Christina Ward

Preservation

The Art and Science of Canning, Fermentation and Dehydration

process self-reliance series

Introduction by Nancy Singleton Hachisu

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Dedicated to the memory of
Lillian Ingersoll Ward and **Margaret Colling Niedziejko**

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Introduction

Preservation: The Art and Science of Nancy Singleton Hachisu

At first glance Christina Ward and I are polar opposites: She approaches preservation and fermentation as a scientist and I as a farm wife.

So why agree to write this foreword?

My first contact with Christina was when I came across her review of my own book (*Preserving the Japanese Way*) in Wink Books, February 12, 2016. My eyes scanned down the screen, absorbing her words, not without a little apprehension, given Ward's position as Master Food Preserver. But as I read Ward's open-minded discussion and analysis of my Japanese farmwife style of preservation, it was clear that she understood and did not judge. And this is ultimately what is most appealing and compelling about Ward's own book. Christina Ward is perhaps an anomaly: a food science educator who can be folksy and present information in a simple, yet not simplistic manner...and a damn good writer to boot.

In these last several years, especially the U.S., but truly the whole Western world has developed a mania for fermentation. Yet many people feel uncertain about where to start, or anxious about making dangerous mistakes that might even take lives (botulism!). Besides jams and marmalades, even I do not can fruits and vegetables, for wont of patience at what I always perceived to be an onerous process requiring strict temperature controls and sterilization. As a Master Food Preserver, Ward gives us the self-confidence and building blocks to go forward and try our hand at some of these age-old Western methods of canning, preserving, and dehydrating foods when they are plentiful. And armed with the knowledge of the basic principles of these styles of preservation, we can seek comfort in the surety that we will not be poisoning our families. Stated

more colorfully by Ward, "The mantra we live by: Don't kill anyone by accident! If you're going to kill someone, do it with purpose!"

I also deeply appreciate that Ward is a proponent of frequent hand washing (so often overlooked!) and of soap, water, and bleach over antimicrobial agents (banned in my kitchen). As a layperson I, mistakenly, thought it was the scientists who recommended antibacterial soaps (though perhaps it is just the companies that sell them).

That said, there are a few of Ward's guidelines to which I do not subscribe, namely the 18-month rule of thumb of when to toss preserved foods. In the Japanese countryside, we are much more liberal with expiration dates and essentially believe that preserved foods (such as miso and soy sauce) have an indefinite shelf life. Certainly, they get darker and more intense, but they don't actually decay. It is more of an aging process similar to wine. Granted, wine does go off, but some wine changes, for the better, over time, and 18 months is too short a window to set unilaterally.

Nonetheless: Ward's continuum to that 18-month rule is dead on. "Simply put: food begins to decay, then the germs move in." These are the kinds of chatty, folksy one-liners that serve to set us at ease as we read through some fairly hardcore scientific material. Normally, my eyes would start to gloss over, but that was never the case as I read this book. The writing is engaging, interesting, and, dare I say, enthralling. Ward coins funny names such as Jimmy Poopfinger, Germy McPathogen, and Sugar Sweetski to illustrate points—all serving not to diminish the importance of her message, but to lull us into a more relaxed and open frame of mind. Woven through the technical information are Ward's homilies and personal stories, which lighten and warm this potentially overwhelming material. Christina Ward is a born teacher who relates to her students and readers on an even plane, despite her fundamentally huge wealth of knowledge and experience.

But it is exactly in Christina's science that I gained clarity and perhaps more of a sense of the simplicity of the technical side of preservation than in reading headier, more esoteric treaties. I like her no-nonsense attack of this huge subject and how she trims it down to be not at all intimidating.

Preservation: The Art and Science of Canning, Fermentation and Dehydration is a primer for anyone seeking to comprehend the mechanics, chemistry, and biology of canning, fermenting, and dehydration.

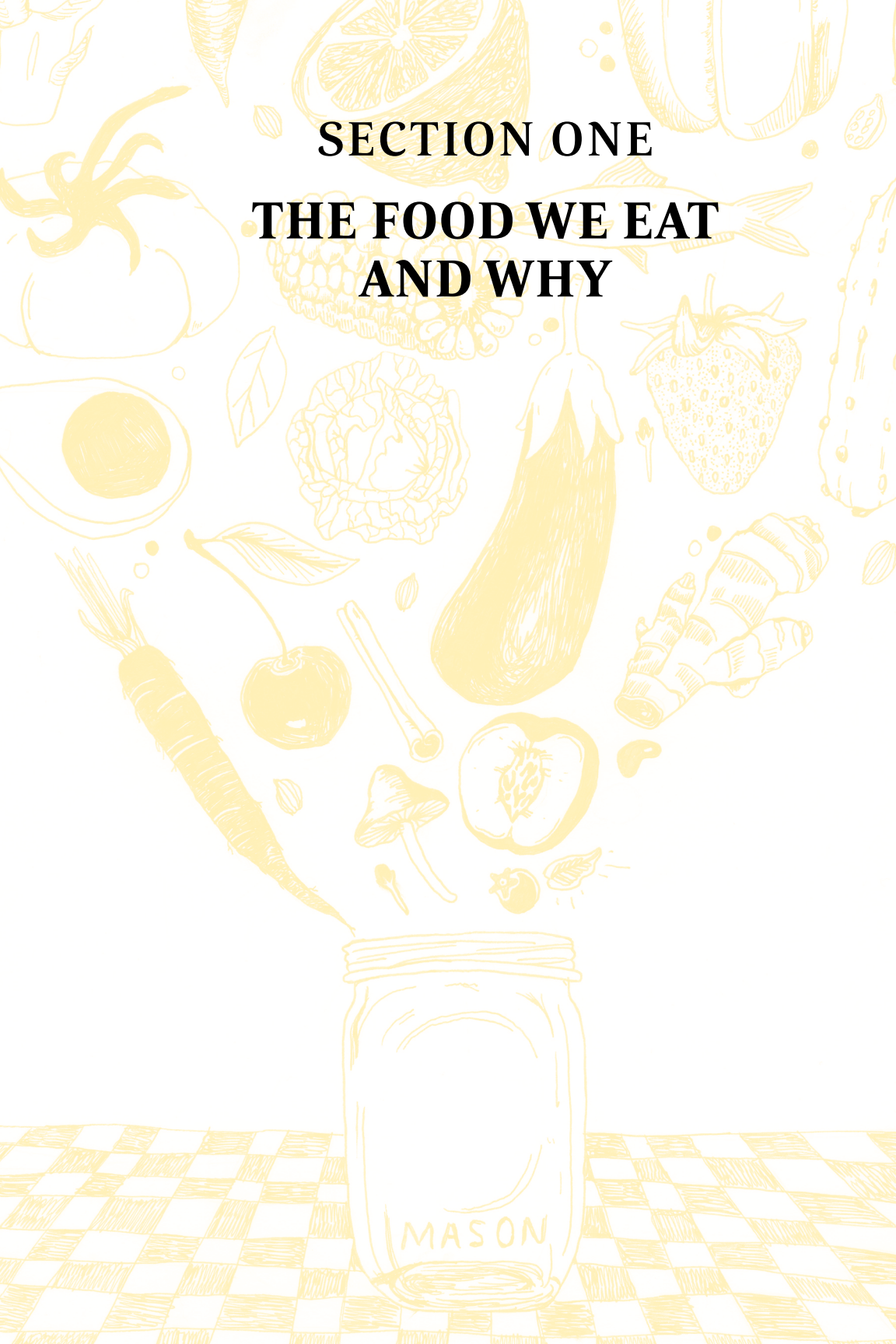
And not to be overlooked, the recipes are worth the cover price of the book—something I do not say lightly since my house is overrun by the hundreds of cookbooks in my library. Ward's recipes are formatted in a user-friendly manner that renders them unusually easy to follow at a glance, and makes this book an invaluable reference for a busy person who likes to cook. At this point in my life, I do not have to prepare a dish to intuitively recognize how it will taste. And as I read through Ward's recipes, I found myself wanting to make a majority of the ones I saw.

Between the understandable yet solid science, and the direct, no-nonsense, yet delicious-sounding recipes, it is without hesitation that I encourage you to read this book from cover to cover. You will walk away a more enlightened and knowledgeable person for it. As I did.

Nancy Singleton Hachisu
March 2, 2017

SECTION ONE

THE FOOD WE EAT AND WHY



Chapter One
Why Food Preservation

It is 5:30 p.m. and the pots of water are boiling as people file into the ramshackle Milwaukee Public Schools classroom. The school system co-opts the home economics rooms to serve the most pressing needs of the students. This is my favorite room, home to the school's Spanish classes. I smile when I see the neatly handwritten, laminated labels taped to every item declaring its name in Spanish. The rooms have met our critical needs: running water and a stove. Milwaukee's Recreation Department program has, since 1911, provided residents the opportunity to learn life enrichment skills. The European revolutions of 1848 brought displaced intellectuals and activists from Germany to Wisconsin and helped foster our unique history of dyed-in-the-pink Socialist governments that instilled a practical socialism based on improving the quality of life for all her residents.

Our faces reflect the history of our city and particular cultures; we're white, black, brown, young, old, and in-between. The classes are cheap. They each have the same goal in being here: learn how to preserve food. Young, eager eco-justice activists and urban farmers want to extend their harvests. More than one mustachioed biker wants to can large batches of killer salsa. A young mother wants jam for her child who cannot have refined sugar. An aging hippie eschews all chemical additives. Three twenty-something girls are going to start their own business immediately after they've taken the class; no, they've never preserved anything before. There are a few retirees who have fond memories of their grandparents but never learned how to preserve. And yes, there are apocalypse preppers who are desperately honing their skills that will help them survive the end of the world.

All are welcome.

We introduce ourselves. We set aside political ideologies. We talk about food. What do we love about it? What's our favorite thing to eat? What's the worst thing you ever ate? Who was the person in your life that sparked your interest in making and eating? As we share these memories of favorite foods prepared by special people, we shed our fear and inhibitions toward working together.

Growing up in 1970s–'80s Milwaukee, I had a foot in both the modern city and rural agrarian way of life. Like many Rust Belt industrial cities, Milwaukee was (and still is) a city of immigrants who came from Europe, Mexico, and from country homesteads throughout the surrounding Midwest and South to work in her burgeoning factories. Summers off from school for me and my classmates meant going back to work on the family farm or in the family garden. (Again with the Socialists; any city resident could and still can sign up for an allotment in a neighborhood community garden space.) I went to my grandmother's rural Jackson County farm.

I loved the old ways. I loved stories of Gramma's childhood. I loved the odd tales and personal foibles of survival and getting by. By the '70s and '80s, life was easier; my uncles changed the heating system from wood to propane, the plumbing was upgraded (no more outhouse), and a telephone was installed. After my grandfather's death in 1974, she stopped any actual farming and let the neighbors cultivate her fields in exchange for rides to town. Summers found the one-bedroom house built from recycled dynamite boxes filled to the literal rafters with cousins and uncles doing the work to keep the roofs on the house and barn. As kids, part of our work was helping Gramma in the acre-sized garden and with her craftwork. Out of many cousins, I was the one that took to the gardening, cooking, preserving, and making.

Spending time with her and the women who were her friends and neighbors harkened to a time long passed. I learned to quilt (short stitches), string and work a loom (lots of counting), pick wild blueberries (always leave some behind), cure boils (milk and sugar poultice), and preserve food. I was the kid who always asked Why. Knowing how to do something was never enough for me. I needed to understand how it worked, who discovered why, and why it works. As a teenager discovering punk rock and feminism, my eyes opened to the value of so-called 'women's work.' The making of things. Food preservation became more than a jar of pickles; it became a direct link to our matriarchal history.

Looking back now to the early 1990s and the rise of Third Wave feminism, music (specifically Riot Grrrl) is often cited as that moment in the cultural zeitgeist that birthed a new consciousness. Maybe so, but the DIY maker movement of the early 2000s has its roots in that same early 1990s period where women, like myself, worked to keep the old ways alive. Ours was a messy and oral tradition. Women sharing craft knowledge and recipes like a secret cabal, as the feminist and punk rock culture judged women 'in the kitchen' as embracing staid mainstream values and accepting repression. To admit you enjoyed making jam and baking cookies was tantamount to saying you were a fan of Ronald Reagan and Anita Bryant's anti-women's rights agenda.

I kept making pickles. And talking to women. Women from Sicily who made tomato sauce. A friend's Serbian auntie who made ajvar. My mother-in-law who made Polish-style crocked pickles. I found other women who shared my passion for preserving historical foodways. In 2011, after three solid years of besieging the State of Wisconsin, the powers that be finally agreed that Milwaukee County should have a Master Food Preserver. It meant that I would be trained and tested in the most scientifically up-to-date food preservation techniques and teach them to my community, and serve as 'expert' for

the nearly million residents of Milwaukee County and answer questions about jelly that won't set, scummy pickles, and slimy sauerkraut. Since finishing my initial training, I have taught thousands of people how to safely preserve food and have answered questions from folks all over the country. Teaching challenges me to continually learn and discover more about the Why and How of food preservation. This book is the distillation of what I have learned yet there is so much more to explore. I hope you do that.

Why Do You Want To Preserve Food?

Your personal journey to food preservation can begin at any time with any method. Many preservation traditions pass through families without anyone actually understanding what is happening to the food they're preserving! The universal language of science is our equalizer. There is value in understanding that the science of modern food preservation works to eliminate ALL opportunities for pathogens to grow and invade your body. Many food preservation techniques are scary for beginners because they lack the knowledge of why it works. It's not magic; it's science. There are historical food preservation techniques. There are European techniques that ignore the American safety standards, but in our classes and this book, we'll talk about techniques that are the safest for EVERYONE.

Each one of us is confronted daily with difficult choices about how we feed ourselves and our families. A multitude of outside stressors influence those decisions. Not everyone can acquire locally grown food. Not everyone has the capability or capacity to make a choice. In class, we talk about those challenges and present opportunities to discover foods in your neighborhood that you can preserve. We also share information about which big-box store has the lowest price on canning jars and preservation equipment. Change rarely comes in the form of a blinding light; it comes by making small adjustments to your regular routines.

I tend to indulge in bad puns and even worse jokes during classes. But I also will firmly tell you "stop!" if you're using a knife poorly or about to make a grave mistake that results in a spoilt batch of pickles. We spend three hours together and talk about everything. I have opinions about recycling (you should do it), composting (do that too), and food waste (don't do that) and share them in class and this book. I also have personal taste preferences and I'm allergic to fish. I'll be honest about those biases when talking about preservation methods and specific recipes.

But why should you listen to me?

As mentioned earlier, I'm the Master Food Preserver for my county. What does that mean? It means I'm one of you, your neighbor...with rarified and specialized training.

In the mid-1800s, most colleges and universities were private schools. Mainly on the Eastern seaboard, these schools could not, nor would not, serve the needs of the citizens of the exponentially growing United States. As the country seized lands and fought the wars of the Westward Expansion, the new territories, and states were left nearly lawless and without any systems for higher education. In 1864, legislation was passed to mandate the founding of colleges in the new states. These colleges would be different from the elite private schools of the East. They would focus on agriculture, sciences, and engineering, in addition to the traditional English system of liberal arts. The schools would be funded by taxes for the benefit of all citizens. Collectively, they became known as the Land-Grant Colleges.

For the newly formed states west of the Ohio River Valley, this meant that the children of the homesteaders could afford and have access to higher education. No prejudice would exist between the sons of the immigrants or the daughters of the slaves. Their mission was more than education; it was to do scientific research to advance agriculture and engineering beyond academia, and disseminate it to the citizens who paid for it. This mission birthed the concept of University Extension Agents. Agents in every discipline worked with university scientists to share knowledge and the latest scientific findings on topics ranging from soil conditions to animal husbandry to food preservation.

Extension Agents were (and still are) assigned by county. Depending on a particular specialty of a university or geographic area, more agents would be available for assistance. If you were a potato farmer and having issues with blight in 1910, you mailed your soil and potato samples to the Extension office, and they would test it and give you advice on how to improve your yields. If you ran an egg farm, an Extension agent could visit your farm and help sex your chicks. That sounds slightly odd in a modern urban context, but to an egg farmer, separating pullets from cockerels is serious business, because no rooster has ever laid an egg.

And, of course, if you were struggling with how to pickle beets (or eggs), you contacted your extension agent who specialized in food preservation issues—the Master Food Preserver. Though awkwardly named, Master Food Preservers remain prominent members of the University Extension Agents corps. We undergo training in food safety and food preservation science. We make a commitment to our community to teach, advise, and assist our neighbors in the safest and most scientifically sound methods of food preservation,

as developed and discovered by a consortium of colleges. The school where I undertook my Master Food Preservation training, the University of Wisconsin-Madison, specializes in microbiological and equipment research and testing. The University of Washington has a focus on fish preservation and the University of Colorado on wild game preservation. The Center for Home Food Preservation is headquartered at the University of Georgia-Athens; they act as the 'clearinghouse' for current research. As an MFP, I have access to and use the collective expertise of these scientists to give my students (and now readers) the most current and scientifically tested information.

This is critical: up-to-date and scientifically tested information.

The resurgent popularity of home food preservation has presented challenges to the participating university agricultural extension programs. Agriculture extension agents still do soil testing and schools are still working with producers to improve their crops, although the scope has shifted with time. Scientists, who once advocated for chemical pesticides, now are researching symbiotic pest control. With a better understanding of the danger of refined sugar, food scientists are testing the safety of natural sweeteners for use in preserved foods. The advances in understanding the digestive functions of the human body have moved the science of food preservation forward dramatically in the past 30 years. We still have much to learn.

We've been working to understand the foods we consume since we began eating. Guaranteed in every class I've taught, there is one person who has the lightbulb moment of "Who thought of eating that?" That question is the beginning of food science. Now it encompasses an exhaustive field of study, including nutrition, plant, animal, and pathogen behaviors, and human systems that derive energy from foods.

History attributes the first science-based food preservation discoveries to Nicolas Appert in the early 1800s. Though Appert may have been the first to note his experiments, after Napoleon's decree to find a better way to feed his armies, the act of humanity preserving food for later consumption is as old as humanity itself. Native American *pemmican* is essentially a beef and fruit dried jerky. Inuit peoples keeping carcasses in snow caves discovered refrigeration. Arab women slathered fruits in honey to prevent pathogens from invading.

Our ancestors learned through experimentation and passed along what worked for them. We do the same thing today, but often to our detriment because we fail to understand why we're doing it. We can learn and honor the 'old ways' of preserving foods, but we must figure out why such methods work. Accepting that modern science helps us better understand how our bodies intake and process foodstuff is a great first step.

As eaters, as consumers, as humans, we strive to educate ourselves about various food choices. We can choose to spend our hard-earned money on locally grown produce. If we have arable land, we can opt to grow our vegetables. But we must not fall prey to the passive righteousness of judgment toward others' choices. The modern American way of eating has blurred the reality of oppositional choices. In Milwaukee, corner stores, the domain of Flamin' Hot Cheetos and Coke, are working with neighborhood urban farms to stock fresh produce. The modern food landscape is nuanced.

Learning the skills of food preservation is a practical way to connect to your cultural history and discover new ways to eat. The concepts in this book are exactly as I present them in classes. You won't need an advanced degree in microbiology, just some common sense.

First lesson: Understand what you are doing and why you're doing it. Food preservation is not exactly cooking, though it has elements of cooking. In cooking, you make a mistake, and your dish is burned, ruined, or rendered inedible. Make an error in food preservation, and you'll kill someone. (Or make them very sick.) **The mantra we live by: Don't kill anyone by accident! If you're going to kill someone, do it with purpose!**

Farm work is a back-breaking, filthy, and often thankless job. Sure, ***Modern Farmer*** *Magazine is the high-gloss fantasy of pastoral farming, but the reality is that the majority of all foods we consume are grown, harvested, packaged, and transported by workers barely eking out survival. Sunup to sundown. No breaks. Most of us wouldn't last an hour.*

Chapter Two

What Are We Preserving Against?

We use the word 'preservation' to mean an extension of usability. It does not mean that food will last forever. I have heard all too many stories of families cleaning out Grandma's house and finding jars of peaches from 1972 and then wondering if they can eat them. No! All food preservation methods and techniques extend the usability of a foodstuff anywhere from a few weeks up to 18 months. There is no good reason to eat any preserved food older than 18 months. If you have items over one year old in your pantry, you need to better manage your inventory. (The exception to this rule of thumb is specifically aged items, like cheddared cheeses.)

Knowing what happens to food when it is harvested helps us understand why preservation means extension, not permanence. As soon as any living thing is deprived of life, it begins to decay. It doesn't matter if it's a picked fruit or a felled deer; as soon as life is over, the cells break down. This state is "enzymatic decay," meaning the enzymes which comprise the proteins of the fruit, vegetable, or animal have been deprived of their energy source and are now dying. Signs of this decay are discoloration and softening.

In some foods, a slight decay is desirable. Cellular breakdown in fruits concentrates sugars, building an enhanced sweetness. An overly ripe banana is an excellent example of how a small amount of decay adds flavor. It is important to understand that enzymatic decay is NOT the same as bacteria, yeasts, mold, or spore population growth. Though, when enzymatic decay begins, microbiological growth quickly follows.

Simply put: food begins to decay, then the germs move in.

The primary method of food preservation involves stopping enzymatic decay. Only one thing will do this: temperature. Whether it be high or low temperature, applying extreme temperature change to food will halt the natural decay. We do this by refrigerating fresh items to delay the decay for short-term preservation. Freezing delays the inevitable decay for a bit longer. A high temperature, i.e. cooking, also stops the enzymatic decay of the items we eat. But slowing and stopping decay is only one small part of the process.

The second, more critical element that defines food preservation is the elimination and prevention of pathogens.

Pathogens are the all-encompassing shorthand to describe the myriad bacteria, spores, yeasts, molds, and viruses that cause harm to the human body. In and of themselves, they are just like us: a small creature trying to survive and replicate. When they are introduced into the ecosystem of the human body, watch out—these are the 'germs' that make people ill and are the challenge to food preservationists.

Good bacteria, yeasts, and spores also exist. These are the microscopic populations that, when guided and nurtured, turn milk into cheese and yogurt. Bacteria are what turn cabbage into sauerkraut. Yeast makes fruit juice into wine. One method of food preservation is the active cultivation of these good bacteria in foodstuffs: fermentation. Any time you read of something having 'probiotics,' it means it contains a living micro-organism that can be beneficial to your gut biome. What is a gut biome? Essentially, you are a mini-ecosystem that plays host to a variety of bacteria, yeasts, and viruses. (We also host mites, worms, and other types of creatures, but let's not gross ourselves out too much.)

Sorting Out The 'Good' From The 'Bad.'

There are two types of microbes: aerobic (they need oxygen) and anaerobic (they *don't* need oxygen). All pathogens are symbiotic to humans; their ideal conditions for thriving are similar to our own. Aerobic microbes need the same things we do to survive: moisture, a preferred temperature range, a preferred alkaline-acidity range, and oxygen. Anaerobic bacteria need moisture, temperature, alkaline-acidity range, but not oxygen. Anaerobic microbes are more deadly to humans and harder to preserve against.

Microorganisms outnumber us. Depending on your outlook on the world, people are either marvelously adaptive or very hard to kill. Our bodies have a built-in system for combatting invasive microorganisms that cause harm to the physical body. There are, however, some organisms that the human body cannot resist. Of course, these are the ones that will kill you, or at the very least, make you so sick you'll wish you were dead.

One of the worst is *Clostridium botulinum*, the anaerobic bacterium that causes botulism. When it is alive and replicating in a human host, it releases fast-acting neurotoxins that kill an adult in about 48 hours. We know from extensive scientific study and testing that these bacterial spores will not propagate nor produce the botulinum toxin when exposed to high-acid environments and prolonged high-heat conditions.

The others on the bad list: *E. coli (Escherichia coli O157: H7), Listeria (Listeria monocytogenes)*, and the all too common *Salmonella (Salmonella enterica)*. Another pathogen enjoying renewed popularity due to the consumption of improperly handled raw chicken or raw milk is *Campylobacter (Campylobacter jejuni, C. lari, C. coli)*. All of these microorganisms are considered pathogenic and will make a human body very ill. In a person with a compromised immune system due to age or other chronic health issues, these pathogens can kill.

I cannot stress this enough: **altering food to make it inhospitable to pathogens is the core tenet of food preservation**. Understanding the conditions that foster pathogen growth is the secret to both safe eating and safe food preservation. Just as you wouldn't want Jimmy Poopfinger as the line cook at your favorite restaurant, you want to make sure that you're following the safest of food handling procedures at home.

Your Body as an Ecosystem

Recent and ongoing studies about how the human gut operates have shed light on many of the issues we face in preserving foods. I am often asked by people who grew up eating incorrectly preserved foods why they didn't get sick, or why should they change their ways if the 'old way' didn't make them ill? Understanding the human biome answers these questions.

We all grew up somewhere. Maybe a city. Maybe a rural area. I grew up in the city of Milwaukee but spent my summers on my grandmother's farm in rural Osseo, Wisconsin. I distinctly remember being 'sick' for the first few days of being on the farm. Was it a particular pathogenic germ? Probably not. What we now know is that your gut biome, the bacteria and flora that live in your body, is as unique to you as your fingerprint. We also know that when we change our geographic area, our bodies are exposed to different and variant versions of those bacteria.

What we are also learning is that where you grow up affects the type of gut biomes. Someone growing up on the veldt in rural South Africa has a much different gut biome than someone who lived their entire life in New York City. It's part of the cause of much traveler's illness. Of course, our bodies will succumb to a dreaded norovirus or salmonella, but I'm referring to that general feeling of intestinal malaise suffered by many travelers. You haven't been poisoned; your gut biome just doesn't know how to deal with the new visitors.

Some of the more exciting research in gut biomes is happening at the University of California-Davis. They have established a connection between unique sugars in breast milk to the existence of a particular bacterium in babies. *Bifidobacterium infantis* (B. infantis) has evolved to feed on the micro sugars in the breast milk to grow and release a substance that essentially tricks pathogenic bacteria into latching onto it instead of the intestinal walls, which prevents the body from becoming ill.

Researchers are following this theory through to food allergies and sensitivities. How can we see an exponential rise in groundnut allergies in the span of two decades? In the studies of infant gut biomes, we've learned that

premature babies do not have the colonies of healthy gut bacteria of full-term babies, leaving them susceptible to deadly infections. We're learning that children who are not breastfed have less robust immune systems, because of the less developed gut bacteria population. Similar biome deficiencies are observed in babies born via caesarian section because they've not been sufficiently exposed to their mother's bacteria population in the birth canal.

A 2016 study published in the *New England Journal of Medicine* researched what is colloquially known as the 'farm effect.' Scientists made observations that children in Amish families had substantially fewer incidents of both food and environmental allergies than the current statistical average of 1 in 5 kids. Initial studies have shown that proximity to farm animals and crop pollen both in utero and as children transmits microbes that trigger immune reactions. More studies are planned, but once again, we're learning that where and how we live affects how our bodies will operate.

Marketers have already cottoned on to this new research and are selling products labeled 'probiotic' as good for your guts. The bacteria in these commercial products won't do you much good, but those in fresh, homemade sauerkraut will because the bacteria are alive. Current research into gut biomes shows that introducing beneficial bacteria can improve digestive systems and alleviate gastrointestinal distress. Currently, people with digestive immune deficiency-related diseases are being helped and cured by fecal transplants. Yes, a poop transplant. Essentially, an unhealthy lower intestine is colonized by the bacterial colony from a healthy colon.

We also know that the research science that helped increase crop yields and decrease food deprivation in famine-prone areas has had unforeseen consequences—consequences not born of pure science, but out of how that science is applied by private companies and governments. Pre-World War II, food production was a regional practice. Even on larger-scale farms, local growers sent their harvests to local processors, who then sold to local purveyors. You could buy a tin can of beans, but it was still grown and harvested within a two-hundred-mile radius of your home, raised on nearly the same dirt you grew up with.

My grandmother would say to us city cousins staying with her for the summer, "You eat more than a pound of dirt a year; a little more won't hurt you." She was more right than she knew. Our fresh produce will always bear trace amounts of the soils (and the circus of bacteria, spores, and molds) from where they grew. In earlier generations, that dirt was from your backyard or a farm a hundred miles away. Now, that dirt is from Chile, Mexico, or wherever your strawberries were grown.

Fast-forward to today. Though we are becoming savvier as consumers about the value of shopping local farmer's markets and supporting local growers, the majority of the foods we consume are grown and processed thousands of miles away from your home. And they're not processed side by side with other locally harvested goods; they're now mixed with the crops from growers all over the world creating a global soup of organisms.

Regardless if your grandparents grew up in generational poverty or upper-class excess, modern access to healthy foods in their natural state is a real challenge. We're inundated by advertising for instant, quick, and pre-made processed foods. Your gut biome doesn't stand a chance. For kids growing up today, the second and even third generation away from localized food production, it means that their guts have not been exposed to local soils. It means their parents' guts haven't built up and passed along the colonies of healthy bacteria to aid in digesting the complex foodstuffs we eat today.

Let's say a few things out loud. Buying locally grown and raised meats and produce reduces the opportunity for pathogen contamination. The less an item is exposed to people, places, and things, the higher percentage chance of that being a safer food. This is one of the benefits of buying locally grown foods. Poor people should not be condemned to foodborne illness because of the inability of the United States to regulate producers efficiently.

Chapter Three

Keeping Your Foods Safe From Contamination

Safe Food Handling Forever and Always

As you think about the myriad ways your food can kill you, you should think about what you do in your kitchen to prevent that from happening. Do you cut raw chicken on the same cutting board as carrots? Have the same manky dishrag sitting by the sink for weeks on end? Pet the dog, then grab a head of lettuce? All of these simple activities are opportunities for pathogens to begin their migration to your guts.

Restaurants and commercial food processing facilities follow standardized procedures established by federal and state authorities, in addition to local health department rules to prevent contamination of foods. As discovered during the investigations of the recent outbreaks of listeria in Blue Bunny Ice Cream, "even though the company found listeria in one of its plants, it did not follow up to identify sanitation failures, nor did it alert the FDA of its findings." (This is directly from the 2015 FDA investigation report.)

The ongoing *E. coli* outbreaks in lettuces and sprouts are due to contamination from fecal matter. How does poop get into your produce? It's not because workers are defecating in the fields. The current body of research pins occurrences of *E. coli* and other pathogen contamination in produce to a combination of untreated sewage in the water supply used for irrigation, improper or raw manure in compost used for soil fertilization, or contaminated water utilized in the washing process.

Keeping your kitchen work areas clean is critical to safe food preservation. We're not just working to keep pathogens from getting into our final product, we're trying to get rid of any that may be there in the first place. The consumer marketplace offers too many specialized items purported to attack all sorts of germs, but you only need two things: soap and bleach.

Washing dishes, pots, and pans with hot soapy water kills most pathogens. Regular, plain old soap. Avoid soaps and cleansers with added 'antimicrobial' agents. These do more harm than good. Just as armies train by engaging in mock battles, pathogens become stronger when continually confronted with so-called 'antimicrobial' agents.

For cutting boards and items that come into contact with raw meats, use hot and soapy water, then a rinse with a diluted bleach and hot water solution. (Two tablespoons of bleach to one gallon of hot water.) This sanitizing rinse will kill any pathogen. Commercial kitchens use a color-coding system for cutting boards that prevents them from mixing up the poultry cutting board with the vegetable cutting board. You can do this at home too, as it's an easy method to eliminate cross-contamination hazards.

Avoid using wood cutting boards for meats. Wood is absorptive and meats can ooze. You can see how this has the potential to become a pathogen playground, yes?

And finally, here is the simplest, most effective action you can take to prevent foodborne pathogens from invading your food: Wash your hands. Honestly and truly. I have encountered too many people about to work with food immediately after they rubbed their feet, picked up something off the floor, ran their fingers through their hair, and yes, even picked their nose and then have the gall to say: "I washed my hands already." Guess what? Wash your damn hands. Again and again and again and again.

FAT TOM

Food safety scientists think they're funny. The mnemonic **FAT TOM** was coined in the 1950s by scientists to remind people about the six elements that foster pathogen growth. I mentioned some of them already but here's the handy list.

F: Food This means that there is a source of food for pathogens. Pathogens prefer protein-rich foods, like meats and dairy, making them more challenging to preserve.

A: Acidity Pathogens, like us, have a preferred range of acidity to alkalinity. (More will be explained in Chapter 4.) Creating an acid bath for food is the primary definition of pickling.

T: Time Pathogens grow at an exponential rate. The longer you leave a food item with no preservation action after enzymatic decay begins, you increase the likelihood of pathogenic infestation.

T: Temperature Again, just like us, pathogens have a preferred temperature range for growth and breeding.

O: Oxygen Excepting *E.coli* and a few odd others, pathogens need oxygen to thrive.

M: Moisture Pathogens also need water to survive.

Think of it this way: A raw chicken left on a wooden cutting board in an 80-degree kitchen for four hours is guaranteed food poisoning.

At its simplest, the preservation of food is changing the state of the food to make it inhospitable for pathogens to grow. Change at least two of the conditions required for microorganism growth, and you extend the life of that food.

If we think about what our microbiological neighbors need to live, we see the various methods of preserving food begin to fall into place. Applying prolonged high heat kills microorganisms (*Pressure Canning*). Depriving them of a moisture-rich environment means they cannot survive (*Dehydration*). Creating a high-acid bath means pathogens will not move in (*Pickling*). Removing moisture and oxygen, then adding acid to a sealed container of foodstuffs prevents microbiological growth (*Jams, Jellies, Sauces, Syrups*). Inviting beneficial microorganisms to take up residence in your food means that pathogenic microorganisms cannot (*Fermentation*).

