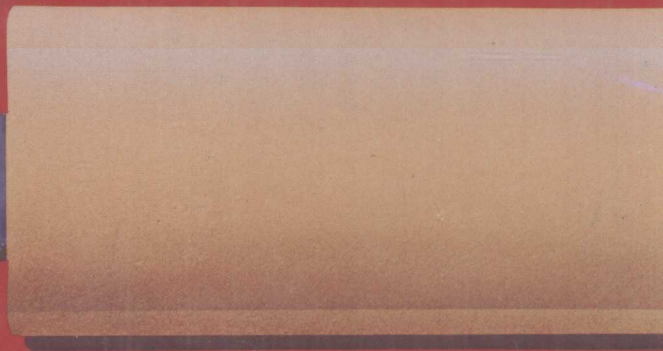
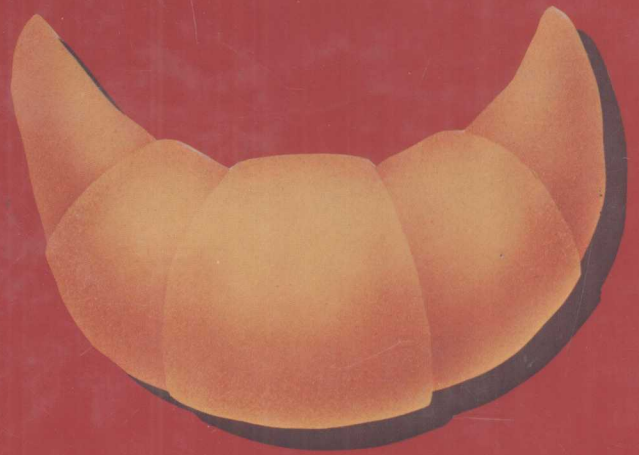
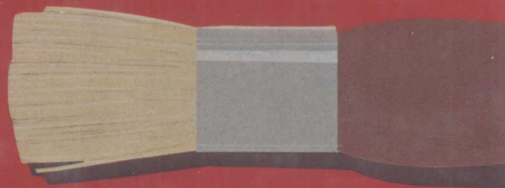


PROFESSIONAL BAKING



WAYNE GISSLEN

PROFESSIONAL BAKING

Wayne Gisslen

John Wiley & Sons

New York

Chichester

Brisbane

Toronto

Singapore

Copyright © 1985 by John Wiley & Sons, Inc.

All rights reserved. Published simultaneously in Canada.

Reproduction or translation of any part of this work beyond that permitted by Sections 107 and 108 of the 1976 United States Copyright Act without the permission of the copyright owner is unlawful. Requests for permission or further information should be addressed to the Permissions Department, John Wiley & Sons.

Library of Congress Cataloging in Publication Data:

Gisslen, Wayne, 1946–
Professional baking.

Includes index.

1. Baking. I. Title.

TX763.G47 1985b 664'.752 84-26988

ISBN 0-471-88668-8

ISBN 0-471-81444-X(pbk)

Printed in the United States of America

20 19 18 17 16 15 14

THIS BOOK IS DEDICATED TO MY PARENTS

PREFACE

The purpose of this book is to teach the fundamental principles and procedures for preparing baked goods, pastries, and desserts. With its attention to both theory and practice, it is designed as a primary text for use in colleges and vocational-technical schools, for baking courses within broader food service curricula, and for on-the-job training programs. It will also be valuable as a manual and handbook for cooks and bakers.

The methods and procedures covered in this book are primarily those of small bakeshops and food service organizations. The emphasis is on producing high-quality, handcrafted items. Development of manual skills is stressed. Such skills are a valuable asset even to those students who may eventually move on to more industrialized, automated production, as found in large commercial bakeries.

Bakeshops, restaurants, hotels, and institutional facilities that offer their customers high-quality, home-made baked goods and desserts have a distinct advantage over their competition. Premium-quality items draw repeat customers and contribute to the total profitability of an operation. In a restaurant, for example, the dinner rolls or bread may be the first foods a customer tastes, and the dessert puts the finishing touch on the meal. Thus, the impressions they create are very important. For this reason, a restaurant may choose to do its own baking rather than purchase such goods from an outside source, so that it can put its own distinctive stamp of quality on these parts of the meal.

