FOOD PRODUCTION OPERATIONS

SECOND EDITION

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New Delhi

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Preface to the Second Edition

Is cooking an art or a science? Cooking is a sphere that blends both art and science. The science of identifying and collecting basic ingredients, measuring quantities, and timing the whole process is the first step towards perfect cooking. The way of presenting a dish, pairing food, and understanding aroma is an art that is learnt by experience. Again, the process of transforming cereals and pulses, vegetables, and meat into delectable delights is an art perfected by science.

This book introduces you to the various ingredients and techniques of food production, an important aspect of hotel management. It includes various aspects of the kitchen and multitude of cuisines popular in Indian hotels. Food production operations in large hotels is a mammoth enterprise that requires knowledge about the ingredients required, the methods of cooking them, and cuisine of various countries. Therefore, hotel management courses invariably include this topic in their curriculum. Courses in this discipline help impart technical skills of food production to students and familiarize them with the day-to-day working atmosphere of food production department.

With time, there has been a growing interest in young people to pursue careers in hospitality. A surge in the number of good hotels in the country and developments in the field of food production operations have made it fundamental for students to develop keen understanding of food production operations.

About this Book

This second edition continues to provide a comprehensive coverage of the techniques of food production and operations. Based on the National Council for Hotel Management and Catering Technology (NCHMCT) syllabus, it introduces students to the concept of cookery, basic principles of food production, bakery, and production of Indian and Western cuisine.

Coverage and Structure

The entire book is divided into five parts—Introduction to Professional Kitchens, Basic Food Production Operations, Basics of Bakery and Confectionery, Basics of Indian Cooking, and Communication.

Part I, *Introduction to Professional Kitchens*, has five chapters that build a strong foundation for those who wish to start their career as chefs.

Chapter 1 introduces the students to the culinary world, thus giving them a glimpse of professional kitchens. It also outlines the health, hygiene, and safety procedures followed in the kitchens. Chapters 2 and 3 discuss kitchen organization structures and various layouts of the kitchen and related areas. They also talk about the various customers the chef has to interact with, for smooth functioning of the hotel.

Chapter 4 talks about the various types of fuels and equipment used in a hotel's kitchen. It also mentions safety guidelines, which must be kept in mind while performing various operations. Chapter 5 deals with basic menu planning. It focuses on menu, menu engineering grid, and wine and food pairing.

A surge in the number of good hotels in the country and developments in the field of food production operations have made it fundamantal for students to develop keen understanding of food production operations.

Part II, *Basic Food Production Operations*, comprises Chapters 6 to 17.

Chapters 6 and 7 deal with the most common food items used in day-to-day operations in the kitchens—vegetables and fruits. The chapters discuss the various ways to process vegetables and fruits respectively, and the methods of selection and storage. Chapter 6, in particular, describes the scientific approach to cook vegetables to create various textures and variety in the dishes.

Chapters 8, 9, 10, and 11 discuss the basic stocks, soups, sauces, and salads used in the kitchens. Many cooking techniques are featured in the accompanying DVD, which will enhance the learning of the students.

Chapters 12, 13, and 14 discuss meats, fish, and eggs, respectively. The selection of meat, its usage and storage is dealt with in detail. Chapters 15 and 16 discuss nuts, seeds, Western spices, and different kinds of grains such as rice, cereals, and pulses. Chapter 17 deals with the various methods of cooking such as blanching, poaching, microwave cooking, etc.

Part III, *Basics of Bakery and Confectionery*, contains Chapters 18 to 22.

Chapter 18 provides a foundation of the topic of bakery and confectionery by discussing various commodities used in bakery and pastry such as flour, raising agents, oils, and milk. Chapter 19 discusses the steps in bread making and the various kinds of breads made around the world. Chapters 20 and 21 deal with the production of various sponges, cakes, pastes, creams, fillings, and sauces. Chapter 22 focuses on laminated pastries and the methods of preparing them.

Part IV, *Basics of Indian Cooking*, comprises five chapters in the book.

Chapter 23 provides an introduction to Indian cooking. It traces the history of Indian cuisine and discusses the influence of travellers and invaders on the same. Chapter 24 deals with the various condiments, herbs, and spices used in Indian dishes. Chapter 25 discusses various masalas and pastes that give variety to Indian food. Chapter 26 deals with commodities such as thickening agents, souring agents, and colouring agents. and their usage in Indian cooking. Chapter 27 discusses Indian gravies, their preparation, usage, and storage techniques.

Part V, *Communication*, illustrates the importance of communication in successful kitchen operations.

Chapter 28 on kitchen communication discusses the various aspects of communication in hotel kitchens.

About the Online Resources Centre

The book is supported by the online resources centre consisting of 55 videos and 365 recipes.

The videos may be divided into the following broad categories.

1. *Various cuts of vegetables and fruits*
2. *Methods of using kitchen equipment*
3. *Preparation of various sauces*
4. *Processing of fish, lamb, chicken, and beef*
5. *Preparation of cakes, pastries, and breads*

The 365 recipes are divided in the following way:

1. *Indian*
   a. Basic Indian gravies and curries
   b. Indian spices and pastes
2. *Western*
   a. Beef
   b. Chicken
   c. Egg preparations
   g. Pork
   h. Salads and dressings
   i. Sauces

d. Fish and shellfish
e. Lamb
f. Pasta
j. Soups
k. Vegetables

3. *Pastry*
a. Basic sponges
b. Breads
c. Cakes, pastries, and desserts
d. Creams and pastes
e. Dessert sauces
f. Laminated pastries

The recipes are designed on Excel sheets with built-in macros. They also allow users to calculate the right amount of ingredients required for preparing the respective dishes.

System Requirements

The videos can be played in any media player such as Windows Media Player, VLC media player, PowerDVD, etc. They will take the player set as default by the user/administrator.

Using the ORC

The ORC consists of two folders—Videos.ppt and Recipes.

Videos

- To view the videos, click on the 'Videos.ppt' folder
- Select the slideshow option
- Click on the tabs to view the various videos

Recipes

- To view the recipes, click on the 'Recipes' folder
- Choose the desired folder (Western, Indian, or Pastry)
- Click on the Excel sheet you wish to view

I sincerely hope that the revised edition of the book will further aid students in understanding the basic concepts and principles of this subject.

Acknowledgements

I would like to mention certain people and organizations who have either directly or indirectly contributed towards this book. First and foremost I would like to mention Mr Prithvi Raj Singh Oberoi, Chairman of The Oberoi Group, under whose able guidance I have been able to collect all the knowledge pertaining to this book. I would like to thank Oberoi Centre of Learning and Development (OCLD) for letting me use the resources for research. I would like to thank Chef Salaria from The Oberoi, New Delhi for doing butchery videos for the online resources centre of this book. I would like to thank the whole Oberoi Group for their support and letting me use the layouts and designs from various Oberoi hotels and resorts.

I would also like to thank the academicians and reviewers, who reviewed the book and gave corrective feedback that helped to frame the contents of the book. I thank the team at Oxford University Press India for their constant follow-ups and all the support that motivated me to accomplish this project. I would like to thank all the near and dear ones and the professionals in the industry who have in some ways influenced the development of this book. I would also like to thank Shubhendu Ghosh for contributing photographs for the revised edition.

Parvinder S. Bali

Preface to the First Edition

Globalization has changed the mindset of many youngsters in India who wish to start their career as chefs in five star establishments. Earlier there were only a few established hotels and everyone wanted to be associated with them. Now, with many international chains coming to India, more and more job opportunities exist in the kitchen as there is a shortage of skilled culinary professionals.

A chef's job comprises performance of all kitchen activities including preparation of food and the operations involved in it. Being the heart of a hotel, the kitchen demands high precision and dedication by its staff. For beginners, it would usually be a very stressful place to work in. However, professionals who have spent decades in the kitchen, look upon it as a place to relieve stress.

The rising demand for experts in the culinary department has made food production operations a much sought-after course. Today, it is common to see students studying specialized culinary art all around the world. Thus, the subject of food production has gained significant popularity among young students. Food production is mostly taught at the undergraduate level in the first two semesters in hotel management institutes as also in diploma and foundation courses.

Food Production Operations introduces students to the various facets of the kitchen—ranging from the layout of the kitchen department to menu planning to production of Indian, Western, and pastry food items. This book would, therefore, familiarize students with the basics of food production operations.

About this Book

Recognizing the need for comprehensive books for students pursuing their career in hotel management, I decided to write books for students and everyone interested in cooking. The first volume, *Food Production Operations*, educates on basic commodities, methods of cooking, and basics of pastry and Indian cuisine. The second volume, *Quantity Food Production Operations and Indian Cuisine*, touches base upon volume cooking and Indian cuisine. The third volume, *International Cuisine and Food Production Management*, is an extension of the first two volumes and it is expected that students have read them to be able to grasp the third one better.

This book has been developed keeping in mind the changing trends in modern kitchens. As there is a myriad of differences in the commodities and technology used across the world, it is important that one should be aware of the dynamics of kitchen operations.

Food Production Operations has been specially designed to meet the requirements of students aspiring to become chefs. It would also be helpful for trained professionals in the industry.

This book discusses the basic day-to-day operations that are performed in professional kitchens and more so, it gives readers insights into why a particular thing happens in a particular way in a kitchen, attempting to educate about the various ways to perform a particular task.

This book also brings in my sixteen years of experience with Oberoi Hotels and Resorts. This professional knowledge percolates down through the chapters in the form of 'chef's tips' that are rarely mentioned in books, but are always followed in kitchens. These were handed down from earlier generations and chefs have always carried the same with them. For example, when there is no time to clean an oil spill on the floor, chefs sprinkle salt over it to avert accidents. There are many such tips, which are mentioned all throughout the book.

Pedagogical Features

Each chapter of the book begins with learning objectives, which give an introduction to the various topics discussed in the chapter. Important information is listed in tables, which are numbered for easy reference and accessibility. The concepts and skills are explained through illustrations, figures, and chef's tips. The illustrations provide added information to readers such as English, Hindi, and scientific names of fruits and vegetables, various cuts of vegetables and fruits, equipment used in Indian kitchens, etc. Each chapter is summarized in the form of conclusions and has a list of key terms, concept review questions, and project work.

Other key features of the book can be listed as follows:

- Discusses the basics of all kitchens—Western, Indian, and pastry.
- Includes chapters on menu planning, vegetable cookery, meats, bakery and confectionery, basic Indian gravies, etc.
- Discusses methods of cooking such as sautéing, steaming, braising, microwave cooking, etc.
- Includes sections on food safety, ergonomics, internal and external customers, modern cooking equipment, and game and poultry.
- Includes projects at the end of each chapter, which can be useful for chef instructors and students alike.