Food preservation techniques can often be combined to both prolong the usable life of the food product and add flavor components. For example, sauerkraut, which is fermented, can further be preserved by freezing or canning. Applying heat kills the probiotic element of the ferment, but retains the flavor and other nutritional values. Food preservation science has come a long way since a French guy packed meats into ceramic jars topped with rendered fat (a confit). But the journey continues, and food scientists and microbiologists all over the world continue to explore the details of what fuels a human. In 20 years' time, it is entirely feasible that we will have developed more methods and techniques to preserve our food.

The Danger of Ignoring Food Safety Procedures

We understand that our guts have changed. We know that our methods of food production have changed. Why wouldn't we want to know that how we approach food preservation has changed too?

As part of the network of University Extension Agents, I am sent bulletins about foodborne illnesses in North America. A dose of *Salmonella* or *Campylobacter* will result in at least 48 hours of your body expelling fluids from every orifice. *E. coli* will make an adult experience diarrhea for days on end, but in a child, it morphs into a kidney-destroying protein and results in Hemolytic Uremic Syndrome (HUS).

Clostridium botulinum is familiar to us because of its medicinal derivative, Botox. But actual botulism? It's caused by a fast-acting neurotoxin that can kill a healthy adult in 48 hours. In 2012, three people in Oregon died from botulism poisoning from eating incorrectly home-canned beets. A 2007 study conducted by the U.S. Center for Disease Control estimates that each year there are 76 million illnesses, 325,000 hospitalizations, and five thousand deaths linked to foodborne illness. These are real catastrophes affecting every single person who eats. When you make a decision to preserve food, you take on a great responsibility.

Remember: *C. botulinum spores*, *Campylobacter*, and *E. coli* cannot be seen, smelled, or tasted. A bacterium doesn't know if it's 'good' or 'bad.' It has the same primal urge to survive and procreate as you do, and unless you are personally acquainted with the particular micro-organism you intend to ingest, be careful. The pathogenic micro-organisms do not ring the doorbell and announce their arrival.

Always err on the side of caution. Always.

Chapter Four

The Chemistry and Physics of Preserving

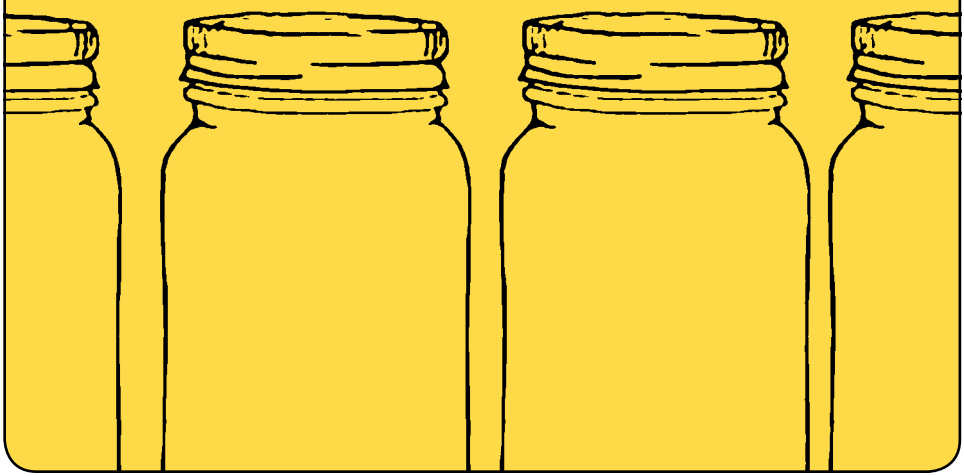
The Internet Will Kill You

I get it. I really do. You're living like some mid-century Amish with your collection of vintage canning jars. You want to try preserving your homegrown green beans. You're going to make your artisanal maraschino cherries. Great! Do it! But, do it correctly.

The World Wide Web is filled with Pinterest pages, Tumblr blogs, and Facebook groups of gloriously photographed foods that are tempting to try. It looks so simple. You're going to try it. What could go wrong? You read about it on the internet. You read somewhere that someone said they do it this way, so it must be okay.

Because nothing is ever wrong on the internet?

Please stop. For the sake of your and your family's health, stop believing every fool thing you read on the web. Science is based on facts and documented, repeatable, and testable application. Sometimes science gets it wrong, but it's always moving forward to better understand the world around us. People on the internet posting recipes and methods from the 1920s are doing you a disservice. But you know that already; you're reading this book. You're not going to do any of those dumb internet things.



Our food preservation toolbox has two scientific disciplines available to us: Chemistry and Physics. Lumped together, it's what scientists and engineers call 'hurdle technology'—you create an obstacle to prevent or discourage something from happening. The hurdles in food preservation are rooted in a combination of applied chemistry and physics that give us our methods and techniques. Mixing solutions, using heat to break down cell structures and re-chain molecules, changing atmospheric pressure to remove oxygen and create a vacuum seal—every action in food preservation is rooted in chemistry and physics.

Acidity and Alkalinity

Every living thing has a pH balance. pH is a measurement of the hydrogen ions contained in everything natural or human-made. The density of hydrogen controls the amount of acid in a thing. Something that has less hydrogen is more acidic. Something that has more hydrogen is not only less acidic but is considered alkaline.

Humans have a preferred range of acceptable and enjoyable acidity to alkalinity. Water is measured at a pH of seven, meaning it is neutral and neither acidic nor alkaline. A sour candy is high in acid with a lower pH measurement than say, a lima bean, which is low in acid with a higher pH measurement. Solutions that are at both extreme ends of the pH range are poisonous to humans.

Alkaloid poisoning through food is rare and the symptoms are mild but it is possible. Dark, leafy greens possess the highest concentration of alkaloids. If you're fan of kale smoothies, be advised to rotate your greens, lest you give yourself alkaloid poisoning. (You would have to eat about one pound of kale every day for six months to feel the adverse effects of tingling and numbness in your fingers and toes.)

Acid poisoning via food in humans is even rarer. The sour taste we experience in our palates with acidic foods prevents us from eating them. Think of the ubiquitous videos of babies eating lemons for the first time; that's the instinctual human response to acidity—sour face and spit it out. A healthy body instinctually recognizes many poisonous acidic substances through its sensory system. Coughing and spontaneous vomiting is your body telling you, "No!"

One of the challenges to food preservation is the old notion of foods having a static pH measurement. Industrial farming, hydroponics, and GMO crops have all contributed to changing the very nature of our foods. Fruits and vegetables once thought to be reliably high in acid (low pH measurement) are now showing variant acidity. We're looking at you, tomatoes!

Pathogens have a less tolerant range of acceptable acidity than humans do. Our particular tastes now become a tool to combat the pathogens. It's why knowing the pH measurement of food is important and instead of that, further acidification of all our preserved foods scientifically hedges our bets against the microbes.

Before you panic and think that every single food must be dipped in vinegar, know that pH balance is sensitive and easily changed. For food to be considered acidic enough to prevent pathogen growth it needs to have a pH measurement of 4.6 or below. (Remember: the lower the measurement, the higher the acid.) You can measure pH at home with a digital pH meter. These are readily available online or at homebrew and winemaking specialty shops. (Recommended models listed in Resource Guide.)

The best way to ensure that the pH measurement is at a safe acidity is simply this: add a touch of bottled lemon juice to every single item you plan to preserve using a hot-water bath or atmospheric canner. Foods that are purposefully made to be acidic, like pickled items and salsas, do not need additional acidification. That being said, foods like applesauce, whole tomatoes, whole fruits in syrups, jams, and jellies all need a boost of acidity in the form of bottled lemon juice. The small amount of bottled lemon juice needed does not change the flavor of your item. You can use bottled lime juice to the same acidic effect, though it will impart a slight lime flavor.

How much acidification do you need? For jams, jellies, syrups, applesauces, use two tablespoons per four cups of fruits. That includes syrups for use with whole fruit. For tomatoes, add a teaspoon per pint jar of tomatoes; increase the amount to a tablespoon for a quart jar. You may be asking if you can use fresh squeezed lemon or lime juice to achieve acidification. You can't. Our food is changing, and even fresh lemons can have a varying degree of acidity. To be safe and ensure the correct level of acidity, bottled juice is best. You can most certainly use organic bottled lemon or lime juice.

Though not as acidic as pickling, the wide variety of fruit preserves are considered high-acid. Some fruits are naturally higher in acid than others, BUT, and this is a big BUT, aside from citrus, no fruit is considered acidic enough to eliminate the need for additional acidification. Every recipe, every single time requires the addition of a small amount of bottled lemon juice. It may seem insignificant, but it is critical; just a few tablespoons of lemon (or lime) juice will elevate the acidity into the safety zone.

But What About Pickles?

There are many ways to acidify foods. Pickle is one of those words that can lead to a "Who's On First" style of conversation. By definition, to 'pickle' something is to submerge an item in a bath of acidic solution until the acid thoroughly permeates the cells of the item, raising that item's total acidity. More than the slight elevation of acidity using lemon juice, the pickling solution is a mixture of neutral liquid (often water), vinegar, and salt or sugar. Where we get confused is that the verb 'pickle,' which I defined above, is often confused for the noun 'pickle.' The noun 'pickle' is a thing, a thing that has been pickled. To add to the confusion, various cultures use the noun 'pickle' to refer to different specific pickled foods. Confused yet?

In the United States, we call vinegar-solution-pickled cucumbers 'pickles.' In the eastern United States, lacto-fermented cucumbers, such as half-sours, are referred to as 'pickles.' In the United Kingdom and countries formerly occupied by the UK, like Jamaica and India, a cured mix of vegetables cooked in a vinegar solution is called a 'pickle.' But that's also a chutney. It's enough to make your head spin. Let's make this easy on ourselves: A vinegar-based pickling solution is the defining element of a food transforming into something pickled. Yes, one type of fermentation process produces acetic acid, but vinegar is the unifying ingredient in the majority of modern pickling recipes, so let's go with that.

The other element unique to pickling (the verb) is that the food must spend enough time in the pickling solution for the acid to fully penetrate the cells of the food. Pickling time varies based on the cellular density of the food being pickled. A green bean with a tough outer shell takes longer to become pickled than a food without the dense cellular structure. It's also why pickling takes patience. If you crack open a jar of pickled cucumbers before they're ready, they'll taste like vinegar and not the spiced and sour flavor you were expecting.

Pickling in and of itself will extend the life of your food for a few weeks without further preservation action. When you make the decision to pickle food, you must decide on how long you want that food to last. If you're looking for long-term storage of over a month, your pickled product should be placed in a canning jar and processed in a hot-water bath canner. After processing, the jar is hermetically sealed (airtight); the pickling solution will do its work.

If you want to use and store the pickled food for less than three months, prepare the food and pickling solution as you would for processing, but place in the refrigerator during the pickling period. You'll see this referred to as "Quick Pickles" or "Refrigerator Pickles." This is a great technique for small batches of pickled items.

Acidifying foods to prevent against pathogen growth has been used in food preservation for generations long before understanding how and why it worked. It's an easy and efficient hurdle to erect against germs. Acidification can work alone, as with pickles, or combined with other techniques like removing moisture and oxygen.

Sugar and Salt Absorb Water (Hydrophilic Action With Hygroscopic Additives!)

We'll talk about the numerous names and meanings of names of the many salted and sugared preserves, but by way of definition, foods treated with sugar and/or salt are rendered 'preserved' because they have 'low-water activity.' What is low-water activity? Think of any water or moisture in food as 'free water.' It's hanging out and if a pathogen moves in, that pathogen can attach itself and use the water to grow and multiply. To chemists, the amount of 'free water' is measured as 'water activity.' Removing or lessening 'water activity' (the available 'free water') is another hurdle we create for pathogens. How to remove the water? We can use heat to increase pressure on the water molecules to break apart into their core elements, like when you heat a pot of water and oxygen breaks away from the remaining water as steam. Or we can use additives that are also searching for 'free water' to bind themselves to the water molecules, which again reduces the 'free water' available for pathogens. Any substance that attracts water molecules is called 'hygroscopic.' Salt and sugar are hygroscopic.

Here's an analogy: there are five glasses of water on the table. Germy McPathogen needs *two*. Sugar Sweetski just drank four; there's only one left. One is not enough for Germy; he's going to die.

There is a very complicated formula used to measure the specific 'free water' amounts in food that contains water. What we need to know comes from basic chemistry class: water is made from oxygen and hydrogen. If we mess around with heat, acid, or additives that absorb or bind themselves to the water molecules, then water changes into something else. The goal is to create a foodstuff that has 'low-water activity' or no 'free water' for pathogens. There are many ways to combine foods, acids, salts, and sugars together to achieve our desired low-water activity, which we'll explore more fully in the chapters devoted to sweetened preserves, pickling solutions, brines, and curing. Water absorption is the science behind every jar of jam you make and every ham you bake.

Besides being higher in acidity, fruit preserves are low in moisture. It may seem a bit counterintuitive as we think of syrups as being liquid, but an exploration of the chemistry explains what's occurring.

Sugar is a nickname. It's used as shorthand to describe any 'sweet-tasting' carbohydrate that is made of combined carbons, hydrogen, and oxygen that will dissolve in water. They can be simple or complex, depending on their form. The sugars most familiar to us are 'sucrose,' which our digestive systems break down into two simple sugars: glucose and fructose. Derived from plants, the majority of edible kitchen sugars are made from corn, sugar beets, and sugarcane.

Honey is also a sweetener with water-absorbing qualities. Unpasteurized (not heat-treated), it contains natural yeast microbes which will begin to ferment if a container of honey absorbs more than 25% of its mass in water. (When actively fermented, this liquid is called Mead.) Honey can also contain dormant *botulinum* endospores, so babies and people with compromised immune systems should never consume unpasteurized honey.

Using heat as our tool and catalyst, we force the individual ingredients to reorder themselves. In the pot under heat, those sugar granules and fruit begin to break apart into their very core elements of oxygen, hydrogen, and carbon. The majority of the oxygen changes state to become steam, and evaporates. The hydrogen and carbon are left to form new chains with the remaining oxygen molecules. The new combination becomes visibly thicker as the liquid is no longer water; it has been absorbed and begins to change its physical presentation. It can become a syrup, or gel, or 'hard-crack' candy depending on how long the mixture is exposed to high temperature.

(The history of the development of sugared preserves is scientifically and culturally significant to how and what we make today. We'll explore that history more thoroughly in Section Two, when discussing how to make every variety of sugared preserve.)

Salt is more than one singular thing. Like sugar, it's a word used as shorthand for all sodium compounds. Edible salt, the salt we use in food, is Sodium (metal) Chloride (gas). The two elements alone are volatile, but when combined they form a stable compound. The unstable nature of the core elements means they are easily coaxed into changing states. Sodium reacts instantly to water, causing the oxygen molecules to evaporate. At its simplest, when you add salt to a food item then expose it to air, water contained in that fruit, vegetable, or meat evaporates. Using sugars and salts to remove water from foods is the chemical action of dehydration and sugared preserves, and the removal of oxygen and water are the key steps in food preservation.

Salting / Curing / Smoking

We know that salt is hygroscopic and attracts water. Salting food doesn't eliminate 100% of the moisture, which is why salting is often combined with dehydration, pickling, and canning for a more stable preservation. As a rule of thumb, the 80/20 ratio works. You need to add 20% of the total mass of a food in salt to draw out the water in a food item by way of plasmolysis; in practical terms, a one-hundred-pound ham would need 20 pounds of salt for curing.

Any food that contains water can be salted, but that doesn't necessarily mean that the results will taste good. Salting was a useful preservation method for hunters, fishers, and travelers. Salted foods were often the only food source for poor people throughout the world during the lean months before the next harvest. My grandmother always referred to tins of tuna and herring as 'famine food.' Hundreds of years later, the connection of hunger and lean harvests to salted foods is culturally strong enough that these foods have fallen away as staples. The good news is that the negative associations in the United States are giving way to culinary curiosity, which means that salted preserved fish and other meats are back.

'Curing' is a term that drifts in meaning. In the modern usage, we tend to refer to food as 'cured,' if water is removed via salt or sugar AND flavor is added. You'll also hear the phrase 'smoke-cured.' Again, all these terms are correct, albeit confusing. Slightly more complicated than the use of salt only to remove water, salt and sugar 'cures' have added nitrites. Nitrites are a family of inorganic compounds that also act as water attractants, but additionally prevent the growth of the deadly neurotoxin-producing *C. botulinum* microbe. The addition of nitrites causes meats to take on a 'pinkish' coloration when used. (Again, think of ham.)

Whereas salting a fish can be as easy as laying a cleaned salmon in a bed of salt and covering it with a cheesecloth, a cure is complex. Cures can be either 'wet' or 'dry.' A dry cure is composed of the correct ratios of salt and/or sugar with an added nitrite and flavoring agents. (More details about nitrites in Section Two.) The meat is covered in the mixture and left in a cool, dark, and temperate area to let the salt and sugar do its work. A 'wet' cure is a marinade that uses the same ratios of salt and/or sugar, nitrites and often herbs and spices for flavoring, but is a liquid solution. The meat is submerged in the liquid for a prescribed amount of time. Though a wet cure is a marinade, not all marinades are cures.

Going back to our ham, it can be either dry or wet cured. Again, this method of preservation extends the usability of the meat, but not for long. Cured meats are often smoked after curing to preserve them further and, more common in our modern age, add flavor. Though we can imagine being stuck on the shores of Lake Superior for the long winter and needing to smoke innumerable chubs to get us through the cold, the reality is that any smoking of foods you choose to do will be to enhance flavor. But then again, if the zombie apocalypse comes, knowing how to salt, cure, and smoke foods will be a useful skill.

Smoking is primarily a method of dehydration. We're using heat to remove moisture with the addition of smoke to add a layer of microbial defense system on the exposed surfaces. Smoking uses hardwood chips burned at a low temperature to produce smoke. The smoke contains phenols, which act as an antimicrobial agent. Eating too many phenols is considered cancer-causing; nitrites too have been determined to affect health adversely. As with most ongoing research into cancer-causing food items, there are no specific details on exactly how much is too much. So as with all good things, moderation is advised.

Smoking has its variations and classifications. A 'cold smoke' is when the smoke's heat source is highly controlled to produce a temperature between 68–86 degrees. You'll see this method often used with cured chicken breasts to add flavor and seal in a moist texture. Because of the low temperatures, a food treated this way is not cooked and needs to be fully cooked before eaten. A 'hot smoke' has temperatures between 126–176 degrees. A 'hot smoked' item IS cooked and can be eaten without further cooking. Our illustrative ham is 'hot smoked.' Finally, 'smoke roasting' or 'pit baking' is done when the temperature is about 250 degrees and the food item is being cooked and smoked simultaneously. This type of smoking is usually done with foods for immediate consumption.

Before the age of modern kitchen conveniences, smoking was done in a small outbuilding away from the main house or barn, as the danger of the smoking fire burning down the entire farm was very real. Now, we have standalone smokers, smoker attachments for grills, and even 'smoke boxes' for our ovens. It's easier than ever to try your hand at smoking foods.

Whether you attempt a Country Ham (dry cured and cold smoked for a couple of months) or Smoked Blueberries (wet cured and hot smoked for 45 minutes), this method of food preservation connects you with your most primal ancestors.

Dehydration

Dehydrating is a chemical change using prolonged exposure to elevated but low temperatures to remove water from food items. Dehydration can also be done with very low (freezing) temperatures, but requires specialized equipment not readily available to home preservers. Dehydrated food often requires further storage action to prevent new pathogen growth.

What's the difference between cooking and dehydrating? It's all about temperature. Cooking is changing the state of the food through heat. Dehydration happens when foods are exposed to a low, dry heat (under 155 degrees). The low temperature is sufficient to evaporate moisture without breaking down the protein or carbohydrate structures as happens when food is "cooked." Cooking breaks down the cell structures whereas dehydrating just removes the water.

Dehydration along with fermentation are the most common and oldest methods of preservation. Again, archeological and anthropological research has shown evidence of dried foods present at early human settlements. Dehydrated foods are also simple to transport. This element was a significant factor in the survival of both nomadic tribes and the success of early explorers.

A health benefit of using dehydration to prepare complex carbohydrates is that the sugars stay complex. If you cook a piece of fruit, the carbohydrates break down into simple sugars that will give your body a quick but short-lasting boost. A complex sugar is processed by your body slowly, giving you a steady release of energy.

Dehydrated foods can be as simple as dried banana chips or as dynamic as beef jerky. Modern dehydration techniques strive to achieve enhanced flavors as well as basic safety. The smoking of food also falls under this umbrella (as we explored in the previous section). High-fat foods are poor candidates for dehydration; avocados and eggs have too much fat to dehydrate successfully. Modern cooks should always think about how the food will be consumed and work to add as much flavor as they are able when making dehydrated foods.

To successfully make dehydrated fruits, acidification is always required. Added bottled lemon juice (or citric acid) lowers the pH of the fruit, also preventing the fruit from oxidizing (browning). Oxidization isn't harmful from a food safety perspective, though it creates an unappetizing brown color. As we 'eat' with our eyes before we taste the smallest tidbit, creating foods that are visually appealing is important as foods that look gross will inevitably be wasted.

Vegetables are well preserved by dehydration. Tomatoes, for example, can be dehydrated with salt and oil to make a 'sun-dried tomato' or wholly dried and

ground into a powder. Tomato powder is a 'secret' recipe enhancer of many a home cook. Herbs too can be dehydrated then blended into your favorite combinations.

Standalone dehydrating units use a closed container to elevate temperatures, circulate air, and exhaust moisture. A convection oven, with a circulating fan, can be utilized for dehydrating meats, but not fruits and vegetables. The temperature control on modern ovens cannot be set below 170 degrees, which would cook fruits and vegetables, not dehydrate them.

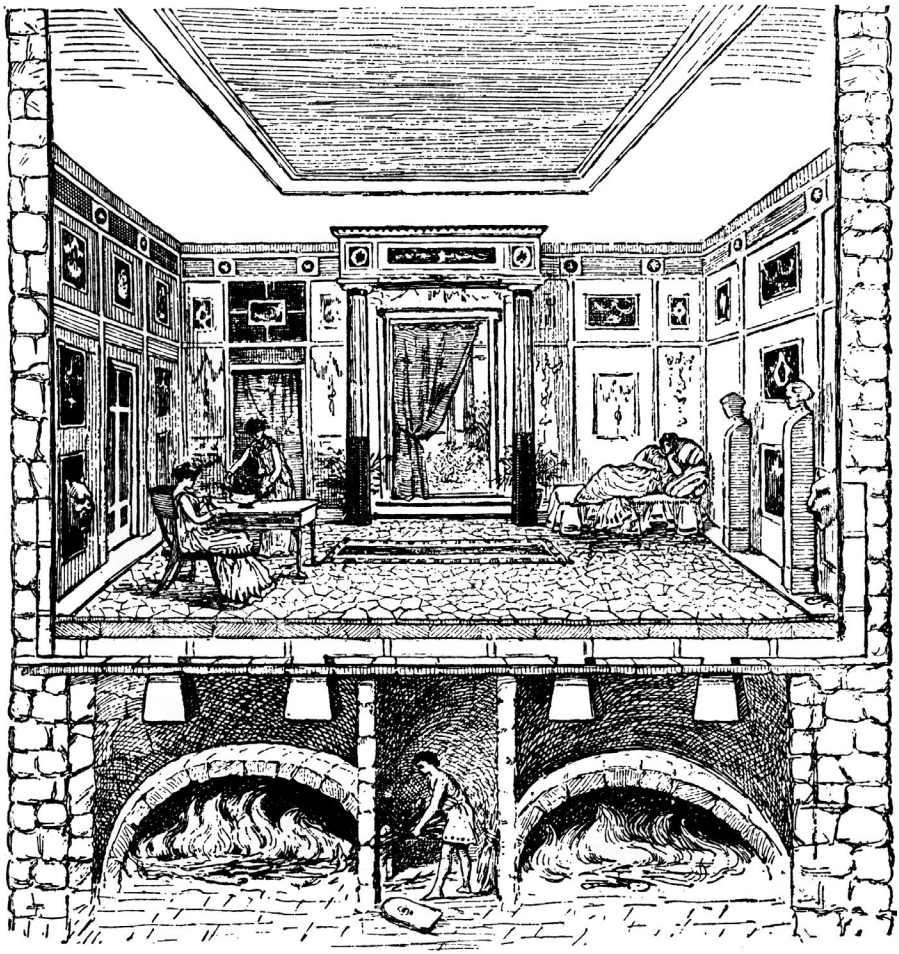
Commercial dehydrators are available in all styles and with accessories to make a variety of dehydrated foods. Because of the long processing time (often 12–24 hours) many makers enjoy the 'set it and forget it' aspect of running a dehydrator overnight. Do keep in mind that a dehydration unit is an electrical appliance, and very cheap models have been known to short out or catch fire. (See the Resource Guide section for recommendations.)

Fermentation

The act of fermenting is to alter a food and its environment to attract or introduce a 'good' bacterium and foster its growth. The resulting food is preserved, edible, and contains beneficial and gut-friendly bacteria and/or yeast colonies in food, which then prevent other pathogenic microbes from taking up residence.

Fermentation itself is a prolonging preservation method, with fermented foods having different usable life spans. You'll often see fermentation combined with other preservation methods, which both adds flavor and extends usefulness. (Think of anchovies which are fermented, then smoked, then canned.) Fermented foods can be as simple or complex as the maker and tradition dictates. It may help to think of fermentation as farming—bacterial farming. A maker prepares a food and an environment best suited to attract and foster the right kind of microbial growth. In some ferments, the maker introduces the particular microbe to the food and controls the environment. Again sugar and salt play a biochemical role in the preservation.

Researchers at Indiana University have declared that as of 2016, there are one trillion microbes on Earth. Some of these are the pathogenic bugs that make us sick, but there are also the sympathetic and symbiotic microbes that live in and on us humans. Through scientific discovery and thousands of years of experimentation and happy accidents, people have figured out that some bacteria and yeasts will change food into something longer-lasting, tasty, and nutritious.



Evidence of fermented foods has been discovered in settlements throughout the world, though food historians have yet to answer the question fully: did early people begin eating fermented foods because they enjoy the taste, or out of necessity? It becomes an interesting question when we explore the kinds and types of foods consumed throughout the world. We can easily get lost in the weeds making definitive statements about who started fermenting and when.

Let's stick to some universally accepted truths from a cadre of food historians and anthropologists: the most common beneficial bacterium in fruit and vegetable ferments, *Lactobacillus*, produces acetic acid as a by-product, which creates the high-acid environment unfriendly to pathogens that we're striving for in preservation. The *Lactobacillus* bacterium is attracted to salt. People

began salting food to extend the usability and discovered that salted foods in temperate and tropical environments began to ferment.

From the essential food sources of meat, vegetable, grain, milk, fruit, and fish, thousands of fermented foods are made. Geography plays a significant role in which types of foods were fermented and how they were fermented. Nomadic tribes relied on milk as their primary food source, which led to the development of yogurts and cheeses based on sheep and camel milk. In England, cow milk cheeses were standard. Each tribe, village, and estate passed along specific tricks and techniques to make their specialty. There are thousands of styles and variations of fermented foods. Japanese katsuobushi can only be made with skipjack tuna and the mold *Aspergillus glaucus*. This particular strain was native to arctic marine environments, which means that only the bonito tuna fermented with *Aspergillus* and made in Japan is true *katsuobushi*. Modern methods can be employed to import a mold strain or particular bacterium, but again, the idea of locale is often a critical flavor component to a fermented food. It's this notion that decrees that Champagne is the double fermented grape juice made only in Champagne, France. The rest is just sparkling wine.

Suffice to say that learning and mastering how to make all fermented foods would take a lifetime. Some people have devoted their life's work to understanding and perfecting making a particular kind of cheese, kimchi, salami, or katsuobushi. This experience and wisdom in the making are the reasons that generational producers of artisanal fermented products exist. Don't be discouraged if you're unable to make a complicated and complex fermented delicacy in your kitchen. There are many simple fermented foods you can make and master at home.

One of the more recognizable fermented foods is *sauerkraut*. Basic sauerkraut requires only cabbage and salt. The salt not only removes water but also attracts the 'good' bacterium *Lactobacillus*. This simple technique of crocking vegetables in a saltwater solution can be applied with success to nearly every vegetable. It's a great way to begin your experimentation with fermenting. Traditional spices add flavor, like juniper berries, fennel seeds, and garlic. You'll see these and other spices in both fermentation and pickling recipes; not only do they add flavor, but they also contain antimicrobial agents.

Fermentation also occurs when yeasts are attracted to sugared fruits and vegetables. Wines begin as juice with yeasts either added or cultivated by the right combination of sugars and yeasts. Carbon dioxide is the waste product of yeast organisms and alcohol is the by-product. Another ferment enjoying renewed popularity is *kombucha*. Russian in origin, it owes its fermentation to

a combination of bacteria and yeast working together to form a symbiotic colony (also called a SCOBY). It's related to kvass, a much older Eastern European ferment. Kvass uses grains as the main ingredient and is often flavored with berries or raisins.

Fermented foods in Asian cultures often use an already fermented sauce as a 'mother' or booster to begin the fermentation process. The traditional Korean cabbage dish kimchi uses fermented fish sauce to kick-start the fermentation process. A generation ago, Americans would have never thought of eating the Korean national dish of kimchi, but now it's commonly found in grocery stores and added to every kind of restaurant dish imaginable. Japanese *tsukemono* uses a variety of fermented sauces to accelerate fermentation of vegetables and is ready to eat within 8–24 hours of making for peak flavor and texture.

The removal of oxygen also plays a role in fermentations. Many ancient styles of fermented food preservation called for burying food in the ground. This action served to keep the food free from oxygen and ensure a cool, consistent temperature for foods to ferment instead of rot. Temperature is the other critical factor in fermentation: the warmer an environment, the faster the bacteria will grow and produce the preserving acid by-products. The reverse is also true; bacteria and yeasts grow slower in cold conditions. In tropical regions, fermentation is often paired with smoking to remove excess moisture from the fermented food. In arid regions, dehydration partners with fermentation to extend usability and create portability. Every culture developed recipes to account for and either work with or work around their environmental limitations.

All fermentation, whether fomented by bacteria, yeast, or mold, uses chemistry and microbiology to create a changed state of a foodstuff to prolong its usability. Included are recipes for a selection of fermentation recipes and techniques. These are recipes that have room for variations. Also included in the Resource Guide are books and retailers that offer in-depth specialized recipes, techniques, and tools for more advanced fermentation.

Some may say that knowing the science on why it works is unnecessary to doing it successfully. And yes, people have been fermenting items for thousands of years, but isn't it reassuring to know what's happening in your crock?

Chapter Five
The Physics of Preserving

Something's Not Right

If at any time you think that your preserve, whether it is a canned product, a ferment, or a cured meat, has become tainted, do not eat it! Don't even taste it. You don't need to analyze what type of pathogen has invaded; you need to dispose of the food properly. Assume that whatever it is, it is the worst thing ever, and treat it carefully. Do not flush it down the toilet or put it into compost. That may contaminate water and soil systems.

The correct way to dispose of contaminated food is to boil the heck out of it for ten minutes and then place in the trash.

The Food Landscape before the 1820s

It helps to understand the role physics plays in the ability to preserve food if we imagine what dinner was like for your average peasant, worker, soldier, and sailor in the 1600–1800s. If you were a farmer in 1780s Europe, you grew only the crops demanded by your landlord. You turned over his allocation and kept the small remainder. Some villages used a model where everything went to the lord of the manor, and he determined how much food his serfs received. Meat was a rarity. Hunting and fishing weren't something one did on a whim; all animals belonged to the local lord and harvesting as much as a rabbit would get you arrested (or worse) for poaching. (This feudal system of land management was standard throughout all regions of the world before the 1800s-ish.)

Workers in early factories and mines relied on owners to feed them a midday meal, no choice in what you were served. Then you had to provide food for your family from your meager wages. Again meats were rarely found on the workers' tables. Sailors and soldiers had it worse. For a navy to travel, it needed to carry food with them onboard ship. Land armies had the privilege of ransacking the stored goods of conquered villages or demanding to be fed and housed by anyone they happened upon in their home country. So critical and common was the problem of feeding soldiers and sailors that the Third Amendment to the United States Constitution forbade armies and navies from demanding food and lodging from civilians. Navies, armies, and workers all needed a way to have and keep food that would stave off starvation and get them over the deprivations, whether they were harvest failures or long sea voyages. Salt-preserved and pickled foods filled that need.

The primary food source for the lower classes were porridges and stews made of legumes. Lentils, peas, chickpeas are all rich in vitamins and protein, and a nutritionally sound food staple. When dehydrated, they would keep for months, if not years. If you walked into a peasant home, you would find the large kettle over the hearth fire, gently cooking a porridge made of a legume with a piece of salted meat (most likely fish) added for flavor and protein. It was not a varied diet, and the lack of fresh vegetables led to diseases like scurvy.

Sailors faced the worst of scurvy. Their diet was rationed to include one pound of heavily salted fish (or heavily salted pork, or beef, or horse meat), one pound of dehydrated bread (biscuits), and one gallon of beer per week. Sailors did not eat their individual rations but were grouped into a 'mess' of five men. The ship's cook then took that total ration and prepared a meal. But the ship's purser, in charge of accounting for all supplies, needed to constantly adjust for rot, spoilage, vermin, and theft, so each 'mess' was only allocated the rations of

four men though five were present. And if the food stores were contaminated or infested, so be it; you still ate it.

Fresh water was heavily rationed for drinking, so a navy cook did not have the luxury of rinsing salt from the meat before cooking. Add to that, most foods were cooked in salty sea water, so sailors suffered the ill effects of consuming too much sodium. A good captain would put ashore every so often while on long voyages to procure fresh fruits and vegetables, but even then it was a rare luxury. Scurvy was rampant among all navies, as was vitamin-deficient blindness. The ordinary person wasn't immune either. Scurvy, pellagra (lack of niacin), beriberi (lack of thiamine), and rickets (lack of vitamin D) were rampant throughout the world. The age of exploration that sent armies and navies to far-flung continents grew in concert with the industrial age that moved millions of people from rural agrarian homes to newly burgeoning cities. The age of science was now upon us. Men began studying the problems of how to feed large armies, navies, and large populations with safe and nutrient-rich foods.