In order to produce baked goods that will set an operation apart from the run-of-the-mill, careful attention must be paid to the selection of ingredients, to proper mixing and baking techniques, to careful makeup and assembly, and to the decoration and presentation of the finished goods. The goal of this book is to provide students with a solid theoretical and practical foundation in quality baking practices, so that, after sufficient practice and experience, their performance will meet these requirements.

The focus of this text is twofold: understanding and

performing. To be successful in their careers, students must master a set of marketable skills. That is, they must be able to perform and produce. Thus, a major portion of the text is devoted to step-by-step procedures and production techniques. Makeup methods are explained and illustrated. A broad range of recipes and formulas reinforce the basic techniques.

At the same time, the text's practical material is supported by a systematic presentation of basic theory and ingredient information. In other words, students learn not only what techniques work but why they work.

THE ORGANIZATION OF THE TEXT

Two factors have strongly influenced the arrangement and organization of this book. The first is the dual emphasis already mentioned—the emphasis on both understanding and performing. It is not enough merely to present students with a collection of recipes. Nor is it enough to give them only a summary of baking theory and principles. They must be presented together, and the connections between them must be clear. Thus, when students practice preparing specific items, their study of theory helps them to understand what they are doing, why they are doing it, and how to get the best results. At the same time, each recipe they prepare helps to reinforce their understanding of the basic principles so that knowledge builds upon knowledge.

The second factor is that most of a baker's activities fall naturally into two categories: (1) mixing, baking, and/or cooking doughs, batters, fillings, creams, icings, and so on; (2) assembling these elements (for example, baked cake layers, fillings, and icings) into finished pieces. The first category of tasks requires careful selection of ingredients, accurate measurements, and close attention to mixing and baking procedures. Naturally, most of the detailed guidelines and procedures in

this book are devoted to these kinds of tasks. The second category, assembly of pre-prepared components, is not so much a matter of scientific accuracy as it is of manual skills and artistic abilities.

This division of tasks is, of course, so well known to the practicing baker that it is usually taken for granted. Consequently, it is often neglected in written materials. As far as possible, the arrangement of subjects in this text reflects the working practices of bakeshops and kitchens. In a typical facility, operations such as mixing pie doughs, cooking fillings, preparing icings, and mixing and baking cake layers are done separately and in advance. Then, depending on demand, finished products can be quickly assembled. In this book, procedures for mixing and baking cakes, for example, are discussed separately from the procedures for assembling, icing, and decorating them. These are very different kinds of techniques, and it is helpful for students to approach them in a realistic context. Similarly, basic creams and icings are fundamental elements required for making a wide range of pastries, cakes, and other desserts; hence, they are treated fairly early in the text.

Although the arrangement of chapters represents a logical grouping of products and procedures, it is not intended to dictate the order in which each instructor should teach the units. Every curriculum has different requirements and constraints, so that the sequence of instruction varies from school to school and instructor to instructor. The arrangement of material in this text is designed to encourage maximum flexibility. Of course, baking techniques are highly interdependent; frequent cross-references help the students understand these connections.

An important element in the text is the participation of the instructor, whose ideas and professional experience are invaluable. There is no substitute for firsthand seeing and doing, under the guidance and supervision of experienced instructors. Baking is an art as much as a skill, and there are many points on which bakers and pastry chefs will differ in their preferences. The text frequently explains possible variations in theory and procedure, and students are encouraged to consult the instructor for the techniques he or she prefers. Throughout the book, the instructor's input is encouraged. Exposure to a variety of formulas and techniques can only enrich the students' education and enhance the flexibility of their skills.

The text is designed for readability and practicality. Discussions of baking theory are presented in easy-to-read, point-by-point explanations. Techniques and makeup methods are detailed in concise yet complete step-by-step procedures. The format emphasizes and highlights key points in bold type, italics, and num-

bered sequences, so that basic information can be located and reviewed at a glance.

THE RECIPES

Approximately 400 formulas and recipes are included for the most popular breads, cakes, pastries, and desserts. These recipes are not selected at random, merely for the sake of having recipes in the book. Rather they are carefully chosen and developed to teach and reinforce the techniques the students are learning, and to strengthen their understanding of basic principles. The goal is that the students will be able to understand and use not only the formulas in this book but any formula they may encounter.