Acknowledgements

I would like to mention certain people and organizations who have either directly or indirectly contributed towards this book.

First and foremost, I would like to mention our Chairman Mr Prithvi Raj Singh Oberoi, under whose able guidance I have been able to compile the information needed for this book. I would like to thank Oberoi Centre of Learning and Development (OCLD) for letting me use the resources for research. I gratefully acknowledge the support of my Dean OCLD Dr Paul Zupan, for allowing me to complete this task. I would like to make a special mention of our chef de cuisine Chef Soumya Goswami, who has lent his encouragement and support in this venture of mine. I would also like to make a mention of the kitchen management associates of OCLD 2008–10 batch—Aditya, Ashutosh, Ayushee, Omkar, Neelabh, Shiv, Sagar, Hitesh, Gaurav, Indranil, Parag, Anurag, Hasan, Saket, Mahesh, and Mandar, who have lent their help and support in the compilation of the videos. I would like to thank my colleague Chef Nishant Bhatia, for organizing the workflow for the video shoot. I would like to thank Chef Salaria from The Oberoi, New Delhi for doing butchery videos for the online resources centre of this book. I would also like to thank the entire Oberoi Group for letting me use the layouts and designs from various Oberoi hotels and resorts.

I would also like to thank my friend Mr Jaydeep Patil, who provided the beautiful photograph for the book's cover. I am grateful to professionals in the industry, who have in some ways influenced the development of this book. I would like to thank the academicians and the reviewers, who reviewed the book and gave corrective feedback that helped frame the contents of the book. I would like to thank the editors and the team at Oxford University Press India for their constant follow-ups and support that motivated me to accomplish this project.

Last but not the least, I would like to thank my parents—Late Major Ranjit Singh Bali and Gominder Kaur Bali—who have given me education and made me worthwhile to write a book which would benefit many, and my wife—Shalini Bali—who has given her full support in this venture of mine and has shown immense patience while I sat late at nights to compile this work.

Parvinder S. Bali

Features of the Book

Learning Objectives
Each chapter begins with learning objectives that focus on learning and the knowledge you should acquire by the end of the chapter.

Learning Objectives

After reading this chapter, you should be able to:

- understand the basic operations of a professional kitchen with regard to safety procedures and hygiene
- appreciate the usage of knives and learn how to take care of them
- claim an insight into the basic hierarchy in the kitchen and their placement in the brigade with regard to their skills and experiences
- enumerate the safety procedures while handling basic equipment and how to lift heavy equipment

CHEF'S TIP
If oil falls on the floor and there is no time to clean, immediately sprinkle salt on it. The friction will prevent slips.

- If there are any spillages such as oil, water, or food substance, it should be cleaned up immediately.
- Signage should be put on wet floor while cleaning of kitchens.
- Proper storage should be available to keep floors clear.
- Ensuring that non slippery and covered footwear is worn by kitchen and the ancillary staff working in the kitchen.

Chef's tip
Important points that should be kept in mind appear as tips throughout the text for quick recapitulation.

ORC Links
Includes video links that aid in better understanding of the concepts discussed in the book.

1.1

The uniforms for chefs were invented centuries ago; however, these have been developed and modernized as per the requirement and availability of new fabric. In early times the prime job of the uniform was to make a cook look like a cook, but today the uniforms are designed keeping in mind that these keep the workers safe, as they all operate in a potentially dangerous environment with lots of sophisticated machinery and tools around. Most people take the chef's uniform for granted, but there are good reasons for each piece of clothing. These are discussed below.

CONCEPT REVIEW QUESTIONS

1. How old is the Indian civilization?
2. How do we know that the oldest cereal eaten was wheat?
3. How has Indian food evolved over the yea
4. What i
thoug
5. Why do you think there are no written recipes of ancient Indian cuisine?
6. What was the drawbacks of

PROJECT WORK

1. Visit various restaurants and hotels and write down the various types of food served in the *ghar ka khana* section. Critique the selection and write down the salient features of the dish that makes it apt for this section.
2. Divide yourself into groups of four to five and visit the various locations in your city that are famous for food joints. Visit the areas that are influenced by a typical religious sect and taste and sample the food.

Exercises
A series of concept review questions as well as project assignments highlight the major topics covered in the chapter. The questions enhance learning and can be used for review and classroom discussion.

Figures and Tables
All chapters contain figures and tables to illustrate the topics discussed in the chapter.

Table12.9 Classification of beef

Bull/Cow	Steer	Heifer	Veal	Yearling bull/Cow
Male is called bull. Female is called cow after calving.	Castrated male bull.	Cow which has not calved yet.	Young cattle from 0–3 months.	Bull or cow under 12 months of age.

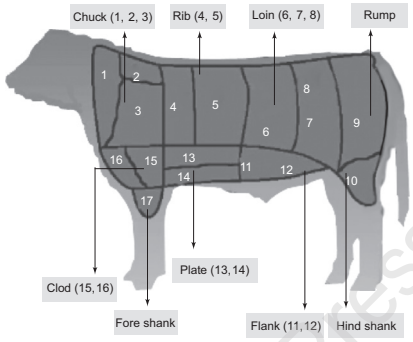


Fig. 12.2 Wholesale cuts of beef

CONCLUSION

This chapter dealt with various kinds of layouts of the professional kitchen that make it functional and cost effective at the same time. We saw the principle behind an ideal layout of the kitchen, where the food comes in and gets stored for processing there and then or later, depending upon the operations. The food is cooked and served and the garbage is disposed of from the receiving area. We discussed the set-up of a receiving area and the various activities that requisition format. We also laid emphasis upon the workflow in the storeroom and how it contributes to the profit of the department. The concepts of FIFO and slow moving items to control and maintain the inventory levels were also briefly touched upon.

We then discussed layouts of various kitchens such as commissary, main kitchen, butchery, pastry, and many other kitchens such as show kitchens. There are many factors that need to be

Summary
The summary at the end of each chapter draws together the main concepts discussed within the chapter. This will help you to reflect and evaluate important concepts.

Key Terms
Important terms have been explained at the end of each chapter as key terms. This will help you to retain all the new concepts that you have learnt in the chapter.

KEY TERMS

Aryavrat Ancient name of India.

Ayurveda Ancient Indian system and document regarding knowledge of life and traditional medicine.

Baati Dumplings made from wholewheat and ghee from Rajasthan.

Bakarkhani Flaky bread from Lucknow and Hyderabad.

Bateyr Indian for quails.

Chapatti Flat Indian bread made from wholewheat on a *tawa*.

Chicken tikka Morsels of chicken marinated in yoghurt and spices and broiled in *tandoor*.

Complete protein Food that contains all the 22 amino acids necessary for the human body.

Cuisine of Iyengars Cuisine of royal families from Tamil Nadu.

Cuisine of Mewars Cuisine of royal families from Rajasthan.

Cuisine of royal gharana Cuisine of royal families.

About the ORC

PREPARATION OF MOTHER SAUCES

♂ **BÉCHAMEL**

10.1

Country: France
Yields 10 portions

100 g Butter	Clarified
100 g Flour	Refined flour
1 litre Milk	
1 pc Pique/cloute	Onion studded with cloves and bay leaf
Nutmeg	Pinch
Salt, pepper	To taste

Method

1. Boil milk with cloute. Then strain and cool the milk.
2. Make roux with flour and butter and cook it to a sandy texture. Add cold milk and keep on stirring with a wooden spoon to ensure no lumps are formed.

Recipes

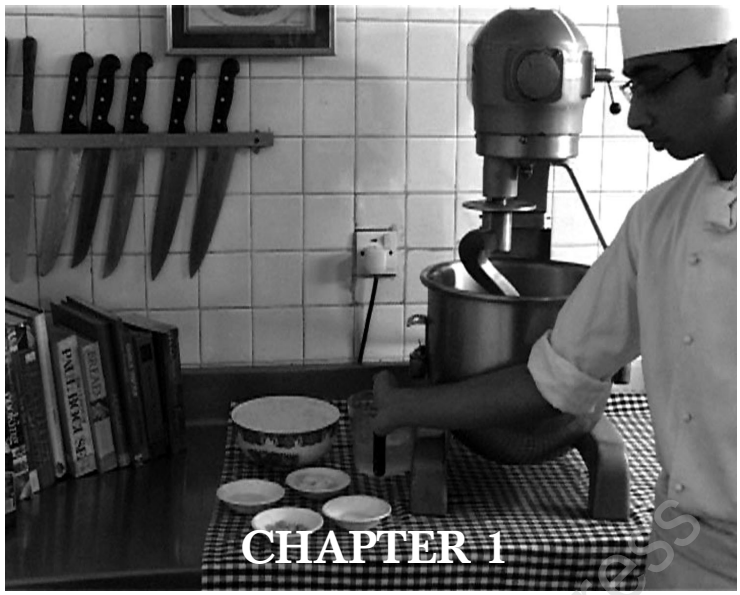
Includes 365 recipes of Indian, Western and pastry items.

Videos

Videos on food production and kitchen operations aid in better understanding of the concepts discussed in the book.

Brief Contents

Detailed Contents



CHAPTER 1

INTRODUCTION TO COOKERY

Learning Objectives

After reading this chapter, you should be able to:

- understand the basic operations of a professional kitchen with regard to safety procedures and hygiene
- appreciate the usage of knives and learn how to take care of them
- claim an insight into the basic hierarchy in the kitchen and their placement in the brigade with regard to their skills and experiences
- enumerate the safety procedures while handling basic equipment and how to lift heavy equipment

INTRODUCTION

Cooking has neither been a discovery nor has it been an invention; it has been an evolution and food has changed with times and societies. Food is one of the basic requirements of survival for humans and in the past all wars have been fought for mere survival only. In the prehistoric times cavemen killed animals for food and this led them to develop crude tools made of stone so that they could hunt with ease. The accidental discovery of fire changed the way we eat food today. We can only guess how the first cooked food evolved. Maybe one day some piece of meat accidentally landed in fire and it tasted good; it could also be that a whole animal fell into a fire and got chargrilled accidentally to create the world's first barbecue. The old pictures of cavemen also depict whole animals being spit roasted. Even till this day the cuisine of nomads and tribes is essentially whole spit roasts.

