

Putting Food By

More than
550,000
copies
sold!

4th Edition, Newly Revised

**NEW MATERIAL
ON:**

freezing for
the microwave

•
making
Christmas presents

•
preserving and
canning for the
small family

•
canning
convenience foods

•
dietary tips
to minimize
salt and sugar

The classic work
on the best ways to can,
freeze, pickle, dry, cure,
and preserve. Includes the
newest canning procedures
and processing times
and many new recipes.

**Janet Greene
Ruth Hertzberg
Beatrice Vaughan**

FOURTH EDITION, NEWLY REVISED

**PUTTING
FOOD
BY**

**JANET GREENE
RUTH HERTZBERG
BEATRICE VAUGHAN**

A JANET GREENE BOOK

THE STEPHEN GREENE PRESS
LEXINGTON, MASSACHUSETTS

THE STEPHEN GREENE PRESS, INC.

Published by the Penguin Group

Viking Penguin Inc., 40 West 23rd Street, New York, New York 10010, U.S.A.

Penguin Books Ltd, 27 Wrights Lane, London W8 5TZ, England

Penguin Books Australia Ltd, Ringwood, Victoria, Australia

Penguin Books Canada Ltd, 2801 John Street, Markham, Ontario, Canada L3R 1B4

Penguin Books (N.Z.) Ltd, 182-190 Wairau Road, Auckland 10, New Zealand

Penguin Books Ltd, Registered Offices: Harmondsworth, Middlesex, England

This fourth edition of *Putting Food By* first published in 1988 in simultaneous hardcover and paperback editions by The Stephen Greene Press, Inc.

Published simultaneously in Canada

Distributed by Viking Penguin Inc.

Copyright © The Stephen Greene Press, Inc., 1973, 1975, 1982, 1988

All rights reserved

Publishing history of *Putting Food By*:

First edition published January 1973

Second edition published July 1975

Third edition published July 1982

Some parts of Chapter 21, "Drying," appeared in different form in the August 1981 issue of *Blair & Ketchum's Country Journal*.

Photographs credited to Jeffery V. Baird are copyright © 1987 by Jeffery V. Baird and reproduced with permission.

Designed by Deborah Schneider

Printed in the United States of America by Haddon Craftsmen

Set in Times Roman and Futura by Maryland Composition

Produced by Unicorn Production Services, Inc.

Library of Congress Cataloging-in-Publication Data

Greene, Janet

Putting food by.

Hertzberg's name appears first on the previous ed.

"A Janet Greene book."

Includes bibliographical references and index.

1. Food—Preservation. I. Hertzberg, Ruth.

II. Vaughan, Beatrice. III. Title.

TX601.G74 1988 641.4 87-34262

ISBN 0-8289-0644-0

ISBN 0-8289-0645-9 (pbk.)

Except in the United States of America, this book is sold subject to the condition that it shall not, by way of trade or otherwise, be lent, re-sold, hired out, or otherwise circulated without the publisher's prior consent in any form of binding or cover other than that in which it is published and without a similar condition including this condition being imposed on the subsequent purchaser.

FOURTH EDITION

PUTTING FOOD BY

Decent mention of all the distinguished food scientists who helped with this Fourth Edition would be a Who's Who in home food preservation in the United States and Canada. They are in Washington, D.C., and Ottawa; in each state's Cooperative Extension Service, and in each province's Ministry of Agriculture and Food; and continue out to all county agents, Extension Home Economists and Master Food Preservers, and informal groups that reach into our homes.

We, and all like-minded people everywhere, are beholden to them and salute them.