The recipes in this book are instructional recipes. That is, their purpose is not merely to give directions for producing baked goods, but to provide an opportunity to practice, with specific ingredients, the general principles being studied. Directions within recipes are often abbreviated. For example, instead of spelling out the straight-dough method for breads in detail for each dough mixed in this way, the student is instead referred to the preceding discussion of the procedure. By making it necessary to think and review, the students derive a stronger learning experience from their lab work.

Many recipes are followed by variations. These are actually whole recipes, given in very abbreviated terms. This encourages students to see the similarities and differences among preparations. For example, there seems little point in giving a recipe for cream pie filling in the pie chapter, a recipe for custard filling for éclairs and napoleons in a pastry chapter, and separate recipes for each flavor of cream pudding in a pudding chapter, and never point out that these are all basically the same preparation. Skill as a baker depends on understanding and being able to exercise judgment, not just on following recipes. The ability to exercise judgment is essential in all branches of cookery, but especially in baking, where the smallest variation in procedures can produce significant changes in the baked product. The recipes in this text will help students develop judgment by requiring them to think about the relationships between general procedures and specific products.

Students are encouraged to study Chapter 1 before actually proceeding with any of the recipes. The first section of Chapter 1 explains the principles of measurement, the various formats used for the recipes in this book, the techniques for converting yield, and the usage of U.S. and metric measurements and baker's percentages.

ACKNOWLEDGMENTS

I wish to thank the many individuals who have contributed their thoughts and expertise to help make this book more useful and accurate. I am especially grateful to the following professionals who reviewed the manuscript and offered their criticism and suggestions: John R. Farris, Lansing Community College, Lansing, Michigan; Robert J. Galloway, Dunwoody Industrial Institute, Minneapolis, Minnesota; Jean Hassell, Youngstown State University, Youngstown, Ohio; Iris A. Helveston, State Department of Education, Tallahassee, Florida; Mike Jung, Hennepin Technical Centers, North Campus, Brooklyn Park, Minnesota; Fred LeMeisz, St. Petersburg Vocational Technical Institute, St. Petersburg, Florida; Valeria S. Mason, State Department of Education, Gainesville, Florida; Philip Panzarino, New York City Technical College, Brooklyn, New York; Richard Petrello, Withlacoochee Voca-

tional-Technical Center, Inverness, Florida; Patrick Sweeney, Johnson County Community College, Overland Park, Kansas; F. H. Waskey, University of Houston, Houston, Texas; J. William White, Pinellas County School System, St. Petersburg, Florida; and Ronald Zabkiewicz, South Technical Education Center, Boynton Beach, Florida.

Thanks are also due to Jim Smith for his fine photography, to Steve Jenkins for his excellent drawings, to Emanuel Darmanin and the staff of Vallette Pastry Corporation for providing some masterfully decorated cakes for this book's illustrations, to my wife Mary Ellen Griffin for her sharp, critical judgment and her moral support, and to my editor Judy Joseph and the rest of the staff at John Wiley for their creativity, patience, and hard work.

TABLE OF CONTENTS

Chapter One Basic Principles	1	Fillings and Toppings	61
Formulas and Measurement	2	Makeup Techniques	66
Mixing and Gluten Development	6		
The Baking Process	7	Chapter Five Quick Breads	85
Staling	8	Mixing and Production Methods	86
		Formulas	88
Chapter Two Ingredients	11		
Wheat Flour	12	Chapter Six Doughnuts, Fritters, Pancakes, and Waffles	99
Other Flours, Meals, and Starches	14	Doughnuts	100
Sugars	14	Fritters	104
Fats	16	Pancakes and Waffles	106
Milk and Milk Products	18		
Eggs	21	Chapter Seven Basic Syrups, Creams, Icings, and Sauces	113
Leavening Agents	23	Sugar Cooking	114
Fruits and Nuts	24	Basic Creams	115
Chocolate and Cocoa	26	Icings	123
Salt, Spices, and Flavorings	27	Dessert Sauces	131
Chapter Three Understanding Yeast Doughs	31	Chapter Eight Pastries	137
Yeast Product Types	32	Pie Doughs and Short Pastry	138
Steps in Yeast Dough Production	32	Tarts and Tartlets	142
Types of Dough-Making Processes	37	Puff Pastry	147
Controlling Fermentation	38	Eclair Paste	156
Bread Faults and Their Causes	40	Strudel and Phyllo	159
		Baked Meringues	164
Chapter Four Yeast Dough Formulas and Techniques	43		
Crisp-Crusted Bread Formulas	44	Chapter Nine Pies	169
Soft-Crusted Bread and Rye Bread Formulas	46	Assembly and Baking	170
Sourdough Formulas	51	Fillings	172
Sweet Dough and Rich Dough Formulas	54	Pie Faults and Their Causes	190
Rolled-in Dough Formulas	58		