Women of the upper classes were already actively working to preserve food and understand how foods affected the health of their family and the estates' workers, and exchanged this information between households and kitchen staff. Much of their work is anonymously noted in household 'receipt' books and kitchen manuals. Unsurprisingly, women were excluded from the official domains of scientific research and review. The history of food preservation is filled with many bad actors who deliberately and casually poisoned soldiers and sailors with vermin-infested, rotting food in the name of 'science.' But there were those men of science who discovered, though more often than not rediscovered, how to prevent food from becoming rancid and pathogenic.

Tools Expand How We Preserve

The beginning of the industrial age puts us at the cusp of modern preservation history. There is a convergence of mechanization, migration, and war. In the early 1800s, Napoleon's armies were marching through Europe. The old method of warfare saw troops pillaging local farms and villages commandeering whatever foods were available—a wholly unreliable method for a modern army to wage successful battles. Napoleon charged French scientists to develop a way to preserve foods for longer than the current methods allowed.

Nicolas Appert was a confectioner, which in French cuisine included the making of sweetened jellies and jams. He began putting his jams and marmalades into glass jars, sealing them with a cork and wax, wrapping the pot in canvas, and then boiling the jar for hours. Appert's contribution was the

recognition that removing oxygen from food would slow down decay and stop 'rot.' He also discovered that vacuum-sealing a lid onto a vessel would prevent oxygen from reaching the food once it had been boiled. This method was effective at killing bacteria years before Louis Pasteur documented and proved that high heat kills bacteria.

Appert's advances, combined with advancements in manufacturing, gave birth to the 'tin can,' which is where the term 'canning' was coined. In Europe, the process is also referred to as 'bottling' because of the use of glass jars and bottles. Commercially available and mass-produced cans and bottles meant that the making of preserves would now move out of manor house kitchens and village confectionaries into factories.

Hot-Water Bath, Atmospheric, and Pressure Canners

The modern physics of food preservation revolve around using tools to alter existing conditions of the natural environment to bring about changes to food. We have three tools at our disposal that allow us to bend the laws of nature: hot-water bath canners, atmospheric (or steam) canners, and pressure canners. Raising temperatures and creating vacuum seals are more hurdles we can erect against pathogens in preserving food.

Hot-water bath canners work by using heated water to create a boiling water bath and a slight increase in pressure. The immersion of a lidded jar in the boiling water cooks the contents of the jar to the boiling point and creates a small amount of pressure that drives out any remaining oxygen in the jar. When removed from the canner, the jar returns to whatever the air pressure of your kitchen is. This pressure change creates the vacuum that ensures the lid is sealed.

Atmospheric canners work on the same principle as hot-water bath canners except they use steam to create the high temperature and slight increase in jar pressure. Atmospheric canners use less water than hot-water bath canners to achieve safe processing, a definite plus in regions plagued by drought. One drawback is that because it uses less water, an atmospheric canner will 'run dry' in approximately 20 minutes. For recipes that require longer processing time, a hot-water bath process is your only option.

Both hot-water bath and atmospheric canners are, as are we all, subject to the laws of physics. Water boils at 212 degrees. And yes, this is true if you and your canner are on relatively flat land. Gravity, as one of the fundamental interactions of nature, is a force determined by the amount of energy emitted by an object. The Earth, being quite large when compared to a pot of boiling water,

exerts an attracting energy. The farther away from the center of the Earth, the less power that attracting force has. This means that more energy is required to make water boil when we're at a lower elevation or closer to the Earth's center.

From zero to 1000 feet above sea level, water indeed boils at 212 degrees. Above 1000 feet (farther away from the Earth's core), it takes less energy—less heat—to cause water to boil because there is less gravitational force at higher elevations. But we still need our jarred foodstuffs to reach 212 degrees, so what to do? To ensure that the center of every jar in our canner has reached 212 degrees, we increase the processing time by one minute per 1000 feet of elevation. So theoretically, a jam that requires five minutes of processing in Milwaukee (617-foot elevation) would be processed for nine minutes in Denver (5280-foot elevation). A quick consultation to your atlas or internet search will tell you the exact elevation of your location.

The first and most important tool is a large pot that can boil water and hold glass jars. This can be a dedicated 'canner,' easily recognizable in the United States by its blue and white speckled enamel exterior. A large stockpot is also workable. The pot should be tall enough that when the filled jars are in the pot, they are covered by two inches of water. This method is essentially the same manner of preserving as Appert devised in the early 1800s. The most noticeable advancement is in the sealing mechanisms. The lid and bands used today are far more efficient than cork and canvas.

Why Can't I Use A Hot-Water Bath or Atmospheric Canner for Low-Acid Foods?

Foods that are low in acid are susceptible to the most virulent of pathogens. It is in low-acid foods that *C. botulinum* spores will grow. The spores are a *gram-negative* pathogen, meaning that unlike most microbes they do not need oxygen to survive. The *C. botulinum* bacterium spore is NOT what causes a body to become ill; the toxin produced by the spore is what causes illness (botulism).

Pay attention here: The toxin can be killed by normal boiling; the C. botulinum *spore survives boiling.*

You will see old cookbooks or even hear old family members tell you that it's acceptable to hot-water bath process beans, meats, and other low-acid foods as long as you boil them for a few hours. They are wrong. Deadly wrong. Again, boiling only removes the toxin, not the actual bacteria. The bacteria are left alive to produce NEW toxins in that jar of food.

I hear the same refrain from people who refuse to believe the science. It always begins the same way: "I do it that way and I never got sick." Let's explore what is going on and why people who have preserved it incorrectly might not have gotten sick (yet).

Say you fill a quart jar with potatoes (low in acid) and decide to process it in the hot-water bath canner. You boil it for an hour, and the lid is sealed. You have killed the toxin that causes botulism, but not the spore. Six months later, you open that jar to use your potatoes. If you choose to use those potatoes in a dish that requires cooking at a temperature over 240 degrees, you will have finally killed the bacteria, and everyone lives another day. But, if you choose to use those potatoes straight from the jar in a potato salad, then you will get very sick from the still active *C. botulinum* spores. (Sadly, this happened in Ohio in 2015. Two people died, and dozens made seriously ill from eating potato salad made with incorrectly home-canned potatoes.)

It's a commonly held belief among food safety folks that many people are saved from accidentally poisoning themselves and their families because long-baking casseroles are popular. If your friends and relatives are preserving low-acid foods using a hot-water bath canner, tell them to stop. At the very least, don't eat anything they give you! If you are starving and your only option for survival is a jar of questionable green beans, here's what you do: Boil the hell out of it for ten minutes. That will kill any toxins present. Is it ideal? No. Could you still get sick? Yes. The better solution is to preserve low-acid foods correctly with a pressure canner.

Altering the Limits of Physical Laws with a Pressure Canner

A pressure canner is a machine that under heat creates a pressurized environment to raise the internal temperature of foods above the boiling point. Prolonged exposure to very high temperature kills all pathogens. This process also creates a vacuum which expels any remaining oxygen in the jar and seals the lid in place, preventing any new microbes from moving in. It is the nuclear option of food preservation.

Mechanically, the essential difference between a hot-water bath and atmospheric canners, and pressure canners is the way in which the lid sits on the pot. For the boiling water and the atmospheric canner, the lids are loose-fitting, allowing for energy to both build and be released. A pressure canner's lid is sealed to the pot using, depending on the individual design, screws, clamps, or latches. Some models use an additional rubber gasket to aid in sealing; others

are machined to seal when clamped and under heat. (Heat causes the molecules of many metals to expand.)

The design of pressure canners has not fundamentally changed since Denis Patin created his 'pressurized cooker' in 1679. It is surprising to think the tools available to us have been around for four hundred-plus years, yet the knowledge of how and why they work is only 175 years old, when Appert began boiling his marmalades and Louis Pasteur and Robert Koch developed and embraced Germ Theory, the radical concept that illness is caused by a microbe and not by a bad attitude. Until then, many people didn't realize that their food was causing illness.

There are two types of pressure canners: a dial gauge canner, and a weighted canner. Most modern dial gauge canners are also weighted. What does this mean?

A dial gauge pressure canner has a calibrated gauge that displays the amount of pressure in the pot. A weighted canner does not use a gauge but relies on **you** to 'hear' the right sounds that indicate you reached the desired pressure. Both styles use a physical 'weight' to regulate the amount of pressure desired in the canner.

Dial gauge pressure canners are usually more expensive than weighted canners. They are machined to fit lid to pot without the addition of rubber gaskets. If you're just getting started with pressure canning, purchase an inexpensive canner. If you fall in love with pressure canning, invest in a well-made pressure canner. It will last multiple lifetimes.

It is important to know that a pressure *cooker* is NOT a pressure *canner*. Here's the tongue twister to remember the difference: **A cooker can't can, but a canner can cook.**

The core difference between a pressure *canner* and cooker is the ability to control the amount of pressure in the pot. A pressure cooker just builds up to a preset and fundamentally uneven pressure in a small-sized container for accelerated cooking. Pressure *cookers* are great for cooking, but not for canning. Don't do it, regardless of what the internet tells you.

Of course, you can use your pressure canner to cook with, but most preservationists prefer not to, as it makes for more work cleaning the machine after use. As a sole-use pressure canner, the only liquid it encounters is water. If it's used for cooking too, then you've got bits of spaghetti sauce or country ribs stuck in the vent holes that need to be cleaned out.

New to the marketplace is a device labeled electric pressure cooker/canner; also known by the brand name, Instant Pot. Stay away from these. Yes, the instructions and even the settings on the machine say you can use for

processing, but you shouldn't. This machine does not have any way to regulate the temperature inside the device, which makes it unsafe for food preservation use.

If you're interested in preserving meats, vegetables without additional acidification, and meals-in-a-jar, then pressure canning is something you'll want to explore. Familiarize yourself with your particular machine before you begin a canning project, though. Learning how your tool works will give you confidence that you can make and preserve your low-acid foods safely.

A Few Words About Jars

Glass jars have become the most versatile tool in the food preservation toolbox. They can be used for both hot-water bath and pressure canning, fermenting, and storage of dehydrated foods. There are variations in jars, and understanding canning jars will help you choose the right jar for the job.

Mason jars. Canning jars. Bottles. Jugs. Pots. Fruit jars. Lightning jars. The glass containers go by many regional and colloquial names. They share the same general design and purpose: to safely contain foodstuff and withstand both hot-water bath and pressure canning. Every glass jar is not necessarily a canning jar. A canning jar is made from soda-lime glass. This is a cheap, sturdy material whose chemical properties allow for it to remain stable when exposed to numerous and wide-ranging temperature fluctuations. It's also 'hardened' to make it nearly impervious to outside water penetration. These qualities are both essential for home food preservation.

A common question asked in classes is about reusing jars. The answer is: Depends on what kind of jars. Canning jars are designed and manufactured to be used multiple times. Commercial pickle and peanut butter jars are not. Especially that cute spaghetti sauce jar that's molded to look like a canning jar; it won't hold up under pressure. Literally. Commercial canning is different than home food preservation. It follows different set guidelines and uses a different methodology and tools. What's good for the pickle factory is not necessarily suitable for your home kitchen. The jar holding Milwaukee Baby Dills is cheaply manufactured to be commercially processed ONCE. That jar is not designed for reuse for home canning. But all is not lost: Those peanut butter and spaghetti sauce jars are ideal for storing dry and dehydrated items.

Jarden Brands in North America has the canning jar market solidly covered. You'll recognize Jarden by the brand names of Ball, Kerr, and Bernadin. Jarden is headquartered outside of Muncie, Indiana, and still manufactures their jars in North America. These jars are the most commonly found at retail

outlets throughout the U.S. and Canada. There are other, smaller brands, also available for purchase, like the Golden Harvest brand, which is also made in the United States (Michigan), though not as widely available.

There are also brands available manufactured in China. These include the Walmart house brand Mainstay, as well as Penly and Golden Orchard, and I'm sure a few retailer-branded names that I haven't come across yet. I have used these brands of jars, but with concerns; Chinese manufacturers have a recent history of using lead in their glass-making recipes. Lead was used in American canning jar manufacturing too, but stopped at the onset World War II. Scientific studies have shown slight elevations of lead counts when using glassware containing lead, but the levels are technically under the amounts determined to cause harm. I leave the choice up to you whether to use Chinese-made canning jars.

Know that canning jars from the prewar period may still contain trace amounts of lead and mercury (in the case of blue- and green-tinted jars). The Center for Home Food Preservation recommends using canning jars that are made post-1950. Besides, antique canning jars have a value in and of themselves. Some are highly collectible and sought after. So think twice before you use that old green Mason jar for your pickles; you could sell it for one hundred bucks and get ten cases of brand new jars.

Lids, Screw bands, Tops, Seals, etc.

Very familiar to Americans is the two-part lid and band style of closure. The lid is a stamped metal filled with rubber in the outer groove designed to fit exactly over the rim of a jar. The screw band is threaded to fit over the lid and onto the jar and holds the lid in position for processing. The metal lid is designed to be used once in processing (but can be reused for when a hermetic seal is not required). The metal screw bands are used until they become rusted and/or misshapen.

Recently, newer and reusable canning jar lids have come to the retail market. These lids are made of a plastic alloy and use a combination of rubber gaskets and metal screw band to hold the lid in place for processing. Much like some European-style jars that use a rubber gasket to seal the lid to the jar, they are safe for use but require some finesse to use successfully. Reusable lids are initially more expensive than disposable lids, but the long-term cost decreases over time and use. In recent years, there was concern that lids manufactured by Jarden Brands (Ball and Kerr) used BPA (Bisphenol-A) in the underlining of their lids. Since 2013, in response to consumer requests, all Jarden brand

lids are BPA-free. Many antique jars still have their old lids intact. These include glass lids affixed by wire closure and glass-lined zinc one-piece lids. These are unsafe to use and should be relegated to either dry storage or decorative use.

If you are someone who wants to reduce the amount of waste in the world, buying old and used canning jars is something you want to explore. Thrift stores, estate sales, and rummage/tag/boot sales often have old canning jars and equipment available for sale. Before buying used jars, inspect them for cracks in the glass or chips in the top rim, where the lids sit. If the jars are damaged in any way, you will not be able to use them for canning. Next take a look at the price. Brand-new canning jars with lids average between 50 to 75 cents per jar. If the used price is higher than that, you're not saving any money, and you still need to purchase new lids. Pinterest and Tumblr are awash with decorative projects using antique canning jars, which has driven the secondary jar market up quite a bit. Though sometimes, you will come across a great deal. If you do, jump on it!

European and Indian Jars

American canning jar design is quite basic compared to European and Asian canning jars. American jars are either cylindrical or a square cylinder shape depending on the size. Jarden Brands has introduced new shapes to appeal to the artisanal makers that are available both in high-end kitchen supply stores and online.

Another difference between the Americans and Europeans is sizing—all European brands use metric measurements. If you choose to use European jars, be prepared to make adjustments for your final yields. There is no exact European equivalent to the standard American eight-ounce jelly jar.

The most commonly seen European-style jar is the German brand Weck. They are widely distributed throughout North America and are the supermodels of canning jars. They come in delicate tulip shapes and elegant squat circles, that grace the covers of most magazines, books, and blogs looking to show off a food stylist's skill. Weck jars do use a differing style of lid than the ubiquitous lid/screw band system. The seal on a Weck jar uses a rubber gasket, a glass lid, and metal clips to hold the business in place during processing. This system is how North American jars were sealed before the invention of the lid/screw band system. Neither method is 'better' regarding safety, though; it takes a bit of trial and error to get the knack of getting a good seal on a Weck jar. A real and practical critique of the Weck jar is the price. A dozen jelly-sized jars

(5.4 ounces) with seals and lids will cost around $35. (For comparison's sake: A dozen eight-ounce Ball-branded jelly jars will cost about $8.)

Fellow Germans, Leifheit uses a straight-sided jar design reminiscent of Ball and Kerr, but without an external embossing texture. Some canners prefer smooth, straight-sided jars as they are easy to decorate with custom labels. Leifheit uses an all-in-one rubberized inner screw-on lid for its jars. These are straightforward and efficient to use, although they cannot be reused for processing (but can be used again for dry or refrigerated storage and quick pickles). Leifheit also has the same challenges in finding replacement lids. Though not as expensive as Weck jars, they are still more expensive than American brands. The Italian brand Borimoli is also available in North America. They share elements with Weck insomuch as they cost more and have a different style of lid closure. Borimoli, like Leifheit jars, uses an all-in-one rubberized inner screw-on lid for its jars. Unfortunately, it is easier to purchase Borimoli jars with the lids than it is to buy replacement lids.

Nakpunar is an Indian company recently introduced to the U.S. market. Their jars are manufactured in both China and India and declare they are free from lead. These too use the all-in-one rubberized lid. Their real appeal lies in their design. Nakpunar makes square jars. And hexagon jars. And even a jar shaped like a teddy bear! How can one resist? But resist you must. The square, hexagon, and faceted jars are safe for home food processing, but the teddy bears and squiggly shapes are not. Use them for quick pickles and refrigerated or dry items.

Kilner Jars were designed by John Kilner in England in 1842. The jars that bear his name have a distinct rubber ring, glass lid, and wire closure model. The rubber ring is removed from the jar, boiled to sterilize and soften, then placed onto the rim of the jar. The hinged glass lid is then swung on top of the rubber ring, then fastened closed with the attached metal clip. This style of closure is called a 'bail lid.' These jars are not recommended for hot-water bath or pressure canner processing. They do work well for refrigerated foods like quick pickles or dry storage items. The French brand Le Parfait and Italian brand Fido also use the 'bail lid' system. Again, beautiful-looking jars, but not safe for processing.

Kilner also makes jars that use the familiar two-part lid and band system similar to American-style jars. A one-piece screw-top lid is also available. Like the other European jars, they are more expensive than their American counterparts. They are enjoying a wider visibility with American consumers as they've recently had placement in Target stores.

Canning Jar Accessories

You already know canning jars are a 'thing' now, yes? They are. People have discovered how useful and versatile Mason jars are for just about anything. In the past ten years, we've seen specialized products that boost functionality as well as transform jars into just about anything. We'll skip the gadgets and geegaws that turn a jar into a flower pot, or candle, or soap pump, and focus on the innovations that are useful to food preservation.

Because canning lids and bands are made from cheap metal, they tend to rust when exposed to water. Plastic screw tops are a recent invention. They cannot be used for processing in a canner, but work well for refrigerator and dry storage. One company, MasonTops, has a range of wooden screw top lids. They also make a screw top lid covered in chalkboard material. Very stylish, but also very expensive.

Canning jars do a marvelous job as fermenting crocks. Many specialized accessories and tools are coming to market to make fermenting in jars as foolproof as possible. MasonTops is selling a product called a 'pickle pipe.' It is a silicone lid with a slit nipple protrusion that sits on the rim of a jar, kept in place by a screw band; it uses the small slit in the nipple to release carbon dioxide and prevent oxygen from entering the fermenting chamber. People report mixed results. Definitely worth exploring for small-batch fermenting.

Also available from various manufacturers are lids with pre-drilled holes that can be fitted with grommets and fermenting airlocks. There are things to turn a canning jar into an infuser, a candle holder, a flower pot, and a travel coffee mug. You'll also find decorative design jar lids and matching bands available. At this point, whatever you need to hack a canning jar is readily found in the retail market. (See Resource Guide.)

Should I Preserve this?

Each food preservation method has advantages and disadvantages for the home cook. The techniques and methods you choose are determined by circumstances unique to you.

Here are some questions you should ask yourself before you begin a preservation project.

How long do I want to keep this food?

Hot-water bath and pressure canning keep foods for one year. Fermented foods may last a few days or a few months. Salted and cured foods also vary in length of storage time. Dehydrated foods will keep for a few years, but their taste and nutritional value decrease after one year.

How do I want this food to taste?

Sweetened preserves are always a fine choice! Pickling will make it sour. Curing will make it salty. Pressure canning will preserve the food with its natural taste.

Am I limited by health or taste?

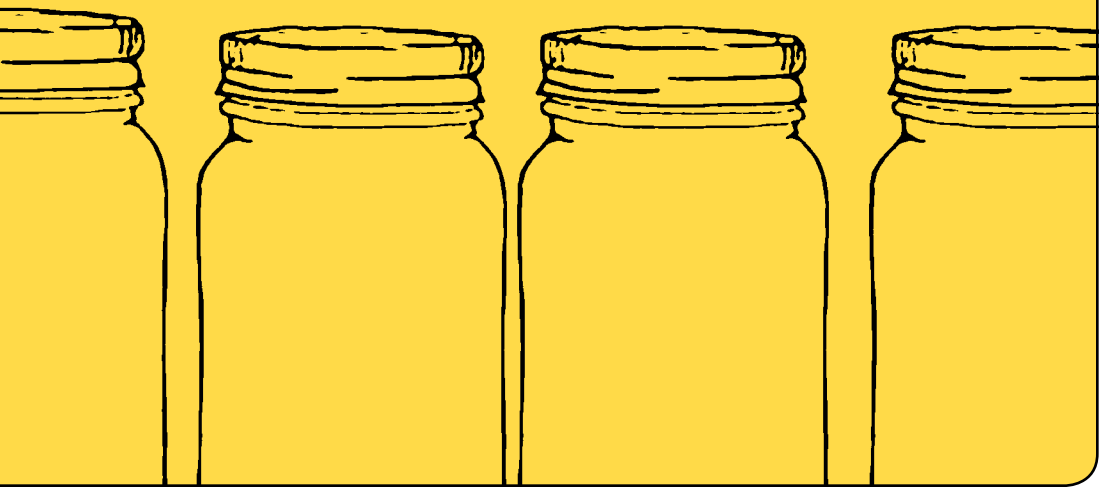
People with diabetes should use sugar-free options. Stay away from cured and salted items if watching your sodium intake. And for Pete's sake, if you don't like a food, don't preserve it.

Do I have the necessary space to store this?
A large pantry is ideal for canning foods. A separate outbuilding makes the best smokehouse. A clean cold-room is suitable for fermenting items. If your power source is unreliable, canning is an excellent choice.

Do I have the needed tools to preserve this food safely?
Low-acid foods require a pressure canner; if you don't have one, your choices of technique and method are limited. You can dehydrate meats in an oven, but not fruits and vegetables; that requires a dehydrator. You need a smoker attachment for your oven or grill before you consider beginning that project.

Do I have the time to execute the technique and methods?
Preserving takes time—if you don't have the needed block of time, don't begin a preservation project. Once you start you can't stop and then finish later.

What is the condition of the food?
Is your fruit perfectly ripe or a little overripe? Overripe means that juice is better than a whole fruit preserved in syrup. Bruised or blemished? Cut the bad parts off and make jam instead of preserving in syrup. Don't even consider rancid or 'off' meats!



Yes, I'm going to Preserve it!

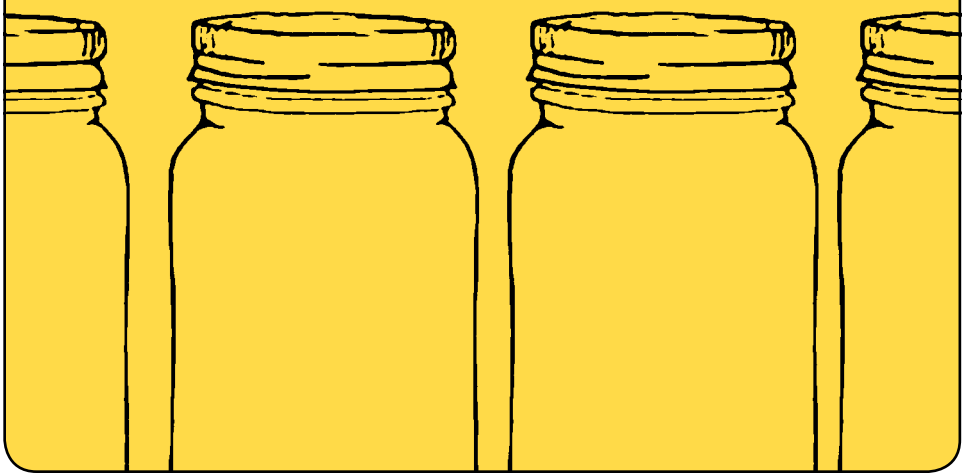
Quick Guide for Choosing the Correct Method of Food Preservation

Pressure Canning. Use for preserving low-acid and non-acidified foods. (Meats, All Vegetables, Legumes, Beans, and Prepared Meals)

Hot-Water Bath & Atmospheric Canning. Use for preserving high-acid and acidified foods. (Jams, Jellies, Pickled anything, Sauces, Salsas, Chutneys, Relishes, Pie Fillings, Syrups, Fruit Juice, and Fruits in Syrups)

Dehydration. Use for both naturally low- and high-acid foods. (Jerky, Dried Fruits and Vegetables, Fruit Leather, Pemmican)

Fermentation. Use for both naturally low- and high-acid fruits and vegetables and their juices. (Sauerkraut, 'Pickled' Vegetables, Yogurt, Cheese, Kimchi, Kombucha, Wine, Ciders)



SECTION TWO
WHERE WE GO FROM HERE

THE NEXT CHAPTERS WILL EXPLAIN THE HISTORY AND DETAILS about each type of preservation, including how to change the recipes. We've explored the science of the varying methods; now we'll get into the details of making it work. You'll learn the **WHY** and **HOW**, so you'll know what to do without relying on a particular recipe. That doesn't mean you're an expert. You'll make mistakes. You'll encounter disasters. You will have occasions where every single thing you do is 100% correct and your preservation will still fail. And that is okay. It's how we learn—by doing.

Each section is organized by style of preservation that may use a single technique (jelly) or multiple techniques (beef jerky). Recipes are included with notes on how to easily and safely modify your preparation. Learning the concepts means that whether you're making strawberry jam or plum jelly, you'll understand the correct ratios and procedures to make it safely. You'll become more confident in your preserving techniques and want to experiment with new methods. You'll become adept at reading recipes and recognizing when a particular recipe is fundamentally 'wrong' and unsafe. You'll also know how to correct it.

How far you want to pursue the art and science of food preservation is up to you. Some people find that working only with high-acid foods serves their needs. Others fall in love with a pressure canner. Some become devotees of dehydration. And more and more people are falling in love with fermentation. Use this book as a guide to understanding, and whichever method of food preservation you pursue, there are many more specialized resources available to give you further information. These books are included in the Resource Guide chapter at the end of this book.

I hope you are inspired to try your hand at food preservation. Recruit your friends and neighbors; as we tend to say in class, many hands make light work. As you work together and share the bounty of your preservation work, you'll laugh, talk, and feel confident that you've prepared foods with joy and safety.

How Much Should I Make

Two criteria help determine how much of food you should preserve. Canned items are optimum within one year of making. Fermented items vary from weeks to months of peak flavor, but can be frozen or hot-water bath processed for longer storage. First, consider how much you and your family will use in one year. If you eat a pint of salsa every week, make 52 pints. Secondly, we often have access to produce from our gardens, farmer's markets, and neighbors. Plan ahead. If you have a bumper crop of apples, you can make apple pie filling, applesauce, apple chutney. Also, consider trading with neighbors and our community. Food swap networks are popping up all over the U.S. You can make a metric ton of sauerkraut and trade it with folks for items you don't have. Much better than stealthily leaving a bag of zucchini on someone's porch.

I've Got *BLANK* and I Want to Make...

This list is by no means comprehensive but will give you a quick guide as to how you can preserve these items.

Angelica—Dehydrate
Apple—Jam, Juice, Jelly, Pie Filling, Dehydrate, Pickle, Sauce, Chutney
Apricots—Pickle, Jam, Jelly, Pie Filling
Artichokes—Pickle, Smoke
Asparagus—Pickle, Pressure Can
Aubergine/Eggplant—Chutney, Mixed Pickle
Bacon—Cure & Smoke
Beans—Pressure Can
Beef—Salt, Dehydrate, Pressure Can
Beer—Jelly
Beets—Pickle, Dehydrate, Pressure Can
Blackberries—Jelly, Jam, Sauce, Juice
Blueberries—Jam, Pie Filling, Jelly, Sauce, Juice, Dehydrate, Smoke
Cabbage—Ferment, Pickle, Mixed Pickle, Relish
Carrots—Pickle, Jam, Dehydrate, Pressure Can, Ferment
Cauliflower—Pickle, Mixed Pickle, Relish
Celery—Dehydrate, Mixed Pickle, Relish
Cherries—Jam, Jelly, Pie Filling, Dehydrate, Pickle, Sauce, Chutney, Smoke
Cucumber—Ferment, Pickle, Mixed Pickle, Relish
Currants—Jam, Jelly, Juice, Dehydrate, Pickle, Sauce, Chutney, Smoke
Dates—Jam, Jelly, Pie Filling, Dehydrate, Pickle, Sauce, Chutney, Smoke
Eggs—Pickle, Curd
Figs—Jam, Jelly, Juice, Dehydrate, Pickle, Sauce, Chutney, Smoke

Fish—Pressure Can, Dehydrate, Salt & Cure
Garlic—Pickle, Dehydrate
Ginger—Dehydrate, Jelly, Pickle
Gooseberries—Jam, Jelly, Pie Filling, Juice, Dehydrate, Pickle, Sauce, Chutney, Smoke
Grapes—Jam, Jelly, Pie Filling, Juice, Dehydrate, Pickle, Sauce, Chutney, Smoke
Green Beans—Pressure Can, Pickle, Ferment
Ground Cherries—Jam, Jelly, Pie Filling, Juice, Dehydrate, Pickle, Sauce, Chutney, Smoke
Guava—Jam, Jelly, Juice, Dehydrate, Pickle, Sauce, Chutney, Smoke
Ham—Cure & Smoke
Herbs—Dehydrate, Juice, Jelly
Lemon—Juice, Jelly, Pickle, Salt & Cure, Dehydrate
Mango—Jam, Jelly, Juice, Dehydrate, Pickle, Sauce, Chutney, Smoke
Melons—Pickle, Jelly
PawPaw—Jam, Jelly, Pie Filling, Juice, Dehydrate, Sauce, Chutney
Persimmons—Jam, Jelly, Pie Filling, Juice, Sauce, Chutney, Smoke
Plum (Mirabelle/Greengage/Damson)—Jam, Jelly, Pie Filling, Juice, Dehydrate, Pickle, Sauce, Chutney, Smoke
Mushrooms—Pickle, Pressure Can
Onions—Pickle, Pressure Can, Chutney, Jam, Jelly
Oranges/Nectarines/Satsumas/Mandarins/Grapefruit—Jam, Jelly, Pie Filling, Juice, Dehydrate, Pickle, Sauce, Chutney, Smoke
Peaches—Jam, Jelly, Pie Filling, Juice, Dehydrate, Pickle, Sauce, Chutney, Smoke
Pears—Jam, Jelly, Pie Filling, Juice, Dehydrate, Pickle, Sauce, Chutney, Smoke
Peas—Pressure Can, Pickle, Ferment
Peppers—Pressure Can, Jam, Jelly, Syrup, Pickle, Ferment
Pineapple—Jam, Jelly, Pie Filling, Juice, Dehydrate, Pickle, Sauce, Chutney, Smoke
Pork—Pressure Can
Potatoes—Pressure Can
Poultry—Pressure Can
Pumpkin—Pressure Can, Pickle, Ferment
Quince—Jam, Jelly, Juice
Radish—Pickled, Ferment
Raisins—Jam, Jelly, Pie Filling, Sauce, Chutney, Smoke
Raspberries—Jam, Jelly, Pie Filling, Juice, Dehydrate, Sauce, Chutney, Smoke
Rhubarb—Jam, Jelly, Pie Filling, Juice, Dehydrate, Pickle, Sauce, Chutney
Rutabagas (Swedes)—Mixed Pickle, Pressure Can
Strawberries—Jam, Jelly, Pie Filling, Juice, Dehydrate, Pickle, Sauce, Chutney, Smoke
Squash (except Summer Squash)—Pressure Can, Pickle, Ferment
Tomatoes—Jam, Jelly, Pie Filling, Juice, Dehydrate, Pickle, Sauce, Salsa, Pressure Can, Chutney, Smoke, Ferment
Turnips—Pickle, Pressure Can, Ferment
Wild Berries (Hedgerow)—Jam, Jelly, Pie Filling, Juice, Dehydrate, Sauce, Chutney, Smoke
Wild Game—Pressure Can, Dehydrate
Wine—Jelly
Zucchini—Pickle, Mixed Pickle

The Dumbest of the Dumb

Oven Canning: Filling jars, putting on the lids, then baking in the oven. Nope. You're not pushing the oxygen out of the jar.

Dishwasher Canning: Filling jars, putting on the lids, then running through a hot cycle of the dishwasher. Again, nope.

Open Kettle Canning: This is when you fill a jar, and either pour wax on top or put a screw-top lid on a filled jar and do nothing else. Don't do it.

Hot-Water Baths for low-acid foods: 212 degrees is not a high enough temperature to kill botulism-causing spores no matter how long you boil them in a jar.

Using "Jello" as a thickener: It's made of people! Not really, but it is an animal product and therefore very low-acid. If you use 'Jello' in your jam or jelly recipe, you're inviting botulism.

Using Amish/Mennonite recipes and techniques: Amish communities are common in the Midwestern U.S. and Canadian Plains. They have a rich and vibrant history and culture. A culture whose core tenet is REJECTING MODERNITY. We can learn cool skills from our Amish neighbors, but safe food preservation is not one of them. Amish and Mennonites have higher instances of small concentrations of foodborne illnesses; you're just not hearing about it.

Using antique cookbooks: Here's the official recommendation from the Center for Home Food Preservation: Use only canning cookbooks published after 1994. That's considered the safe procedure date cutoff. That being said, please be careful using ANY canning cookbooks. Many high-gloss picture canning books written by bloggers are not using reliably safe techniques. When in doubt about a recipe, contact your local University Agricultural Extension office and ask to connect to the Master Food Preserver closest to you. They will review recipes and determine their safety. They will also examine old or family recipes and help you adjust that recipe to the most current food safety standards.