—JG

CONTENTS

1. What Is It?	1
2. Why Foods Spoil	3
3. Altitude and Metrics	11
4. Fair Warning	21
5. Common Ingredients and How to Use Them	26
6. The Canning Methods	41
7. Canning Fruits	83
8. Canning Tomatoes	114
9. Canning Vegetables	124
10. Canning Meats	146
11. Canning Seafood	159
12. Canning Convenience Foods	170
13. Getting and Using a Freezer	185
14. Freezing Fruits	195
15. Freezing Vegetables	212
16. Freezing Meats and Seafood	225
17. Freezing Convenience Foods	235

18. Jellies, Jams, and Other Sweet Things	254
19. Pickles, Relishes, and Other Spicy Things	290
20. Curing with Salt and Smoke	310
21. Drying	329
22. Root-Cellaring	361
23. Putting By Presents for Christmas	379
Appendix: Where to Find Things	395
Index	405

1

WHAT IS IT?



To “put by” is an old, deep-country way of saying to “save something you don’t use now, against the time when you’ll need it.” Putting food by is simply food preservation.

Who does it? Millions of households in the United States and Canada, for openers. Preserving food at home is prehistorical, though: drying and fermenting are the earliest known means, followed in very short order by salting and brining (pickling). Preserving with sugar came next, but much later. Home-canning is less than two centuries old, and deliberate deep-freezing is the youngest method used at home.

Nowadays every nation on earth practices its own forms of preservation family-by-family, but chances are that North Americans do more of it on a wider scale than householders in any other major region. One statistic will give an idea: in the last year that figures were available (at this writing, the year was 1985) experts in the field of preserving food at home estimated that in the United States alone \$310 million was spent on canning jars, lids, sugar, salt, pectin, and a modest proportion of spices.

There is no hocus-pocus about food preservation, no touchstone, no luck, no mystery. Food preservation is the protection of food from spoilage—period. Spoilage can mean unattractively over-the-hill, on to downright nasty, to finally—and most dangerously because sometimes it is not self-evident—deadly.

This book has been written to tell the lay person how to control spoilage or prevent it entirely, so that a full program/menu of foods can be harvested in a time of plenty and treated to be wholesome and available in a time of need.

Whether we are cooking dinner or canning tomatoes, we first clean the food, ridding it of external spoilers like dirt, blemishes, or infestations. We do the same thing in starting to preserve it. Next, we treat the unseen

causes of deterioration, chief among them being the enzymes, those remarkable substances programmed to make the food fulfill its ordained life cycle.

And finally we deal with the greater trouble-makers: the micro-organisms that can poison our food. These are stopped dead or destroyed outright by reducing the oxygen that most microbes need; by applying heat or radically decreasing the temperature (heat kills them, freezing holds them immobilized); by increasing acid (because virtually no microbial action occurs in strong-acid mediums); by decreasing the available water that they require.

George York of the University of California, Davis, gives the following examples of how these microbial controls are applied, thereby demonstrating the beauty of home-preservation of food. The preserving methods are: (1) making jams and jellies—lowering the available water, removing oxygen, applying heat, adding acid; (2) canning fruits and tomatoes—reducing oxygen (sealing jars), applying heat, relying on natural or added acid; (3) drying—taking away most of the available water; (4) canning vegetables and meats (both low-acid)—removing oxygen again, and applying *intense* heat; (5) freezing—inhibiting enzymatic action and radically lowering temperature; and (6) pickling—greatly increasing acidity beyond the tolerances of deadly micro-organisms.

PFB has said earlier, and says again, that anyone with the drive to preserve food has the gumption to want to do it right. No big deal: anyone who can ride herd on a backyard gas barbecue can follow the ways to preserve food safely.

2

WHY FOODS SPOIL



Everything in this chapter applies to every safe method of preserving food at home, as you will see as *PFB* describes each process for each individual food. Meanwhile here follow the basic principles that are amplified throughout the rest of the book. They are corralled here for ready reference because we feel so strongly that any newcomer to canning, freezing, making preserves, drying, root-cellaring, or curing can always keep the *How* of food safety in mind if the *Why* is clear and handy.