Chapter Ten Cake Mixing and Baking 193

Mixing	194
Cake Formula Balance	199
Scaling, Panning, and Baking	201
Altitude Adjustments	203
Formulas	205

Chapter Eleven Assembling and Decorating Cakes 219

Assembling and Icing Simple Cakes	220
Basic Decorating Techniques	223
European-style Cakes	234

Chapter Twelve Cookies 247

Cookie Characteristics and Their Causes	248
Types and Makeup Methods	248
Mixing Methods	249
Panning, Baking, and Cooling	251
Petits Fours Secs	252
Formulas	253

Chapter Thirteen Miscellaneous Desserts 275

Fruit Desserts	276
Custards and Puddings	282

Bavarians and Mousses	292
Soufflés	298
Frozen Desserts	300

Chapter Fourteen Decorative Work and Display Pieces 311

Chocolate	312
Marzipan	314
Pastillage	317
Nougat	318
Boiled Sugar Work	319

Appendix One Metric Conversion Charts 325

Appendix Two Decimal Equivalents of Common Fractions 326

Appendix Three Approximate Volume Equivalents of Dry Foods 327

Appendix Four Temperature Calculations for Yeast Doughs 329

Appendix Five Equipment Checklist 331

Bibliography 334

Glossary 335

Index 341

RECIPE TABLE OF CONTENTS

Hard Rolls	44	Kugelhopf	56
Vienna Bread	44	Baba Savarin Dough	57
Italian Bread	45	Brioche	58
French Bread	45	Croissants	60
Whole Wheat French and Italian Breads	45	Danish Pastry	60
Pizza	45	Cinnamon Sugar	61
French Bread (Sponge)	46	Streusel or Crumb Topping	61
Country-style French Bread	46	Nut Streusel	61
White Pan Bread	47	Clear Glaze	61
Whole Wheat Bread	47	Date, Prune, or Apricot Filling	62
White Bread (Sponge)	47	Almond Filling I (Frangipane)	62
Soft Rolls	48	Almond Filling II (Frangipane)	63
Egg Rolls and Bread	48	Almond Filling III (Frangipane)	63
Raisin Bread	48	Lemon Filling	63
Cinnamon Bread	48	Cheese Filling	64
100% Whole Wheat Bread	48	Hazelnut Filling	64
Challah	49	Chocolate Filling	65
English Muffins	49	Poppy Seed Filling	65
Light American Rye Bread and Rolls	50	Honey Pan Glaze (for Caramel Rolls)	66
Water Bagels	50	Biscuits	88
Onion Rye	51	Buttermilk Biscuits	88
Onion Pumpnickel (Non-Sour)	51	Cheese Biscuits	88
Sour I	52	Currant Biscuits	88
Sour II	52	Herb Biscuits	88
Sour Rye	53	Biscuits (Creaming Method)	89
Pumpnickel	53	Corn Bread, Muffins, or Sticks	89
Sweet Roll Dough	54	Plain Muffins	90
American Rye II	54	Raisin Spice Muffins	90
Rich Sweet Dough	55	Blueberry Muffins	90
Stollen	55	Whole Wheat Muffins	90
Babka	56	Corn Muffins	90
		Corn Cheese Muffins	91
		Bran Muffins	91
		Crumb Coffee Cake	91