After the colonies were built and the civilizations set in, societal structure started developing based on the type of work being done by different people. Man started to demarcate food as well. Food began to be classified as food for warriors, royal cuisine, and poor man's food. With the advent of religions, religious barriers prevented eating of pork for Muslims and beef for Hindus. Kosher laws[1] of Jews, royal cuisines of Thailand, Emperor's cuisine of China, and many others around the world have been segregated according to caste and social status of the people.

Food grows naturally in the forms of grains, nuts, and vegetables; but with the advent of technology in the sphere of agriculture, various types of pesticides and insecticides and hybrid technology gave birth to new kinds of vegetables and fruits which even have colour and shape. Japan has started producing tomatoes which are square-shaped like bread loaves, so only a single slice of such a tomato will cover an entire piece of bread in a tomato sandwich.

Now with awareness of the harmful effects of pesticides and insecticides, people are restoring back to naturally produced vegetables and fruits and now we call them 'organic food'. Organic food has become a fashion statement and the same food which was once available naturally, is being purchased at thrice the price and so only the rich and famous can afford it.

In the prehistoric times and until very recently men went hunting, while the women would stay back to cook meals and look after kids and it became a norm that woman of the household will cook, while the man earns and brings in the commodities. However, in the modern era, women have been competing with men in all the spheres of life. Lack of time to cook at home has given a new dimension to food and a whole range of ready-to-eat meals have hit the shelves of markets all over the world. After a hectic day of work, all one has to do is empty the contents of a ready-to-eat meal packet into a boiling pot of water and after a few minutes, one can relish any dish from around the world.

Thus, we see how food has evolved from centuries, and we do not really know where the future will lead us. But there is one thing for sure, for which chefs do not have to bother and that is, whatever form food takes, it will still be chefs who will create the delicacies.

LEVELS OF SKILLS AND EXPERIENCES

As discussed above, women are competing with men in all spheres of life and kitchens are no exceptions. Though cooking in a professional set up is very different from cooking at home, it can be seen that more and more lady chefs are putting in the same amount of efforts and energy into becoming world-renowned chefs.

To understand a professional kitchen let us talk about the four 'P's.

Product

To any customer coming to wine and dine in a restaurant, the paramount importance is food and service. The food has to be hygienically prepared and presented in a modern way, so that the restaurant stays ahead of its competitors. All the aspects of food need to be considered while preparing and serving food in a professional kitchen. The taste,

[1] Kosher food laws are very strict food eating laws of Jews.

serving temperature (hot food served hot and cold served cold), eye appeal, smell, and hygiene can never be ruled out in order to get the customer delighted.

Process

Standardization is one of the biggest challenges faced today in professional kitchens. Imagine being in a restaurant where you do not know how the food will taste. To achieve the standard dish each and every time, the processes have to be in place. The way the ingredient is processed to get the maximum usable product, the standard equipment to be used each time to produce that dish, the modulation of heat applied to the food, and many other processes form an integral part of food business.

Profit

A food service provider should be able to offer the most enjoyable dining experience to the customers. At the end of the day, apart from customer's satisfaction, one has to operate a profitable business for further growth and development of the organization. The chef behind the scene contributes greatly to the financial viability of the business. He/she has to be in control of all aspects of food operations such as purchasing, storing and portioning, and wastage control. The old saying 'customer or guest (as we call him/her today in our hotels) is God' means that the guest is always right; but we must remember that financial viability is of the utmost importance to stay in the food business.

People

The first three 'P's—process, product, and profit—cannot happen unless there is a humans touch involved to give finishing touches to the food. The basic organizational chart of a kitchen looks as shown in Figure 1.1.

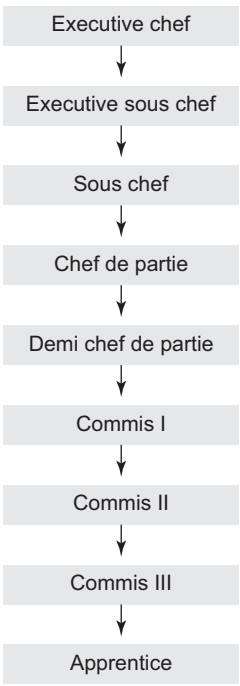


Fig. 1.1 Organizational chart

In the following chapters we shall discuss the job responsibilities of each position in the kitchen. This organizational chart or the hierarchy of the kitchen will be different for each business depending on the volume and type of operations. Most of the hotels today follow a very flat kind of hierarchy known as 'lean hierarchy'. It is very common to see these days that modern hotels do not have commis classified as I, II, and III; the joining level after an apprentice programme is commis.

An apprentice is a person who wishes to make his/her career in the professional kitchen as a cook and finally, with experience and knowledge, wishes to become a chef in the future. An apprentice joins an organization at the lowest level of the kitchen and has no skill and experience. Only a few apprentices become chefs, because apart from skill and experience it requires passion to become a successful executive chef. Working in a kitchen is quite complex as it requires long hours on the feet amidst the heat and noise. Apprentice programme is usually governed by the labour laws and the duration of the course is around two to three years.

In India it is a three year programme. 'Commis' is a French word which means a cook. After completing the apprenticeship programme, one is employed as a commis. Based on the needs of the operations and the style of business, the commis may be restricted to one area, thereby specializing himself/herself into a saucier, butcher, baker, staff cook, soup cook, vegetable cook, roast cook, etc. as the operations demand. This kind of segregation of commis was earlier done in most of the hotels, but now with the labour becoming expensive, it is advisable to follow the modern trends of staffing, whereby, multi-skilling has not only become necessary but it has also become the first choice of hotel operations. Multi-skilled cooks thus have better chances of promotions.

The next level of promotion is demi chef de partie. As we can see, the titles of the chefs are all in French. This is because France was the first country to classify this profession into various levels and the world thereafter followed suit. 'Demi' in French means 'half' and 'chef de partie' means 'a part of chef', and if we try and put this together, then chef de partie would mean a supervisor or a person who, with his/her sheer hard work and skills is preparing to take on the job of a chef. In this role, a chef de partie takes on other managerial responsibilities as well. A demi chef de partie would be an entry level into a chef de partie and can be referred to as an assistant supervisor. In kitchen operations, the main job of any person at any level is to cook on the range for guests; therefore, with promotion the kitchen personnel get another set of responsibilities with addition to the basic job of cooking that they are doing. These days, however, the position of demi chef de partie is being overlooked and people can become chef de partie from commis. There is no particular time span to become a chef de partie from commis, but usually depending on the skills, minimum work experience of at least three years is required before being promoted.

The next level in the hierarchical grid of kitchen is sous chef, which literally translates to 'under chef'. This person would be a kitchen manager of a section, heading a team of chef de partie, demi chef de partie, commis, and apprentices. Depending on the size of the operations, there could be as many sous chefs as the departments in the kitchen. The modernistic view, however, is to have two or three sous chefs overlooking more than two to three kitchens, depending on their levels of skill and experience. The sous chef reports to the executive sous chef. The executive sous chef is in charge of the overall kitchen operations. His/her main job is to assist the executive chef in planning menus, implementing the standard operating procedures, doing portion control, motivating his/her workforce.

Depending on the levels of skill, a person would become an executive sous chef in 10 years time and then may become an executive chef in another two to three years.[2]

In the early times, being a cook was looked down upon and this profession was regarded as a profession for the poor and failures. But today there are many famous chefs around the world and now being a chef is considered to be a very respectable career and hence, more and more people are opting for the same. Now prestigious universities have specialized courses on cooking and catering, thereby preparing people to be successful hotel professionals.

[2] Here it refers to operations in a five star establishment. In small scale operations one can be head of the kitchen brigade in less than five years also.

There are three-year diploma courses and even four-year degree courses in hotel management, which have an academic component and also industrial exposure, where a student has to work in hotels to get hands-on experience of what has been taught. These students are known as industrial trainees or internship trainees. It is very important for budding professionals to see for themselves, if they can manage to face such challenges in their life, as hotels work 365 days, 24 hours a day. During festivals chefs in the hotels have the busiest times, as they have to create a memorable experience for their customers.

Other important chefs seen in the kitchen are master chefs. The master chefs have to perform particular jobs and it usually takes around 12 to 15 years of hard work for a cook to specialize as a master chef. This concept has come from South-East Asia.

ATTITUDE AND BEHAVIOUR IN THE KITCHEN

Kitchen essentially is quite a dangerous place to work. In many areas, accidents can occur, if the basic safety rules of the kitchens are either not known to the staff or are ignored. The three main causes of accidents in the kitchen are:

1. Distraction
2. Haste
3. Failure to observe safety rules and regulations

Distraction

Distraction in the kitchen is usually caused by other personnel working in the kitchen. In the kitchen, a chef works with tools and equipment, such as sharp knives and intricate machinery, which help him/her to do his/her job efficiently and diligently; but if he/she loses concentration while working with any of these, it can prove fatal. For example, while slicing onions with speed, if people talk to someone over the counter it can prove dangerous.

Haste

One of the major enemies of kitchen personnel is 'haste'. A cook or a chef must complete the work which has to be done, that very moment itself. The customer can wait for his/her food for a considerable time only; but that does not mean that chefs should run around in the kitchen and try to do things fast. Therefore, it is very important to set up the workstation in a way that everything is within reach. All the *mise en place* should be in place and the placement of commodities should be thought through by the executive chef after doing time and motion studies. The golden rule in the kitchen is not to run, no matter how urgent the task is.

Failure to Observe Rules and Regulations

The last but not the least is the failure to observe safety rules and regulations. In a busy operational kitchen, sophisticated machineries are provided to perform jobs effectively and all these machines come with safety and handling manuals. Any deviation could result in fatal accidents. For example, while extracting juice from a juice machine, one has to use the pusher to push the fruit in. Using bare hands can cause loss of fingers or hand. Figure 1.2 shows a sample of operating instructions used in hotels, usually found hung near equipment in the kitchens.

HOTEL XYZ

Operational Instructions
3-deck Oven

- Isolate power supply when not in use and while cleaning.
- Always use safety gloves when placing or removing objects from the oven.
- Ensure the oven is at the correct temperature prior to using and preset temperature.
- Ensure to open damper prior to opening the door to exhaust steam within the chamber.
- Use a soft brush to clean the templates in the chamber when the oven is completely cold.
- Clean oven with a wet cloth. Avoid excess water.