Chapter Six

How to Process Using Hot-Water Bath/ Atmospheric Canner

Tools for Canning

Non-reactive Cooking Pot. A non-reactive cooking pot is one made of stainless steel or enameled metal. Hot-water bath canning is used only for acidified foods, so a cooking pot that is made of aluminum will chemically react with the acid. Pickling solutions and copper pots do not mix at all. Using a reactive metal can impart an 'off' flavor or color to the jam or pickles you're making.

You'll often see copper pots in artistic pictures of jam and jelly making. They're not necessary. In the European tradition of jam making, copper pots are used because they transfer heat quickly, bringing a fruit and sugar mixture to a boil. Copper jelly pots are expensive. Do you have one that's been passed down? Great, use it. But there is absolutely no need to purchase one unless you plan on devoting your preservation time to mastering the jams and jellies of France.

Canner. You can use a hot-water bath canner that is familiar by its white-speckled enamel finish or any other stockpot that is tall enough to stand jars. A pot for canning must have a rack, as the jars cannot touch the bottom of the pot. Racks of all sizes are available online. Prices range from $20 to $40, depending on the size of the canner.

Dedicated canners come with a rack that fits inside the pot. It is important that the jars never to touch the bottom of the canning pot. For the process to be effective, water needs to circulate the heat around the entire jar, which won't happen if the jar is standing on the bottom of the pot. You also risk jar breakage because the intense heat is transferred directly from the flame to the metal pot to the glass jar, without the tempering effect of the water. You can purchase a rack for any size pot based on the diameter of the pot. You can also fashion a homemade rack by wiring some canning bands together. You may have heard that it's okay to use a towel at the bottom of the pot ; it's not. A towel will absorb water and prevent it from circulating around the jar, which means the contents of the jar do not reach the temperature needed to kill germs, push out oxygen, and create a vacuum. It's dangerous and ineffective, so don't do it.

Some canning supply makers have developed something called a "getting started kit" or a "beginning canning kit." These kits are low-priced and include a silicone basket that can be used in any stockpot, as well as additional helpful tools. If you're not ready to purchase a full complement of canning supplies, seek out one of these kits. (See Resource Guide for details.)

Steam canners have been proven safe by the University of Wisconsin for home use in 2015. These use less water than traditional boiling-water canners to create the high-heat environment needed to process high-acid foods safely.

In favor of their use, these use less water and less energy to create the correct conditions for processing—so very useful when water conservation is a concern. A drawback is that for items requiring a longer processing time (more than 20 minutes), atmospheric canners can 'run dry' and cause your jar to seal improperly. I find that steam canners are best used for high-acid items like jams, jellies, salsas, etc. that have very short processing times. Available at larger hardware or home/farm supply stores, as well as online, they are made of lightweight aluminum and come with a standing rack. Prices range from $35 to $50, depending on the size of the canner.

Jar Lifter. This specialized tool is made to lift jars into and out of boiling water. Can you use tongs? Sure; do you like second-degree burns? Spend the five dollars and buy a jar lifter!

Measuring Tool. Another specialized canning tool; this is a six-inch-long piece of plastic that is tapered and rounded on one end and incrementally stepped on the other. This is an inexpensive tool that at the stepped end measures quarter-inch intervals. The rounded end is used to move material around in a jar to remove air bubbles. They are inexpensive and invaluable.

Canning Funnel. This is also referred to as a wide-mouth funnel. Placed into a jar, it makes filling a jar with hot pickling solution/jam/pie filling much less messy. Less mess equals less waste.

Magnetic End Lifting Tool/Wand. This is a 99-cent gadget that is a piece of plastic about ten inches long with a small magnet at one end. Very useful for removing metal lids from scalding water. Fancier models have a flat blade at the opposite end that can be used as a 'poker' in jars to remove air bubbles.

Clean Rags and/or Paper Towels. It may seem obvious, but canning involves hot foodstuff and boiling water. You need clean rags for both wiping jars and placing them after processing. Having a good stock makes your canning practice more efficient.

Silly Stuff You Don't Need

Automatic Jelly & Jam Maker / Automatic Canner. These are, much like a bread machine, made to 'set it and forget it.' They are sold by Jarden Brands (Ball and Kerr) and marketed to people who want homemade jam and jelly without any of the manual steps required. These machines allow you to mix ingredients in a bowl, then fill and process jars in one step. These devices are

expensive and make only four 8-ounce jars at a time. At $300, they are a total boondoggle. They also have not been tested by any of the Center for Food Preservation consortium members.

Sure-tight Lid Tightener. A key instruction in canning is 'finger-tighten lids.' Some people are needlessly perplexed by this. The Jarden Company, instead of better explaining what that phrase means, developed a $13 tool to tighten the band for you. Don't buy it. When you begin to feel resistance as you tighten the lid, you stop turning. That's it. Done.

Stainless Steel Canners. These are giant stockpots with a rack at the bottom. Sold by higher-end consumer kitchen goods stores, they are overpriced and excessive. A well-made stockpot with a rack will perform just as well.

How to Process

All high-acid foods are ideally processed for long-term storage using a hot-water bath or atmospheric canner. Jams, jellies, sauces, salsas, pie fillings, chutneys, relishes, pickles, sauerkraut; if food is acidified you can preserve it by boiling it in the canner.

The steps you follow in processing are exactly the same, regardless of the food you preserve. The only change will be: **1**. The amount of headspace left in the jar, and **2**. The processing time.

What's headspace? Headspace is the canning-specific term used to describe the negative space between the food in a jar and the top of the rim of the jar. Leaving this negative space is critical to safe processing, as it allows for the food to expand without escaping the jar and for oxygen to be vacated out, creating the anaerobic environment and a hermetic seal.

Each recipe will tell you the amount of headspace required. It varies from as little as ¼ inch to as much as 1½ inch for some pressure canning recipes. There is a tool for measuring headspace, but you'll develop your 'eye' over time and will be able to determine the correct headspace visually. You don't need to get out a micrometer and measure to the nth degree of accuracy, but getting close is important. Err on the side of a bit too much, rather than a bit too little, as overfilling a jar may cause the lid to bend or too much pressure to build in the jar, causing it to crack.

The processing time is the exact amount of time your filled jar spends in the canner. Do not tinker with the processing time. If the recipe calls for a 15-minute processing time, then that's what you do. Don't shave off a minute or two because you're in a hurry. The jars need to be in the canner for the prescribed

amount of time to fully expel the oxygen and to guarantee that the food at the center of the jar has reached the boiling point.

Conversely, do not overprocess. This is not a scenario where 'more is better.' Jellies are particularly sensitive; overprocessing can undo the delicate chemical structure of the sugar and pectin, and will re-liquify. Overprocessing pickled foods can easily create soggy pickles. And no one likes soggy pickles.

Again, the steps you follow to prepare, fill, seal, and process your jars is always the same.

Prepare Your Canner

The first step to beginning your processing should be in prepping your canner. If you're using a hot-water bath canner, know that it will take time to build enough energy to boil the water in the pot. Much like preheating your oven before you start a batch of cookies, you want to get your water boiling.

A dedicated canning pot has a 'bump out' around the bottom third of the pot. This is the fill line and shows how much water you should add. The goal is to have the water cover your filled jars by about two inches over the top. By filling the canner to one-third full, the weight displacement of the filled jars raises the water level over the top of the jars, regardless of the size of jar used. Sometimes, if you're not filling your canner entirely with jars, the water level may not reach. Then you add extra boiling water to bring the level in the pot to two inches over the top of the jars. A canning pot needs to be at a rollicking and rolling boil before you put your jars into the pot. This will take time. Naturally, the boil will slow when you take the lid off, but it will get right back up to full boil as soon as the lid goes back on.

Filled jars should either be placed into the canner one by one using a jar lifter or loaded into the basket rack while it sits on a counter or table, then carefully lifted and placed into the canner. This is boiling water, so be careful! Boiling water and steam can easily give you a second-degree burn.

An atmospheric/steam canner works slightly differently. The main benefit is that it uses both less water and less energy; it often takes only five minutes for this canner to boil water and produce steam. (A hot-water bath canner often takes up to 30 minutes to create the full rolling boil required.) Because it takes so little time to boil, you do not have to begin heating this pot until you're ready to process your filled jars.

An atmospheric/steam canner is a specially designed single-purpose tool for canning. The bottom is wide and shallow with a standing flat rack where the jars stand. It only holds two to three inches of water total and the jars are not

submerged; they stand above the boiling water. The cover of this pot is taller and has two to three holes to vent out steam. The canner is filled with a few inches of water, then the rack is placed into the pot and will stand above the water. Place your filled jars onto the rack. Place the cover on top of the pot, then turn on the heat. Watch the pot carefully for steam to begin pushing out the vent holes. As soon as you see steam, start your timer for the prescribed processing time.

When your batch has completed processing, turn off the heat and remove the lid. Allow a moment for the built-up steam to escape. Then, using your jar lifter, carefully lift out each jar and place onto a counter or table. It is important that you keep the jars upright and level as you move them. The phrase that's said over and over in class is: "Straight up. Straight over. Straight down." Resist the urge to wiggle or tip the jars to remove the water. There will be water pooled on the lid of the jar; don't worry about that. You can wipe it off later.

Sometimes a jar will fall over onto its side in the canner. Don't panic. With your jar lifter, carefully pick up the jar and take it out of the canning pot and stand it up as quickly as you can. Remember, that pot is filled with boiling water. Do not stick your hand in to fetch it. (Yes, people have tried that in class—I stand at the ready to prevent anyone from reflexively doing that.) If a jar is righted within a few minutes, oftentimes the seal remains intact. Worst-case scenario, and this would apply to all jars if your lid did not seal, place it into the refrigerator after it has cooled and eat it within a few days.

How can you tell if your lid is sealed? A lidded jar before processing is flexible; you can press it down, and it pops back into position. The center of the lid is sometimes referred to as the 'button'; when the 'button' is pulled down the jar is sealed. You can test this by pushing on the lid—it should feel tight as a drum with no flex action. It is a common myth that you have to hear a jar 'POP' for it to be sealed. Nope. The popping sound does happen as a by-product of the final vacuum seal occurring. But a jar can still be sealed without hearing a 'POP.' It's much better to check the lid by gently pressing on it after it has cooled.

Prepare Your Jars

The most current guideline for preparing your jars for canning is this: wash them in hot and soapy water immediately before use. Rinse and do not dry. That's it.

I know, you're thinking back to the idea that jars needed to be sterilized. And they did, a few decades ago. Commercial dish soap (not the antibacterial kind, thank you very much) when combined with hot water does a great job of

removing and dirt and microbes. Years back, soaps were less reliable and often homemade, so to guarantee a germ-free environment it was recommended that jars should be boiled for ten minutes. Not anymore.

If you have a dishwasher, jar prep is even easier. Load the dishwasher up and run on a hot/sanitize cycle. Leave the jars in the hot dishwasher until you need them. Easy peasy. If you don't have a dishwasher and have a large-scale canning project planned and don't want to wash jars *just* before you fill them, there is a hack. Fill an electric roaster (in Wisconsin we call them 'Nescos') with water. Set the temperature at 250 degrees. Place your clean jars into the heated water-filled roaster and pull them out as you need them.

Rumors are floating around the internet that one does not have to wash brand-new jars. That's not true. All you have to do is unscrew the band and remove the lid from a jar taken from a factory-new case. Smell that? Gross. There is chemical residue from the manufacturing process in those jars; please wash them.

Fill Your Jars

Jar-filling can be messy. You're taking a hot food from large pot and transferring it via ladle to a smaller-sized jar. Spills are bound to happen. Use a canning funnel to minimize mess and waste. You do want to prepare your workspace, the 'mise-en-place,' as chefs say.

What you'll need is your canning funnel, a ladle, a measuring cup, a tablespoon, a magnetic lifting wand, a medium-sized shallow bowl filled with very hot water (you could carefully take some from the boiling-water canner), and paper towels or tea towels. Give yourself enough room to work without danger of burning yourself with either hot food or the boiling water from the canning pot.

Before you begin filling jars, place the canning lids into the bowl of hot water to soak for a few minutes. Again, there are contrary recommendations about 'boiling' lids, but given the chemicals involved in the manufacturing process, a good soak helps remove any invisible debris and microbes, and softens the rubber.

In class, we work in small groups and break jar-filling into four distinct steps. The first step is what I refer to as a 'hard fill.' Trying to fill a jar that has a plastic funnel in it and hit the correct headspace measurement is tough. Don't even try. Instead, using the ladle, fill the jars close to the shoulder, about one inch below the rim. Then fill a measuring cup with the hot food. The second step is to use the measuring tool to check the headspace. Use a tablespoon to either

add or remove food until you reach the correct headspace. Thirdly, take a paper towel or tea towel that has been moistened in the bowl of hot water and scrupulously wipe the rim of the jar. Not the outside. Not the inside. The flat top rim where the rubber of the lid sits must be absolutely clean and free from even the smallest debris. The danger of failing to wipe the rim is that if there is a food obstruction, the lid will not seal during processing.

Lastly, the lids and screw bands are carefully placed on the jar and are loosely tightened. What does that even mean? Finger-tighten is the other phrase used. Here's what you're looking for: tighten the bands until you feel the grooves 'catch'; it's the moment when you would have to exert a little more effort to tighten the band. That's the moment you stop. Why aren't the screw bands fully torqued to tighten? The bands have two jobs in their entire existence. One is to hold the lid in place during processing; the other is to act as a shock absorber until they're cooled. That's it. Bands never need to be tightened before or after processing. In fact, the best thing you can do is remove the bands when your jar is cooled. The bands can be reused many, many times. If you leave it on the jar after processing, they may rust and get stuck.

Carefully place the filled jars into your canner. Start your timer for the required processing time. (If it's a hot-water bath canner, as soon as they get into the rolling boiling water, and if it's a steam canner, as soon as the steam begins to vent out of the holes in the lid.) Jams and jellies process quite quickly, within five to ten minutes. Sauces and pie fillings can take up to 25 minutes. Keep an eye on your canner. You'll want to move with purpose to remove the jars when the timer sounds.

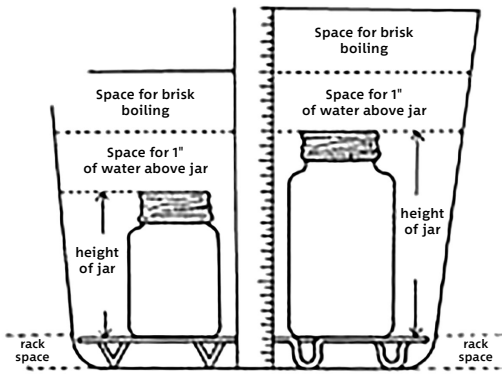
Jars may take up to 24 hours to fully seal, but most modern jars seal within an hour. Let them cool off naturally. Do not submerge them in cold water or place into a refrigerator or freezer. Moving a glass jar from boiling water to very cold water in a short amount of time can cause the jar to shatter. When your jars are cooled, and you've checked the seal, gently remove the bands. Now is also the time to write the date on the lid of the jar with a permanent marker. You think you'll remember when you made that batch of applesauce, but you won't.

One of the discouraging things that can happen is the discovery that your jar didn't seal, or worse, the jar broke inside the canner. Mistakes will cause jar failure; run through your recipe and canning instructions to check if you followed the steps, but if nothing jumps out as an error on your part, accept it and move on.

STEP-BY-STEP REVIEW OF THE CANNING PROCESS

1. Clean and prep jars by washing with very hot soapy water, rinse thoroughly in hot water. Do not dry. Immediately use OR instead of hand-washing, run jars in a dishwasher on sanitize cycle.
2. Place lids into boiling hot water. This softens or 'activates' the rubber edge on the lid.
3. Pour food into hot, drained jars. Leave correct headspace as directed in the recipe. Headspace is the air left between the jelly and the rim of the jar, necessary to set the seal.
4. Carefully wipe rims of jars to remove drips. Place lids on jars.
5. Place bands on jars and "finger tighten." As soon as you feel the natural resistance of the band on the jar when turning, stop.
6. Place jars into boiling water processor. Or Atmospheric / Steam Canner. Jars should be on the rack and not touching the bottom of the canning pot.
7. Process for the amount of time listed in the recipe. Timing begins when the water in the canner is at a full boil. Or when steam is venting from holes in the lid of Atmospheric / Steam Canner.
8. Remove jars from canner. Place jars on flat counter/table surface and let them cool 24 hours.

Water Bath Canners



Chapter Seven
Sugared Preserves

A History of Sugared Preserves

It all begins with honey.

Honey is the only food that requires zero intervention to preserve its safe use. Scientists recently unearthed a 10,000-year-old pot filled with honey. Of course, they sampled it. Still good. There are theories, but our written human histories have not yet mentioned when we discovered nutritive bee effluent as human food. What we do know is that the first documented use of honey as a preserving agent is noted by Cato in his farm notes in 200 B.C. A few hundred years later, in what is considered to be the first 'cookbook,' the Greek physician Apicius gives instruction on how to store fruit using both honey and wine must. Around the same time, he explained to students how to create a powerful medicine by cutting quince into sections and submerging them in honey for a year, and then cooking it with wine.

What these ancients accidentally discovered is not only the seemingly magical power of honey but how sugars interact with the natural pectin (a fiber) in fruits to form a thickened gel. It is from these experiments that our modern jams, jellies, pie fillings, fruit cheeses, and marmalades developed.

Names Reveal the History

Names for sweet preserves can be confusing. There is no single correct answer, but understanding the origin of these names helps us to know what we're talking about. One of the elements that make English a useful and somewhat universal language is its adaptability. Most English words have origins in other languages. So is the case for our sweet preserves.

In the ancient classical times, the preferred word for fruits soaked in honey and then cooked was called melomeli (apples in honey). These are not the apples of modernity. Think of the famed golden apple of the Greek goddess Aphrodite; it wasn't an apple, but a quince. The quince is a fruit native to Southwest Asian and Mediterranean countries. There are dozens of cultivars, but all share the same basic makeup. The skin is thin and fuzzy, and the interior is hard and inedible without cooking. They are a golden hue with a rosy patch when ripe. Quince is in the same family as apples and pears. In Greek, they are called cydonia. The Greek name birthed the French appellation *coindoic*, which later morphed into quince.

Quince fruit is among the fruits with the highest concentration of pectin in its cells. The long immersion in honey broke down the cell wall structure of the fruit, and then recombined with the sugars in the honey, becoming a gel. Humankind's first jelly.

These preparations of quince and honey spread throughout the region, with each culture adding a slight variant to both the technique and flavoring. The Romans considered quince lacking flavor and added black pepper. Persians used rose water as a flavoring, which Romans also quickly adopted. In the dry, western regions of Portugal, a cooked honey quince mixture was set out to dehydrate and called *membrillo*. Arab settlements in Spain and North Africa used the honey immersion method on their fruits and called it by a name we recognize today: jam.

Dictionary geeks may argue that the origin of the word 'jam' has not been definitively found, but scholars commonly accept that jam is a phonetic transliteration of the Arabic word يِبّزُم (ziham) meaning 'packed together.' Southern Spain was part of the Muslim caliphate for one hundred or so years, and Arab culture made an impact on numerous aspects of Catalan culture. The word 'jam' makes its first appearance in English cookery books in the mid-17th century.

It was during this age of forays that traders began bringing back foodstuffs from once foreign lands. As foods were eaten and discovered, demand for both the finished product and raw ingredients grew. (This practice holds true today.) Portuguese traders shipped crates of membrillo to England where it was the highest of high-class hostess gifts to send to the local duke.

By the Middle Ages, the French refined their technique of preparing quinces in honey and wine, substituting the wine with ale wort, a beer by-product, and added pears and ginger to the mixture. Named *coindoignac*, it was popular as a delicacy and lauded for its medicinal qualities of stimulating or settling the appetite depending on what the ailment was. English cooks and physicians made it following the French recipe, calling it *chardequynce*.

By the early 1500s, sugar, once a rare prize, became a cheap bulk commodity due to colonization and slavery of peoples in sugarcane-growing areas. The cheapness and accessibility led to the use of sugar in place of honey in these recipes. Because the methods had evolved to use cooking to accelerate the softening of the quince, the sugar behaved in the same way as the honey did. It absorbed the moisture and worked with the natural pectin to form a gel.

This is the moment when these concoctions get a new name: marmalade.

The marmalade of the Renaissance is a very particular food. It is a hybrid of the French and Portuguese styles. It still uses quince and sometimes pears, but is no longer dehydrated after cooked. It is in a gel form and stored in pots instead of the 'cheese' consistency of the *membrillo*.

The marmalade of the 1600s is recognizable to our modern palates. Each household prided itself on having good marmalade recipes in the home

cookbook. It retained its medicinal quality as well. Doctors would customize recipes by adding an array of spice combinations and other less savory ingredients to cure a broad range of ailments. This also leads to the then commonly held belief that marmalades were an aphrodisiac.

As complaints of a sexual nature are as old as humanity, people sought remedies in specially concocted marmalades. Libraries across Europe are littered with recipes for quince-based, gelled aphrodisiacs. Even noted visionary Nostradamus, who was a physician by training, had recipes for spiced fruit gels. (I've included one of Nostradamus' famed aphrodisiac recipes, updated for modern safety.)

It was during that same period that cooks began making preserved fruits using the marmalade techniques. These early cooks discovered that apples had the same gelling quality that quinces did. It is those household cooks foraging for wild berries and fruits that did the yeoman's work of experimentation and notation. These recipes weren't traditional marmalades and needed a new word to describe them. The Arab word 'jam' spread through the continent and was adopted as the all-purpose description of these cooked fruit and sugar mixtures.

Isn't Marmalade Made From Oranges?

Modern marmalade is made from citrus fruits, primarily oranges. The Scots claim the invention, but of course, an accurate history is less clear. During the late 700s, the entire Mediterranean area was ruled by the early Uyymadid Caliphate. Those occupiers and settlers began planting crops native to their eastern Mediterranean home: oranges and lemons. The climate of the northern Mediterranean was perfect for citrus to flourish.

As trade was relatively easy between Spain, Portugal, and England, citrus fruit was a readily available commodity by the early 1700s. The type of orange imported was nothing like the sweet-fleshed, heavy-skinned oranges of today. Called Seville oranges, they are thin-skinned and slightly bitter. Cooks who were already using the flesh and juice of oranges in recipes began sugaring the peels to create, essentially, a candied orange peel.

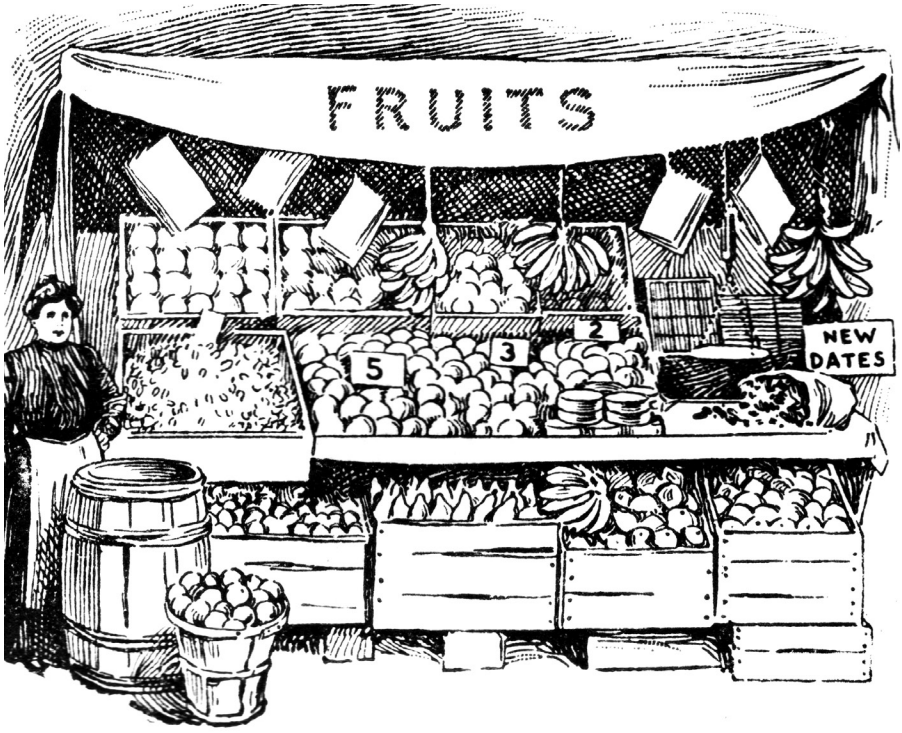
The first iteration of modern marmalade is made with a combination of apples and orange pulp. It had a softer gel set and was a favorite spread on meats and bread. The Scots' geography and climate is not conducive to quince growth but the ports of Glasgow and Edinburgh had been receiving regular orange shipments since the 1500s. There had already been variations of English quince-based recipes used in Scotland, substituting apples and oranges.

Full credit given here to the Scots: they were the first to put the peels into the gel. What they did was take sugared orange peels and add them to the apple-orange gel mixture. Modern Scots marmalade, made without apples, is first noted in Scottish cookbooks in the 1750s. At this time, there are two styles of marmalade: beaten and clear. The clear marmalade is considered more refined and challenging to make. The process requires multiple cookings and strainings, as well as special handling of the orange peel. The 'beaten' style is easier and involves cooking the whole fruit and then pulverizing it with a mortar and pestle. The clear marmalade with the fine shred is the version that made it through to modern times. (In the recipe section, you'll find recipes for both the clear marmalade and a modern version of 'beaten' marmalade that is quite easy to prepare.)

In the United States, tastes followed the European lead. Martha Washington's cookbook has recipes for Quince Marmalades and Apple-Orange Marmalade. As the country grew, people began to take advantage of locally grown fruits, experimenting with the making of 'jam pots.' So much so that Louisa May Alcott's 1868 classic *Little Women* features an episode of a frustrated Meg as a brand-new housewife, crying over her pots of currant jam that did not gel properly.

The largest manufacturer of jams and jelly products in the States is Welch's. They began in New Jersey as part of a Wesleyan Methodist Temperance Utopian community named Vineland in 1893. Dr. Thomas Welch was an active resident and began pasteurizing grape juice and marketing it as 'unfermented wine' to fellow adherents of the growing temperance movement. In 1913, at the advent of World War I, Welch's responded to the United States Army's request for preserved foods viable for transport with troops. Welch's produced, in enormous quantities, a gelled product they named "Grapelade." In the name alone, we see the ancient roots of our modern preserves. The first Welch's Grapelade was more of a pulpy jam versus the stiff, sugar-laden jelly of many childhood memories.

The success of Welch's Grapelade encouraged other food manufacturers to begin large-scale jam and jelly operations. An early and still rival to Welch's is the Smuckers Company of Ohio. Founded in 1897 on apple cider and apple butter, Smuckers has grown into a multi-brand international conglomerate. Such a fierce competition between the two companies exists that one of Smuckers' early advertising slogans proclaimed "Better than Welch's." Suffice to say, neither company can produce a sweetened preserve that will compete with your homemade product.


FRUITS
5
3
2
NEW
DATES

Sources for Produce and Meat

Beyond farming and gardening, here are some non-grocery-store sources for food.

CSA (Community Supported Agriculture)—CSAs are essentially a buyer's co-op. You purchase a share directly from a farmer and get a portion of the bounty. There are CSAs for any type and kind of food you could want to eat and preserve. Check with your local organic or natural food co-op for more info on what's available in your area.

Farmer's Markets—Many of the markets in larger cities lean heavy on the cutesy brunch crowd. But the people hauling in the produce are still farmers; talk to them about sourcing specific items.

Wild Harvest—Take a walk in the park or through your neighborhood and begin to notice the amazing fruit-bearing trees and shrubs around you. People often planted fruit-bearing trees on their small city lots to help feed their families. Generations and a few owners later, those trees are neglected with the fruit rotting on the vine and in the grass. Knock on the door and ask if a tree is being harvested. Many people are happy to let you pick their tree if you offer to share the harvest with either fresh or preserved items. Do ask about pesticide use. And never pick anything you can't identify with 100% accuracy.

Trade—Talk to your neighbors or local community gardens. Lots of people who are fantastic at growing things may not have the skills to preserve them. Organizing a Community Preserve get-together helps you and your neighbors stock their pantries, with a bonus of not wasting food. Farmers too may be open to trading. They're often so busy farming they don't have time to preserve as items ripen. Livestock farmers may often be interested in trading to supplement their own stores.

Problematic Foods for Preservation

The science of food preservation makes small strides forward every day. But there are still foods that present challenges to the home food preservationist. I don't care if you saw it on the internet. Don't care if that's how Aunt Hazel did it. These are the items that CAN NOT BE SAFELY CANNED via hot-water bath canner OR pressure canner. Just don't. If you've got your heart set on making Monkey Butter, make a small batch and refrigerate it.

Pumpkin Purees. Or any variety of squash, parsnip, or potato puree. You can safely pressure-can chunks of squashes, but not the puree. The puree is too dense, and the tools we have available to us are unable to maintain enough temperature and pressure to render it safe from pathogens.

> ***Try this instead:*** *1. Make your pumpkin butter or squash puree and freeze it.* **2.** *Dehydrate your pumpkin into a powder and add it to apple butter; process as you would for apple butter.*

Bananas. Bananas are cellularly dense. It's the same issue as with squash purees.

> ***Try this instead****: Make your Monkey Butter recipe as a refrigerator jam and use within a few days.*

Bacon Jam. It's a fad-food item. Regardless of popularity, you cannot safely hot-water bath or pressure-can high-fat content meats.

> ***Try this instead****: Make your Bacon Jam recipe as a refrigerator jam and use within a few days.*

Dairy. All dairy products are high in fat content. Even using a pressure canner, you cannot render the product safe from pathogens.

> ***Try this instead:*** *1. Butter freezes very well.* **2.** *Dehydrate milk.*

High-Fat Meats and Low-Fat Fish. One of the advantages of a pressure canner is that you can preserve meat items and complete meals containing meat, but not if they contain high-fat meats. And just NO NEVER to organ meats; liver pâtés and other organ meats can never be safely preserved at home. The opposite rules apply to fish: higher-fat content fish like salmon and tuna can be safely processed, but panfish (crappies, bluegills, etc.) are better preserved by freezing.

> ***Try this instead:*** ***1****. Dehydrate meats into jerky or pemmican.* ***2****. Cook meat until all fat is rendered out.* ***3*** *Freeze them.*

Floret and layered leaf vegetables. Brassicas (like broccoli), cauliflowers, Brussels sprouts, cabbage, and lettuce are not safe for pressure canning. The many small surfaces of the florets are great homes for pathogens. The high heat of the pressure canner will turn the vegetable into mush, yet allow pathogens to remain.

> ***Try this instead****: Pickle it. Acid bath preserving will create a safe environment for dense, cruciferous vegetables.*

Avocados. These are very high in fat and cannot be safely processed. Nor can any completed recipes containing avocados (e.g., guacamole) be safely preserved.

Complete recipes containing rice, grains, flour, pasta, cornstarch, tapioca, arrowroot, cornmeal, oats, etc. All these items are used as fillers or thickeners; they are unsafe to use in any canning. No amount of heat and pressure processing will kill the pathogens.

> ***Try this instead:*** ***1****. For soups, cook any rice or noodle additives separately then add to your reheated soup.* ***2****. If something needs to be thickened, do it on the stovetop before serving.* ***3****. For pie filling thickener, USE ONLY ClearJel. ClearJel was developed by the Center for Home Food Preservation and is made to be safe for home canning. (See SOURCES for purchase)*

Don't be discouraged! If one method of food preservation is not safe, another method will be.

Sugared Preserves! What is...

Jelly	Jellies are made solely from the strained juice of the fruit.
Jam	Jams contain mashed or pulped fruit.
Preserve	Whole or half fruits preserved in a sugared syrup OR gel.
Conserve	Either a single or mixed fruit pulp and nutmeats.
Cheese	A fruit pulp that has been sweetened, cooked, dehydrated to the consistency of a firm cheese.
Fruit Spread	By legal definition, a fruit spread has no added sugars.
Marmalade	Citrus peels cooked, then suspended in jelly.
Fruit Curd	A spread of egg yolks and citrus fruit juice.
Fruit Butter	Made of sieved fruit pulp, with sugar added after sieving, then cooked to evaporate all water.
Chutney	Chutney can be included as either a sweetened preserve or a pickle, as it has the qualities of both. Fruits and vegetables are mixed with sugar, spices, and vinegar to make a complex-tasting spread or condiment.

Making Jams, Jellies, Pie Fillings, Syrups, Fruit in Syrup, and Sweetened Preserves

To make something into a gelled product, pectin must be introduced to the mixture. Pectin is a fiber that, when present in fruit, acts as a cellular binding agent, keeping the protective skin of the fruit stable and intact. When heat is applied to the fruit, the pectin releases from the flesh and begins to rechain with the sugars to form a gel. Some fruits are naturally high in pectin, but many have very little.

As referenced earlier, it was the ancients who first observed some fruits developed a gel when left in vats of honey for a period of time. Later, other fruits were found to have the same quality. Apples, oranges, pears, gooseberries, and guavas all thickened to a beautiful gel when prepared in the traditional marmalade method. These observations were passed along in cookbooks and word of mouth until 1825 when pectin was first isolated as a unique fiber entity.

It wasn't until after World War I that commercial pectin was produced in the United States. It is a natural product made, depending on brand, with a combination of citrus peels and apple pomace, pomace being the remnants of juice extraction. The process involves using a hot diluted food-grade acid to unchain the pectin from its source. The resulting solution is then dehydrated and milled into a fine powder. Originally and still available in a liquid form,

powdered pectin is a more stable product for both storing and usage. There are two types of pectin commercially available: one version is high in 'ester,' the name given to reactive acids, and the other is lower in 'ester.' The difference is this: higher-ester pectin needs more sugar to create a gel; low-ester requires less sugar to gel. It's marketed and branded as "Low-Sugar Pectin."