Muffins (Creaming Method)	92	Vanilla Pastry Cream	120
Chocolate Chip Muffins	92	Deluxe Pastry Cream	121
Blueberry Muffins	92	Pastry Cream Mousseline	121
Raisin Spice Muffins	92	Chocolate Pastry Cream	121
Scones	93	Coffee Pastry Cream	121
Steamed Brown Bread	93	Crème St. Honoré	121
Banana Bread	94	Ganache	122
Orange Nut Bread	94	Chocolate Mousse	123
Lemon Nut Bread	94	Fondant	124
Date Nut Bread	95	French Buttercream	126
Fruit Nut Bread Variations	95	Simple Buttercream	126
Popovers	96	Decorator's Buttercream	127
Soda Bread	96	Cream Cheese Icing	127
Old-Fashioned Gingerbread	97	Meringue-type Buttercream	127
Pain d'Épices	97	Plain Boiled Icing	127
Yeast-Raised Doughnuts	101	Marshmallow Icing	128
Cake Doughnuts	103	Chocolate Foam Icing	128
Chocolate Cake Doughnuts	103	Cocoa Fudge Icing	128
Doughnut Glaze	104	Vanilla Fudge Icing	128
Honey Glaze	104	Caramel Fudge Icing	129
Fritter Batter I	105	Quick White Fudge Icing I	129
Fritter Batter II	106	Quick Chocolate Fudge Icing	129
Pancakes	107	Quick Fudge Icing II	130
Waffles	107	Flat Icing	131
Buttermilk Pancakes and Waffles	108	Royal Icing	131
Gaufres (French Waffles)	108	Chocolate Sauce I	132
Crêpes	109	Chocolate Sauce II	133
Crêpes Normande	110	Melba Sauce	133
Banana Crêpes	110	Caramel Sauce	134
Crêpes with Jam	110	Hot Caramel Sauce	134
Glazed Crêpes	110	Clear Caramel Sauce	134
Crêpes Frangipane	110	Butterscotch Sauce	134
Crêpes Suzette	110	Hard Sauce	134
Simple Syrup	115	Sabayon	135
Dessert Syrup	115	Cold Sabayon	135
Whipped Cream	115	Zabaglione	135
Stabilized Whipped Cream	116	Flaky Pie Dough	140
Chocolate Whipped Cream	116	Mealy Pie Dough	140
Common Meringue	117	Enriched Pie Pastry	140
Chocolate Meringue	117	Short Dough (Sugar Dough)	141
Swiss Meringue	118	Almond Short Dough	141
Italian Meringue	118	Linzer Dough	141
Vanilla Custard Sauce (Crème Anglaise)	119	Graham Cracker Crust	142
Chocolate Custard Sauce	119	Apple Tart	145
Coffee Custard Sauce	119	Apple Custard Tart	145
		Plum, Apricot, Cherry, or Peach Tart	145

Pear Almond Tart	146	Lemon Chiffon Pie Filling	189
Fruit Tart with Pastry Cream	146	Lime Chiffon Pie Filling	189
Frangipane Tart	146	Orange Chiffon Pie Filling	189
Linzertorte	147	Pumpkin Chiffon Pie Filling	190
Puff Pastry	148	Pumpkin Cream Chiffon Pie Filling	190
Blitz Puff Pastry	150	Yellow Butter Cake	206
Eclair Paste	157	Upside Down Cake	206
Strudel Dough	159	Chocolate Butter Cake	206
Cheese Filling for Strudel	161	Brown Sugar Spice Cake	207
Cream Cheese Filling for Strudel	161	Carrot Nut Cake	207
Apple Filling for Strudel	162	Banana Cake	207
Baklava	163	Applesauce Cake	207
Japonaise Meringues	166	Old-Fashioned Pound Cake	208
Apple Pie Filling (Canned Fruit)	175	Raisin Pound Cake	208
Dutch Apple Pie Filling	175	Chocolate Pound Cake	208
Cherry Pie Filling	175	Marble Pound Cake	208
Peach Pie Filling	176	Sheet Cake for Petits Fours	208
Pineapple Pie Filling	176	Fruit Cake	208
Blueberry Pie Filling (Frozen Fruit)	176	Almond Cake for Petits Fours	210
Apple Pie Filling	177	Sacher Mix	210
Cherry Pie Filling	177	White Cake	211
Raisin Pie Filling	177	Yellow Cake	211
Rhubarb Pie Filling	178	Strawberry Cake	211
Fresh Apple Pie Filling	178	Cherry Cake	211
Fresh Strawberry Pie Filling	179	Devil's-Food Cake	212
Old-Fashioned Apple Pie Filling	180	Angel Food Cake	212
Custard Pie Filling	181	Chocolate Angel Food Cake	212
Coconut Custard Pie Filling	181	Coconut Macaroon Cupcakes	212
Pumpkin Pie Filling	182	Pound Cake (High-Ratio)	213
Sweet Potato Pie Filling	182	Yellow Chiffon Cake	213
Squash Pie Filling	182	Chocolate Chiffon Cake	213
Pecan Pie Filling	183	Orange Chiffon Cake	214
Vanilla Cream Pie Filling	184	Sponge Roll I (Swiss Roll)	214
Coconut Cream Pie Filling	184	Chocolate Sponge Roll I (Chocolate Swiss Roll)	214
Banana Cream Pie Filling	184	Dobos Mix	214
Chocolate Cream Pie Filling I	184	Genoise (Butter Sponge)	215
Chocolate Cream Pie Filling II	185	Chocolate Genoise	215
Butterscotch Cream Pie Filling	185	Sponge for Seven-Layer Cake	215
Lemon Pie Filling	185	Almond Sponge I	215
Strawberry Chiffon Pie Filling	187	Almond Sponge II	215
Strawberry Cream Chiffon Pie Filling	187	Sponge Roll II	215
Raspberry Chiffon Pie Filling	187	Chocolate Sponge Roll II	215
Pineapple Chiffon Pie Filling	187	Jelly Roll Sponge	216
Chocolate Chiffon Pie Filling	188	Milk and Butter Sponge	216
Chocolate Cream Chiffon Pie Filling	188		