Authorized personnel to utilize machine: Sous chef positions
Chef de partie positions

Fig. 1.2 Operating instructions format

PERSONAL HYGIENE AND FOOD SAFETY

Hygiene is the science that deals with sanitation and disinfection. For successful food operations, hygiene and food safety form the backbone of a successful business. News has shown the closure of famous food industries after the outbreak of food poisoning. Personal hygiene and food safety go hand in hand because one is complementary to the other. Most of the contamination of food takes place by improper handling of food by the food handlers and so it is imperative for us to know about these.

Food Safety and Kitchen Hygiene

Most chefs would say that food safety and kitchen hygiene relate to the cleanliness of the kitchen. Clean pots and pans being used each time someone starts cooking, wearing a clean uniform each time someone reports to work in the kitchen at the start of a shift, and food prepared in the right manner using the best quality ingredients ensures food safety and kitchen hygiene. Food and all activities related to food is why a kitchen exists, whether at home or in a hotel.

Food that is produced in the kitchen has to be safe and hygienic so that when a guest eats it, he/she does not fall ill due to food poisoning. Safe food is food that is free of contaminants and will not cause illness or harm. Persons involved in food poisoning investigations often remark about the cleanliness of the premises involved in such cases. Hygiene is more than cleanliness. It involves all measures necessary to ensure the safety and wholesomeness of food during manufacture, distribution, transportation, receiving, storage, issuing, processing, preparation and handling, holding, sales and service. From the time raw ingredients come into the receiving department until the time the food is eaten by the guest, it is the hotel's responsibility to ensure that the food is absolutely safe and free from all contaminants.

CONTAMINATION OF FOOD

Contamination of food is a major hazard that entails the occurrence of any objectionable matter in or on the food. Lamb legs may be contaminated with faecal matter; high-risk

food (food high in protein content) may be contaminated with spoilage or food poisoning bacteria; and flour may be contaminated with rodent hair and excreta, weevils, etc.

There are three types of contamination, namely:

1. Physical contamination
2. Chemical contamination
3. Microbiological contamination

Physical Contamination

Foreign bodies found in food (other than what is supposed to be consumed) is termed as physical contamination. The list of foreign bodies is endless—stalks, stones, pebbles, insect bodies, metal particles, nuts and bolts, glass, rodent droppings, metal screws, cigarette ends, plastic pieces, plastic packaging material, stapler pins, pieces of corrugated box material, sawdust, wood chips, human hair, pins, clips, etc. This type of contamination can easily be brought under control if the establishment has sound systems and procedures in place, and a dedicated team of people who ensure that nothing unwanted comes into the kitchen area.

Chemical Contamination

This takes place when unwanted chemicals enter the foodstuff during:

- growth, for example, veterinary drugs, excessively-used fertilizers, pesticides, and environmental contaminants such as lead or dioxins;
- food preparation, for example, oil, cleaning chemicals (residues found in pots and pans that have not been cleaned thoroughly), or insecticides;
- processing, for example, excessive addition of preservatives in foods such as sausages, salamis, etc.

Chemical food poisoning can cause long-term illness such as cancer, and many such cases of food poisoning have come to light.

Microbiological Contamination

It is surprising to know that when one talks about contamination, most of the time one refers to physical contamination or chemical contamination. However, the type that can cause real havoc in a food business is seldom spoken about—microbiological contamination. This is by far the most significant type as it results in large amounts of spoilt food and unacceptable instances of food poisoning cases.

Microbiological contamination takes place due to the presence and multiplication of food poisoning bacteria. Bacteria are single-celled organisms found everywhere—on raw food and people; in the soil, air, and water. Bacteria are microscopic and vary in size—from around .001 mm to .003 mm. While most of the bacteria found in nature are harmless to humans, a few are harmful and can cause damage to mankind. These bacteria are classified as 'pathogens'.

Food poisoning bacteria may be brought into the food premises from sources such as:

- food handlers, people working in related departments such as kitchen stewarding, service personnel, and to a certain degree, guests;

- raw food including poultry, meat, eggs, milk, fish, shellfish, and water, especially when polluted with sewage or animal faeces (vegetables or fruit may become contaminated by manure or polluted irrigation water);
- insects, rodents, animals, and birds;
- the environment, including soil and dust.

Bacterial multiplication takes place in many ways, and more often than not, it is the food handlers themselves who unknowingly contaminate perfectly safe food, thereby making it hazardous to eat.

Vehicles and Routes of Bacterial Contamination

Sometimes bacteria pass directly from the source to high risk food, but as bacteria are largely static and as the sources are not always in direct contact with food, the bacteria have to rely on other vehicles to transfer them to food. The main ones are:

- hands of food handlers (many of them carry *pan masala*, tobacco for chewing, *bidis*, etc. in their pockets even when they are working in the kitchen);
- clothes and equipment (when a food handler goes to use the conveniences, he/she is supposed to take the apron off and keep it in the kitchen itself, in pigeon holes made exclusively for holding aprons while the staff go to the lockers; after the work is done he/she is supposed to deposit the soiled uniform in the uniform room.
- hand-contact surfaces (when kitchen staff use the conveniences and do not wash their hands properly; ideally a nailbrush should be provided at the wash hand basin at all times);
- food-contact surfaces.

In the kitchen one of the most common causes of bacterial contamination is 'cross-contamination', defined as the transfer of bacteria from contaminated foods (usually raw) to other safe foods. This includes the direct contact, drip, and indirect methods.

Direct Contact Method It takes place when a commis goes to the food store to pick up ingredients, and loads all the butchery items such as vegetables, fruits, etc. into one basket or trolley, rather than into separate baskets. Many endeavour to follow good practice, but most of the time it is the junior-most in the kitchen brigade or the industrial trainee who goes for picking up the ingredients and he/she does not know about cross-contamination.

Drip Method This type of contamination takes place when there is inadequate storage (small walk-ins, just one walk-in), where the kitchen staff have to make do with whatever little space they have to store the food. When frozen meat is stored above cooked food and it is thawing, a certain amount of liquid may fall onto the cooked food, thereby contaminating it.

Indirect Method It takes place when a chopping board is used to cut raw meat and then cooked food is cut on the same board without cleaning or disinfecting it.

The above mentioned methods of food contamination happen all the time in most hotels. Even staffs, who have been trained, forget about best practices in hygiene over the

years. As the leader of the team, it is the responsibility of the chef to reinforce best practices at all times. It is important to train all the kitchen personnel for maintaining hygiene in the kitchen. Also, there has to be a visible commitment from all the kitchen personnel regarding the hygienic practices to be followed in the kitchen.

Here is a check list for contamination control that may be of value to all.

1. Purchase food and raw materials from known and reliable suppliers.
2. Accept deliveries only if transported in clean, properly-equipped vehicles, whether refrigerated or not.
3. Inspect deliveries immediately on arrival; reject or segregate damaged, unfit, or contaminated items; wherever relevant, check temperature, codes, and date markings, and reject food that have passed the expiry date.
4. After checking, remove deliveries immediately to appropriate storage, refrigerator, or cold store.
5. Ensure adequate thawing of foods and separate the thawing foods from other foods.
6. Make suitable provision for cooling food prior to refrigeration.
7. Use only proper containers for storing food.
8. Keep high-risk foods apart from raw foods, in separate areas with separate utensils and equipment; colour coding is useful.
9. Keep food covered or otherwise protected until it is actually processed or prepared, in which case bring the food out only when needed and do not leave it lying around.
10. Keep premises, equipment, and utensils clean and in good condition, and remember to repair the same; disinfect food contact surfaces, hand contact surfaces and where appropriate, hands.
11. Ensure that all empty containers are clean and disinfected prior to filling with food.
12. Control cleaning materials, particularly wiping clothes; keep cleaning materials away from food.
13. Remove waste food from food areas as soon as possible; store in appropriate containers, away from food.
14. Keep any chemical away from stored food.
15. Maintain scrupulous personal hygiene at all times and handle food as little as possible. A person who has just recovered from an illness should not be given kitchen duties.
16. Maintain an active pest control programme.
17. Control visitors and maintenance workers in high-risk areas.
18. Ensure that hygiene disciplines apply to all personnel, including management.

In spite of modern machines, manual work cannot be avoided when it comes to food preparations and thus personal hygiene becomes the most important thing for food handlers. They should have highest level of personal cleanliness and clean protective clothing. Before we understand personal hygiene and food safety, let us first know what contamination of food

is and what the main causative agents of the same are. Consumption of contaminated food results in acute illness, and symptoms could vary depending upon the kind of food poisoning. The most elementary ones being nausea, sharp gripping pains in the lower stomach, diarrhoea, and sometimes, fever. Food poisoning is mainly caused by the following.

Bacteria

Bacteria are the main causative agent of cases of food poisoning. In some countries the bacteria are often referred to as 'bugs'. Bacteria are so small that they cannot be seen with the naked human eye. They are everywhere—they live in the air, in soil, in water, on and inside people, in and on the food that one cooks. Not all bacteria are harmful; some bacteria are friends of chefs as they help in production of cheese and yoghurt. Such friendly bacteria are known as 'commensals'. Some bacteria help in decaying and rotting of food and are called 'spoilage bacteria'. Many are pathogenic and the most common types found in the food are as follows:

- *Salmonella*—found in eggs and poutry
- *Staphylococcus aureus*—found on human skin, nose, ears, and hands
- *Clostridium perfringens*—found in the faeces and sewage
- *Clostridium botulinum*—found in fish intestines, soil; this bacteria is a concern in the bottling and canning industries, as it can withstand high temperature
- *Escherichia coli (e-coli)*—found in manured vegetables, raw milk, and intestines of animals

Bacteria enjoy temperatures between 5 and 62°C. This is usually termed as 'danger zone'. So cold food should be stored and served at a temperature lower than 4°C and hot food at above 63°C. Most bacteria will get killed in food that is held at 70°C but to ensure that food is cooked thoroughly we must cook the food till the internal temperature of food reaches 74°C.

Viruses

Viruses are even smaller than bacteria. For survival they must live in a host body. Viruses are responsible for illnesses as common as the common cold or as dangerous as smallpox and polio. Hepatitis is the most common problem in the food industry today. Viruses have the ability to change form and this ability has led to a number of known strains of hepatitis, and in order to track them, the medical profession has given each strain an identifying letter, such as A, B, C, D, and E. Virus is usually spread through the faecal-oral route. One has to be very careful of purchasing sea food and the same must be procured from trustworthy sources as most of the seafood is bred in sewage polluted water. However, thorough cooking will kill the virus. The vegetables grown in sewage polluted water are also a prime cause of viral food infections.