Four kinds of things cause spoilage in preserved food: (1) *enzymes*, which are naturally occurring substances in living tissues, and are necessary to complete growth and reproduction; and three types of microorganisms—(2) *molds*, (3) *yeasts*, and (4) *bacteria*. All these microorganisms are present in the soil, water, and air around us. They can be controlled adequately by care in choosing ingredients, scrupulous cleanliness in handling them, and faithful good sense in following the established safe procedures for putting food by at home.

CONVERSIONS FOR PUTTING FOOD BY

Do look at the conversions for metrics (with workable roundings-off) and for altitude—both in Chapter 3—and apply them.

How Enzymes Act

Nature has designed each plant or animal with the ability to program the production of its own enzymes, which are the biochemicals that help the organism to ripen and mature—in short, enzymes promote the organic

changes necessary to the life cycle of all growing things. However, their action is reversible: they can turn around and cause decomposition, thereby causing changes in color, flavor, and texture, and making food unappetizing.

Their action slows down in cold conditions, increases most quickly between around 85 to 120 degrees Fahrenheit/29 to 49 degrees Celsius, and begins to be destroyed at about 140 F/60 C. However, the heat resistance of enzymes in a vinegar-loaded—and hence strong-acid—food like pickles can be stiffer than the opposition inherent in bacteria or molds or yeasts in the same type of food. The natural enzymes in cucumbers are especially tough.

How Molds Act

Molds are microscopic fungi whose dry spores (seeds) alight on food and start growing silken threads that can become slight streaks of discoloration in food or cover it with a mat of fuzz.

It used to be felt that “a little mold won’t hurt you,” but modern research has disclosed that only the mold introduced deliberately into the “blue” cheeses like Roquefort, Gorgonzola, or Stilton is trustworthy. The others, as they grow in food, are capable of producing substances called mycotoxins, and some of them can be hurtful indeed.

In addition, molds eat natural acid present in food, thereby lowering the acidity that is protection against more actively dangerous poisons—but we’ll have more to say about this in a minute.

Molds are alive but don’t grow below 32 F/Zero C; they start to grow above freezing, have their maximum acceleration at 50–100 F/10–38 C, and then taper off to inactivity beginning around 120 F/49 C; they die with increasing speed at temperatures from 140–190 F/60–88 C.

How Yeasts Act

The micro-organisms we call yeasts are also fungi grown from spores, and they cause fermentation—which is delightful in beer, necessary in sauerkraut, and horrid in applesauce. As with molds, severe cold holds them inactive, 50–100 F/10–38 C hurries their growth, and 140–190 F/60–88 C destroys them.