Again, naming conventions cause misunderstandings. There is no sugar in any American pectin. Low-sugar indicates that it works in a low-sugar mixture. Adding to the confusion is the fact that in Europe, commercial pectin is sold pre-mixed with sugar and called "Jam Sugar." Jam Sugar is always a high-ester pectin mix unless labeled otherwise. Finally, pectin in and of itself is not sweet. It imparts no actual flavor to a preserve.

Liquid pectin is readily available in supermarkets. It is a 'full-ester' pectin. You'll often see it listed as an ingredient in jellies versus jams. The recipes included here make no mention of it whatsoever. It's my personal opinion that liquid pectin is awful. Using liquid pectin in a recipe often results in a jelly (or jam) that doesn't set up correctly. It's frustrating to use besides being more expensive. I don't recommend it.

Many European cooks never add commercial pectin to their preserves; they rely on the addition of pectin-rich fruits to create a gel. Most favored is the apple, as it is mildest in flavor and can be added without changing the desired flavor of the jam. Included are recipes for homemade pectin that can be used in place of commercial pectin, and European-style recipes that combine fruits and apples.

The Center for Home Food Preservation has developed a finely milled and refined pectin for use in making pie fillings. Sold under the brand name of ClearJel (high-ester, needing more sugar), this product is available online and in specialty supply stores. Though more challenging to acquire, it is the ONLY type of pectin safe for use in making home-canned pie fillings.

Check the Set

The goal of making gelled fruit preserves is just that: gelling. I receive numerous calls from distressed makers from around the country with this simple but perplexing question: My jelly won't set! There is not much one can do to correct a non-gelled jelly after it has been poured into a jar and processed besides remaking it entirely. But, you can remedy a non-gelling batch prior to pouring it into a jar.

Once your preserve has completed its cooking cycle, take out a tablespoon of the preserve and pour onto a plate or small dish. Let it cool. In class, this is

when we walk away from it and prep our workspace for filling jars. You should too. Your sample needs to be completely cooled to test. When it is, you'll see a glistening pool on the dish. Is it gelled? Run your finger through the middle as if you're Charlton Heston parting the Red Sea. If the material runs back together, it has not reached a gel point. If the jelly/jam sea remains parted, then success—your preserve is gelled! In class, we call this the Moses Test.

You'll see other variations of checking your set that requires placing a dish in a freezer. It's the same idea: you're cooling the material to see if it results in a gel. Some cookbooks suggest testing the set by dipping a spoon into the hot mixture and watching how it slides off the spoon—the sheeting test. Honestly, I could never tell if something was set that way. Use the Moses Test. It works, and there's no question about if it gelled or didn't.

What do you do if your jelly or jam isn't set? Remake it. Meaning: add ⅓ cup of pectin and two tablespoons of lemon juice, then bring the mixture back up to a rolling boil and boil for one minute. Turn off the heat. Then check the set again. That usually fixes it. Sometimes it doesn't. When it doesn't, take heart; no one has to know that you really wanted to make jelly in the first place. They will happily eat your delicious syrup.

Following the recipes below will ensure that your sugared preserve is at the proper pH level with the correct amount of acidity. But I know you; you want to be sure. You may also want to experiment. If you are the adventurous type, then invest in a pH meter. No, you can't use the paper testing strips you may remember from chemistry class.

This is a tool that resembles a thermometer that will measure the acidity of your mixture. If your mixture is liquid, you can dip the meter into a small amount of the jelly and measure. If your mixture has chunks, you need to blend it into a puree before measuring. (You can add a small amount of water to thin the mixture, as drinkable water is of neutral acidity.) Your measurement needs to be less than 4.5 for it to be considered high in acid and safe for canning. (See Resource Guide for recommended pH meters.)

At its most basic, the making of syrups, jams, jellies, pie fillings, and fruit cheeses is a favorite technique for preserving foods. All of these final products can be stored for about a month in a refrigerator and six months in a freezer. But to entirely prevent pathogen growth, you must use hot-water bath or atmospheric canning to expel all oxygen and create a vacuum seal. This is the only way that jars can be safely stored for one year at room temperature.

Making Jellies

Traditionally, jellies are made from the juice of the whole fruit. There are a few items called jellies that have 'bits' in them; technically, these are fruit preserves, but we'll allow it. So the very first step in making jelly is making juice. It is perfectly acceptable to use purchased juices, but do make sure that they are 100% juice without any additional sweeteners. Some of the recipes below use bottled fruit juices.

This is how you extract juice from the fruit. Heat is used to break down the physical cell structure of the fruit, which then releases the moisture. You can do this by boiling and straining or using a specialized tool, a steam extractor. An electric juicer leaves too much fiber in the juice. This is perfect for drinking and fine if you're not concerned about pulp in your jelly. Award-winning jellies have a jewel-like clarity.

In the first technique, the fruit is covered with a nearly equal amount of water, boiled, then pressed through a sieve and then further strained to remove impurities. The tools involved in this process are a conical sieve and a jelly bag. Be forewarned, the process is laborious, requiring multiple steps. When making jelly, resist the urge to give the jelly bag a squeeze as the clearest juice is derived by gravity alone.

In the second technique, a specialized tool called a steam extractor/juicer does the job of heating and straining. A steam juicer is a three-part pot that uses heat and gravity to create juice. Simply, water is placed in the lowest section and fruit in the highest section. The middle section is the collection pot for the juice and has an external hose to drain the results. The steam extractor/juicer eliminates the need for manual pressing and sieving—a boon if you're planning on preserving lots of juices and jellies. For occasional makers, the conical sieve and a jelly bag work just fine.

Some makers are disappointed by the low yield of jelly. You begin with pounds of fruit and end up with a few jars. Don't let the fruit pulps go to waste. The pulp from making apple or quince juice can be made into jam, fruit sauce, or fruit leather. If you're straining berries, the seedy pulp can be added to a smoothie. Preserving food also means not wasting food.

Tips for Jellies

Use your favorite herbs and spices to add flavor to jellies. Be inspired by your favorite cocktails, dinner, scent, anything. Remember: spices that remain in jelly will grow stronger over time. For a more subtle flavor use a cheesecloth spice bag or stainless steel tea ball to infuse your jelly.

Double recipe with care. Beyond the chemistry of acidification and water absorption, the physics of evaporation is working in jelly making. You can safely double a recipe if the final juice amount does not exceed eight cups. If you double one element of the recipe, you must double all of it. Know that jellies are more delicate than jams and suffer when measurements are willy-nilly. A disciplined jelly maker will make two batches of jelly rather than jeopardize having a doubled batch not set up.

Patience is rewarded. Some jellies will take up to 72 hours to set up in the jar. Be patient. Make sure you check your set before you pour into jars. If it's not set when you check it, it's not going to set when you process.

Break the rules! Pepper Jelly contains bits of pepper suspended in the jelly. That's okay. You add fruit pieces in when you add the sugar as it does need to cook to release its moisture and absorb sugars. The fruit will 'float' to the top of the jelly, giving the jelly a layered look. Try these combos for a 'booze-infused' jelly: Asian Pears in Sake Jelly, Apples in Krupnik Jelly, Peaches in Rum Jelly, Strawberries in Pinot Noir Jelly.

Step-by-Step Making Juice for Jelly

Step One: Rinse fruit in cold water. Remove any stems or leaves and rough-chop into chunks if a larger fruit. Include any peels and seeds if present.

Step Two: Put prepped fruit into the non-reactive stockpot, then add water until fruit is entirely covered.

Step Three: Cook on medium heat until mixture comes to a boil, then simmer for a half-hour on low heat.

Step Four: Fruit should be completely mushy. Let mixture cool down from boiling temperature. Pour 2 cups of the mixture into a conical sieve then press through. (Seeds and skins will remain in strainer; remove these and reserve in bowl between additions.)

Step Five: Set up jelly bag. (Mesh or cheesecloth bag suspended by a frame over a container.) Pour fruit mixture into damp jelly bag. Let juice separate from solid materials for 12–24 hours.

Note: If you would like to preserve your juice, you can do that after this step. The juice is unsweetened and concentrated; you should acidify with lemon juice and add sugar to taste. (See the recipe below.)

All recipes make the assumption that you've prepared your canning jars according to the best practices described in the Hot-Water Bath Canning Instructions. When should you get your jars ready? Wash and rinse them when you're doing your 'set check.' If you're using a dishwasher, start the cycle before you begin cooking.

If you're hot-water bath processing, your canner should be filled with water and underway before you start your final cooking of the jelly.

RECIPES

Cranberry Juice (Making and Canning Juice)
Homemade Apple Pectin (Jelly)
Basic Berry Jelly
Basic Stone Fruit Jelly
Basic Rosaceae Jelly
Beer Jelly
Wine Jelly
Garlic Jelly
Pepper Jelly
Herb Jelly

Cranberry Juice

(All fruits)

Total Preparation Time: 2 hours

Special Equipment: Conical Sieve

How Long Before Use: 1 day

Headspace: ¼ inch

Process time: 10 minutes

Jars: 8 ounces, 16 ounces, 32 ounces, 64 ounces

Yield: 6–8 32-ounce jars

NOTES: This basic juice recipe can be used with every type of fruit. Honey or Splenda can be substituted for white sugar.

Juices are the only item that can be safely processed in the large half-gallon (64 oz.) sized jars. Smaller canning pots may overboil when filled with the larger jars. Check your canner capacity before using.

3 pounds cranberries

7 quarts water

1 cup lemon juice

Sugar to taste

Step One: Wash cranberries. In a large stockpot, place cranberries and 4 quarts of the water. On medium heat, bring to boil. Simmer until all the berries have 'popped' and release their juice. (Yes, they make a popping sound!) Remove from heat.

Step Two: Using a conical sieve, press the cranberries through to separate the seeds. Pour this pulp through a sieve to strain the juice.

Step Three: Take the remaining pulp and place back into stockpot. Cover with 2 quarts of water. Bring this mixture up to a boil over medium heat. Simmer for 5 minutes. Remove from heat.

Step Four: Strain this mixture to remove the pulp from the juice. Add the juice to reserved juice. And repeat Step Three, adding the remaining quart of water to the remaining pulp.

Step Five: After all fruit juice has been extracted, place it back into the stockpot and add the lemon juice. The juice can be processed at this point, but if you'd like a sweeter juice, add 1 to 3 cups of sugar. If you're adding a sweetener, begin heating the juice over medium heat and add sweetener one cup at a time, tasting after each addition. Bring this mixture to boil then remove from heat.

Step Six: Pour into prepared jars. Put on lids and process.

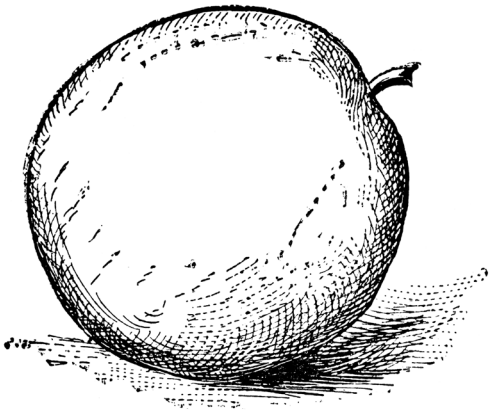
VARIATION: You can make juice blends if you're looking to maximize your produce. Grape and apple are a childhood staple.

Homemade Apple Pectin

Total Preparation Time: 2 hours
How Long Before Use: Immediate
Headspace: ¼ inch
Process time: 7 minutes
Jars: 8-ounce
Yield: 6–8 8-ounce jars

NOTE: In recipes calling for ⅓ cup of pectin, use 1 cup (8 ounce) of homemade pectin.

3 pounds barely ripe apples (or crabapples)
(reduced to 4 cups of juice)
4 cups sugar
6 cups water
2 Tablespoons bottled lemon juice



Step One: Rinse the apples in cold water. Remove stems and rough-chop into 4-inch chunks with peels and seeds (pips) included.

Step Two: Put chopped apples into the non-reactive stockpot, then add water to cover apples.

Step Three: Cook on medium heat until apple mixture comes to a boil, then simmer for a half-hour on low heat.

Step Four: Apples should be completely mushy. Let mixture cool down from boiling temperature. Pour 2 cups of the mixture into a conical sieve then press through. (Seeds and skins will remain in sieve; remove these and reserve in bowl between additions.)

Step Five: Set up jelly bag. (Mesh or cheesecloth bag suspended by a frame over a container.) Pour Apple Mixture into damp jelly bag. Let juice separate from solid materials for 12–24 hours.

Step Six: Pour 4 cups of the apple juice into a non-reactive preserving pan with lemon juice and sugar.

Step Seven: Bring to boil. Then continue to boil until mixture reaches 225 degrees. (This should be measured with a candy thermometer.) Continue boiling at 225 for 5 minutes.

Step Eight: Remove pan from heat. Check for the set. (If not set, put back onto stove and reheat to 225 degrees for 5 minutes.

Step Nine: When set, pour into jars. Put on lids and process.

Basic Berry Jelly

Total Preparation Time: 2 hours
How Long Before Use: Immediate
Headspace: ¼ inch
Process time: 7 minutes
Jars: 4-ounce, 8-ounce
Yield: 6–8 8-ounce jars

3 pounds berries
(reduced to 4 cups of juice)
4 cups sugar
4 cups water
2 Tablespoons bottled lemon juice
⅓ cup pectin

NOTE: Reduce sugar to 2 cups total and use low-sugar pectin for a less sweet jelly.

Step One: Rinse the berries in cold water. Remove stem leaves, and hull.

Step Two: Put berries into the non-reactive stockpot then add water to cover.

Step Three: Cook on medium heat until berry mixture comes to a boil, then simmer for a half-hour on low heat.

Step Four: Berries should be completely mushy. Let mixture cool down from boiling temperature. Pour 2 cups of the mixture into a conical sieve then press through. (Seeds will remain in sieve; remove these and reserve in bowl between additions.)

Step Five: Set up jelly bag. (Mesh or cheesecloth bag suspended by a frame over a container.) Pour berry mixture into damp jelly bag. Let juice separate from solid materials for 12–24 hours.

Step Six: Heat juice to boiling, then add in lemon juice and sugar. Stir well but gently to avoid adding air bubbles. Sugar should dissolve evenly into the mixture.

Step Seven: Bring mixture back to full, rolling boil. Add in pectin. Stir gently to dissolve evenly.

Step Eight: Bring mixture back to full, rolling boil. At rolling boil, begin the timer for 1 minute. After 1 minute, remove the pot from heat.

Step Nine: Let mixture rest for a few minutes. Check set. If set, skim the top of the jelly to remove the film, or 'scum.'

Step Ten: If set, pour into jars. Put on lids and process. If not set, add 1 Tablespoon of lemon juice and 1 Tablespoon of pectin. Repeat Steps Eight and Nine.

VARIATION:

This basic berry recipe is applicable for all types whether commercially grown or wild-harvested. Feel free to mix different berries together; mixed-berry jellies are often referred to as Razzleberry or, if wild-harvested, Hedgerow Jelly.

If you live in an area that has a native-growing berry, take the time to seek them out and preserve their delicate flavor. In the Upper Midwest and Southern Canada, look for cloudberries; salmon berries range throughout the Pacific Northwest. Chokecherries are prolific east of the Mississippi River while sea plums and sea grapes are found in the Atlantic Coastal areas. Invest in a guidebook that thoroughly describes the fruit-bearing plants native to your region.

(**Wild Berry Jelly** and **Strawberry Jelly** pictured on page 165)

Basic Stone Fruit Jelly

Total Preparation Time: 2 days
How Long Before Use: Immediate
Headspace: ¼ inch
Process time: 7 minutes
Jars: 4-ounce, 8-ounce
Yield: 6–8 8-ounce jars

6 cups fruit skins and stones
4 cups sugar
6 cups water
2 Tablespoons bottled lemon juice

NOTE: Reduce sugar to 2 cups total and use low-sugar pectin for a less sweet jelly.

NOTES: This recipe is applicable for any fruit that has a center stone or pit. Peaches, apricots, plums, cherries, nectarines are all considered stone fruits.

This recipe assumes that you've used the flesh of the fruit for another beautiful preserve. Skins and stones may be frozen in an airtight container and used at a more convenient time.

Step One: Take the reserved skins and stones and place into non-reactive preserving pot then add water to cover.

Step Two: Cook on medium heat until berry mixture comes to a boil, then simmer for a half-hour on low heat.

Step Three: Let mixture cool down from boiling temperature. Pour 2 cups of the mixture into a conical sieve then press through. (The skins and stones will remain in sieve; remove these and reserve in bowl between additions. Larger stones can be plucked out.)

Step Four: Set up jelly bag. (Mesh or cheesecloth bag suspended by a frame over a container.) Pour berry mixture into damp jelly bag. Let juice separate from solid materials for 12–24 hours.

Step Five: Heat juice to boiling, then add in lemon juice and sugar. Stir well but gently to avoid adding air bubbles. Sugar should dissolve evenly into the mixture.

Step Six: Bring mixture back to full, rolling boil. Add in pectin. Stir gently to dissolve evenly.

Step Seven: Bring mixture back to full, rolling boil. At rolling boil, begin the timer for 1 minute. After 1 minute, remove the pot from heat.

Step Eight: Let mixture rest for a few minutes. Check set. If set, skim the top of the jelly to remove the film, or 'scum.'

Step Nine: If set, pour into jars. Put on lids and process. If not set, add 1 Tablespoon of lemon juice and 1 Tablespoon of pectin. Repeat Steps Six and Seven.

VARIATION:

This Stone Fruit Jelly recipe is an excellent way to reduce waste. Cooking the stones with the skins extracts all the fruit flavor in addition to the slightly almond-esque flavor from the pits.

Let's bust this myth forever: Yes, stone fruit seeds (the seed inside the stone) contain cyanide. BUT it is a trace amount, about nine milligrams. The amount of cyanide needed to kill an average human is many many grams. Put it this way: You would need to eat the entire seed of 66,666 peaches to ingest a killing amount of cyanide. You're safe. Really.

For a beautiful ombre effect in your lighter-colored jellies, add one maraschino cherry to the jar after filling. When the jelly processes in the hot-water bath canner, the red from the cherry sinks toward the bottom.

Rosaceae Family Fruit Jelly

(Apples, Pears, and Quince)

Total Preparation Time: 2 days

How Long Before Use: Immediate

Headspace: ¼ inch

Process time: 7 minutes

Jars: 4-ounce, 8-ounce

Yield: 6–8 8-ounce jars

4 cups fruit juice*

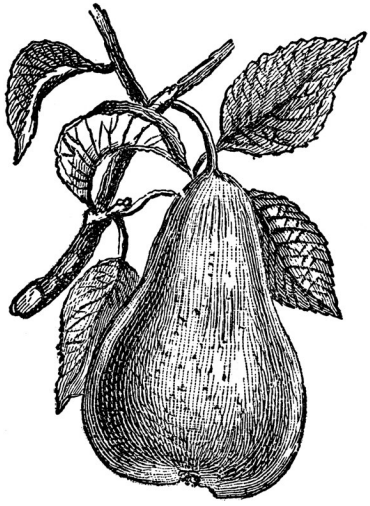
4 cups sugar

2 Tablespoons bottled lemon juice

⅓ cup pectin

NOTE: Reduce sugar to 2 cups total and use low-sugar pectin for a less sweet jelly.

Also, Rosaceae are naturally high in pectin, so be conservative in adding more than required.



Step One: Pour quince juice into a non-reactive preserving pan.

Step Two: Heat mixture to boiling, then add in lemon juice, sugar, and spices. Stir well but gently to avoid adding air bubbles. Sugar should dissolve evenly into the mixture.

Step Three: Bring mixture back to full, rolling boil. Add in pectin. Stir gently to dissolve evenly.

Step Four: Bring mixture back to full, rolling boil. At rolling boil, begin the timer for 1 minute. After 1 minute, remove the pot from heat.

Step Five: Let mixture rest for a few minutes. Check set. If set, skim the top of the jelly to remove the film, or 'scum.'

Step Six: If set, pour into jars. Put on lids and process. If not set, add 1 Tablespoon of lemon juice and 1 Tablespoon of pectin. Repeat Steps Four and Five.

VARIATION:

For a traditional Quince Christmas Jelly: Add in 1 Tablespoon each finely grated lemon and orange zest, and a ½ teaspoon of French spice blend, pain d'epices (a mixture of cinnamon, clove and anise). 'Apple Pie Spice' with a pinch of anise can be substituted.

Use Apple Pie Spice blend with apple juice.

Pear matches well with 1 teaspoon of cardamom.

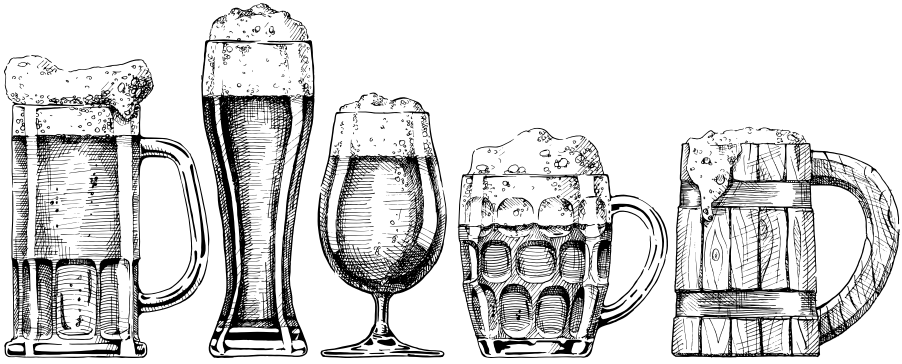
Beer Jelly

Total Preparation Time: 2 hours
How Long Before Use: 3 days
Headspace: ¼ inch
Process time: 5 minutes
Jars: 4-ounce, 8-ounce
Yield: 6–8 8-ounce jars

4 cups beer
2 cups organic apple juice, unfiltered
4 cups sugar
2 Tablespoons lemon juice
⅓ cup pectin

NOTE: Reduce sugar to 2 cups total and use low-sugar pectin for a less sweet jelly.

Craft brewers are creating fabulous styles and flavors of beer. Choose your favorite for this recipe.



Step One: Decant beer and apple juice into a non-reactive preserving pan. Allow to sit in the pan for 30 minutes to allow for carbonation to evaporate.

Step Two: Heat mixture to boiling, then add in lemon juice and sugar. Stir well but gently to avoid adding air bubbles. Sugar should dissolve evenly into the mixture.

Step Three: Bring mixture back to full, rolling boil. Add in pectin. Stir gently to dissolve evenly.

Step Four: Bring mixture back to full, rolling boil. At rolling boil, begin the timer for 1 minute. After 1 minute, remove the pot from heat.

Step Five: Let mixture rest for a few minutes. Check set. If set, skimthe top of the jelly to remove the film, or 'scum.'

Step Six: If set, pour into jars. Put on lids and process. If not set, add 1 Tablespoon of lemon juice and 1 Tablespoon of pectin. Repeat Steps Four and Five.

NOTES: A jelly made from beer accentuates the flavors in the beer while removing most of the alcohol. The subtle dried fruit and spice notes traditionally associated with craft beers yield jelly with complex aromatics and caramel-brown color. You can also add complementary spices and citrus zest to any beer jelly.

Use your jelly on toast as you would any other jelly, but also try as a glaze for fruits, cheeses, pastries, or spooned over ripe cheese such as Comte.

VARIATION:

Founder's Breakfast Stout with/cinnamon

Lakefront Brewery Wit Beer with/coriander

Southern Tier Tripel Café with/orange zest

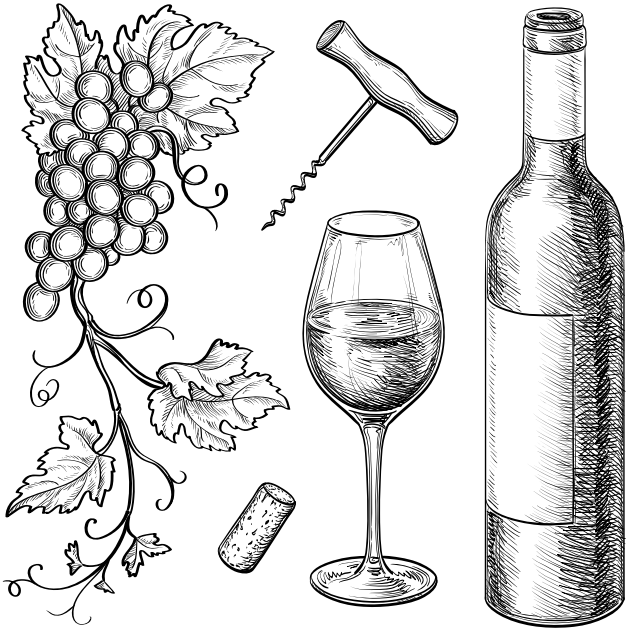
A Saison with/ginger

Pabst Blue Ribbon stands alone!

Wine Jelly

Total Preparation Time: 2 hours
How Long Before Use: 3 days
Headspace: ¼ inch
Process time: 5 minutes
Jars: 4-ounce, 8-ounce
Yield: 5–7 8-ounce jars

4 cups wine (Drink remaining wine)
2 cups sugar
1 Tablespoon bottled lemon juice
⅓ cup low-sugar pectin



Step One: Decant wine into a non-reactive preserving pan.

Step Two: Heat mixture to boiling, then add in lemon juice and sugar. Stir well but gently to avoid adding air bubbles. Sugar should dissolve evenly into the mix.

Step Three: Bring mixture back to full, rolling boil. Add in pectin. Stir gently to dissolve evenly.

Step Four: Bring mixture back to full, rolling boil. At rolling boil, begin the timer for one minute. After one minute, remove the pot from heat.

Step Five: Let mixture rest for a few minutes. Check set. If set, skim the top of the jelly to remove the film, or 'scum.'

Step Six: If set, pour into jars. Put on lids and process. If not set, add 1 Tablespoon of lemon juice and 1 Tablespoon of pectin. Repeat steps four and five.

VARIATION: This recipe works with any wine but chooses wine that is 'drinkable' yet not expensive. A wine jelly made from 'party leftovers' is tasty too. Feel free to mix similar wines together.

Roasted Garlic Jelly

Total Preparation Time: 2 hours
How Long Before Use: 3 days
Headspace: ¼ inch
Process time: 8 minutes
Jars: 4-ounce, 8-ounce
Yield: 5–7 8-ounce jars

12 medium heads garlic
1 Tablespoon olive oil
1 Tablespoon balsamic vinegar

2 cups dry white wine
1⅓ cups water
1 cup white balsamic vinegar
1 Tablespoon whole black peppercorns

3 Tablespoons lemon juice
3 cups sugar
⅔ cups pectin

Step One: Separate garlic into cloves. Place on a parchment-lined jelly roll pan. Drizzle the olive oil and balsamic vinegar over cloves. Roast at 425 degrees for approximately 15 minutes.

Step Two: In a medium non-reactive stockpot combine roasted garlic, wine, water, white balsamic vinegar, and peppercorns.

Step Three: Bring mixture to boil, then reduce heat to gently simmer for 5 minutes uncovered. Mash garlic cloves with a fork. Remove from heat and cover pot and steep for 15 minutes.

Step Four: Transfer cooled garlic mixture to damp jelly bag. Let juice drip from the mixture for about 30 minutes.

Step Five: Measure 4 cups garlic juice. If you don't have enough, add up to ¼ cup dry white wine or water to the mixture to bring up to 4 cups.

Step Six: Heat garlic juice to boil then add in lemon juice and sugar. Stir well but gently to avoid adding air bubbles. Sugar should dissolve evenly into the mixture.

Step Seven: Bring mixture back to full, rolling boil. Add in pectin. Stir gently to dissolve evenly.

Step Eight: Bring mixture back to full, rolling boil. At rolling boil, begin the timer for 1 minute. After 1 minute, remove the pot from heat.

Step Nine: Let mixture rest for a few minutes. Check set. If set, skim the top of the jelly to remove the film, or 'scum.'

Step Ten: If set, pour into jars. Put on lids and process. If not set, add 1 Tablespoon of lemon juice and 1 Tablespoon of pectin. Repeat Steps Four and Five.

Pepper Jelly

Total Preparation Time: 2 hours
How Long Before Use: 3 days
Headspace: ¼ inch
Process time: 8 minutes
Jars: 4-ounce, 8-ounce
Yield: 10–12 8-ounce jars

NOTE: Working with every type of hot pepper can cause injury. Wear latex protective gloves when working with hot peppers. This recipe is a highly volatile mix of peppers. It is recommended that you wear both eye protection and a light face mask. Rinse any tools in cold water before washing in hot water to remove residual pepper oils. (Using hot water vaporizes the oils creating a cloud of atomized pepper gas in your kitchen!)

This recipe will be as mild or as hot as you desire. Use a mix of pepper styles for a depth of flavor.

4 cups peppers (seeds and ribs left in if you like it hotter, or seeds and ribs removed if you like it milder), very finely chopped
6 cups sugar
4 cups cider vinegar
1 cup pectin

Step One: Pour cider vinegar and peppers into a non-reactive preserving pan.

Step Two: Heat mixture to boiling, then add sugar. Stir well but gently to avoid adding air bubbles. Sugar should dissolve evenly into the mixture.

Step Three: Bring mixture back to full, rolling boil. Add in pectin. Stir gently to dissolve evenly.

Step Four: Bring mixture back to full, rolling boil. At rolling boil, begin the timer for 1 minute. After 1 minute, remove the pot from heat.

Step Five: Let mixture rest for a few minutes. Check set. If set, skim the top of the jelly to remove the film, or 'scum.'

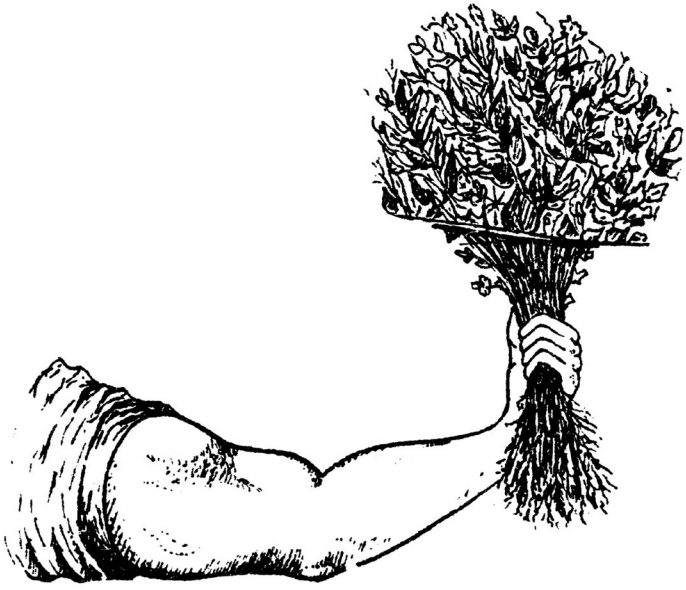
Step Six: If set, pour into jars. Put on lids and process. If not set, add 1 Tablespoon of lemon juice and 1 Tablespoon of pectin. Repeat Steps Four and Five.

Basic Herb or Flower Jelly

Total Preparation Time: 2 hours
How Long Before Use: 3 days
Headspace: ¼ inch
Process time: 8 minutes
Jars: 4-ounce, 8-ounce
Yield: 6–8 8-ounce jars

NOTE: Only gather herbs or flowers that you know are 100% pesticide-free.

4 cups fresh herb leaves or flowers
4 cups water, apple juice or white wine
½ cup fresh lemon juice
8 cups sugar
⅓ cup pectin
pinch of salt



Step One: Pour water (or juice or wine) and place leaves (or flowers) into a non-reactive preserving pan.

Step Two: Heat mixture to boiling, then cover and turn off heat. Leave in mixture in pan for 2 hours. Strain through fine mesh strainer to separate liquid from material. Re-measure, add water (juice or wine) to bring total measurement to 4 cups.

Step Two: Add lemon juice and salt to liquid. Heat liquid to boiling, then add sugar. Stir well but gently to avoid adding air bubbles. Sugar should dissolve evenly into the mixture.

Step Three: Bring mixture back to full, rolling boil. Reduce heat to simmer and add in pectin. Stir gently to dissolve evenly.

Step Four: Bring mixture back to full, rolling boil. At rolling boil, begin the timer for 1 minute. After 1 minute, remove the pot from heat.

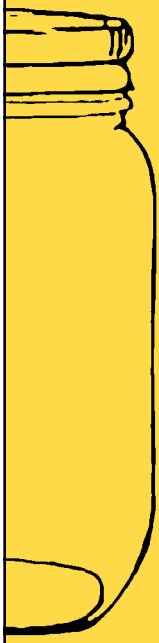
Step Five: Let mixture rest for a few minutes. Check set. If set, skim the top of the jelly to remove the film, or 'scum.'

Step Six: If set, pour into jars. Put on lids and process. If not set, add 1 Tablespoon of lemon juice and 1 Tablespoon of pectin. Repeat Steps Four and Five.

Suggested Herbs and flowers:

Lemon Verbena
Mint
Rosemary
Sage
Lavender
Violet Flowers
Dandelion Flowers
Rose Petals
Rose Hips

A lovely citrus variation is made by using 3½ cups of orange or grapefruit juice and ½ cup of lemon juice. Prepare as you would for jelly, then add in 2 cups minced or chiffonade complementary herbs. Herbs that pair well with citrus include basil, mint, and cilantro. Check your *Flavor Bible* for more creative pairings.



Medieval jam and jelly makers were often physicians (and male) who jealously guarded their recipes and techniques in fear that another doctor would usurp their position as the village expert. The modern male-oriented chef culture mimics this staid mindset.