Chemicals

Chemical poisoning, metal poisoning, and poisonous plant poisoning are all caused by carelessness or ignorance of the commodities that are being handled. Always read the instruction labels for use of cleaning materials and store them away from food in a specific storeroom or an area designated for the same. Many a time, it has been seen that

the cleaning chemical is stored in empty mineral water bottles and sometimes in busy operations one can easily mistake it for water, especially if the chemical is colourless and odourless. It is the prime responsibility of the executive chef to ensure that the kitchen is always maintained with regard to repairs and maintenance. Ripping of paint on the ceiling can also be disastrous if it falls on the food.

Metals

Metal poisoning is not very common; however, occasionally finding a piece of metal in food was quite common until a few years ago. These metals were found in commodities such as rice, wheat, pulses, etc. Some foods react to metals such as copper, for instance, while deep-frying of food, using a copper tool in the hot oil will make people sick. Similarly, cooking of yoghurt or acidic food in a copper vessel should be avoided.

Poisonous Plants

Toadstools, red kidney beans that have not been cooked thoroughly, rhubarb leaves, deadly nightshade, and many other plants and their related products cause food poisoning.

PERSONAL HYGIENE AND ITS IMPORTANCE IN THE KITCHEN

As a food handler, one must ensure that the food provided to the customer is free of all of the above mentioned contaminants. Food handlers should remember that customers place great trust in them, and that carelessness on their part could make customers ill, or at times even lead to death.

Our normal body temperature, which is around 37°C, is favourable for bacteria to dwell and grow. This is probably the source of most cases of food poisoning. Personal hygiene should be important to everyone but to a food handler, it is of paramount importance.

The food handler has a moral and legal responsibility of having good standards of personal hygiene. The bacteria on the human body are usually found on hands, ears, nose, mouth, throat, hair, and groin. One must wash hands after touching these areas, otherwise the pathogen will enter into the food and then with favourable conditions the bacteria will grow and multiply and will cause the risk of contamination.

The hands are the main medium through which bacteria are transferred to food. So one must ensure washing hands:

- when first entering the kitchen
- when coming back from a break
- after going to the toilet
- after handling raw meat
- before handling cooked meat
- after handling raw vegetables and other dirty foods
- after handling garbage
- after handling cleaning equipment—mop, buckets, clothes
- after touching or blowing one's nose
- after touching one's hair

- after licking one's fingers
- at regular intervals throughout the day

This list can be endless. Hands should be washed in a basin meant for hand wash only and never in a sink. Always use hot water to wash hands and clean with a germicidal soap. Hands should be cleaned all around and between the fingers also. Use nail brushes, while cleaning the hands and apply a disinfectant to keep your hands free from germs.

One must keep the finger nails short as bacteria might grow in the dirt under the nails. Nail varnish should not be used as it may chip and contaminate food.

No jewellery (bracelets, watches, earrings, etc.) should be allowed in food areas, as they also harbour dirt and bacteria. One can wear an important ring such as a wedding ring on a chain around one's neck.

In case of food poisoning it is always advisable to:

- report one's illness to one's employer or supervisor;
- not handle food until given clearance to do so;
- tell the doctor that one is a food handler;
- get medical clearance to start work again.

Food safety is governed by strict food safety laws. Health inspectors can take food samples at random and in case, if a sample fails, prosecution can follow. Every food establishment is being Hazard Analysis and Critical Control Points (HACCP)[3] certified.

The first step is to form a HACCP team, who shall then identify any step in the activities of the food business which is critical to ensuring food safety and ensure that adequate safety procedures are identified, implemented, maintained, and reviewed on the basis of the following principles.

- Analysis of the potential food hazards in a food business operation.
- Identification of the points in those operations where food hazards may occur.
- Deciding which of the points identified are critical to ensuring food safety (critical points).
- Identification and implementation of effective control and monitoring procedures at those critical points.
- Review of the analysis of food hazards, the critical control points and the control and monitoring procedures periodically and whenever the food business operations change.

UNIFORM AND PROTECTIVE CLOTHING

The uniforms for chefs were invented centuries ago; however, these have been developed and modernized as per the requirement and availability of new fabric. In early times the prime job of the uniform was to make a cook look like a cook, but today the uniforms are designed keeping in mind that these keep the workers safe, as they all operate in a potentially dangerous environment with lots of sophisticated machinery and tools around. Most people take the chef's uniform for granted, but there are good reasons for each piece of clothing. These are discussed here.

[3] Hazard Analysis and Critical Control Points, a programme started by scientists in National Aeronautics and Space Administration (NASA).

Chef's Jacket

Fig. 1.3 Chef's jacket

The typical chef's jacket or chef's coat is also called *veste blanc* in French (Fig. 1.3). It is made of heavy white cotton. This fabric is important as it acts as insulation against the intense heat from stoves and ovens and is also fire resistant. The white colour of the jacket repels heat and thus keeps the worker comfortable. Also, a white uniform will get soiled quickly and a cook would have to change it, since personal hygiene is very important in the kitchen. The jacket is always double-breasted as the thickness in the cloth will prevent the chef from being scalded by hot liquids or spattering hot oil and thermal shocks as the chef constantly shuttles between the cold storage areas and the hot kitchen areas. Since there are two rows of buttons, the chef can rebutton the double breasted jacket to change sides whenever a side gets soiled during the course of work during a shift.

Chef's Trousers

Chefs wear either black pants or black and white checked pants. The traditional checkered pants were so designed to camouflage spills and the colour of the pants in some organizations also denotes the seniority of the chef. A black pant is usually worn by sous chefs and other senior chefs, while cooks and apprentices would wear checkered pants. Just like the coats, kitchen pants are designed to provide comfort and protection. The kitchen pants should be straight and without cuffs, which can trap debris and any hot liquid spills. It is advisable to have a snapped fly and elastic waist band and the kitchen trousers should be worn without a belt, so that it can be removed easily in case of hot liquid spills or even fire.

Chef's Hat

The most interesting part of the uniform is the tall white hat, called *toque blanc*. The toque dates back to mid-seventh century BC. Cooks during that time were required to wear hats similar to those worn by royalty of that time so that it resembled the crown and segregated them from the common people. The main purpose of the hat is to prevent hair from falling into the food and also help in absorbing sweat. Along with the other conveniences, disposable paper hats were invented to look like cloth so that they can be thrown away when they are soiled.

Scarf/Neckerchief

Chefs wear white neckerchiefs, which are knotted in the front. These were originally designed to absorb perspiration. Nowadays, chefs wear the neckerchiefs to keep the tradition and finish the look of their uniforms. In some cases scarves are used to represent various levels in a kitchen hierarchical grid.

Apron

It is usually made of thick cotton fabric and is worn around the waist with the help of a long string. The apron should reach below the knees to protect the chefs from spilling hot liquids. The string of the apron helps hold the chef's kitchen towel in place. The loose

ends of the same should be tucked under or else they can be trapped in machinery and can cause accidents.

Kitchen Towel/Duster

They are used to pick up hot pots and pans and also to wipe hands in order to keep them dry. Usually two dusters should be kept with the chef—one to wipe the wet hands, and the other (dry one), to pick up hot pans, as a wet duster can scorch the hands. Considering the modern hygiene trends, it is advisable to use disposable paper towels for wiping and cleaning. The kitchen dusters should be used only for handling hot equipments.

Shoes

The shoes should be black and well polished. To prevent slipping, the sole should be made of rubber. Black cotton socks, preferably the sweat absorbing cotton variety should be worn. The shoes should be closed, to prevent the feet from scorching in case of spills. The shoes have to be comfortable, as we know that cook will have to stand for long hours.

IDENTIFICATION OF KNIVES AND HOW TO SHARPEN THEM

The importance of knives to a chef cannot be overstated. It is the most important piece of equipment in the kitchen. Knives come in various shapes and sizes and each is meant for a specific use though some knives can be used as multi-purpose knives. Let us now familiarize ourselves with different parts of a knife (Fig. 1.4).

Blade The blade is usually made up of a metal compound called high carbon stainless steel. It combines the property of carbon of being sharpened easily and the non-corrosive properties of steel.

Tip The tip of the knife is the pointed edge where the knife blade ends. The tip is generally used for scoring patterns and working with meats or carving.

Spine The spine of the knife is the topmost, thick edge of the knife, which gives strength to the knife.

Bolsters In some knives there is a collar known as a bolster, at the point where the blade meets the handle. It reinforces the structure of a knife.

Cutting Edge The cutting edge is the most important part of the knife. It should always be kept honed and sharpened.

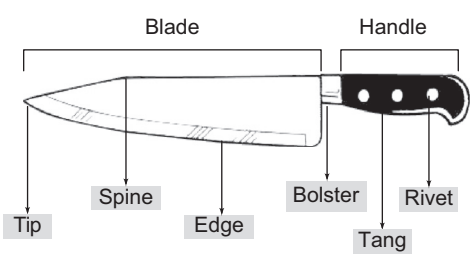


Fig. 1.4 Parts of a knife

Handle The handle of a knife should be easy to grip and should be non reactive to most cleaning agents. The different materials used to make handles are wood, plastic, plastic fibre, or even metal.

Tang The tang is the continuation of the blade and extends into a knife's handle.

Rivets These are metal fasteners that hold the handle and the tang together.

Table 1.1 Types of knife

Knife	Description	Photograph
Chef's knife	Also known as French knife, it is usually an extension of a chef's hand. This is so because it is the most common knife used for various operational jobs in the kitchen such as chopping, slicing, etc. The length of the blade is usually 8 to 12 inches.	
Paring knife	Also known as fruit knife, it is usually used for small jobs such as paring of apples, taking wedges of lemon, hulling strawberries, etc. The blade is usually 3 to 4 inches long.	
Tourne knife	It is also known as bird's beak knife, which is same size as that of a paring knife, only difference is that the cutting blade is slightly curved to facilitate the cutting of a vegetable into a barrel shape.	
Boning knife	Boning knife has a thinner and shorter blade than a chef's knife and is used to cut meat away from the bone. The heel of the knife is slightly curved so that the knife can rest on the bone whilst deboning.	
Filleting knife	Similar to boning knife but has a flexible blade for the ease of filleting a fish.	
Bread knife	A long serrated knife used to slice bread or sponge cakes. The blade is usually 12 to 15 inches long.	
Carving knife	Thin sharp blade usually used for carving cooked meats or big joints of roasts on the buffet.	
Cleaver	It is generally used in the Chinese kitchen for cutting and chopping. It has a large wide blade and is heavier than a chef's knife. A multipurpose knife which can also be used as a mallet, to flatten a piece of ginger before chopping.	
Palette knife	It is not a knife for cutting purposes; but is a flexible spatula with a rounded tip and is widely used in confectionery to decorate cakes.	