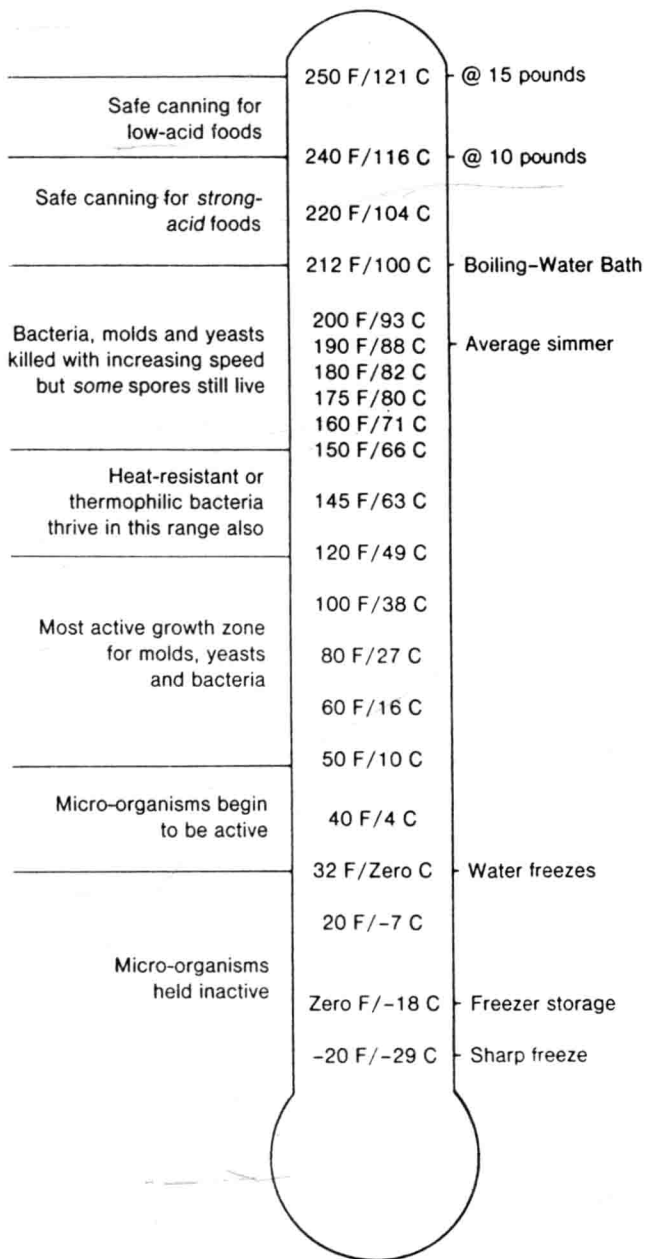
How Bacteria Act

Bacteria also are present in soil and water, and their spores, too, can be carried by the air. But bacteria are often far tougher than molds and yeasts are; certain ones actually thrive in heat that kills these fungi, and in some foods there can exist bacterial spores which can make hidden toxins.

TEMPERATURE vs. THE SPOILERS

F = Fahrenheit/C = Celsius

(At sea level to 1000 feet/305 meters altitude)



These spores will be destroyed in a reasonable time only if the food is heated at 240–250 F/116–121 C—at least 28 degrees higher than the boiling temperature for water AT SEA-LEVEL CLASSIFICATION, and obtainable only under pressure.

Of the disease-causing bacteria we're concerned with mainly, the most fragile are members of the genus *Salmonella*, which are transmitted by pets, rodents, insects, and human beings, in addition to existing in our soil and water. *Salmonellae* live in frozen food, are inactive up to 45 F/7 C, and are killed when held at 140 F/60 C, with destruction much quicker at higher temperatures.

The transmittable bacteria that cause "staph" poisoning, the *Staphylococcus aureus*, are responsible for the most common type of food-borne illness, the sort formerly attributed to "ptomaines." The prevalence of the poisoning is traced to the fact that most meats and dairy foods carry the bacterium but its presence is not known unless the foods are allowed to sit unrefrigerated at room temperature; it is specially widespread during the summer, when picnic food is spread out, and it is found in meats kept warm for serving to a crowd. The staph bacteria are halted in their tracks fairly easily at temperatures that kill *Salmonellae*. However, their toxin is destroyed only by many hours of boiling or 30 minutes at 240 F/116 C; the growth of the bacteria themselves is checked if the food is kept above 140 F/60 C or below 45 F/7 C.

Most dangerous of the bacteria is the tough *Clostridium botulinum*, which deserves a section of its own.

Botulism

The scientific books describe *C. botulinum* as a "soil-borne, mesophilic, spore-forming, anaerobic bacterium." Which, translated into everyday language, means that it is present in soil that is carried into our kitchens on raw foods, on implements, on clothing, on our hands—you name it. Next, it thrives best in the middle range of heat—beginning at about room temperature, 70 F/21 C, on up to 110 F/43 C. Next, it produces spores that are extremely durable: whereas the bacterium is destroyed in a relatively short time at 212 F/100 C, the temperature of briskly boiling water at sea level, the *spores* are not destroyed unless they are subjected to at least 240 F/116 C for a sustained length of time. And finally, the bacterium lives and grows in the *absence* of air (and also in a very moist environment; these combined conditions exist in a container of canned food).