I know of one chef who flew an 80-year-old Portuguese woman who is the recognized master of that region's jam-making style halfway around the world so she could teach him her methods. Did he do that to share with fellow chefs and makers the information this woman lovingly gave to him? No, he kept it solely for himself to claim as his own.

True expertise comes only through the beautiful drudgery of repetitive work and the sharing of information. We should study the various techniques throughout the world, but we also need to joyfully share our discoveries as it makes us better makers.

Making Jams / Conserves / Marmalades

Let's say this immediately: jams are easier to make than jellies.

To make jams and conserves, you'll be using either pulped fruit or pieces of the fruit and skipping the additional steps of extracting the juice. Because they have the added bulk of the fruit, they tend to gel more readily than jellies do. That's not to say that making jam is any less fulfilling or complex. As with most food preparation, it can be as simple or complicated as the cook makes it.

You may hear contrary recommendations about the fruit you use to make jam. Let's clarify: You should use fresh, unblemished, not-rotting fruit for jams. But that does not mean that if a strawberry has a bit of 'ick' on it, you need to toss it into the compost pile. Cut off the offending bit and use the rest. There are cautions about using overripe fruit in jams as the natural pectin amounts have decreased and some enzymatic decay has begun. The history of jam making disagrees with this. Using windfall apples is the historic ingredient in applesauce. 'Bruisers' are perfect for jams. Again, cut off the damaged piece and use the rest. In fact, if you ask your favorite farmer at the beginning of a market to 'save you the bruisers or seconds,' you'll get a discounted price and happy farmer. (Farmers also hate wasting food.)

The jam and jelly making techniques of the Alsace region of France and Germany encourage a small amount of decay and fermentation in their jams. Each recipe begins with allowing fruit to sit in a bowl of sugar overnight to macerate. This technique mimics ancient memomeli, where fruits are immersed in sugar to allow a natural absorption of oxygen and cellular breakdown to release the pectin. Alsatian jams also use apples as an ingredient in nearly every recipe to boost the amount of gel-producing pectin without adding powdered pectin. This method has been rediscovered in the United States with the popularity of Christine Ferber, a renowned *confituriere*. (She readily teaches her techniques and shares her knowledge!)

The techniques in the recipes included here are a compendium of cultural techniques and food safety practices that will ensure success. Included are a few traditional recipes as well as ideas for modern combinations. I do recommend that you invest in the book *The Flavor Bible* by Karen Page and Andrew Dorenburg. The book diligently researched thousands of foods and spices to develop an encyclopedic reference guide to what flavors can be successfully paired together. It will help you stretch your imagination and serve as inspiration for everything you create. And now a word of caution: English and European (and sometimes Canadian) jam and jelly recipes don't tell you to hot-water bath your jars. This is contrary to the latest scientific understanding of how

pathogens cause foodborne illness. Please, process or refrigerate your preserves.

My own personal making tends to be more experimental. I enjoy creating interesting flavor combinations as well as modernizing ancient recipes. Alcohol plays a large part in flavors and preservation. Alcohol, of course, is highly acidic. Adding it to a jam satisfies the required acidification. Recipes for marmalades and jams from the 1200s all called for wine or ale wort as a primary ingredient. The science still works today, but we have many more types of alcohols to choose from.

Using alcohol in a jam requires a sure hand. You're adding a lot of flavor and you're adding more acidification. The extra acid in the mixture often requires additional pectin if matched with a fruit that has less naturally occurring pectin. Most of the actual alcohol cooks out during the making, but not all of it. Do let folks know if your 'secret' ingredient is bourbon before they eat your creation.

Nuts!

A conserve is, by definition, a jam that contains nuts. Adding nuts to jam requires some forethought. Nuts that are higher in fat can alter the acidity of your entire mixture. Do follow the ratios of nuts to acid to fruit, to ensure a proper pH level.

Grocery store nuts have a reputation for being old and rancid. Rancid nuts have a sour and bitter flavor. Don't use them. Use only the freshest nutmeats you can find. Taste any nuts before adding them to your mixture. Nuts are always added at the end of the jam cooking, after testing your set. Adding them in sooner in the cooking process will overcook and soften them.

Chocolate

There is a European tradition of using chocolate in jams and sweetened sauces. Be cautious of French and German recipes that call for melting chocolate pieces into a jam. The high fat content of solid chocolate makes it unsafe for canning. The good news is that powdered cocoa contains no fat and is used in a number of recipes, including two adapted from the master, Christine Ferber (modified to meet American safety standards).

Tips for Jams

Use your favorite herbs and spices to add flavor to jams. Just as in jellies, you can add and adjust spices as your palate dictates. Remember: spices that remain in a jam will grow stronger over time. For a more subtle flavor use a cheesecloth spice bag or stainless steel tea ball to infuse your jam.

Double recipe with care. You can safely double a recipe if the final fruit amount does not exceed eight cups. If you double one element of the recipe, you must double all of it. A disciplined jam maker will make two batches of jam rather than jeopardize having a doubled batch not set up.

Be patient. Some jams will take up to 24 hours to set up in the jar. Be patient. Make sure you check your set before you pour into jars. If it's not set when you check it, it's not going to set when you process.

Make it your own. You ran out of raspberries before you reached four cups? That's okay, add strawberries and call it razzleberry! The recipe says to toss the berries into the pot, but Aunt Mabel has diverticulitis and can't have seeds? That's fine, use the conical strainer to remove the seeds and make your jam with the pulp. Your family loves the flavor of grapes and peaches? Great! Mix them together.

Ready?

All recipes make the assumption that you've prepared your canning jars according to the best practices described in the Hot-Water Bath Canning Instructions. When should you get your jars ready? Wash and rinse them when you're doing your 'set check.' If you're using a dishwasher, start the cycle before you begin cooking.

If you're hot-water bath processing, your canner should be filled with water and underway before you start your final cooking of the jam.


MARMALADE

JAM RECIPES

Master Jam Recipe

(Master Low-Sugar Jam Recipe)

This recipe is the structure from which all other jams are based. When in doubt, go back to this recipe. The recipes in this section use the Master Jam ratios. Some of these recipes use 'tricky' fruits, ones that require a little extra effort in preparing. Read through and get inspired to make your own combinations.

Total Preparation Time: 2 hours

How Long Before Use: 1 day

Headspace: ¼ inch

Process time: 8 minutes

Jars: 4-ounce, 8-ounce

Yield: 6–8 8-ounce jars

NOTE: To make this Master Recipe reduced in sugar, substitute low-sugar pectin for regular pectin and reduce the sugar to 2 cups instead of four. For a sugar-free version, use Splenda and low-sugar pectin. Use other sweeteners, like honey and syrups in full measure with low-sugar pectin.

This recipe calls for the addition of powdered pectin but fruits higher in natural pectin will have a firmer set. You can substitute your homemade pectin jelly (see the jelly section for recipe), using 1 cup (8 ounces) per ⅓ cup of powdered pectin. These recipes do not use the older and European techniques of high sugar and long cooking times to achieve a gel point.

4 cups peeled, cored, hulled, or otherwise prepared fruit

4 cups sugar

2 Tablespoons lemon juice

⅓ cup powdered pectin

Step One: Place prepared fruit and lemon juice into a non-reactive preserving pan.

Step Two: Heat over medium flame until simmering. Add sugar.

Step Three: Bring mixture to full, rolling boil. Reduce heat to simmer and add in pectin. Stir gently to dissolve evenly.

Step Four: Bring mixture back to full, rolling boil. At rolling boil, begin the timer for 1 minute. After 1 minute, remove the pot from heat.

Step Five: Let mixture rest for a few minutes. Check set. If set, skim the top of the jelly to remove the film, or 'scum.'

Step Six: If set, pour into jars. Put on lids and process. If not set, add 1 Tablespoon of lemon juice and 1 Tablespoon of pectin. Repeat Steps Four and Five.

VARIATION:

Jams can be smooth or chunky; it is up to you as the maker to decide your preference. Fruit cut into smaller pieces will make a smoother jam. If you'd like a 100% smooth jam, use an immersion blender to whiz everything together. A potato masher is a handy tool for smashing some of the fruit while leaving larger chunks behind. There is no wrong way to do this.

Master Wild Berry Jam

Total Preparation Time: 2 hours
Special Equipment: Conical Sieve or Food Mill
How Long Before Use: 1 day
Headspace: ¼ inch
Process time: 8 minutes
Jars: 4-ounce, 8-ounce
Yield: 9–12 8-ounce jars

NOTE: Late July and early August in Wisconsin is the time to look through your favorite wild areas for the blackberries. Lush and big with a tart bite, blackberries are beloved by Northerners (including deer and bears). Use this recipe for any type of native or small-seeded berry.

This jam is a blend of berries and apple juice. The apple juice helps temper the tartness of the berries for a smooth jam. Apple juice is a good addition to jams and jellies; it absorbs stronger flavors and works well to extend your yield in case you run short of the full measure required.

Reduce sugar to 2 cups total and use low-sugar pectin for a less sweet jam.

2 cups (16 ounces) berries (juiced) — this will take about 6 cups of berries

1½ cups (12 ounces) unfiltered apple juice

4 cups cane sugar

2 Tablespoons lemon juice

⅓ cup pectin

Step One: Cover de-stemmed berries with water in heavy-bottomed pot. Bring to boil, then cover and remove from heat. Let steep for 30 minutes. Strain in conical sieve to remove seeds.

Step Two: Pour blackberry pulp, apple juice, and lemon juice into pot.

Step Three: Mix sugar and pectin together.

Step Four: Bring contents to boil, making sure sugar mixture is dissolved. When at full boil, let boil for 1 minute.

Step Five: Remove from heat.

Step Six: Let mixture rest for a few minutes. Check set. If not set, add 1 Tablespoon of lemon juice and 1 Tablespoon of pectin and re-boil for 1 minute.

Step Seven: If set, pour into jars. Put on lids. Put on lids and process.

Blueberry Guinness Jam

(Strawberry Pinot Noir, Asian Pears with Sake, Apple Honey Mist, Amaretto Peach, Bourbon Cherry)

Total Preparation Time 2 hours
How Long Before Use: 1 day
Headspace: ¼ inch
Process time: 8 minutes
Jars: 4-ounce, 8-ounce
Yield: 9–12 8-ounce jars

NOTE: Guinness Stout has a malty, earthy flavor that pairs well with blueberries. You can use this basic recipe to pair any style of beer or wine with a fruit. You may remember that early recipes for sugared preserves included wines and beer wort.

4 cups blueberries
2 cups Guinness Stout
3 cups sugar
2 Tablespoons bottled lemon juice
⅓ cup low-sugar pectin

Step One: Cover de-stemmed berries with Guinness Stout in heavy-bottomed pot. Cook on medium heat until simmering and the blueberries begin to release their juice.

Step Two: Mash blueberries with a potato masher or fully blend with an immersion blender.

Step Three: Add lemon juice and bring to boil.

Step Four: Add sugar, continue to cook to boil.

Step Five: Add pectin, return to hard boil. Boil for 1 minute.

Step Six: Remove from heat.

Step Seven: Let mixture rest for a few minutes. Check set. If not set, add 1 Tablespoon of lemon juice and 1 Tablespoon of pectin and re-boil for 1 minute.

Step Eight: If set, pour into jars. Put on lids and process.

VARIATION:

We already know that fruit and alcohol pair nicely. Use the same ratios in the Blueberry Guinness Jam and try these combinations:

Strawberry with Pinot Noir

Strawberry with Prosecco

Raspberry with Framboise (fruit beer)

Raspberry with Malibu Rum

Black Currants with Cassis

Blackberries with Cider

These are just a few ideas. Use your favorite cocktail as inspiration. Strawberry margarita jam is a mix of strawberry, lime, and tequila. Mimosa jam is a mix of orange and champagne. I have even, as a special request, made Gin & Juice jelly! (A mix of gin and grapefruit juice.) Have fun!

Clear Marmalade

Total Preparation Time: 2 hours
Special Equipment: Candy Thermometer
How Long Before Use: 1 day
Headspace: ¼ inch
Process time: 10 minutes
Jars: 4-ounce, 8-ounce
Yield: 6–8 8-ounce jars

NOTE: This is 'clear style' marmalade that requires multiple steps. The next recipe is for the 'beaten style,' which, honestly, requires much less work! This recipe can be used for most types of citrus. Try a blend of citrus fruits like orange & grapefruit, or lemon & lime.

4 cups of Seville oranges (about 8–10 medium oranges)
1 cup water
4 cups sugar

Step One: Wash oranges to remove waxy film. With a vegetable peeler peel the oranges, removing as much of the rind as possible while avoiding the white pith. Places the peeled oranges aside.

Step Two: Cut the pieces of rind into a fine julienne. (Alternately, if you have a rind peeler tool, feel free to use that.)

Step Three: Place julienned orange rinds into a heavy-bottomed pot and cover with the 1 cup of water. Heat to boiling and boil hard for 10 minutes. The goal is to soften the pieces of rind. If the rind isn't soft enough to 'squish' with the back of a spoon, boil another 5 minutes. Remove from heat.

Step Four: Juice the reserved oranges. Set aside.

Step Five: Add cooked rinds and water with half the sugar to the preserving pan. Under a low flame, begin heating while stirring constantly to prevent scorching. Simmer for 25 minutes.

Step Six: Add the reserved juice and remaining sugar to preserving pan and continue to cook bringing the mixture up to a low boil. Continually stir until mixture has reached the gel stage. (Tested either with candy thermometer at 225 degrees or Moses Test.)

Step Seven: When gel set is achieved, pour. Put on lids and process.

Easy Orange Marmalade (modern beaten style)

(Bourbon Marmalade, Grapefruit Ginger and Black Pepper Marmalade, Lemon Marmalade)

Total Preparation Time: 2 hours

Special Equipment: Food Processor

How Long Before Use: 1 day

Headspace: ¼ inch

Process time: 8 minutes

Jars: 4-ounce, 8-ounce

Yield: 6–8 8-ounce jars

NOTE: The old method of making 'beaten marmalade' was to use a mortar and pestle to physically beat the oranges into a pulp. We achieve the same result using a food processor.

4 cups of pulverized oranges (about 6–8 oranges)

4 cups sugar

4 Tablespoons lemon juice

⅓ cup low-sugar pectin

Step One: Wash oranges to remove waxy film. Cut in half and remove seeds.

Step Two: Place oranges into food processor. (Can be done in batches.) Pulverize.

Step Three: Measure out 4 cups of orange pulp and place in preserving pan. Add lemon juice. Heat on medium flame until simmering.

Step Four: Add low-sugar pectin. Increase heat to boiling and boil hard for one minute. Remove from heat.

Step Five: Let mixture rest for a few minutes. Check set. If not set, add 1 Tablespoon of lemon juice and 1 Tablespoon of pectin and re-boil for one minute.

Step Six: If set, pour into jars. Put on lids and process.

VARIATION:

You may hear this style of marmalade referred to as 'country style.' Regardless of the name, it's an easy way to make any kind of citrus marmalade. It also lends itself to flavorful additions, including a boozy option. Add 1 cup of bourbon, or port, or any other complementary spirit for a kick. This method also mixes well with other fruits, so try adding a cup of strawberries or blueberries. Changing the sugar from white to brown sugar develops a caramel taste.

Grapefruit, ginger and black pepper

Orange and bourbon

Orange and clove

Lemon and coriander

Orange Chocolate Christmas Jam

Total Preparation Time: 2 hours
How Long Before Use: 1 day
Headspace: ¼ inch
Process time: 8 minutes
Jars: 4-ounce, 8-ounce
Yield: 6–8 8-ounce jars

NOTE: Reduce sugar to 2 cups total and use low-sugar pectin for a less sweet jam.

4 cups orange juice (no pulp)
3 cups sugar
½ to 1 cup cocoa powder (to taste)
⅓ cup powdered pectin
2 Tablespoons lemon juice

Step One: Pour orange juice into preserving pan. Heat on medium flame until simmering.

Step Two: Mix half the sugar with the cocoa powder until smoothly blended. Mix the other half of the sugar with the pectin powdered.

Step Three: Add the lemon juice and the sugar/pectin mixture to pan. Simmer until sugar is dissolved.

Step Four: Add the sugar/cocoa powder mixture. Simmer until sugar and cocoa powder are dissolved; a whisk may be needed to fully blend.

Step Five: Bring mixture to boil and let boil for 1 minute.

Step Six: Remove from heat. Check the set.

Step Seven: Let mixture rest for a few minutes. Check set. If set, skim the top of the jelly to remove the film, or 'scum.' If not set, add 1 Tablespoon of lemon juice and 1 Tablespoon of pectin and re-boil for 1 minute.

Step Eight: If set, pour into jars. Put on lids and process.

Belle Helene (Alsatian Chocolate Pear Preserves)

(à la Christine Ferber, adapted by Christina Ward
for American food safety laws/practices)

Total Preparation Time: 2 days (in 2 one-hour bursts of activity)

Special Equipment: Stoneware Bowl

How Long Before Use: 1 day

Headspace: ¼ inch

Process time: 8 minutes

Jars: 4-ounce, 8-ounce

Yield: 6–8 8-ounce jars

2¾ pounds ripe but still firm William, Bartlett, or D'Anjou pears
(a total of 6 cups when sliced)

3 cups sugar

3 Tablespoons orange juice

2 Tablespoons lemon juice

1 cup extra bittersweet cocoa powder (60% to 70%)

⅓ cup low-sugar pectin

Step One: Peel pears. Remove stems. Cut in two, core, then thinly slice.

Step Two: In a preserving pan, combine the pears, sugar, orange and lemon juices. Heat to simmer then remove from heat. Pour entire mixture into heavy stoneware bowl.

Step Three: Add cocoa. Fold gently until thoroughly blended. Cover bowl with parchment paper and refrigerate overnight.

Step Four: The next day, take a small taste of the mixture. If sweet enough, proceed to next steps; otherwise add a half-cup of sugar.

Step Five: Pour mixture into preserving pan. Heat to simmer. Add ⅓ cup low-sugar pectin. Bring back to hard boil for 1 minute. Remove from heat.

Step Seven: Let mixture rest for a few minutes. Check set. If not set, add 1 Tablespoon of lemon juice and 1 Tablespoon of pectin and re-boil for one minute.

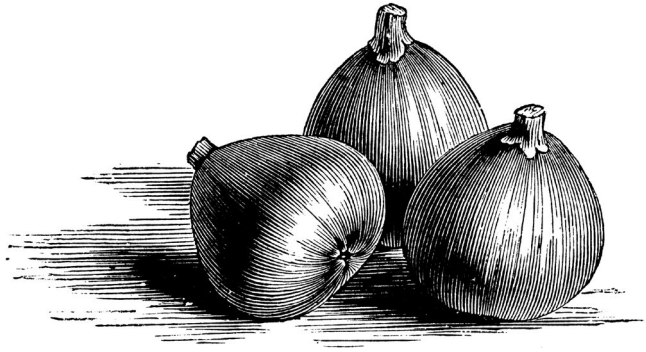
Step Eight: If set, pour into jars. Put on lids and process.

Fig et Orange

(à la Christine Ferber, adapted by Christina Ward
for American food safety laws/practices)

Total Preparation Time: 2 days (in 2 one-hour bursts of activity)
Special Equipment: Stoneware Bowl
How Long Before Use: 1 day
Headspace: ¼ inch
Process time: 8 minutes
Jars: 4-ounce, 8-ounce
Yield: 4–6 8-ounce jars

2¾ pounds ripe but still firm figs
2 oranges (use oranges with a thinner peel, like a Seville)
4 cups sugar
¼ cup orange juice
2 Tablespoons lemon juice



Step One: Wash oranges. Slice paper thin into rounds and/or moons; set aside.

Step Two: Wash and pat dry figs. Remove the stems. Cut figs into slices. Place into stoneware bowl with lemon juice and 3 ½ cups of the sugar. Cover and let steep for 1 hour.

Step Three: In preserving pan, add the orange rounds, ½ cup sugar, and orange juice. Over medium heat, poach oranges until they are translucent. Stir to prevent the sugar from scorching.

Step Four: Add the fig mixture to the oranges in the preserving pan. Mix thoroughly. Bring to boil, then reduce heat and simmer for 15 minutes. Remove from heat.

Step Five: Pour mixture back into stoneware bowl. Cover bowl with parchment paper and refrigerate overnight.

Step Six: The next day, return mixture to preserving pan. Over medium-high heat, bring to boil for 5 to 10 minutes while stirring gently. Remove from heat.

Step Seven: Let mixture rest for a few minutes. Check set.

Step Eight: Pour into jars. Put on lids and process.

Nostradamus' Spice Quince Jam

Total Preparation Time: 2 days (in 3 one-hour bursts of activity)
Special Equipment: Stoneware Bowl
How Long Before Use: 1 day
Headspace: ¼ inch
Process time: 8 minutes
Jars: 4-ounce, 8-ounce
Yield: 6–8 8-ounce jars

NOTES: Quinces were long thought to be medicinal. Nostradamus, the famed French physician and astrologer, wrote a long treatise about the healing properties of quince that includes this basic recipe. I've updated for modern methods and safety.

This recipe is, as we say in classes, putzy, with lots of steps to get to the finished product. It does give you a fair idea of the amount of work that ancient jam makers did and why their concoctions were considered so rare and valuable.

By definition, quinces in this recipe refer to large, yellow fruit, not the small fruit of ornamental flowering bushes. Quinces are very dense; 4–6 quinces will easily weigh 3 pounds. Quinces quickly discolor when exposed to air; take care to place them into water acidified with lemon juice as soon as they're peeled or cut. And this is where it gets very time-consuming—quinces are tough-fleshed fruit. You can't really eat them raw. This makes them difficult to both peel and cut. Be patient and use sharp knives and peelers.

Approximately 3 pounds quince
(1¼ cups quince juice)
2½ cups sugar
2 Tablespoons lemon juice
¼ teaspoon ground cinnamon
⅛ teaspoon ground cardamom
⅓ cup low-sugar pectin

Step One: Wipe quinces with a towel to remove the slight fuzz. Wash them in cold water. Peel them, and remove the stems and any remaining blossom and hard parts.

Step Two: Cut them in quarters, removing the center skins and seeds. Reserve cores, skins, and seeds to make the quince juice. Place the quarters into a stoneware bowl and cover with the 2½ cups sugar. Let the quince pieces remain in the sugar until you finish the next step.

Step Three: Place the reserved peels, cores, and seeds into a pan and cover with 2 cups of water. Bring mixture to boil. Let boil for about 5 minutes, then cover pan and remove from heat. Steep for 3 hours. Strain, keep the juice.

Step Four: In a preserving pan, combine the sugared quince pieces with lemon juice, quince juice, and the spices and bring to simmer. Simmer for 2 minutes, then pour into a ceramic bowl. Cover the fruit with a sheet of parchment paper. Refrigerate overnight.

Step Five: On the next day, bring the preparation to a boil in a preserving pan, skim carefully. Continue cooking about 10 minutes on low heat, stirring gently. Lift out the quince pieces and distribute them among jars.

Step Six. Add ⅓ cup low-sugar pectin to quince syrup mixture. Return to boil for 1 minute. Remove from heat.

Step Seven: Let mixture rest for a few minutes. Check set. If set, skim the top of the jelly to remove the film, or 'scum.' If not set, add 1 Tablespoon of lemon juice and 1 Tablespoon of pectin and re-boil for 1 minute.

Step Eight: If set, pour into jars. Put on lids and process.

Pear Walnut Conserve

(Plum Hazelnut, Strawberry Hazelnut, Apple Walnut, Mango Macadamia, Peach Almond, Cherry Almond, Cherry Pecan, Blueberry Pecan)

Total Preparation Time: 2 hours

How Long Before Use: 1 day

Headspace: ¼ inch

Process time: 8 minutes

Jars: 4-ounce, 8-ounce

Yield: 9–12 8-ounce jars

NOTE: Pears quickly oxidize when cut. Keep them in cool, acidified water until ready to use.

Reduce sugar to 2 cups total and use low-sugar pectin for a less sweet jam.

4 cups peeled and chopped pears

4 cups sugar

2 cups chopped walnuts

2 Tablespoons bottled lemon juice

⅓ cup pectin

Step One: Place peeled pears, sugar, and lemon juice into preserving pan.

Step Two: With a low heat, cook mixture while constantly stirring to prevent scorching until simmering.

Step Three: Add pectin. Stir to dissolve completely then bring up to full boil.

Step Four: Boil for 1 minute. Remove from heat.

Step Five: Stir in chopped walnuts.

Step Six: Let mixture rest for a few minutes. Check set. If not set, add 1 Tablespoon of lemon juice and 1 Tablespoon of pectin and re-boil for 1 minute.

Step Seven: If set, pour into jars. Put on lids and process.

VARIATION:

This basic recipe can be successfully altered when you change the fruit, nuts, or both. Here are some good combinations. You can also substitute honey for sugar (making sure to use a low-sugar pectin). You can also add 1 cup liquid without changing the dry ratios. I've made this into a boozy jam by adding a cup of whiskey.

Plum & Hazelnut	Peach & Almond
Strawberry & Hazelnut	Cherry & Almond
Apple & Walnut	Cherry & Pecan
Mango & Macadamia	Blueberry & Pecan

(**Plum Nut Jam** pictured on page 166)

Cogna

Total Preparation Time: 4 hours

Special Equipment: Spice Bag or Loose Tea Infuser Ball

How Long Before Use: 1 day

Headspace: ½ inch

Process time: 10 minutes

Jars: 4-ounce, 8-ounce

Yield: 9–12 8-ounce jars

NOTES: Cogna is a rarified preserve from the Piedemonte region of Italy. It is a traditional 'end of the harvest' preserve made by wine-makers large and small. Each vintner's batch is slightly different as influenced by terroir and grapes. The key ingredient that truly makes it 'cogna' is the fermented grape must. ('Must' is the term used for the thickened sediment remains of the first ferment in winemaking; if the grape seeds remain, these should be removed via a conical sieve.)

If you're a home winemaker, consider adding cogna to your repertoire. Even if you're making country fruit wines, you can use the leftover must as a base for this versatile preserve. You can also add or subtract your favorite fruits.

The cooking of this recipe can also be done in a crock pot or slow cooker, as the cooking goal is to evaporate the moisture.

2 quarts (32 ounces or 8 cups) 100%, no sugar added, grape juice (if you have it, wine must)

1½ pounds quince

1½ pounds pears

1½ pounds peaches (or plums)

7 fresh figs (or 5 dried)

⅓ pound walnut pieces, chopped and toasted

⅓ pound hazelnuts, chopped and toasted

⅓ pound almonds, chopped and toasted

1 cup of honey

zest of 3 lemons

2 Tablespoons lemon juice

10–12 whole cloves

2⅓ inches of cinnamon stick

Step One: Chop nuts, then lay single layer on a parchment-lined jelly roll pan. Roast in a 300-degree oven for 5 minutes. Remove and cool.

Step Two: Peel, remove seeds and cores of all fruits. Rough-chop into bite-size pieces.

Step Three: Pour grape juice and honey into preserving pan. Heat on medium flame until simmering.

Step Four: Place cloves and cinnamon sticks into a spice bag. (Or a non-reactive metal loose tea ball infuser.)

Step Five: Add all chopped fruits, lemon rind and lemon juice. Add the spice bag/ball. Continue to simmer on low heat until all liquid is absorbed. Stir occasionally to prevent burning and scorching. (The cooking process may take a few hours.)

Step Six: When mixture is thickened, check the set as you would for jam. The cogna should be of a nearly 'apple butter' thickness. Remove from heat. Remove spice bag/ball.

Step Seven: If set, pour into jars. Put on lids. Put on lids and process.

Lemon Curd

(Orange Curd, Lime Curd, Grapefruit Curd)

Total Preparation Time: 2 hours

Special Equipment: Double Boiler, Food Thermometer

How Long Before Use: 1 day

Headspace: ½ inch

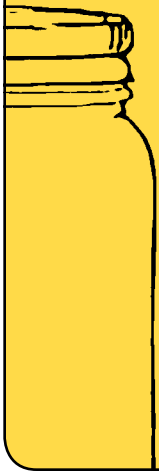
Process time: 15 minutes

Jars: 4-ounce, 8-ounce

Yield: 3–4 8-ounce jars

NOTES: Fruit curds are a great example of a preservation that breaks the rule. It contains eggs and butter, which makes it high in fat. The acidification is what makes this preserve safe.

Curds have a shelf life of 3 months. Discard immediately at any sign of discoloration in the jar.



*If at any time your preserved food item has 'gone off,' **DON'T EAT IT!** I'm always flabbergasted by the number of people who contact me to describe the color and smell of the bio-colony living in their jar of jam, then end the disgusting recitation with the question: Can I still eat it? NO! Are you starving? Are you trapped in a cave with no hope of survival except that jar of moldy jam? If your immediate survival does not depend on you eating that moldy thing, **DON'T EAT IT**. You have no idea the type or kind of pathogens that are living in that jar. And that jar of peaches from Grandma's basement dated '1972'? Don't eat that either.*

2½ cups sugar

½ cup lemon zest (freshly zested), optional

1 cup bottled lemon juice

¾ cup unsalted butter, chilled, cut into approximately ¾" pieces

7 large egg yolks

4 large whole eggs

Step One: Wash and zest lemon. In a small bowl, combine sugar and lemon zest; set aside.

Step Two: Measure lemon juice; set aside. Cut butter into pieces; set aside.

Step Three: Fill bottom pan of double boiler with water and over medium heat, bring to low boil. (Water in lower pan should not touch the bottom of the upper pan.)

Step Four: In the top of the double boiler, on the countertop or table, whisk the egg yolks and whole eggs together until thoroughly mixed. Slowly whisk in the sugar and zest, blending until well mixed and smooth. Blend in the lemon juice and then add the butter pieces to the mixture.

Step Five: Place the top of the double boiler over boiling water in the bottom pan. Stir gently and continuously with spatula, to prevent the mixture from sticking to the bottom of the pan. Continue cooking until the mixture reaches a temperature of 170°F.

Step Six: Remove the double boiler pan from the stove and place on a protected surface, such as a dish cloth or towel on the countertop. Continue to stir gently until the curd thickens (about 5 minutes). Strain curd through a mesh strainer into a glass or stainless steel bowl. Discard collected zest.

Step Seven: Fill hot strained curd into jars. Remove air bubbles and adjust headspace if needed.

Step Eight: Put on lids and process.

VARIATION:

To save a step, you can omit using the citrus zest.

FRUITS IN SYRUP AND SAUCES

When it comes to preserving whole or halved fruits in syrups, the English term 'bottling' is most appropriate here. Seeing a pantry shelf filled with peaches in a light brandy syrup cheers a soul on a gray winter day. You may remember eating the dreadfully over-sweetened tins of 'fruit cocktail' as a child; the version you make and can yourself will be a taste revelation.

Sugar syrups are classified into five types: Very Heavy, Heavy, Medium, Light, and Very Light. The variance is in the amount of sugar used in each. (And by 'sugar,' I do mean any sweetening carbohydrate, so honey, agave, even the much maligned corn syrup can be used in recipes.) Many traditionalists shy away from strongly flavored sugars, like molasses, sorghum, brown sugar. I say go for it. Just know that using a strong-flavored sugar or liquid may overpower the flavor of the fruit you're canning. You can also mix sugars to get a touch of the stronger flavor without it taking over.

Using four cups of liquid as our baseline, here are the measurements that define the syrups:

4 cups of sugar & 4 cups liquid = Very Heavy Syrup.

3 cups of sugar & 4 cups liquid = Heavy Syrup.

2 cups of sugar & 4 cups liquid = Medium Syrup.

1 cup of sugar & 4 cups liquid = Light Syrup.

½ cup of sugar & 4 cups liquid = Very Light Syrup.

The liquid you use to make your solution is up to you. Water can be used. Juice can also be used. If you used juice, pay attention to how sweet the juice already is; a super sweet juice made into a heavy syrup will result in an eye-popping sweet concoction. Alcohol can most definitely be used. You can dilute the alcohol with water for a less boozy preserve. The choice of syrup, from very light to very heavy, is completely up to you.

It's entirely possible to preserve fruits in juice alone. To do that safely, acidification is required. The rule to follow is to add three teaspoons of lemon juice per cup of juice. Be mindful of which juice you choose, as it will add flavor to your fruit. The two best choices for a 'neutral'-tasting juice are apple juice and white grape juice. Avoid the sweetened juices and look closely at the label for a product that is 100% juice. As with jams and jellies, sucralose (brand name Splenda) is the ONLY tested and approved artificial sugar acceptable for use in canning.

As a best practice, it's a good idea to have a large container filled with cold, acidified water on hand. Many fruits, especially those in the *Rosaceae* family (apples, pears, etc.), oxidize and turn brownish when exposed to air. Even cherries begin to brown within ten minutes of air exposure. As you clean, peel and prep, place the finished fruit into the bowl of acidified water until you're ready for the next step. (Use ¼ cup of bottled lemon juice per quart of water. You can also use ascorbic acid in the form of crushed vitamin C tablets or the commercial product Fruit Fresh.)

Fruits can be preserved with skin/peel on or skin/peel off, though you will have a better final product if you take the time to remove the outer protective layer to allow the sugar syrup to penetrate. Stone fruits are best preserved with skins removed. Blanch a peach for a few minutes in boiling water and the skin will easily slide off. (Blanching works for removing tomato peels too.)

You'll see two phrases used in the recipe directions for canning whole or half fruits: Hot Pack or Cold Pack (sometimes referred to as Raw Pack). These terms pop up again in both pickling and pressure canning. Here's what it means. A Cold Pack is when you place a cleaned and prepped fruit into a canning jar, and then cover it with hot syrup. A Hot Pack is when you blanch or lightly cook the fruit in the syrup, and then place it into jars.

One of the benefits of a Hot Pack is that the cell walls of the fruit begin to break down and release their retained moisture, allowing the sugars to absorb the water quickly. If using a Hot Pack, fruit is loosely fitted into a jar then covered with syrup. When using a Cold Pack, fruit should be packed as tightly as possible in the jars prior to filling with hot syrup, as the fruit tends to shrink during processing. In both cases, a quick poke around with a plastic tool to release air bubbles is important.