Many types of knives are used in the kitchen that make up an essential kit for a successful chef. Since these are the most valued possessions of a cook, utmost care needs to be taken to keep them in good working condition. Table 1.1 shows the basic knives used in a professional kitchen.

Sharpening a Knife

Sharpening a knife involves two processes—occasional honing and regular sharpening. A dull blade should be honed or ground against a carborundum stone. Long sharpening steel is used to smoothen the blade after honing and to sharpen the knife each time you use it. The various kinds of sharpening tools are shown in Table 1.2.

1.2

Table 1.2 Types of sharpening tools for knives

Sharpening Tool	Description	Photograph
Sharpening stone	It is essential for the proper maintenance of a knife that it is sharpened by passing its edge over the stone at the correct angle. The grit and its degree of coarseness abrade the surface, creating a sharp cutting edge. While sharpening, start with the coarse surface and then move to the finer one. Most stones are moistened with water or oil but once moistened with oil then the process has to be continued every time. There are three basic types of sharpening stones namely: 1. Carborundum stones (most commonly used) 2. Arkansas stone 3. Diamond impregnated stone	
Steel or sharpening rod	The steel should be used immediately after sharpening a knife, it helps in alignment of the sharp edge of the knife, length of the working surface can vary from 3 to 14 inches and usually the material is made up of hard steel. This steel can have diamond impregnation.	
Commercial sharpeners	These are available in various shapes and sizes, some are manual and some are machine operated. The machine has small rollers made out of the same material as the sharpening steel. There are grooves through which the knife can be slid in and out for sharpening.	

There are five steps in sharpening a knife. They are as follows:

1. Use a good medium to fine steel.
2. Ensure to maintain the same honing angle during all strokes. Twenty degrees make a good edge.
3. Blades should be drawn with the edge first, across the face of stone or steel.
4. Count your honing strokes. Then turn blade over and hone the other side with an equal number of strokes.
5. Start strokes with heavy pressure. Then ease off to lighter pressure and finish off with a lighter stroke.

Safety Instructions Regarding Knives

There are many safety instructions which one must follow, to ensure longevity of the knives and to prevent any accident.

1. Always handle knives carefully, especially when cleaning and sharpening.
2. Never leave knives in a sink of water. This is bad for the blade and presents a safety hazard to anyone who puts his/her hands into the water. Always clean and wipe the knives dry before storing in a knife box. A knife box has a magnetic strip inside, on which the knives can be stuck and the same can be locked to ensure that there is control on the knives, as most of the knives are very expensive.

3. As a general rule, hold the knife away from the body.
4. When carrying a knife in the kitchen, make sure the blade faces downward to avoid injury to self or to others.
5. When cleaning a knife ensure that the cutting blade is facing away from your wiping hand. Always focus when handling your utensils.
6. Do not attempt to catch a falling knife. Let it fall and get your feet out of the way. It is important to wear leather footwear for protection.
7. Do not hide a knife under anything.
8. Do not hand a knife to anyone else. Put it down on the table and let him/her pick it up.
9. When a knife is placed down onto a bench, ensure that the blade is flat.
10. Do not let knives hang over the table edge.
11. When using a knife keep your mind and eye on the job.
12. Use the right knife for the right job.
13. Always keep knives sharp. There is an old saying that 'sharp knives cut vegetables and blunt knife cuts hand'.
14. Always keep the handle free from any grease.

SETTING UP OF WORKSTATION

In a busy kitchen there is a lot of hustle and bustle and noise. The guest's orders on the pick-up counter keep the service staff on their toes. Each dish has to be consistent and the hot food has to be served hot to the guest. One always has to be prepared even if the entire restaurant is full and the orders are waiting on the counter, commonly known as 'pass' and is usually handled by the sous chef or the chef in charge of the meal service. In order to meet deadlines, it is mandatory for a cook to be well organized.

Let us understand a basic workstation and its components (Fig. 1.5).

Gas Range

The cook has to ensure that all the ranges are in proper working condition. He/she must light up all the burners and physically check them. In case of any malfunctioning, engineering must be informed for necessary repairs. A cook must light up the small protruding pipes known as 'pilots'. Pilots should be kept lit as they emit out a very small amount of flame and one does not have to light up the flame every time an order comes in.

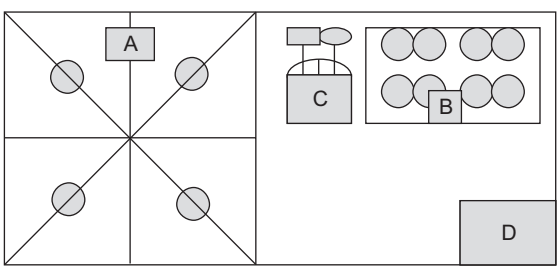


Fig. 1.5 Workstation set-up for basic cooking

Mise en Place

This is a French word, which literally translates to 'putting in place'. A pre-preparation of a dish is also referred to as *mise en place*. Before being able to put finishing touches to a guest's food, the entire *mise en place* has to be in place and within reach so that the cook does not have to move from one place to another as this would tire him easily.

Pot Full of Water

Pot full of water to hold ladles and spoons kept near the cooking range saves a lot of time while cooking. The water in the pot helps rinse the ladles and spoons; but the water should be changed at regular intervals. Some people add a small amount of chlorine into the water so that the knives are constantly sanitized; however, care has to be taken as we do not want the smell of chlorine getting into the food.

Chopping Board

Wet the duster and squeeze out excess water, fold to the size of chopping board and place the chopping board firmly on it. This will prevent the chopping board from slipping. Usually it is advisable to fix the chopping board on the corner of the work table so that the debris can be collected easily in the bin and processed vegetables can be scraped into a bowl. As per hygiene laws, colour-coded chopping boards are used for various food commodities.

Red chopping boards are used for raw meats, and yellow for pork, green for vegetables, blue for fish, brown for cooked meat, and white for dairy products.

Setting up of a workstation can be different for each workstation. A cooking range for pasta cooking (Fig. 1.6) will be very different from grill section or a tandoor section (Fig. 1.7) to the Chinese cooking set-up. The following can be seen in Fig. 1.6.

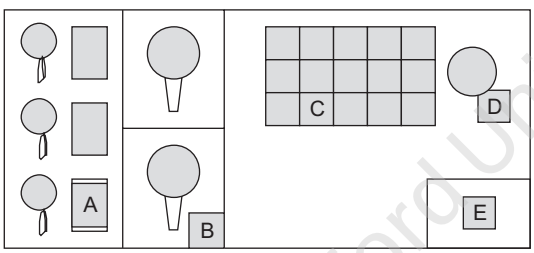


Fig. 1.6 Workstation set-up for pastas

A: Pasta cooker—This equipment is like a bain-marie, with dipping baskets to blanch pastas
B: Cooking pans for tossing pastas
C: Condiment tray for *mise en place* such as seasoning, olive oil, herbs, and vegetables
D: Pot for keeping cooking equipment such as slicers and ladles
E: Chopping board

The following can be seen in Fig. 1.7.

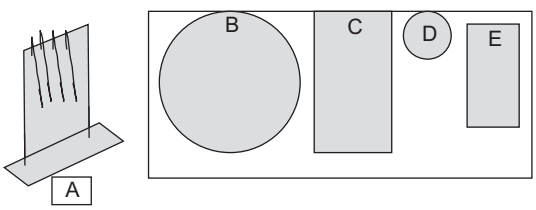


Fig. 1.7 Workstation for tandoor

A: Stand for holding hot iron *seekhs*
B: *Tandoor*
C: Wooden plank for flattening Indian breads
D: Condiment tray for oil, dry herbs, etc.
E: Tray for basting the kebabs

Similarly, there can be many such set-ups but one has to ensure that each set-up provides a smooth workflow.

SAFETY PROCEDURES IN HANDLING EQUIPMENT—ERGONOMICS

This section is very important for students aspiring to be chefs in hotels. Working in kitchens demand long hours on the feet and lifting of heavy pots and pans are normal way of life in the kitchens. Most of the students and also the aspiring cooks suffer from back pain

and spinal injuries in their industrial training because of their wrong postures. This section will suggest students how to work efficiently and safely as safety is the biggest concern in the kitchens.

Most people will agree that food quality, safety, and hygiene is of utmost importance as the satisfied and happy guests would come back to the hotel and it would generate a lot of revenue. So strict control measures and systems are in place for serving and cooking of food to the guests. It is seen that many a time some employers do not give too much of importance to the health and safety of those people who serve or cook the food. The health and safety of workers should form a part of induction and orientation process of every organization.

Kitchens can be potentially dangerous places to work and cooks and staff face a range of health and safety risks. According to surveys, slips, trips, and falls are some of the many causes of injuries; however, there are uncountable number of risks in lifting and carrying heavy baskets of food commodities, pots, pans, and heavy food pans containing food items. High temperatures in the kitchens, smoke which is not good for patients of asthma, the use of chemicals, equipment, such as knives, food slicers, and many other sophisticated machinery (if not handled carefully), can cause an injury.

In addition to men, these days many women also work in kitchens, some of them are older women working through the menopause. Working conditions in many kitchens are not very conducive to work especially for such women as high temperatures and poor ventilation can aggravate the menopausal symptoms.

As we read above that the main causes of accidents in the kitchens result from slips, trips, and falls; but sometimes stray kept trolleys, protruding pots and pans, or being struck by falling objects or even at times being exposed to hazardous and toxic chemicals are also major causes of accidents in these workplaces.

It is legally forced by the law, that the employers must report all the injuries and accidents to the management. It is also advisable to talk to the supervisor and take leave from work in case of any food poisoning or infection, as the person may be the carrier of germs and will affect others if he works in the food area. If this does not happen then it should be assumed that the health and safety procedures in that work area are not in place and it demands a serious view of the management. In case of an accident while on duty, report should be duly filled in. The employer is legally liable to remunerate the worker if the injury results in death or partial or permanent disability. An incident report will look like the one shown in Fig. 1.8.

All the employers should assess all risks to the health and safety of employees and it is not only legal but also their moral responsibility. This assessing is known as 'risk assessment'. If the risk assessment report reveals that the work cannot be carried out safely, then the management must ensure that the other arrangements are made for the same. The employers must appoint a team of safety representatives who would assist the employers to assess the risks. Employers should also provide the following to the employees as a safety measure.