This description does not mention the poison thrown off by the spores as they grow: the toxin is so powerful that one teaspoon of the pure substance could kill hundreds of thousands of people.

The grave illness caused by eating toxin present in preserved food is comparatively rare—rare in relation to the cases of "staph" or salmonellosis—but, unlike them, it is often fatal unless life-support care is given

right away. The symptoms are blurred vision, slurred speech, inability to hold up the head, and eventual respiratory arrest unless the victim is given help to breathe until the body can reverse the progress of the illness with the aid of medication. Between 1899 and 1949 the case-fatality rate of food-borne botulism was 60 percent. Since then it has declined markedly and steadily, thanks to quicker diagnosis and great improvements in intensive care at the outset. The *case* rate took a brief upward spurt in the mid-seventies, however, because a whole generation of people went in for food preservation, especially home-canning, without having the information or equipment needed for a safe product.

The botulinum toxin can be destroyed by brisk boiling in an open vessel. This is why, throughout this book, we warn people to boil hard—for the time demanded by its density and acidity—any home-canned food *about which there is the slightest safety problem*.

C. botulinum is held inactive at freezing and comes into its own at room temperatures, as mentioned earlier. Type E, the comparatively rare food-borne strain that is found on sea- and freshwater seafoods, begins to grow at refrigeration temperatures.

As with all micro-organisms, a moisture content of below 35 percent directly inhibits its growth.

DEALING WITH THE SPOILERS

Enter *pH*—the Acidity Factor

The strength of the acid in any food determines to a great extent which of the spoilage micro-organisms can grow in each food. Therefore acidity is a built-in directive that tells us what temperatures are necessary to destroy these spoilers within it, and make it safe to eat. (Heat alone, not natural acidity, controls the action of enzymes.)

Acid strength is measured on the *pH scale*, which starts with strongest acid at 1 and declines to strongest alkali at 14, with the Neutral point at 7, where the food is considered neither acid nor alkaline. The *pH* ratings appear to run backward, since the larger the number, the less the acid, but it may help to think of the ratings as like sewing thread: size 100 cotton thread is smaller (finer) than size 60.

The term “*pH*” is an abbreviation in chemistry for “potential of hydrogen,” traced by a sophisticated laboratory device. Crude indications

can be made by litmus-like test papers gettable from scientific supply houses, in the Yellow Pages.

pH RATINGS

This listing indicates in a general way the natural acid strength of common foods on the *pH* scale. Different varieties of the same food will have different ratings, of course, as will identical varieties grown under different conditions. The Food and Drug Administration now uses a *pH* rating of 4.6 as the dividing point that dictates the preserving techniques to use: most notably, which canning method is right. Thus foods rated 2.2 (some lemons) on up to 4.6 (virtually every tomato, but see Chapter 8) *PFB* calls *strong-acid*—inserting “strong” as a sharper workable distinction than merely “acid,” the customary designation. Foods over 4.6 up to Neutral 7 are always specified as *low-acid*. Foods over Neutral are *alkaline*.

Lemons	2.2–2.8	Beets	4.9–5.8
Gooseberries	2.8–3.0	Squash	5.0–5.4
Plums	2.8–4.0	Beans, string, green, wax	5.0–6.0
Apples	2.9–3.7	Spinach	5.1–5.9
Grapefruit	3.0–3.7	Cabbage	5.2–5.4
Strawberries	3.0–3.9	Turnips	5.2–5.6
Oranges	3.0–4.0	Peppers, green, bell	5.3
Rhubarb	3.1–3.2	Sweet potatoes	5.3–5.6
Blackberries	3.2–4.0 +	Asparagus	5.4–5.8
Cherries	3.2–4.2	Potatoes, white	5.4–6.0
Raspberries	2.8–3.6	Mushrooms	5.8–5.9
Blueberries	3.3–3.5	Peas	5.8–6.5
Sauerkraut	3.4–3.7	Tuna fish	5.9–6.1
Peaches	3.4–4.0 +	Beans, Lima	6.0–6.3
Apricots	3.4–4.4 +	Corn	6.0–6.8
Pears	3.6–4.4 +	Meats	6.0–6.9
Pineapple	3.7	Salmon	6.1–6.3
Tomatoes	4.0 + – 4.6	Oysters	6.1–6.6
Pimientos	4.6–5.2	Milk, cow's	6.3–6.6
Pumpkin	4.8–5.2	Shrimp	6.8–7.0
Carrots	4.9–5.4	Hominy	6.8–8.0