Regardless of which method you choose, covering the fruit with hot syrup while allowing for the required headspace can be a bit tricky. Fruit may float. An air bubble may remain. It's okay to get a little rough with your fruit. A firm yet gentle press of a thumb is often enough to get a stubborn pear fully into a jar. Conversely, you may have to remove an offending cherry that keeps popping up above the liquid. All normal occurrences. As long as all the fruit in the jar is covered by syrup and you've left enough headspace, you'll be fine.

Sweetened sauces are a fun variation on fruit preserves. They are, at their most basic, ungelled jams. They use a combination of removal of moisture and slight acidification to extend their usability. Whether pureed or chunky, fruit sauces are also an economical way to use windfall and found fruits that just don't have the magazine-quality good looks for whole fruit preserves.

Fruit butters are related to sauces. A 'butter' is a sauce cooked until nearly all moisture has evaporated. Butters are an old-fashioned recipe, but don't let the hominess dissuade you; a peach puree cooked with a touch of brown sugar for 24 hours has a depth of flavor that is unmatched. Many recipes call for the pureed fruit to be cooked in a roasting pan in a 250-degree oven until done. If you have a slow cooker or crock pot, you can use that with beautiful results.

The unassailable NO in making fruit butters is the making of pumpkin butter. You can't do it. Don't even try. I don't want to hear about what person said that you could. You cannot. Pumpkin and all squashes are too dense as well as very low in acid. When cooked and pureed, there is no tool available to home cooks that can get the center of a jar to the required high temperature for the prescribed length of time to make it safe. End of story. But all is not lost: Included is a 'cheat' recipe that will satisfy your taste for pumpkin butter. Adding dehydrated and powdered pumpkin to your apple butter will give it a pumpkin butter taste.

If you take your pureed fruit sauce and place it into a dehydrator, you're well on your way to making fruit leathers. As we've seen, preservation techniques are often combined to create foods that serve your needs. With planning, it's quite easy to make apple jam, applesauce, apple butter, and apple fruit leather from one bushel (and a long weekend in the kitchen) of apples.

Finally, if you continue cooking your apple puree sauce in that slow cooker or oven until nearly all the liquid is gone, you'll have fruit cheese. More prevalent in European and Hispanic cuisines, it is directly related to the *membrillo* of the Middle Ages. In making a fruit cheese, you continue to cook the pectin-rich fruit puree until it is rubbery. It is then cooled, sliced into pieces then rolled in sugar.

The recipes included here are a combination of Master Recipes that can be applied to all fruits that are acceptable for canning. Also included are specialty recipes to serve as inspiration and a launchpad for your own creations.

Tips for Whole Fruit Preserves and Sweetened Sauces

Use an alcohol to add flavor. Makers throughout history have used alcohol to preserve and flavor fruits. You should too. Use a quality product, though it need not be 'top-shelf.' Explore flavor combinations and experiment. Rum and peaches go well together, but what about spiced rum, or dark rum? Try it!

Mix fruits for more flavorful sauces. Applesauce alone can be boring to some. Add pureed strawberries, raspberries, or any berries for a delicious and colorful sauce.

Experiment with sweeteners. Any natural sugar you choose will do the job of absorbing moisture. Pick a sugar that complements your fruit and liquid. Balance your flavors, so they're not competing with each other; white sugar has a neutral flavor and is best matched with a strongly flavored liquid. A mild liquid pairs with a robustly flavored sweetener. Never forget to let the flavors of your fruit shine through.

Substitute for flavors you like. Do you like flavors that others find repugnant? If you like the combination of mangoes and kumquats in heavy syrup, then that's what you should make. You want to make a cranberry and lemon sauce instead of cranberry and orange? Go ahead and do it. Don't let prevailing tastes dictate to your palate.

Ready?

All recipes make the assumption that you've prepared your canning jars according to the best practices described in the Hot-Water Bath Canning Instructions. When should you get your jars ready? Wash and rinse them when you're doing your 'set check.' If you're using a dishwasher, start the cycle before you begin cooking.

If you're hot-water bath processing, your canner should be filled with water and underway before you start cooking your sauce. Sauces require a longer processing time than jams and jellies. If you want to use an Atmospheric / Steam Canner, note that the machine will 'run dry' after 20 minutes of processing. If your processing time is longer than that, the hot-water bath canner is the better tool to use.

RECIPES

Master Recipe for Fruit in Sugar Syrup

Ginger Simple Syrup
(Herb Syrups)

Lady Apples in Syrup
(Apples in Calvados Syrup, Peaches in Rum Syrup, Pears in Ostler Syrup)

Cherries in Syrup
(Brandied Cherries, Blueberries in Syrup, Gooseberries in Syrup)

Peaches in Brandy Syrup
(Plums in Brandy Syrup, Greengages in Calvados Syrup,
Nectarines in Rum Syrup, Peaches in Dark Rum Syrup)

Cranberry Sauce
(Cranberry Orange Sauce, Port Wine Cranberry Sauce)

Pecan Praline Sauce

Chocolate Berry Sauce

Citrus Sauce

Applesauce
(Applesauce with Strawberries, with Blueberries, Maple Applesauce)

Crock Pot Apple Butter
(Peach Butter, Pear Butter, Faux Pumpkin Butter)

(**Mint Syrup** pictured on page 166)

Master Recipe for Fruit in Sugar Syrup / Ginger Simple Syrup (Herb Syrups)

Total Preparation Time: 2 hours
How Long Before Use: 1 day
Headspace: ¼ inch
Process time: 10 minutes
Jars: 8-ounce, 16-ounce
Yield: 4–6 8-ounce jars

NOTE: This is the basic recipe for all herb-infused syrups. If you want a strongly flavored syrup, double the amount of herb or root called for in the recipe.

2 cups sugar
3 cups water
½ cup thinly sliced, peeled ginger
2 Tablespoons lemon juice

Step One: In heavy-bottom stockpot or saucepan, combine sugar, ginger slices, lemon juice, and water.

Step Two: Over medium heat, simmer until sugar is dissolved, then bring to boil and boil hard for 1 minute. Reduce to simmer.

Step Three: Simmer at low heat for 40 minutes. Remove from heat.

Step Four: Let mixture rest for a few minutes. Strain through fine sieve into bowl.

Step Five: Pour into jars. Put on lids and process.

VARIATION:

You can add multiple spices for a complex syrup. Try whole peppercorns, cardamom pods, or coriander. (Use about 2 teaspoons per batch.) As in the Pecan Praline Syrup, you can substitute orange or apple juice for a fruit syrup. Keep in mind, using a juice makes the entire syrup sweeter.

Besides making lovely syrups on their own, herbs like basil, mint, lemon verbena, bay leaves, thyme, and rosemary pair well with apple juice. Flavored syrups are useful as additives in baking and can serve as a base for an elegant 'soda pop' when mixed with seltzer water.

Lady Apples in Syrup

(Apples in Calvados Syrup, Peaches in Rum Syrup, Pears in Ostler Syrup)

Total Preparation Time: 2 hours
How Long Before Use: 1 day
Headspace: ½ inch
Process time: 15 minutes
Jars: 16-ounce, 32-ounce
Yield: 4–6 16-ounce jars

NOTES: Lady Apples are the smallest cultivated apples in modern orchards. Popular in Europe and native to France, these apples are popping up in farmer's markets across the United States. They make for a lovely whole-fruit preserve because of their small size.

This recipe, like all recipes for a fruit preserved in a sugar syrup, is a two-step process. First is the preparation of the syrup, next is the preparation of the fruit. This recipe is for a Heavy Syrup. Refer to the chart above these example recipes if you'd like to substitute a lighter syrup.

3 pounds lady apples

6 cups sugar

6 cups water

¼ cup lemon juice

Step One: Wash apples, leaving the stems intact. Poke each apple all over with a thin skewer so they are covered in small holes. Place apples into a large stockpot. While poking, boil 2 quarts of water in a different pot.

Step Two: Pour the boiling water over the apples, then cover with a heavy plate inside the pot to keep the apples submerged. Let stand for 15 minutes.

Step Three: While apples are steeping, make the syrup. In a heavy-bottomed saucepan, combine sugar, water, and lemon juice. Over medium heat, bring to boil while stirring until sugar is fully dissolved.

Step Four: Using a slotted spoon, transfer apples from the water bath to the sugar syrup. Lower heat to simmer and cook covered for 15 minutes. Remove from heat.

Step Five: Using slotted spoon, transfer apples from syrup to prepared jars. Pack tightly.

Step Six: Carefully ladle syrup into jars so that apples are covered yet not exceeding headspace. Remove air bubbles with 'poking' tool.

Step Seven: Put on lids and process.

VARIATION:

This method is essentially the same for all fruits in syrups. All varieties of apples and pears can be preserved in this manner. For larger fruits, halving and quartering is recommended. If you cut the skin of the fruit, you don't have to poke holes. Fruits with heavy skins, like mango and papaya, should be peeled. For apples and pears, peeling is the cook's choice. The recipe below for cherries illustrates the method used for fruits with a higher moisture content.

You can also substitute a portion of the water in the syrup recipe for juice or alcohol. Add a cinnamon stick, nutmeg pod, or cardamom pod into the bottom of the jar prior to adding the fruit for additional flavor. Alcohol-preserved fruits are still common in Europe and are an easy and elegant dessert.

Try some of these combinations:

Apples in Calvados with cinnamon

Pears in Ostler

Pears with nutmeg

Pears with cardamom

Apples in brandy

Plums in brandy

Cherries in Syrup

(Brandied Cherries, Blueberries in Syrup, Gooseberries in Syrup)

Total Preparation Time: 2 hours

How Long Before Use: 1 day

Headspace: ½ inch

Process time: 15 minutes

Jars: 8-ounce, 16-ounce, 32-ounce

Yield: 6–8 16-ounce jars

NOTE: This technique is similar to the method used for Lady Apples. Smaller fruits don't require cutting into smaller pieces. Use this same recipe for blueberries and grapes. For berries, which have a higher moisture content, reduce cooking time to five minutes.

Heavy or Medium Syrup

8 cups water / 8 cups sugar

8 cups water / 4 cups sugar

¼ cup lemon juice

4 pounds Cornelian cherries (any type of fresh cherries can be used)

Step One: Wash cherries, de-stem and remove pits.

Step Two: Make the syrup. In heavy-bottomed saucepan, combine sugar, water, and lemon juice. Over medium heat, bring to boil while stirring until sugar is fully dissolved.

Step Three: Stir the cherries into the syrup and simmer on low for 30 minutes. (There may be a slight foam that develops at the surface; skim it off with a slotted spoon.)

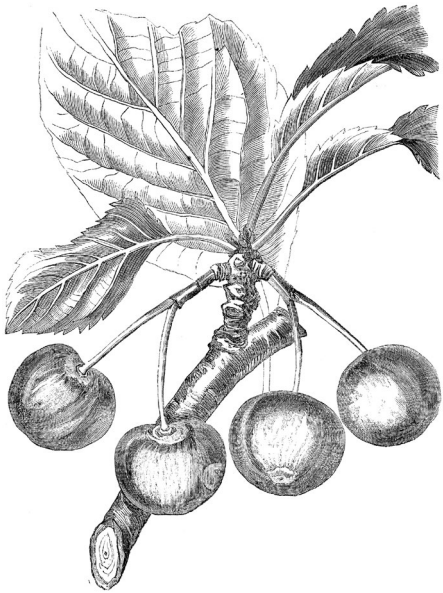
Step Four: Using slotted spoon, transfer cherries from syrup to prepared jars. Pack tightly.

Step Five: Carefully ladle syrup into jars so that cherries are covered yet not exceeding headspace. Remove air bubbles with 'poking' tool.

Step Six: Put on lids and process.

VARIATION:

Use this same method with blueberries, gooseberries, huckleberries, and any skinned berry.



Peaches in Brandy Syrup

(Plums in Brandy Syrup, Greengages in Calvados Syrup, Nectarines in Rum Syrup, Peaches in Dark Rum Syrup)

Total Preparation Time: 2 hours

How Long Before Use: 1 day

Headspace: ½ inch

Process time: 15 minutes

Jars: 8-ounce, 16-ounce, 32-ounce

Yield: 6–8 16-ounce jars

NOTE: This technique is like the previous methods, yet peaches, apricots, nectarines, and plums need to be treated differently prior to jarring; the outer skin is removed via blanching.

Heavy or Medium Syrup (with alcohol)

4 cups water / 4 cups brandy / 8 cups sugar

4 cups water / 4 cups brandy / 4 cups sugar

¼ cup lemon juice

4 pounds firm yet ripe peaches

Step One: Prepare large stockpot, filled ⅓ full. Bring to boil and cover. Reduce to high simmer. Prepare a large bowl filled halfway with cold water and ice. Prepare another large bowl with cold water acidified with lemon juice.

Step Two: Wash peaches. Gently place into pot of simmering water in a single layer. (Overpacking the pot will slow down the blanching process.) Leave in pot between 3–5 minutes.

Step Three: Using slotted spoon, remove the peaches from boiling pot and place into ice water bath. Let the peaches sit in the ice water bath for 5 minutes.

Step Four: With a paring knife, score the peach skin. The peel will gently slide away from the flesh of the fruit with gentle pressure. Place peeled peaches into acidified water.

Step Five: Repeat Steps Two and Three until all the peaches are peeled.

Step Six: Make the syrup. In heavy-bottomed stockpot, combine sugar, water, brandy, and lemon juice. Over medium heat, bring to boil while stirring until sugar is fully dissolved. Remove from heat.

Step Seven: Halve or quarter peaches and remove pits. Using slotted spoon, transfer peaches from syrup to prepared jars. Pack tightly into jars.

Step Eight: Carefully ladle syrup into jars so that peaches are covered yet not exceeding headspace. Remove air bubbles with 'poking' tool.

Step Nine: Put on lids and process.

VARIATION:

When using an alcohol in your syrup, match the flavor profiles so that the alcohol doesn't overpower the fruit.

Peaches with dark rum syrup

Substitute brown sugar in the syrup for a caramel taste.

Plums in plum brandy syrup

Peaches in tea syrup
(Make black tea, and use that for the liquid in the syrup.)

Nectarines in spiced rum syrup

Greengages in Calvados or Ostler

(**Peaches in Brandy Syrup** pictured on page 169)

Cranberry Sauce

(Cranberry Orange Sauce, Port Wine Cranberry Sauce)

Total Preparation Time: 2 hours
How Long Before Use: 1 day
Headspace: ½ inch
Process time: 10 minutes
Jars: 4-ounce, 8-ounce
Yield: 6–8 8-ounce jars

4 cups fresh or frozen cranberries
4 cups sugar
2 cups orange juice
1 orange
2 Tablespoons lemon juice

Step One: Wash oranges to remove waxy film. Zest and reserve.

Step Two: Place cranberries and orange juice into preserving pan. Using medium heat, simmer until cranberries 'pop' and release their juice.

Step Three: Add sugar, stirring until fully dissolved. Add in reserved orange zest.

Step Four: For a chunky cranberry sauce, use a potato masher to crush a portion of the berries. For a smoother sauce, use an immersion blender to blend to desired consistency.

Step Four: Bring to full boil then reduce to simmer for 10 minutes. Remove from heat.

Step Five: Let mixture rest for a few minutes. Then pour into jars. Put on lids and process.

VARIATION: This basic cranberry sauce recipe can be altered to reflect many tastes. Add in a cup of pineapple chunks for a tropical feel.

You can substitute the orange juice with water for a purer cranberry flavor. Warming spices like cinnamon and clove work well with cranberry. You can 'heat' this sauce up with the addition of red pepper flakes. Here are some flavor ideas:

Cranberry & port wine and cinnamon

Cranberry & Grand Marnier or Cointreau

Cranberry & candied ginger

Cranberry & ginger beer

Cranberry & maple syrup

Cranberry & honey

Cranberry & jalapeño

Pecan Praline Sauce

Total Preparation Time: 2 hours
How Long Before Use: 1 day
Headspace: ¼ inch
Process time: 10 minutes
Jars: 8-ounce, 16-ounce
Yield: 6–8 8-ounce jars

4 cups corn or cane syrup*
⅔ cup brown sugar
1 cup water
2 cups pecan pieces
1 teaspoon vanilla extract
2 Tablespoons lemon juice

Step One: In heavy-bottom stockpot or saucepan, combine syrup, brown sugar, and water.

Step Two: Over medium heat, simmer until sugars are dissolved, then bring to boil and boil hard for 1 minute. Reduce to simmer.

Step Three: Add pecans and vanilla. Simmer for 5 minutes.

Step Four: Let mixture rest for a few minutes. Then pour into jars. Put on lids and process.

*You can make your own sugar syrup by boiling to 240 degrees a mixture of 5 cups of sugar with 2 cups of water and 1 teaspoon of salt. 240 degrees is the 'soft ball' stage in candy making. This is technically an invert sugar and can be used as a substitute for any recipe calling for corn syrup.

VARIATION:

The water in this recipe can be substituted with juice for a subtle flavor infusion. Try orange or apple juice. (Run juices through a sieve to remove any remaining pulp before use.) You can also substitute pecans with walnuts, hazelnuts, and other nutmeats. Orange and pecan pair nicely together as do apple and walnut.

Chocolate Berry Sauce

(Adapted from the Ball Complete Book of Home Preserving)

Total Preparation Time: 2 hours
How Long Before Use: 1 day
Headspace: ¼ inch
Process time: 10 minutes
Jars: 8-ounce, 16-ounce
Yield: 6–8 8-ounce jars

½ cup unsweetened cocoa powder, sifted
4 cups crushed berries (Raspberries or strawberries are ideal. Fresh or frozen berries can be used.)
4 cups sugar
4 Tablespoons lemon juice
1 Tablespoon 100% sea salt

Step One: In a bowl, whisk together sugar, cocoa powder, and salt. Set aside.

Step Two: Place cleaned, hulled/de-stemmed berries into preserving pan. Add lemon juice. Over medium heat, simmer until berries begin to release their juice.

Step Three: Add sugar, cocoa, salt mixture. Stir while simmering until completely dissolved. Increase heat to bring mixture to boil for 1 minute.

Step Four: Remove from heat. Let mixture rest for a few minutes. Taste. If it tastes like it's missing 'something,' add in 1 teaspoon of sea salt.

Step Five: Pour into jars. Put on lids and process.

VARIATION:

As noted at the top of this recipe, this is an adaptation of the classic Raspberry Sundae Topping from the Ball Canning Book. My recipe omits any thickening agents like pectin or ClearJel. The bulk of the fruit makes the sauce thick enough.

This recipe is versatile and you can use any small berry as the fruit ingredient.

Citrus Sauce

Total Preparation Time: 2 hours
How Long Before Use: 1 day
Headspace: ½ inch
Process time: 15 minutes
Jars: 8-ounce, 16-ounce
Yield: 6–8 8-ounce jars

9 cups sections of small oranges (about 4 pounds; clementine, honey tangerines, mandarins work well)
¼ cup granulated sugar
⅓ cup orange juice
¼ cup liquid honey
2-inch piece of peeled ginger root

Step One: Peel oranges and remove seeds and any white pith from each segment. Set aside.

Step Two: Combine sugar, orange juice, honey, and ginger in large stockpot. Bring to boil over medium heat. Stir until sugar is fully dissolved.

Step Three: Add oranges to syrup. Bring to boil and simmer for 5 minutes. Remove from heat. Remove ginger root.

Step Four: Using slotted spoon, pack oranges tightly into jars, leaving 1 inch of head room.

Step Five: Ladle hot syrup to cover fruit. Remove air bubbles.

Step Six: Put on lids and process.

VARIATION:

Much like our other fruits in syrup, this orange recipe can be adjusted for grapefruit, lemons, or limes, or combination of all. More complementary spices can be added to the syrup; use a spice bag to control the intensity of the flavors.

Fresh fruit at the market

Red Cherries

Cherry Pie Filling and Pie (page 186)

Pitting Red Cherries

Wild Berry Jelly and Strawberry Jelly (page 99)

Plum Nut Jam (page 138), Mint Syrup (page 148),
Dill Pickles (page 207), and Red Tomato Sauce (page 276)


Tomatoes

Milwaukee Dill Pickles (page 207)

Peaches in Brandy Sauce (page 154)

Dehydrated Blueberries and Cherries (page 378)

Red Currants

Fresh pears

Raw ingredients for Sauerkraut


Raw honey

Lacto-fermented and dehydrated Granola (page 354)

Strawberry Pie Filling (page 186)

Applesauce

(Strawberry Applesauce, Maple Applesauce)

Total Preparation Time: 2 hours

How Long Before Use: 1 day

Headspace: ½ inch

Process time: 15 minutes for half-pints and pints / 20 minutes for quarts

Jars: 8-ounce, 16-ounce, 32-ounce

Yield: 6–8 8-ounce jars

15 cups mixed sweet and tart apples
(approxmiately 5 pounds)

½ cups granulated sugar

½ cup lemon juice

Step One: Wash, peel, and core apples.

Step Two: In large stockpot, place prepared apples with a scant ½ cup of water.

Step Three: Over medium-low heat and covered, bring apples to simmer. Mix to prevent scorching. Cook until apples are softened, about 15 minutes. Remove from heat.

Step Four: Use potato masher to mash apples to preferred consistency. For a smooth texture, strain cooked apples through a sieve.

Step Five: Add any sweetener or spices. Add lemon juice. Return to simmer for 5 minutes while contstantly stirring.

Step Six: Ladle applesauce into jars.

Step Six: Put on lids and process.

VARIATION:

The sweetening of applesauce can be omitted or substituted with honey or maple syrup. Splenda is also acceptable.

Prior to the final cooking, add in a pureed fruit for a blended taste. Try strawberries, blueberries, or raspberries.

Crock Pot Apple Butter

(Peach Butter, Pear Butter, Faux Pumpkin Butter)

Total Preparation Time: 12 hours

Special Equipment: Slow Cooker

How Long Before Use: 1 day

Headspace: ¼ inch

Process time: 10 minutes

Jars: 8-ounce, 16-ounce

Yield: 7–9 16-ounce jars

NOTE: Apple butter uses a long, slow cook time to evaporate moisture and reduce overall water activity. A slow cooker can be replaced with an oven-roasting pan and cooked in a 200-degree oven.

Traditionally, windfalls and bruised apples are used in apple butter. Remove any blemishes before adding to the mixture.

8 pounds apples (About 25–30 apples.)
Use a mixture of varieties for a complex flavor.

1 cup apple juice, cider, or water

1 cup apple cider vinegar

4 cups brown sugar

4 Tablespoons cinnamon

Step One: Wash apples. Rough-chop apples and place into stockpot with 1 cup of water.

Step Two: Cover pot and simmer on low heat for 1 hour. Remove from heat.

Step Three: In batches, strain apples through conical sieve or food mill to remove seeds and peels. (This method allows for the maximum amount of pectin in the puree.)

Step Four: Pour puree into slow cooker or roasting pan. Add sugar and cider and mix thoroughly. Add cinnamon or other spices as desired. Set slow cooker on 'low' or 200-degree setting. If using oven, set at 200 degrees. (Angle the cover of the slow cooker to allow for moisture to escape; oven-roasting pan should be uncovered.)

Step Five: Cook time will vary based on the amount of moisture in the apples but can take anywhere from 5 to 10 hours. Check every few hours to stir the mixture. Check for doneness* at about 5 hours.

Step Six: Pour into jars. Put on lids and process.

*How to test for doneness: Take a teaspoon of apple butter and place onto small plate. Let cool. The apple butter should remain intact; if a pool of liquid forms around the mound, then more cooking is required.

VARIATION:

A 'butter' can be made from pears, peaches, and plums. Fruits in the Rosaceae and stone fruit families are good candidates for fruit butters.

A 'faux' pumpkin butter can be made by adding dehydrated pumpkin powder to apple butter. This is a great work-around for the fact that home food preservationists cannot safely can pureed pumpkin butter.

Pie Fillings

More than anything else I can for my own friends and family, home-canned pie fillings bring the most surprise and delight. A home-canned pie filling is a 'ready to go' pantry item. Prepare a crust, pour in the filling, and whammo! You've got pie. The filling is already cooked, both in the preparation and in processing, so you can also use your pie filling as a topper for a custard-based pie or a no-bake cheesecake. Think of it this way: for any recipe that calls for a dreary can of oversweetened, minimal fruit, so-called pie filling, substitute your jar of the homemade real deal.

Pie fillings can ONLY be thickened with ClearJel. That's the product developed by the Center for Home Food Preservation, and is a super-finely milled modified corn starch. It's not organic, but neither is it synthetic. It's corn-based. If you have concerns about GMOs and organic sourcing, then don't use it. But if you don't use ClearJel, you can't use anything else. Flours, cornstarch, tapioca, etc. are not safe for processing. Remember, the heat needs to get to the center of the jar. What happens with other starches is they cook and coagulate into a solid mass of disgusting in the jar. It's gross besides being unsafe.

If ClearJel doesn't appeal to you, I suggest either canning fruits in syrup, then making your pie slurry out of the liquid when you open the jar for pie-making use. Or use one of the pie filling recipes that do not require additional thickening. These are old-fashioned recipes resurrected for modern cooking.

ClearJel is available as a Regular or Instant product. Avoid Instant ClearJel; it's primarily used in restaurants to thicken foods without having to use heat. Regular ClearJel is for canning. It is not produced in a 'low-sugar' form, so there is no option for reducing the sugar amounts in the recipes. I have already tested and adjusted these recipes to use the least amount of sugar and still make the safety science work. You can substitute the sugar with honey or Splenda, but that often results in a less thickened slurry. It's pie. It's going to be sweet.

A drawback to canning pie fillings is procuring the ClearJel. It is not a product you will find in your neighborhood grocery store. It is, however, readily available via multiple online sellers. Amish or Mennonite stores always stock ClearJel and many more food preservation supplies. It's worth a trip if you have one nearby. (See Resource Guide for sources.)

ClearJel requires both a heat and chemical catalyst to activate. Meaning, liquid dissolves the ClearJel, then when the lemon juice is added, the combination of heat and acid thickens it. This happens fast. Always keep a large measuring cup filled with a few cups of water on hand as you're making your pie filling to

toss into the pot if the filling becomes too thick. You'll recognize it as too dense if is unable to stir and begins to scorch.

There are two ways of making pie filling. First is to make the ClearJel-thickened slurry, then add the fruit. The second method is to cook the fruit and slurry together until thickened. Just like the difference between Hot Pack and Cold Pack, the pie filling that contains the cooked fruit expands less in the jar.

Make close note of the headspace when filling your jars. Pie fillings tend to expand much more than other sweetened preserves. There are few more sorrowful things in a kitchen than when a quart of cherry pie filling oozes out the bent lid or cracks the jar because of too much pressure.

The recipes in this section feature regional favorites that may be unfamiliar to you. Try them. Each recipe also includes variations in tweaking the flavor as well as ideas for serving. You'll notice that there are zero recipes for any dairy-based or egg-based pie fillings. Milk and eggs are low-acid and high-fat, making them unsafe for hot-water bath canning. All the recipes call for using a quart-sized jar as one quart fills a standard 8- to 9-inch pie plate. You can also use pint jars; the processing time remains the same.

Tips for Pie Fillings

Use an alcohol to add flavor. Makers throughout history have used alcohol to preserve and flavor fruits. You should too. Use a quality product, though it need not be 'top-shelf.' Explore flavor combinations and experiment. Included are recipes for Bourbon Apple Pie Filling and Rum Raisin Pie Filling. Any of the liquid in a recipe can be substituted with booze.

Substitute liquids for added flavor. A recipe may call for water, apple juice, cherry juice, etc. as its base liquid. You can substitute any kind of juice with any other, keeping in mind that it will complement or change the flavor. Using pineapple or orange juice with a strawberry pie filling will give it a zingy fruity flavor. As always, apple juice is the most neutral-flavored juice and tends to absorb whatever the dominant flavor is.

Experiment with sweeteners. Any natural sugar you choose will do the job of absorbing moisture. Pick a sugar that complements your fruit and liquid. Balance your flavors, so they're not competing with each other; white sugar has a neutral flavor and is best matched with a strongly flavored liquid. A mild liquid pairs with a robustly flavored sweetener. Always remember to let the fruit shine through.

Ready?

All recipes make the assumption that you've prepared your canning jars according to the best practices described in the Hot-Water Bath Canning Instructions. When should you get your jars ready? Wash and rinse them when you're doing your 'set check.' If you're using a dishwasher, start the cycle before you begin cooking.

If you're hot-water bath processing, your canner should be filled with water and underway before you start cooking the pie filling. Pie fillings take a minimum of 25 minutes to process in the hot-water bath canner. An Atmospheric / Steam Canner does not produce enough steam for that length of time. Don't use them here; use the hot-water bath canner instead.

RECIPES

Apple Pie Filling
(Bourbon Apple Pie, Pear Pie Filling, Pear Cranberry Pie Filling, Caramel Apple Pie Filling, Apple Cranberry Pie Filling)

Strawberry Pie Filling
(Raspberry, Blackberry, Cherry, Chokecherries, Ground Cherries, Peach)

Rum Raisin Pie Filling

Vegetarian Mince Meat Pie Filling

Green Tomato Pie Filling

Ambrosia Pie Filling

Nantucket (Cranberry) Pie Filling

Apple Pie Filling

(Bourbon Apple Pie Filling, Caramel Apple Pie Filling, Apple Cranberry Filling, Pear Pie Filling, Pear Cranberry)

Total Preparation Time: 3 hours

Special Equipment: ClearJel

How Long Before Use: 1 day

Headspace: 1½ inches

Process time: 25 minutes

Jars: 16-ounce, 32-ounce

Yield: 6–8 32-ounce jars

NOTE: This recipe requires ClearJel. See the Resource section on where to purchase. ClearJel expands in volume during the canning process; keeping as close to the 1½-inch headspace measurement is critical.

20 cups peeled and sliced apples (a mix of tart apples works best)

5½ cups sugar

1½ cups ClearJel

1 Tablespoon ground cinnamon

2½ cups cold water

5 cups apple juice

1 teaspoon nutmeg

¾ cup bottled lemon juice

Step One: Peel, core, and slice apples. Set aside. (An apple peeling machine will do all three tasks!)

Step Two: In a large stockpot, mix apple juice, water, sugar, spices and ClearJel. Stir with whisk to fully integrate the dry items.

Step Three: Begin to heat over medium flame. Stir often as the mixture will begin to thicken and potentially scorch before it boils. Add the lemon juice. Boil for 1 minute while constantly stirring with whisk. (The slurry should take on a glossy and clear sheen.) Remove from heat.

Step Four: With a large rubber spatula, mix in apple slices.

Step Five: Fill jars. Stir mixture after every few jars to keep the fruit-to-slurry mixture in balance. Remove air bubbles from jars.

Step Six: Put on lids and process.

VARIATION: Apple Pie turns into Caramel Apple Pie if you change white sugar to brown sugar. Exchanging half the apple juice for your favorite bourbon makes this a boozy Bourbon Apple Pie.

The steps in this recipe are the same used for more variations. Substitute pears for the apples and pear juice for apple juice and it's Pear Pie. Add cranberries to either and you have a lovely autumn fruit blend. As with all our recipes, keep the ratios intact and feel confident to substitute fruits, sugars, and spices with an experimental hand.

Strawberry Pie

(Blackberry, Blueberry, Cherry, Chokecherries, Ground Cherries, Peach, Raspberry)

Total Preparation Time: 3 hours

Special Equipment: ClearJel

How Long Before Use: 1 day

Headspace: 2 inches

Process time: 25 minutes

Jars: 16-ounce, 32-ounce

Yield: 6–8 32-ounce jars

NOTE: This recipe requires ClearJel. See the Resource section on where to purchase. ClearJel expands in volume during the canning process; keeping as close to the 2-inch headspace measurement is critical.

This same recipe is used for Peach Pie Filling. Peaches must be peeled prior to using. See the recipe for Peaches in Syrup for how to blanch and peel peaches.

24 cups fresh or frozen (thoroughly thawed) strawberries

2 cups ClearJel

6 cups sugar

7 cups cold water OR mix of cold water and strawberry juice

1 cup lemon juice

Step One: Wash, hull, and halve berries. Set aside.

Step Two: In a large stockpot, mix water/juice, sugar, and ClearJel. Stir with whisk to fully integrate the dry items.

Step Three: Begin to heat over medium flame. Stir often as the mixture will begin to thicken and potentially scorch before it boils. Add the lemon juice. Boil for 1 minute while constantly stirring with whisk. (The slurry should take on a glossy and clear sheen.) Remove from heat.

Step Four: With a large rubber spatula, mix in strawberries.

Step Five: Fill jars. Stir mixture after every few jars to keep the fruit-to-slurry mixture in balance. Remove air bubbles from jars.

Step Six: Put on lids and process.

VARIATION: The ratio of liquid to sugar to ClearJel to Fruit remains the same for all berry-based pie fillings. If you'd like to add spices, use 2 teaspoons dry or 3 teaspoons liquid.

As noted in other recipes, changing the sugar from white to brown gives the pie filling a caramelly taste.

Strawberry + 1 cup minced basil leaves

Half strawberry and half chopped rhubarb

Half strawberry and half pineapple

Use orange juice as the liquid for a strawberry orange pie filling. This works well for blueberry and peaches too.

Blueberry + 1 cup minced basil leaves

Blueberry with cinnamon

Cherry with almond extract

Use 3 cups of lime juice and lime zest in the slurry for Cherry Lime Pie

Peach with almond extract

Peach with cinnamon

Peach and blueberry

Razzleberry is the name given to a pie filling of raspberries and other small berries.