- Facilities for health check-ups and first aid on duty. This is liaised with the human resource department.
- Suitable equipment to be provided and also its training should be imparted so that the employees can work safely.

HOTEL XYZ Incident Report in Case of Injury	
To be filled in by department head	
1. Name of the person injured:	
2. Address:	
3. Telephone number:	
4. What type of injury:	
5. Which part of the body:	
6. Where did the injury take place:	
7. What was the person doing at the time:	
8. Who witnessed the incident:	
9. Who attended to the person:	
10. Who administered first aid:	
11. What first aid was given:	
12. Was the person taken to hospital:	
13. Name of the hospital:	
To be filled in by human resources/house doctor	
14. Room number:	
15. Name of doctor:	
16. Is the person still in hospital:	
17. Number of days admitted:	
18. Is the person insured:	
Reported By/Date	Department Head/Date
To be sent to human resources department within three days of the incident	

Fig. 1.8 Incident report format

- Training on fire safety and how to handle various types of fire. Fire extinguishers need to be placed in the right places and engineering department is responsible for checking the equipment on a periodic basis.
- Systems in place so that it is ensured that all the electrical equipment are checked regularly and the records updated and kept in a place for audit purposes.

First of all it is advisable to set up a team in each department who will act as safety inspectors. They should do a risk assessment on the shop floor level and sometimes a format such as Fig. 1.9 can be duly filled up and given to the concerned people to fix up the problems.

When doing the risk assessment, wide range of jobs should be taken into account such as moving, lifting, and carrying materials and equipment (such as pots and pans, or cooking ingredients) and the chemicals used for cleaning and washing. The assessment should also take into account the layout of the work area, assessing whether it is

HOTEL XYZ

Hazard Spotting Format

Date: _____

Hazard Spotted	Area and Time	Accident if Any	Recommendation	Action Taken	Engineering Comments

Manager's Name : _____

Executive Chef : _____

Engineering Leader's Acknowledgement : _____

Fig. 1.9 Hazard spotting format

crowded and should also take into account the storage areas, which are regularly used by kitchen staff.

It should also be noted that even the ancillary staff in the kitchen such as kitchen cleaners, often referred to as 'kitchen stewards', are also prone to similar kinds of accidents on duty as the kitchen staff and sometimes it can be also said that probably they are worst affected, as they deal with cleaning chemicals and toxic materials.

Slips, trips, and falls are the highest causes of injury in kitchens. More than a quarter of these result in major injuries, such as a broken arm or other injuries requiring hospitalization. Carrying loads or pushing/pulling trolleys increases the risk of slips and should be avoided or reduced. In order to prevent accidents in kitchen areas the following should be kept in mind.

- Kitchens should have non-slip flooring which should be easy to clean and maintain.
- Floors should always be mopped and kept dry and there should be no obstruction in the walkway to the kitchen or in the kitchen itself.
- Use only the recommended cleaning materials from a reputed company and train the staff to use them in right dilutions, as the wrongly used chemical or its quantity can cause the floor to lose its slip-resistant properties.
- If there are any spillages such as oil, water, or food substance, it should be cleaned up immediately.
- Signage should be put on wet floor while cleaning of kitchens.
- Proper storage should be available to keep floors clear.
- Ensuring that non slippery and covered footwear is worn by kitchen and the ancillary staff working in the kitchen.

CHEF'S TIP

If oil falls on the floor and there is no time to clean, immediately sprinkle salt on it. The friction will prevent slips.

Hazardous Chemicals and Other Substances

One can find all sorts of chemicals in the kitchens and here we are not talking about condiments and spices; but cleaning materials such as:

- Dish washing liquid
- Detergents
- High-acid oven cleaners
- Disinfectants
- Drain and other cleaning products

Exposure to these are likely to be through contact with the skin or eyes, breathing in, or swallowing. Many of the chemicals used in the kitchens are hazardous in nature because they are corrosive and can cause skin and eye burns if they are accidentally touched by hand or come in contact with the body. Some can simply cause irritations on the skin, whereas some can be fatal. Some substances can also cause breathing problems if they are sprayed in large quantities on hot surfaces, for example, high acid oven cleaners and this so happen especially where there is no proper ventilation.

We must ensure that the employees are properly informed about such hazards and training provided to them to ensure safe practices. Even after training is imparted the supervisors must ensure that the staff is supervised at all times, especially the new ones on induction.

Sprains and Strains in the Kitchen

Cooking involves a lot of lifting of commodities and equipments and also manual work which can be very repetitive in nature such as decorating pastries or garnishing large amount of salads. It is seen that lifting, handling, and carrying accidents account for more than cuts, slips, and falls and this is more fatal because it usually happens over a period of time by doing the same repetitive jobs over and over again. Back injuries can be very painful and most of the time they are difficult to treat and can lead to partial disability, but they can be prevented by being aware of the right posture to work, etc. Lot of manual handling task happen in the kitchens and these include pulling trolleys of food commodities and carrying food stores as well as lifting heavy crates of vegetables and fruits. Unplanned work methods and inadequate training can lead to manual handling injuries to the kitchen staff. Most common strenuous tasks in kitchens include the following.

- Lifting, pushing, pulling, folding, or moving tables around, especially when the kitchens have to be deep cleaned.
- Setting up equipment and workstations.
- Moving food stores from storage and sometimes from the kitchens to the larger storage areas such as walk-ins and deep fridges.
- Filling and carrying large food containers with liquids or prepared foods.

Employers are required by law to prevent manual handling injuries. In brief, the regulations state that employers must do the following.

- As far as possible avoid the need for handling the work manually. For example, use well-oiled trolleys to move around with ease, when they are loaded with the permissible weight limits.
- Where manual handling cannot be avoided, identify and assess the risks and provide the necessary equipment and support systems.
- Ensure permissible load limits are marked and followed by the staff.
- Staff should be trained and well informed about the safety rules and regulations.
- Overalls supplied, especially when entering into deep freezers where a considerable time would be spent, safety shoes and uniforms provided which are safe and comfortable. Refer back to the section on kitchen uniform and its uses.
- Training should be provided for ergonomics and other safety procedures such as evacuation in case of fire, etc. But in spite of all this, one must remember the old phrase 'prevention is better than cure'.
- Making sure the staff is trained when new equipment are being introduced and also if there are changes being made to the work methods which are directly related to the safety of the workers in the kitchens.

Certain jobs in the kitchens, such as chopping large amount of onions for a banquet operation, where along with repeated movements of limbs one also needs to apply pressure, can cause aches, pain or stiffness of muscles in the neck or shoulders. These disorders are known as WRULD in medical language, which stands for 'work-related upper limb disorders'. Kitchen staff should thus be trained and take care of the following.

- They should avoid too many repetitive movements and tasks, especially the ones which are of fast pace.
- They should take sufficient rest breaks as kitchen involves long hours on the feet.
- They should not use unsuitable tools or equipment, for example, blunt knives.
- They should use the work areas of sufficient height for jobs such as chopping, etc.
- They should do variety of tasks at the same; doing a same job in the same position can cause a muscle to strain and stress out.

Fatigue or stiffness in the neck can result in neck pain and can cause headache at the same time. This situation will occur when the neck is in one position for a long period of time. This mostly happens when cooks do intricate jobs such as decorating cakes or salads. Always maintain a straight posture and avoid keeping neck in one position for long.

Cooks always forget the basic rules of lifting heavy things and end up having back problems. Figure 1.10 shows some right and wrong position of working in the kitchen.

The following five general rules should be applied while lifting a weight.

- Plan the lift. Both squat and stoop lifting is now considered acceptable for jobs requiring repetitive lifting. The term used to describe this is 'free form lifting'. No matter what type of lift is used, it is never permissible to exceed the maximum acceptable load of the worker.
- Squat on the floor and access the weight.

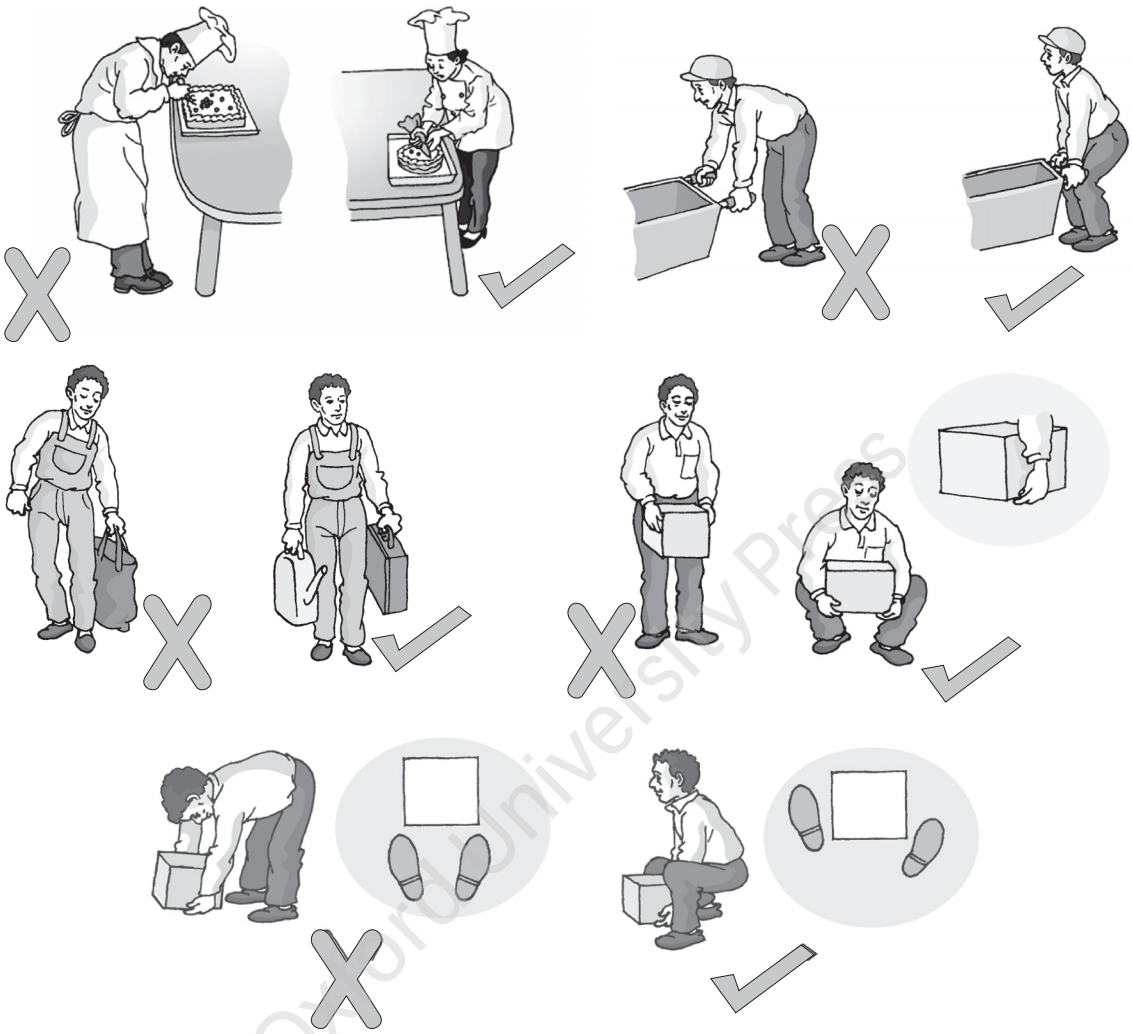


Fig. 1.10 Right and wrong positions of working

- Keep the load as close to the body as possible.
- Lift the load with a smooth body motion (avoid jerking).
- When turning, do not twist. Turn with the feet.