The Importance of Sanitation

Even though the spoilage micro-organisms in a food are rendered inactive by cold, they kick in with a vengeance as soon as they warm up.

Or, adequately preheated food can be contaminated by air-borne spores while it, or its unfilled container, stands around unprotected; and, unless it is cooled quickly or refrigerated, the new batch of spoilers can start growing—and growing fast. In this connection, it's interesting to trace back the notion that one must not put hot food in a refrigerator in order to cool it quickly. This idea is a holdover from the days of the wooden ice chest, which was kept cool by a big block of ice: of course the hot food warmed the inside of the ice chest, and there was a long lag before the ice (or what was left of it) could reduce the internal temperature of the cabinet to a safe-holding coolness. With modern refrigerators, though, a container of warm food merely causes the thermostat to kick on, and the cooling machinery goes to work immediately.

Another good way to deal with the spoilers is simply to wash them off the food as carefully as possible, and to keep work surfaces and equipment sanitary at every stage in the procedure. Food scientists refer to the "bacterial load" in describing the almost staggering rate of increase in bacteria if the food is handled in an unsanitary manner or allowed to remain at the optimum growing temperature for the spoilers. The procedures described in this book have been established after years of research by food scientists, and naturally there is an allowance made for extra micro-organisms that must be destroyed. But in many cases the food would have to be processed almost beyond palatability if the bacterial load had been allowed to increase geometrically to an enormous extent; the alternative of course would be that the treatment was not intensified, so the food spoiled after all.

Household Disinfectants

Boiling water can destroy many organisms *if* it is indeed boiling and *if* it has long enough contact with a contaminated surface after it has dropped a hair below the boiling point. Cleaning work surfaces with boiling water is a cumbersome exercise, though; better to use a good household disinfectant, which, for our money, is the liquid chlorine bleach on hand in most kitchens. An extremely strong solution of such bleach is 1:4, or 1 part bleach to each 4 parts water; this should do a virtually instantaneous job of destroying bacteria—the drawback is that if the water is hot the fumes are strong enough to be unpleasant, even dangerous in large amounts. For a less strong yet efficient mixture, see Bacterial Load in Chapter 4.

Chlorine dissipates after a while: when you can smell it in the air, it is dissipating. (The best way to rid big-city tap water of too much chlorine is merely to draw a pitcher/bottle of water and let it sit uncovered in the refrigerator for several hours.)

The carbolic-acid-based disinfectants, generally pine-scented, and always milky in solution, are likely to leave their flavor on surfaces.

Heat + Acidity = Canning Safety

Combining (1) the temperatures that control life and growth of spoilage micro-organisms with (2) the *pH* acidity factor of the foods that are particularly hospitable to certain spoilers, gives the conscientious home-canner this rule to go by: *it is safe to can strong-acid foods at 212 F/100 C (at sea level to 1000 feet) in a Boiling-Water Bath, but low-acid/nonacid foods must be canned at 240 F/116 C (again, at sea-level zone)—a temperature possible only in a Pressure Canner at 10 pounds pressure—if they are to be safe.*

Processing times vary according to acidity and density of the food concerned. Adequate temperature and length of processing time are given in the specific instructions for individual foods.