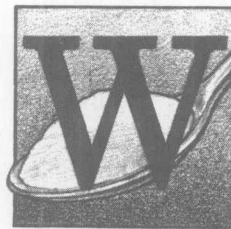
Icebox Cookies	253	Raisin Spice Bars	272
Butterscotch Icebox Cookies	253	Apple Crisp	276
Nut Icebox Cookies	253	Peach, Cherry, or Rhubarb Crisp	276
Chocolate Icebox Cookies	253	Fruit Cobbler	277
Fancy Icebox Cookies	254	Apple Betty	277
Oatmeal Raisin Cookies	256	Poached Fruit (Fruit Compote)	278
Chocolate Chip Cookies	256	Poached Apples, Pears, or Pineapple	278
Brown Sugar Nut Cookies	257	Pears in Wine	278
Sugar Cookies	257	Poached Peaches	278
Brown Sugar Rolled Cookies	257	Peaches in Wine	278
Chocolate Rolled Cookies	257	Poached Apricots, Plums, or Nectarines	278
Almond Slices	258	Poached Cherries	278
Rich Shortbread	258	Poached Dried Fruit	279
Basic Short Dough for Cookies	259	Fresh Fruit Salad	279
Jam Tarts	259	Apple Charlotte	279
Almond Crescents	259	Applesauce	280
Peanut Butter Cookies	260	Cherry Clafouti	280
Cinnamon Cookies	260	Apple Clafouti	281
Chocolate Cinnamon Cookies	260	Raspberry or Cherry Gratin	281
Nut Cookies	261	Blanc Mange English Style	283
Speculaas	261	Baked Custard	285
Pfeffernüsse	262	Crème Caramel	285
Butter Tea Cookies	262	Vanilla Pots de Crème	285
Fancy Tea Cookies	263	Chocolate Pots de Crème	285
Sandwich-type Cookies	263	Rice Pudding	286
Chocolate Tea Cookies	263	Raisin Rice Pudding	286
Gingerbread Cookies	263	Rice Condé	286
Gingersnaps	264	Tapioca Pudding	287
Spritz Cookies	264	Bread and Butter Pudding	287
Lemon Cookies	265	Cabinet Pudding	287
Lime Cookies	265	Cream Cheesecake	288
Langues-de-Chat	265	Cheesecake with Baker's Cheese	289
Ladyfingers	266	French Cheesecake	289
Coconut Macaroons (Meringue Type)	266	Christmas Pudding	290
Madeleines	267	Steamed Blueberry Pudding	291
Almond Macaroons	267	Steamed Raisin Spice Pudding	291
Amaretti	267	Steamed Chocolate Almond Pudding	292
Chocolate Macaroons	268	Vanilla Bavarian Cream	294
Chocolate Macaroons (Chewy Type)	268	Chocolate Bavarian Cream	294
Chocolate Macaroons	268	Coffee Bavarian Cream	294
Almond Tuiles	269	Strawberry Bavarian Cream	294
Nut Squares	269	Raspberry Bavarian Cream	294
Swiss Leckerli	270	Liqueur Bavarian Cream	295
Brownies	271	Praline Bavarian Cream	295
Florentines	272	Diplomat Bavarian Cream	295
		Orange Bavarian Cream	295

