.2	120	0.2	174	0.05	0.19	0.1	2
Buffalo Milk	117	4.3	210	0.2	160	0.04	0,10	0.1	1

.....5

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Breast milk	65	1.1	28	0.1	137	0.02	0.02	-	3
Cheese†	348	24.1	790	2.1	273	-	-	-	-
Curds	60	3.1	149	0.3	102	0.05	0.16	0.1	1
Goat's milk	72	3.3	170	0.3	182	0.05	0.04	0.3	1
OTHER FLESH FOODS:									
Egg, hen	173	13.5	60	2.1	1,200	0.10	0.18	0.1	0
Beef muscle	114	22.6	10	0.8	60	0.15	0.04	6.4	2
Liver, sheep	150	19.3	10	6.3	22,300	0.36	1.70	17.6	17
Mutton	194	18.5	150	2.5	31	0.18	0.27	6.8	-
Pork, muscle	114	18.7	30	2.2	0	0.54	0.09	2.8	2
Egg, duck	181	13.5	70	3.0	1,200	0.12	0.28	0.2	-
Goat meat, muscle	118	21.4	12	-	-	-	-	-	-
Liver, goat	107	20.0	17	-	-	-	-	-	-
MISCELLANEOUS FOODSTUFFS:									
Betel leaves	44	3.1	109	-	9,600	0.07	0.03	0.7	5
Bread	245	7.8	11	1.1	-	0.02	-	0.7	-
Sago	351	0.2	10	1.3	0	0.01	-	0.2	-
Jaggery	383	0.4	80	11.4	0	0.02	-	1.0	0
Sugar	398	0.1	12	-	-	-	-	-	-
Oil or ghee	900	-	-	-	-	-	-	-	-

RAW VEGGIES POSE HEALTH HAZARD

GEETHA RAO
Times News Network

SWEAR by salads? Then read this: Jayashree Kumar (name changed), a bubbly 13-year-old, was doing her homework when suddenly her mind went blank, her eyeballs rolled and her face twitched uncontrollably. Her parents rushed her to hospital where they were told she had neurocysticercosis. The cause — consumption of uncooked or undercooked pork, or unclean raw vegetables in the form of salads.

Dr H V Satish Babu, consultant neurosurgeon, Elbit Diagnostics, Basavanagudi, has patients with the disorder almost every other day, and in all age groups, from the early teens to the elderly. "It affects patients of both sexes equally. Symptoms vary from simple chronic headache to multiple neurological problems like unconsciousness, epilepsy or weakness of the limbs." The root cause of all this is unplanned public health sanitation and unchecked meat dispensation.

Epilepsy is a serious disorder of the central nervous system which results in sudden, violent and involuntary movements in the body along with a host of neurological disorders. These range from an innocuous fever to a brain tumour. Also, accidents, brain haemorrhages and infections.

According to Dr Satish Babu, "Brain infection in the form of cysticercosis is one of the commonest causes of epilepsy, which in turn, occurs because of uncooked pork meat and unclean salads. Vegetables are sometimes grown in low lying areas where the water source is contaminated by the excreta of animals."

The larval stage of the tape worm taenia solium in pigs causes this. Human beings serve as the final host of this parasite. The larval stage enters the human body, and the intestines, into the blood stream and gets lodged in the brain, muscle or eyes.

Vegetables to watch out for are carrots, radish and coriander leaves. The World Health Organisation estimates that throughout the world at least 50 million people are infected by this parasite annually and results in nearly 50,000 deaths annually worldwide.

However, what is heartening is that the disease is not contagious. It is totally curable and rarely if not treated well can lead to a persistent epilepsy disorder.

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FACT FILE

- Eat well cooked meat.
- Wash vegetables for salads thoroughly in potassium permanganate and running water.
- Vegetables to watch out for are carrots, radish and coriander.
- Health authorities must check the state of the meat sold and ask stalls to maintain utmost cleanliness.
- Health authorities must check against poor sanitation, primitive animal husbandry practices.

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