Temperature

High temperatures and humidity are very common in kitchens because of the fuel and heat used in cooking process and the need for food to be served hot. But high temperatures can sometimes have an adverse effect on the cooks.

Working in high temperatures can cause many side effects such as lack of concentration, irritability, cramps in muscles, and sometimes fainting. Cooks should ensure that they keep drinking lots of fluids while on duty, especially in summers, to avoid dehydration.

Some women are more at risk when working in areas that have high temperatures, especially pregnant women or lactating mothers, as pregnant women are more prone to heat stress and fatigue in high temperatures and breast feeding for lactating mothers may be affected by dehydration.

As for high temperature, on the flip side the cold temperatures can also cause discomfort, loss of concentration, irritability, and tiredness. Cold conditions can also cause fatigue since the body would use more energy to keep it warm. There could also be accidents caused as the cold may make the fingers numb and hence, an increased risk of accidents while working with sharp equipment.

The employers must ensure that:

- temperature inside a working kitchen is reasonable and this can be done by installing air handling units known as AHU and should have proper exhaust and ventilation systems;
- a warm overall coat is placed outside areas of deep fridges, so that one can wear it and enter deep freezer if it is going to take time inside the same.

Burns and Scalds

Most scalds and burns in the kitchens are caused by the spillage of hot oil from the griller or the deep fat fryer or food spills from the pots and pans. In Indian kitchens, these occur mainly from hot *tandoor* while making bread and kebabs. One can see the scars on hands of every cook as, most burns or scalds occur to the hands, arms, and feet. These gave rise to the use of knee-length aprons and closed protective shoes to protect the sensitive parts of the body. These accidents can be avoided by ensuring that:

- the staff do not lift or carry heavy pans of food or hot water;
- oil and fat is filtered or moved only when it is cool;
- appliances are allowed to cool before being cleaned;
- special oven gloves are used when opening ovens and dry dusters to be used while handling hot pots and pans and utensils while cooking (wet dusters would emit steam, when they come in contact with the hot pans and this can scorch the hands).

All staff including those who work in kitchens should be given health and safety training. This is in addition to food hygiene training. Employers have legal duties to give health and safety information and training to all employees. But for kitchen staff this is very important, as the cooks are exposed to potentially dangerous equipment in kitchens. Apart from all this basic training, the staff should also be trained to handle small fire in the kitchens or any risk that employees are exposed to.

CONCLUSION

The first chapter of this book introduces the concept of professional kitchen. The things mentioned here are very basic and prepares the learner to understand the jobs done in a professional set-up. This chapter discussed about the history of cooking and evolution of food with respect to the societies, castes, and status. It was necessary to write about the basic elements of the kitchen with regards to the

4 Ps namely people, product, process, and profit. We saw how the role of chef is crucial in making sure that the food service organization meets up the budgets and controls the bottom line. We also read about the basic organization in the hotel; however, we shall discuss more about the same in the next chapter.

Few key elements were stressed upon such as the professionalism in the kitchen, where every person works in a methodical and disciplined manner. Kitchen can be a dangerous place to work in as the modern kitchen deals in machines and equipment that are very sharp and sometimes to a layman this place can look very confusing. Hence, it is important to be vigilant and display high levels of alertness and passion to survive in these odd working conditions.

We also discussed the most sensitive areas of kitchen—health, hygiene, and safety. We discussed about the importance of personal hygiene, food safety, and many ways to protect food from spoilage and contamination. We read about different contaminants such as microbiological, chemical, physical, and poisonous plants. Since the job in the kitchen requires odd and long working hours and physical labour, the aspect of safety such as correct way of lifting weights cannot be ignored.

We discussed the parts of the chef's uniform and understood the usage of each element in the same. We discussed about the knives, their parts, and also the ways of sharpening them. We discussed about various equipment used for the sharpening of the knives and learnt about the basic set-up of the workstation to carry out the job effectively. Right equipment such as knives, chopping boards, etc. play an important role in the safe and hygienic preparation of nutritious food that will keep bringing the happy customers back.

The next chapter will deal with the organizational set-up of various establishments and will also talk about the hierarchy of kitchen department.

KEY TERMS

Apprentice Person under training to become a cook.

Arkansas A type of sharpening stone for knives.

Bacteria Unicellular microorganisms.

Bain-marie An equipment with hot water used to hold hot food.

Barbecue Literally means barbe (beard) cue (tail). So a whole animal roasted from head to tail.

Bugs Another name of bacteria and germs.

Carborundum Type of stone for sharpening knives.

Chargrill Method of cooking where a commodity is cooked on high heat.

Chef de partie Supervisor in the kitchen. Also called CDP sometimes.

Chef French word for chief, usually referred to experienced cooks and kitchen managers.

Commensals Friendly bacteria that help humans in many ways.

Commis French word for cooks on the bottom of the organizational structure.

Contamination Presence of harmful microorganisms in food.

Cook One who cooks for professional living.

Cuisine French word for things related to food.

Demi chef de partie Assistant to the kitchen supervisor. Also called DCDP sometimes.

Ergonomics Scientific approach to lifting weights and using equipment for human use.

Executive chef One who heads the kitchen and is overall in charge.

Executive sous chef One who is next in position to the executive chef.

Food cost Cost of the raw material incurred to prepare a dish.

Food poisoning Sickness caused by food infected with microorganisms.

Food safety Methods of preparing food in a safe and hygienic manner.

Generation time Time taken for the bacteria to divide into two for multiplication.

HACCP Hazard Analysis and Critical Control Points is a programme that certifies safe and hygienic practices.

Hierarchy Organizational structure of kitchen.

High risk food Food rich in protein and which does not need further cooking.

Honing Sharpening of edge with a sharpening steel.

Hygiene Science that deals with cleanliness and sanitation.

Incident report Format filled in case of accident on the job.

Industrial trainee Students who are studying hotel management and go to hotels for their training.

Internship trainees Same as industrial trainees.

Kitchen stewarding Department that takes care of cleaning of kitchens.

Kosher laws Food eating laws of Jews.

Lean hierarchy When in an organizational structure there are not many levels of reporting.

Master chefs Skilled chefs who have gained expertise in one area of kitchens.

Mise en place Arranging things prior to cooking, putting up things in place.

Multi-skilling When variety of skills are learnt by cooks.

Operating instructions Instructions on how to use a machine.

Organic food Food grown without the addition of pesticides and chemicals.

Organizational chart The number of staff in a kitchen and their seniority structure.

Pass Area where food is picked up from, for service.

Pathogens Bacteria that can cause infection and disease.

Portioning Serving of agreed quantity of food to the guest.

Restaurant A place that offers food and beverage service on charge basis.

Saucier Cook who is responsible for preparing sauces.

Sous chef Literally means under the chef. He/she is a person reporting to executive sous chef.

Spit roast Method of cooking where the piece of meat is grilled over direct fire.

Staff cook Person who cooks meals in cafeteria for staff.

Tandoor A cylindrical clay oven for baking Indian breads.

Thawing Defrosting the frozen products.

Toque blanc Chef's/cook's hat worn to prevent hair falling into food.

Toxins Poisonous wastes secreted by bacteria.

Veste blanc Chef's/cook's coat.

Walk-in Large fridges where one can walk into.

CONCEPT REVIEW QUESTIONS

1. What are the food laws of Jews known as?
2. List the basic organization of the kitchen department.
3. What is the head of the kitchen department known as?
4. Who is at the bottom of the hierarchy?
5. List the attitudes and behaviour of the kitchen staff in a professional hotel.
6. 'Personal hygiene' in food rooms is of utmost importance. In a chart write down five dos and five don'ts that must be followed by food and beverage professionals.
7. What do you understand by the term 'food safety'?
8. List the three main types of food contamination.
9. Give examples of at least five physical contaminants in food.
10. What are the vehicles and routes of contamination? Give examples.
11. What is the difference between bacteria and virus?
12. How would you ensure that the food is safe from microorganisms?
13. Write at least four points that need to be considered while designing the uniform for the kitchen staff.
14. What is so special about the chef's jacket?
15. What is the role of the scarf in the kitchen uniform?
16. List the various parts of a knife and its uses.
17. What is the difference between a tang and a bolster?
18. List at least three things that can be used for sharpening a knife.
19. List at least five safety considerations while handling knives safely.
20. What is the basic workstation set-up for any kitchen?
21. What do you understand by the term *mise en place*?
22. List the various kinds of chopping boards and their uses.
23. List at least 10 hazards that can take place in the professional kitchen.
24. List at least five safety procedures of handling any kitchen equipment.
25. What is an incident report and how is it useful in the hotel?

PROJECT WORK

1. In groups of five, do a market survey of hotels of various categories and a few stand-alone restaurants and draw out an organizational chart. Compare the charts and record your findings.
2. Conduct a survey of professional kitchens and institutional canteens and study the kitchens from health, hygiene, and safety point of view and list down the observations made therein. Give suggestive feedback to the person concerned with a detailed report on the same.
3. While visiting fast food restaurants or hotels, study the arrangement of the workstation from the health, hygiene, and safety point of view and operational feasibility. Discuss with faculty and friends and draw out a better plan, if any, and give justifications for the same.