Charlotte Russe	295	Praline	304
Charlotte Royale	295	Fruit	304
Fruit Bavarian	296	Bombe or Parfait with Fruit	305
Rice Imperatrice	296	Bombe or Parfait with Nuts, Sponge Cake, or	
Chocolate Mousse	297	Other Ingredients	305
Cream Cheese Bavarian	298	Syrup for Bombes	305
Icebox Cheesecake	298	Frozen Mousse I (Meringue Base)	306
Vanilla Soufflé	299	Liqueur Mousse	307
Chocolate Soufflé	300	Chocolate Mousse	307
Lemon Soufflé	300	Apricot Mousse	307
Liqueur Soufflé	300	Banana Mousse	307
Coffee Soufflé	300	Lemon Mousse	307
Praline Soufflé	300	Chestnut Mousse	307
Basic Bombe Mixture I	303	Raspberry or Strawberry Mousse	307
Basic Bombe Mixture II	304	Frozen Mousse II (Syrup and Fruit Base)	308
Vanilla	304	Frozen Mousse III (Custard Base)	308
Chocolate	304	Marzipan	315
Liqueur	304	Pastillage	317
Coffee	304	Nougat	319

BASIC PRINCIPLES

After studying this chapter, you should be able to:

1. Explain the importance of weighing baking ingredients.
2. Use a baker's balance scale.
3. Use formulas based on baker's percentages.
4. Explain the factors that control the development of gluten in baked products.
5. Explain the changes that take place in a dough or batter as it bakes.
6. Prevent or retard the staling of baked items.



When you consider that most bakery products are made of the same few ingredients—flour, shortening, sugar, eggs, water or milk, and leavenings—then you should have no difficulty understanding the importance of accuracy in the bakeshop, since slight variations in proportions or procedures can mean great differences in the final product.

In this chapter you are introduced to bakeshop production through a discussion of the kinds of measurements and mathematical calculations necessary for baking and of the basic processes common to nearly all baked goods.

FORMULAS AND MEASUREMENT

Bakers generally talk about “formulas” rather than “recipes.” If this sounds to you more like a chemistry lab than a food production facility, it is with good reason. The bakeshop is very much like a chemistry laboratory both in the scientific accuracy of the procedures and in the complex reactions that take place during mixing and baking.

Measurement

Ingredients are almost always weighed in the bakeshop, rather than measured by volume because measurement by weight is more accurate. Accuracy of measurement, as we have said, is essential in the bakeshop. Unlike homemakers’ recipes, a professional baker’s formula will not call for 6 cups of flour, for example.

To demonstrate to yourself the importance of weighing rather than measuring by volume, measure a cup of flour in two ways: a) Sift some flour and lightly spoon it into a dry measure. Level the top and weigh the flour. b) Scoop up some unsifted flour into the same measure and pack it lightly. Level the top and weigh the flour. Note the difference. No wonder home recipes can be so inconsistent!

The baker’s term for weighing out ingredients is *scaling*.

The following ingredients, and only these ingredients, may sometimes be measured by volume, at the ratio of *one pint per pound* or *one liter per kilogram*:

Water

Milk

Eggs

Volume measure is often used when scaling water for small or medium-sized batches of bread. Results are generally good. However, whenever accuracy is critical, it is better to weigh. This is because a pint of water actually weighs slightly more than a pound, or approximately 16.7 ounces. (This figure varies with the temperature of the water.)

For convenience, volume measures of liquids are frequently used when products other than baked flour goods — such as sauces, syrups, puddings, and custards — are being made.

Units of Measure

The system of measurement used in the United States is very complicated. Even though we have used the system all our lives, we still sometimes have trouble

remembering things like how many fluid ounces are in a quart or how many feet in a mile.

Table 1.1 lists equivalents among the units of measure used in the bakeshop and kitchen. You should memorize these thoroughly, so you don’t have to lose time making simple calculations. Table 1.2 lists the abbreviations used in this book.

TABLE 1.1 **Units of Measure —
U.S. System**

Weight	
1 pound	= 16 ounces
Volume	
1 gallon	= 4 quarts
1 quart	= 2 pints
	or
	4 cups
	or
	32 (fluid) ounces
1 pint	= 2 cups
	or
	16 (fluid) ounces
1 cup	= 8 (fluid) ounces
1 (fluid) ounce	= 2 tablespoons
1 tablespoon	= 3 teaspoons
Length	
1 foot	= 12 inches

Note: One fluid ounce (often simply called “ounce”) of water weighs one ounce. One pint of water weighs approximately one pound.

TABLE 1.2 **Abbreviations
of U.S. Units
of Measure
Used in This
Book**

Pound	lb
Ounce	oz
Gallon	gal
Quart	qt
Pint	pt
Fluid ounce	fl oz
Tablespoon	tbsp
Teaspoon	tsp
Inch	in

The Metric System

The United States is the only major country that uses the complex system of measurement we have just described. Other countries use a much simpler system called the metric system. Someday we will be using the

metric system in our bakeshops and kitchens, so it is important for us to become familiar with it.

Basic units

In the metric system, there is one basic unit for each type of measurement:

The *gram* is the basic unit of weight.

The *liter* is the basic unit of volume.

The *meter* is the basic unit of length.

The *degree Celsius* is the basic unit of temperature.

Larger or smaller units are simply made by multiplying or dividing by 10, 100, 1000, and so on. These divisions are expressed by *prefixes*. The ones you will need to know are:

kilo = 1000

deci = $\frac{1}{10}$ or 0.1

centi = $\frac{1}{100}$ or 0.01

milli = $\frac{1}{1000}$ or 0.001

Once you know these basic units, there is no longer any need for complicated tables such as Table 1.1. Table 1.3 summarizes the metric units you will need to know in the bakeshop.

Converting to metric

Most people think that the metric system is much harder to learn than it really is. This is because they think about metric units in terms of U.S. units. They read that there are 28.35 grams in an ounce, and they are immediately convinced that they will never be able to learn metrics.

Do not worry about being able to convert U.S. units into metric units and vice versa. This is a very important point to remember, especially if you think that the metric system might be hard to learn.

The reason for this is very simple. You will usually be working in either one system or the other. You will rarely, if ever, have to convert from one to the other. (An exception might be if you have equipment based on one system, and you want to use a formula written in the other.) Many people today own imported cars and repair them with metric tools, without ever worrying about how many millimeters are in an inch. Similarly, when American bakeshops and kitchens change to the metric system, you will use scales that measure in grams and kilograms, volume measures that measure in liters and deciliters, and thermometers that measure in degrees Celsius. And you will use formulas that indicate these units. You will not have to worry about how many grams are in an ounce. All you will have to remember is the information in Table 1.3.

To become accustomed to working in metric units, it is helpful to have a feel for how large the units are. The following rough equivalents may be used to help you visualize metric units. They are not exact conversion factors. (When you need exact conversion factors, see Appendix One.)

A *kilogram* is slightly more than 2 pounds.

A *gram* is about $\frac{1}{16}$ ounce. A half teaspoon of flour weighs a little less than a gram.

A *liter* is slightly more than a quart.

A *deciliter* is slightly less than a half cup.

A *centiliter* is about 2 teaspoons.

TABLE 1.3 **Metric Units**

Basic units

Quantity	Unit	Abbreviation
Weight	gram	g
Volume	liter	l
Length	meter	m
Temperature	degree Celsius	° C

Divisions and multiples

Prefix/Example	Meaning	Abbreviation
kilo-	1000	k
kilogram	1000 grams	kg
deci-	$\frac{1}{10}$	d
deciliter	0.1 liter	dl
centi-	$\frac{1}{100}$	c
centimeter	0.01 meter	cm
milli-	$\frac{1}{1000}$	m
millimeter	0.001 meter	mm