(**Strawberry Filling** pictured on page 176,
Cherry Filling and Pie pictured on page 163)

Rum Raisin

Total Preparation Time: 3 hours
Special Equipment: ClearJel
How Long Before Use: 3 days (1 hour on day one, 2 hours on day three)
Headspace: 1½ inches
Process time: 25 minutes
Jars: 16-ounce, 32-ounce
Yield: 6–8 32-ounce jars

NOTE: This recipe requires ClearJel. See the Resource section on where to purchase. ClearJel expands in volume during the canning process; keeping as close to the 1½-inch headspace measurement is critical.

8 cups golden raisins
8 cups dark raisins
5½ cups sugar
1½ cups ClearJel
5 cups apple juice (this may vary up or down by 2–3 cups)
¾ cup bottled lemon juice
1 liter spiced rum

Step One: On the first day, in a large, lidded plastic container, place all the raisins. Mix together. Pour rum over raisins. Place lid and steep for 3 days.

Step Two: Use sieve to strain liquid from raisins. Set raisins aside. Measure this amount. Add apple juice until total measure is 5 cups.

Step Two: In a large stockpot, mix juice, water, sugar, and ClearJel. Stir with whisk to fully integrate the dry items.

Step Three: Begin to heat over medium flame. Stir often as the mixture will begin to thicken and potentially scorch before it boils. Add the lemon juice. Boil for 1 minute while constantly stirring with whisk. (The slurry should take on a glossy and clear sheen.) Remove from heat.

Step Four: With a large rubber spatula, mix in raisins.

Step Five: Fill jars. Stir mixture after every few jars to keep the fruit-to-slurry mixture in balance. Remove air bubbles from jars.

Step Six: Put on lids and process.

Vegetarian Mincemeat Pie Filling

Total Preparation Time: 3 hours
How Long Before Use: 1 day
Special Equipment: ClearJel
Headspace: ½ inch
Process time: 30 minutes
Jars: 16-ounce, 32-ounce
Yield: 10–12 32-ounce jars

NOTE: You may notice that this recipe bears similarity to the Mock Apple Pie recipe. Both recipes are 19th-century in origin and updated for modern canning safety procedures.

12 cups diced, cored, peeled, tart apples
2 cups cranberries
2 cups golden raisins
2 cups dried currants
2 cups dried, chopped figs
1 cup ground, seeded oranges
¾ cup ground, seeded lemon
1 cup mixed, candied peel
2 cups lightly packed brown sugar
3½ cups apple cider
1½ teaspoons cinnamon
2 teaspoons allspice
2 teaspoons ground nutmeg
1 teaspoon ground cloves
1½ teaspoons ground ginger
1 cup brandy (You can double the amount of Brandy if you'd like. Cook's choice.)

Step One: Wash apples. Peel, core, and dice apples. Wash orange and lemon. Cut in half to remove seeds. Grind in food processor.

Step Two: In a large stockpot, mix all the ingredients, except brandy and spices.

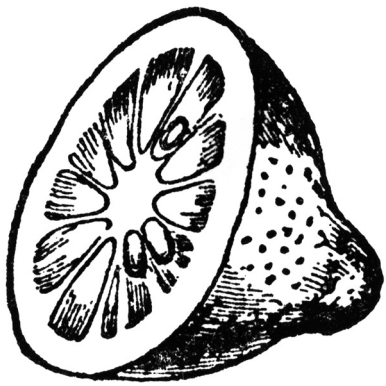
Step Three: Begin to heat over medium flame. Simmer mixture uncovered for about 15 minutes until thickened.

Step Four: Mix spices into brandy. Add to cooked fruit mixture. Continue to simmer for another 15 minutes. Remove from heat.

Step Five: Ladle into jars. Remove air bubbles.

Step Five: Put on lids and process.

VARIATION: Depending on your family tradition, sherry can be substituted for brandy. You can also substitute other dried fruits, if you keep the total volume the same. Spices can also be adjusted to suit your personal tastes.



Green Tomato Pie Filling (Mock Apple Pie)

Total Preparation Time: 3 hours
How Long Before Use: 1 day
Headspace: ½ inch
Process time: 15 minutes
Jars: 16-ounce, 32-ounce
Yield: 6–8 32-ounce jars

NOTE: This recipe is a great way to use up green tomatoes that get caught in the first frost of the season. You may notice that this recipe bears similarity to the Vegetarian Mincemeat Pie recipe. Both recipes are 19th-century in origin and updated for modern canning safety procedures.

16 cups chopped green tomatoes
12 cups peeled and chopped tart apples
2 cups seedless raisins
2 cups dried cranberries
¼ cup zested orange peel
2 cups water
2½ cups brown sugar
2½ cups white sugar
½ cup cider vinegar
1 cup lemon juice
2 Tablespoons ground cinnamon
1 teaspoon ground nutmeg
1 teaspoon ground clove

Step One: Wash tomatoes and apples. Rough-chop tomatoes; set aside. Peel, core, and chop apples; set aside.

Step Two: In a large stockpot, mix all the ingredients.

Step Three: Begin to heat over low to medium flame. Simmer mixture uncovered for about 40 minutes until thickened. Remove from heat.

Step Four: Ladle into jars. Remove air bubbles.

Step Five: Put on lids and process.

Ambrosia Pie Filling

Total Preparation Time: 2 hours
Special Equipment: ClearJel
How Long Before Use: 1 day
Headspace: 1 inch
Process time: 20 minutes
Jars: 16-ounce, 32-ounce
Yield: 6–8 16-ounce jars

NOTE: This recipe requires ClearJel. See the Resource section on where to purchase. ClearJel expands in volume during the canning process; keeping as close to the 1-inch headspace measurement is critical.

9 cups chunked fresh pineapple
3 cups peeled, de-seeded, and sectioned oranges
3 cups shredded coconut
4 cups sugar
1¼ cups ClearJel
8 cups orange juice or pineapple juice or blend of both

Step One: Core, peel, and cut pineapple into 1-inch-sized cubes making sure to remove the 'eyes.' Peel, de-seed, and section oranges. Set aside.

Step Two: In a large stockpot, mix juice, sugar and ClearJel. Stir with whisk to fully integrate the dry items.

Step Three: Begin to heat over medium flame. Stir often as the mixture will begin to thicken and potentially scorch before it boils. Boil for 1 minute while constantly stirring with whisk. (The slurry should take on a glossy and clear sheen.) Remove from heat.

Step Four: With a large rubber spatula, mix in pineapple, orange, and coconut.

Step Five: Fill jars. Stir mixture after every few jars to keep the fruit-to-slurry mixture in balance. Remove air bubbles from jars.

Step Six: Put on lids and process.

Nantucket Pie (Cranberry)

Total Preparation Time: 3 hours
Special Equipment: ClearJel
How Long Before Use: 1 day
Headspace: 2 inches
Process time: 25 minutes
Jars: 16-ounce, 32-ounce
Yield: 6–8 32-ounce jars

NOTE: This recipe requires ClearJel. See the Resource section on where to purchase. ClearJel expands in volume during the canning process; keeping as close to the 2-inch headspace measurement is critical.

The cranberries in this pie filling 'cook' during processing. You may hear a 'popping' sound during processing as the cranberry skins break open.

32 cups fresh or frozen (thoroughly thawed) cranberries
2 cups ClearJel
6 cups sugar
6½ cups orange juice
4 cups pecans, chopped then measured
1 cup lemon juice

Step One: Wash cranberries. Set aside. Chop pecans. Set aside.

Step Two: In a large stockpot, mix orange juice, sugar, and ClearJel. Stir with whisk to fully integrate the dry items.

Step Three: Begin to heat over medium flame. Stir often as the mixture will begin to thicken and potentially scorch before it boils. Add the lemon juice. Boil for 1 minute while constantly stirring with whisk. (The slurry should take on a glossy and clear sheen.) Remove from heat.

Step Four: With a large rubber spatula, mix in cranberries and pecans.

Step Five: Fill jars. Stir mixture after every few jars to keep the fruit-to-slurry mixture in balance. Remove air bubbles from jars.

Step Six: Put on lids and process.

Chapter Eight
Acidified & Pickled


MIXED
PICKLES

Pickled foods contain the most acid of all acidified foods. Up until the modern era, pickling and salting were the most assured ways to prevent any type of contamination. As the joke goes, anything can be pickled.

Pickle fans in the eastern United States are very familiar with a 'pickle' that goes by many names: Half-Sours and Full-Sours, Jewish Pickles, Deli Pickles... but I hate to break it to you, but these are not true pickles as we determined earlier. They are fermented cucumbers. Yes, they are high-acid because the by-product of fermentation is acetic acid. But for modern palates, pickles made by a prolonged soak in a vinegar solution are what we're going to call pickles. You can fight me on this one. You'll find the recipes for Half-Sours and their kin in the Fermentation section.

Though each recipe has slight variations to create flavor, there are some universal best practices to create fantastic pickled foods. Regardless of what you're going to pickle, use the freshest produce you possibly can. If you're a farmer's market customer, talk to your favorite vendor about what you'd like to make and order in advance. Cucumbers have a short 'ripe season' depending on your location. Find out when it is and plan ahead. This goes for all produce. Brussels sprouts, which are lousy pressure-canned but great pickled, are at their peak in fall, after the first frost. Strawberries ripen in late spring. Follow the seasons and the farmer for the best quality product.

Vinegar is used in all the recipes. But not every kind of vinegar is safe to use. Pickling solutions are chemistry: to ensure that your final product has the correct amount of acidity, only use vinegars that have a 5% acidity. How do you know if your vinegar is at 5%? It's there on the label in small print. There are many styles and flavors of vinegar, and you're free to use any of them in substitution, providing it is 5% acidity.

Substituting vinegars will cause an alteration to the flavor. In some cases, the result will be better, in other instances not so much. Apple cider vinegar works very well with fruit but can overpower vegetables. Rice wine vinegar matches well with Asian-inspired spices. Malt and red wine vinegars have intense flavors and should be used in recipes that demand a robust partner.

Use a non-reactive pot for cooking your pickling solution, chutney, relish, or mixed pickle. Vinegar will cause a chemical reaction with aluminum, cast iron, and copper pots. A stainless steel stockpot is ideal, though an enameled pot will also work. Avoid nonstick-coated pots altogether.

The kind of salt used in pickling is critical. Never use 'table salt' or any other kind of salt that contains additional chemicals, usually added to keep the salt crystals from caking. Never use a salt that has added iodine; it will react with

the acid in the vinegar. Canning salt is readily available at grocery stores and is ideal. Sea salts can also be used, provided they are 100% salt.

Some of these recipes contain a slight amount of vegetable or olive oil. Fats present safety challenges, as too much fat will lower the overall acidity and increase chances of botulism. When using a recipe that includes oil, do not increase the amount of oil. This holds true for all the ingredients in a pickling solution. When increasing the total amount of the pickling solution, keep the measurement ratios intact. The only ingredients that can be adjusted with a free hand are spices.

Spices add flavor to your pickled product. How much flavor is up to you. Whole spices are preferred to ground spices. Think about how strong a flavor the pickled product should have. For more robust flavors, spices are added to the jar or crock with the fruit or vegetable. The flavor intensifies as it pickles. A more subtle and controlled flavor is achieved when the spices are cooked with the pickling solution and then removed. The term 'spice bag' is often used in recipes. A 'spice bag' can be as simple as a spice-filled piece of cheesecloth tied into a bundle. You can also purchase muslin cloth bags that can be filled, tied, then reused. My favorite 'spice bag' hack is to use a larger-sized loose tea infusion ball. It should be of a non-reactive material. Easily cleaned and reusable, they are a excellent time- and material-saver.

Packing the food into the jar is as described in the Preserving Fruits in Syrups section. Pickled items are most commonly Cold Packed into the jar. (The fresh, washed item is packed tightly into the jar, then covered in pickling solution.) Mixed pickles and pickled fruits are commonly Hot Packed. (The fresh, cleaned item is cooked in the pickling solution for a prescribed time, removed from the pickling solution, and packed into the jar. The pickling solution is then poured over the material.) Removing air bubbles and making sure that the pickling solution covers all the material in the jar is critical. In class, when we cold pack jars, I ask people to tip their packed jars over into their hand. Ideally, nothing should move. That is the goal for a perfectly packed jar. It may take more work to get that tightly packed jar, but it will be rewarded by pickles that are uniform in size and not floating around higgledy-piggledy.

There are a plethora of folk tales about adding things to the jar or pickling solution to keep your pickled item crisp. I have not seen any improvement in the quality of pickle from using these additives. Whether it's grape leaves or 'Pickle Crisp,' I've found that the best results come from using the freshest produce. In my many years of teaching and answering questions from people all over the country, I have found one common error that people who report 'soft pickles' continually make: overprocessing.

A phrase that I use in class is: move with speed and purpose. That does not mean running around the kitchen like a chicken with your head cut off. It means that your workspace is prepared, your tools are ready, and you know exactly what you are doing and will do. Once the produce is in the jar and the hot pickling solution is poured into the jar, the high temperature is changing the food. Wipe those rims. Get the screw bands on. Get the jars into the canner. When they are done processing, get them out. Lackadaisical timing and inattentiveness often cause the jars to be exposed to high heat far longer than they need to be, resulting in overcooking and soft pickles.

Ultimately, if your ideal pickled product is a snappy, crunchy, cold item, then you need to omit hot-water bath canning and make refrigerator pickles. Remember our food preservation techniques: pickling is the chemistry to create the high-acid environment while hot-water bath processing is the physics that raises the internal temperature, drives out remaining oxygen, and creates the hermetic seal. If the final product isn't what you want, use a different method to preserve the food. Any pickling recipe is a refrigerator pickle recipe. All you have to do is stop before you get to the processing steps and place your jar or crock into the fridge.

Mixed pickles is the all-encompassing term for a mix of fruits or vegetables in a pickling solution. Giardiniera and Curtido are commonly known in the United States. Feel free to combine cut pieces of vegetables together in any combination that suits you. Many of these recipes began in the spirit of not wasting a single item from the garden. Others have evolved to reflect regional and cultural tastes. Included are recipes that are easily customized to your tastes.

Pickling fruit is a traditional method of preservation that I would like to see return. The taste is often a surprise to modern eaters. We have to remind ourselves that not all pickling solutions are savory. Using sugar in addition to the measure of salt creates a sweet and sour flavor that creates the elusive umami that cooks seek. Western Asian and Middle Eastern cuisines feature dynamic pickled fruits. Included here are recipes for our class favorite, Pickled Pineapple, and the 1950s Wisconsin supper club traditional appetizer, Spiced Pickled Apples.

Regardless of what you pickle, what recipe you follow, or what method you use, follow the note stating how long the item needs to be in the pickling solution before it is at "Peak Pickle." Some items only take hours; others may take weeks. Eating a pickled item before it's ready results in sadness.

Cucumbers

There are multiple varieties of cucumbers. The cuke in your green salad is not the best candidate for pickling. The most common pickling cucumber in the United States is the 'Kirby.' If you're planting cucumbers with a mind toward making pickles, make sure you buy the right seed. At the market, ask for 'pickling cucumbers'; the farmer and produce manager will know what you want.

Pickling cucumbers are rated and priced by size. The smaller the cucumber, the more expensive it is. Cornichons or midgets will command the highest price. Use 'Number One' size, which is about the size of your pointer finger, for pickling whole cucumbers. 'Number Two'-sized are ideal for Half-Sours (fermented cucumber pickles) and cut spears.

Regardless of the size of a cucumber, there is one preparation technique that will help ensure quality pickles. At the 'blossom end' of the cucumber is a deposit of enzyme-rich residue that is the remnants of the flower. Scrape this off. You can use your fingernail or a spoon but gently remove this residue. Some people prefer to cut off the entire end of the cucumber. Whichever method you use, you must remove this enzymatic residue. If left, it will cause your pickles to soften in the jar.

The spices used in traditional pickled cucumbers fluctuate based on region and cultural influence. In the Midwest, pickling spice combinations reflect our German and Polish heritage and include cloves. No cloves in East Coast-style pickling spice combos. There is no single 'right' spice; use what you like. Commercially available 'pickling spice blends' are also wildly variant. (I'll claim preference for Penzeys 'Pickling Spice Blend' as having a great combination and balance of flavors. See Resource Guide.)

Traditional dill pickle recipes use dill in many forms. The recipes here call for fresh, mature dill versus the 'baby dill' more common in grocery stores. Mature dill is available and often sold with pickling cucumbers. If you don't see it, ask your farmer or produce manager. Ask for 'pickling dill,' and they'll know exactly what you want. If you can't find mature dill, then go ahead and substitute. Baby dill is preferable to dill seed, but dried dill seed will work just fine.

Many people scoff at the amount of garlic used in pickles. Regardless of how much is called for, people think it's either too little or too much. Use your personal preference as a guide. If you're the type who mentally substitutes 'entire head' when a recipe calls for 'one clove,' then go ahead. You can also omit the garlic. It will change the flavor of your pickles, but if you don't like garlic that's the reason you're making your own. For garlic lovers, feel free to peel any

leftover cloves and place into a small jar and cover with remaining pickling solution. Process as you would your pickles for an extra garlicky treat.

Fresh is always best, except in the case of garlic. Garlic and onions often have an enzymatic reaction to the acid in vinegar that causes them to turn blue or a bluish-green. This discoloration is harmless. Garlic that has aged two to four weeks is less likely to have the sulfur-acid reaction. Most garlic is aged before sold, but if you're growing your own, let it age a few weeks prior to use. That's not to say that ALL garlic will turn blue in a pickling solution, but it happens often enough that you should not be shocked if you see it.

Dill may also react with the vinegar and turn the pickling solution in the jar a light shade of pink. Again, perfectly harmless. Asparagus often has the same enzymatic reaction and will turn an alarming shade of pink after processing. The color fades and returns to normal (or very light pink) after the one-month pickling wait time.

Tips for Whole Pickling

Substitute vinegars. White distilled vinegar is the most commonly used in pickling solutions. You can add flavor and depth to your pickling by using cider, malt, rice, or wine vinegars as long as they are at a 5% acidity.

Adjust your spices. Use whole spices with a free hand to create unique flavor profiles. Use your favorite ethnically inspired dishes as a launchpad.

You want it hot? Any pickle can become a 'hot' pickle. Add a few of your favorite hot peppers to the jar and your pickles will be hot. Of course, the hotter the pepper, the hotter the pickle. Needless to say, wear latex gloves to protect your skin when working with hot peppers.

Aim for Peak Pickle. The time it takes food to pickle is hard to predict with accuracy. The recipes all state an approximate time. Taste your creation and determine when 'Peak Pickle' is for yourself. A palate is as unique as a fingerprint.

Drink your pickle juice. If you've eaten your last pickled thing and have a bit of pickle juice at the bottom of the jar, don't waste it. Old Poles swear by a daily glass of pickle juice. Elite athletes have gone on

record as pickle juice being better than Gatorade. But to be a true pickle juice aficionado, try the 'pickle back.' Many claim creation, but who cares—drink a shot of your favorite liquor and immediately drink a shot of pickle juice.

Can you pickle it? Yes, you probably can. But there are a few food items that make for poor pickles. Stay away from delicate greens like spinach and lettuces, but hearty greens like pickled mustard greens are a staple of Vietnamese cuisine.

Ready?

If you're making refrigerator pickles, have your containers prepared the same way you would for hot-water bath processing. Place containers in the refrigerator after filling, lidding, and cooling.

All recipes make the assumption that you've prepared your canning jars according to the best practices described in the Hot-Water Bath Canning Instructions. When should you get your jars ready? Wash and rinse them when the pickling solution has finished cooking. If you're using a dishwasher, start the cycle before you begin heating the pickling solution.

If you're hot-water bath processing, your canner should be filled with water and underway before you start cooking your pickling solution. If you want to use an Atmospheric / Steam Canner, note that the machine will 'run dry' after 20 minutes of processing. If your processing time is longer than that, the hot-water bath canner is the better tool to use.

RECIPES

Milwaukee Dill Pickles
(Dilly Beans, Curry Green Beans, Asparagus, Eggs)

Pickled Brussels Sprouts
(Cauliflower, Carrots, Green Tomatoes)

Bread & Butter Pickles

Senfgurken (Slippery Jims)

Sweet & Sour Pickled Onions

Pickled Hot Peppers (Sweet & Sour & Hot)

Marinated Roasted Red Peppers
(Mushrooms, Cardoni, Artichoke)

Jardinière/Giardiniera

Pickled Pineapple
(Pickled Apples)

Spicy Pickled Grapes
(Pickled Blueberries, Pickled Plums, Pickled Peaches, Pickled Gooseberries, Pickled Cherries)

Milwaukee Dill Pickles

(Dilly Green Beans, Curry Green Beans, Asparagus)

Total Preparation Time: 3 hours

Special Equipment: Spice Bag or non-reactive, loose tea ball

How Long Before Use: 3 weeks

Headspace: ½ inch

Process time: 10 minutes for pints / 15 minutes for quarts

Jars: 16-ounce, 32-ounce

Yield: 10–12 32-ounce jars

NOTE: Pickling cucumbers are rated by number. Read the section about pickling cucumbers to learn more. This recipe makes a large batch of pickles; feel free to halve for smaller projects.

15 pounds pickling cucumbers (number one-sized for whole pickles; larger sizes can be sliced into spears)

2 cups onion slices

24 cloves of garlic, peeled

4–6 bunches of pickling dill (Baby dill can be used if pickling dill isn't available. Dill seed is acceptable if no fresh dill is available.)

1 cup yellow mustard seed

Pickling solution

12 cups white vinegar

3 cups water

1 cup sugar

3 cups 100% pure canning salt

⅓ cup pickling spice blend*

3 quarts of cold water

3 cups 100% pure canning salt

(**Milwaukee Dill Pickles** pictured on page 166 and 168)

Step One: Gently wash cucumbers. In a large bowl, mix cold water and salt.

Step Two: Remove the 'blossom end' (opposite of the stem) either scraping off the residue or cutting the ends completely off. Place cucumbers in cold saltwater bath. Repeat until all the cucumbers are finished. Set aside.

Step Three: Clean and slice onions; set aside. Separate and peel garlic; set aside. Rinse pickling dill and place on kitchen towel to dry; set aside.

Step Four: Make pickling solution. In a large, non-reactive stockpot, mix vinegar, water, sugar, and salt. Tie spices into spice bag and place into mixture.

Step Five: Over medium heat, bring pickling solution to boil while covered. Reduce heat and simmer for 5 minutes. Remove from heat.

Step Six: Into prepared jars, place a few strands of onion slice, 2 cloves of garlic, 1 Tablespoon of mustard seed, and dill flower head and leaves. Press firmly into bottom of jar.

Step Seven: Pack cucumbers tightly into jars, up to shoulder (or curve) near the top of the jar. (The ideal pack is when none of cucumbers move if you shake the jar.)

Step Eight: Remove spice bag from pickling solution. Ladle pickling solution over peppers in jar, making sure that all peppers are covered and within the required headroom. (You may have to add or remove a pepper.) Remove bubbles.

Step Nine: Put on lids and process.

VARIATION:

This is the classic recipe for Midwestern-style dill pickles. You can use this same recipe and technique on green beans and asparagus. If you like the 'dilly' taste, feel free to use this pickling solution on nearly everything.

You can make this 'hot' by adding a few hot peppers or red pepper flakes to the bottom of the jars.

***Pickling Spice**

Makes ⅓ cup

2 Tablespoons mustard seed

1 Tablespoon whole allspice

1 Tablespoon ground turmeric

2 teaspoons coriander seeds

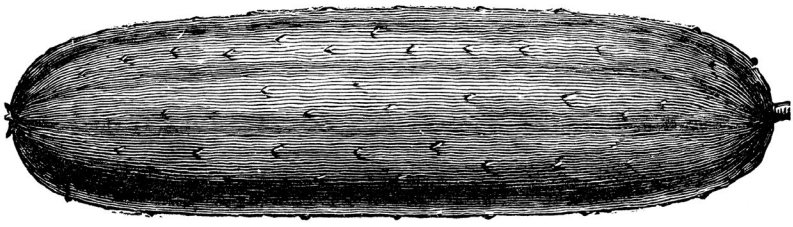
5 whole cloves

1 teaspoon ground ginger

2 bay leaves (crushed)

1 small (2-inch) cinnamon stick

NOTE: Midwesterners include whole clove in their pickling spice. East coasters omit the clove. Follow your personal preferences.



Pickled Brussels Sprout Halves

Total Preparation Time: 2 hours
How Long Before Use: 2 weeks
Headspace: ¼ inch
Process time: 15 minutes
Jars: 16-ounce, 32-ounce
Yield: 6–8 16-ounce jars

NOTE: This pickling solution can be used for pickling any tougher-skinned vegetable, including green beans, snap peas, carrots, beets. Really, anything.

When making pickling solutions, always cook with the lid on the pot. Evaporation will cause the solution to go out of balance and become too salty or too sour.

5 pounds Brussels sprouts

Pickling solution

7 cups apple cider vinegar
5 cups water
5 Tablespoons 100% pure pickling salt

1 cup peppercorns
½ cup yellow mustard seeds
16–32 whole garlic cloves, peeled
6–10 bay leaves

Step One: Wash sprouts. Cut off dried stem ends. Remove any blemished outer leaves. Cut in half (stem to top). Set aside.

Step Two: Make pickling solution. In large non-reactive stockpot, add the vinegar, water, and salt. Bring to boil while covered over medium heat. Remove from heat.

Step Three: Place approximately 1 Tablespoon of peppercorn and mustard seed into prepared jars. Place 1 or 2 garlic cloves and bay leaves into jars.

Step: Four: Pack jars tightly with Brussels sprouts, up to shoulder (or curve) near the top of the jar. (The ideal pack is when none of the sprouts move if you shake the jar.)

Step Five: Ladle pickling solution over sprouts in jar, making sure that all sprouts are covered and within headroom. (You may have to add or remove a sprout.) Remove bubbles.

Step Six: Put on lids and process.

VARIATION:

This pickling solution works very well with green tomatoes, cauliflower florets, really, any kind of vegetable you'd like to pickle.

Add a hot pepper or red pepper flakes to the bottom of the jar to make this a hot pickle. Feel free to adjust the spices to suit your personal tastes.

Bread & Butter Pickle Slices

Total Preparation Time: 2 hours (with 4-hour rest time)
How Long Before Use: 4 weeks
Headspace: ½ inch
Process time: 10 minutes
Jars: 16-ounce, 32-ounce
Yield: 6–8 16-ounce jars

NOTE: This is the recipe for the traditional sweet pickle slices often found on hamburgers.

6 pounds pickling cucumbers (4 to 5 inches long)
8 cups onion, peeled and thinly sliced (about 3 pounds)
½ cup 100% pure pickling salt
Crushed or cubed ice

Pickling solution
4½ cups sugar
4 cups white vinegar
2 Tablespoons mustard seed
1½ teaspoons celery seed
1 Tablespoon ground mustard

Step One: Gently scrub cucumbers in cool water.

Step Two: Trim both blossom and stem ends. Cut into ¼-inch slices; set aside. Clean and slice onions into ¼-inch strands; set aside.

Step Three: In a large bowl, add the salt. Add the cucumber and onion slices. Gently mix with hands. Cover with 2 inches of crushed ice. Place in refrigerator for 4 hours.

Step Four: Remove from refrigerator and drain liquid; set aside.

Step Five: Make pickling solution. In large non-reactive stockpot, add the vinegar, sugar, and spices. Bring to boil while covered over medium heat, making sure that sugar is dissolved. Remove from heat.

Step Six: Pack cucumbers and onions into prepared jars.

Step Seven: Ladle pickling solution mixture into the jar. Make sure that cucumbers and onions are completely covered and within the required headspace. Remove bubbles.

Step Eight: Put on lids and process.

VARIATION:

You can substitute the cucumbers with zucchini or yellow squash. (No more than 1½ inches in diameter.)

Senfgurken (Slippery Jims)

(Adapted from the August 3, 1978 *Milwaukee Sentinel*)

Total Preparation Time: 2 hours (with 24-hour rest time)

How Long Before Use: 3 weeks

Headspace: ½ inch

Process time: 10 minutes

Jars: 16-ounce, 32-ounce

Yield: 4–6 16-ounce jars

NOTE: Senfgurken are a German-style sweet mustard pickle. I'm going to be very honest here: they stink up your kitchen during the making. They are also an acquired taste. Known in the Upper Midwest as 'Slippery Jims' or 'Slippery Jacks,' they also go by the name of 'Copper Pickles.' The one constant is the type of cucumber used, which is what makes this recipe unique: overripe cucumbers. The cucumber of choice: the club-sized, yellowing behemoth that escaped previous harvests. The overnight brining, which causes the cucumbers to begin fermenting, gives them a slimy or slippery texture; this is normal and desired.

When making pickling solutions, always cook with the lid on the pot. Evaporation will cause the solution to go out of balance and become too salty or too sour.

5 pounds overripe and yellowed cucumbers, peeled, deseeded, cut into strips

1 cup red bell pepper, sliced into strips

4 ½ cups of water

½ cup 100% pure salt

Pickling solution

1 quart white vinegar

6 cups sugar

3 Tablespoons yellow mustard seed

1 Tablespoon whole cloves

Step One: Peel cucumbers. Slice in half, lengthwise. Deseed by scooping out the middle interior. Slice lengthwise into 2-inch-wide strips.

Step Two: In a large bowl, mix water and salt. Stir until salt is dissolved. Add the cucumber strips. Cover bowl with thin cotton towel. Let sit overnight.

Step Three: The next day, drain the cucumbers from the brine; set aside. Clean, deseed, and slice red pepper into strips; set aside.

Step Four: Make pickling solution. In large non-reactive stockpot, add the vinegar, sugar, and spices. Bring to boil while covered over medium heat, making sure that sugar is dissolved.

Step Five: Add in the drained cucumbers and sliced red peppers. Simmer until cucumbers are translucent yet still firm. Remove from heat.

Step Six: Using slotted spoon, fill prepared jars with cucumber and red peppers.

Step Seven: Ladle pickling solution mixture into the jar. Add extra pickling solution from the pot to ensure that onions are completely covered and within the required headspace. Remove bubbles.

Step Eight: Put on lids and process.

VARIATION:

Every family and county had a version of Slipperies. Many of the variations hold a clue as to why these are also called 'copper pickles.' Adding a tablespoon of turmeric or mustard powder to the pickling solution gives it a flavor boost and yellow color. The white vinegar can be swapped for cider vinegar, again giving the final pickles a coppery color.

Sweet & Sour Pickled Onions

Total Preparation Time: 2 hours
How Long Before Use: 3 days
Headspace: ½ inch
Process time: 10 minutes
Jars: 8-ounce, 16-ounce
Yield: 6–8 16-ounce jars

NOTE: When making pickling solutions, always cook with the lid on the pot. Evaporation will cause the solution to go out of balance and become too salty or too sour.

6 pounds red onions, thinly sliced
3 quarts of water

Pickling solution
3½ cups apple cider vinegar
3 cups water
4½ cups sugar
⅓ cup 100% pure pickling salt

4 Tablespoons yellow mustard seeds
2 Tablespoons celery seed
3 teaspoons red chili pepper flakes (can adjust to taste)

Step One: In a large stockpot, bring water to boil over medium heat.

Step Two: Clean and slice onions. Place into boiling water and blanch for 3 minutes. Remove from heat.

Step Three: Using slotted spoon, remove onions from water and place into large strainer to drain; set aside.

Step Four: Make pickling solution. In large non-reactive stockpot, add the vinegar, water, sugar, and salt. Bring to boil while covered over medium heat, making sure that sugar and salt are dissolved. Add in the drained onions and stir to combine. Remove from heat.

Step Five: Place approximately 1 Tablespoon of peppercorn and mustard seed into prepared jars. Place 1 or 2 garlic cloves and bay leaves into jars.

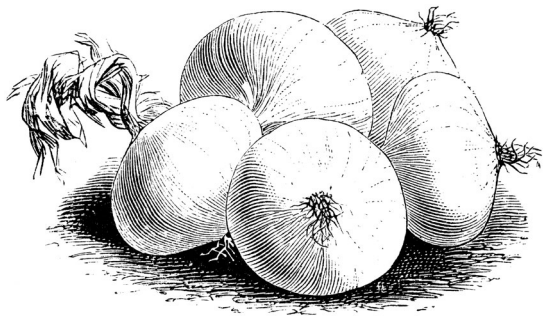
Step Six: Mix the spices together in a small bowl. Place 1 Tablespoon of the mixed spice into the bottom of the prepared jar.

Step Seven: Ladle onion and pickling solution mixture into the jar. Add extra pickling solution from the pot to ensure that onions are completely covered and within the required headspace. Remove bubbles.

Step Eight: Put on lids and process.

VARIATION:

If you don't have red onions, you can substitute any type of onions.



Pickled Hot Peppers

Total Preparation Time: 2 hours
How Long Before Use: 1 week
Headspace: ¼ inch
Process time: 15 minutes
Jars: 8-ounce, 16-ounce
Yield: 6–8 8-ounce jars

NOTE: Working with every type of hot pepper can cause injury. Wear latex protective gloves when working with hot peppers. This recipe is a highly volatile mix of peppers. It is recommended that you wear both eye protection and a light face mask. Rinse any tools in cold water before washing in hot water to remove residual pepper oils. (Pepper oils aerosolize in hot water and become pepper gas!)

This recipe will be as mild or as hot as you desire. Use a mix of pepper styles for a depth of flavor.

2 pounds fresh peppers, sliced

Pickling solution

1⅓ cups cider vinegar
4 cups sugar
¼ cup mustard seed
½ teaspoon celery seed
2 Tablespoons minced garlic
½ teaspoon cayenne pepper

Step One: Wash, de-stem, and slice peppers into rings; set aside.

Step Two: Make pickling solution. In non-reactive large stockpot, mix all ingredients. Over medium heat, bring mixture to boil. Reduce heat and simmer covered for 5 minutes.

Step Three: Add sliced peppers to the pickling solution. Simmer another 5 minutes. Remove from heat.

Step Four: Using a slotted spoon, remove peppers from pickling solution. Place in bowl and set aside.

Step Five: Pack peppers tightly into jar, up to shoulder (or curve) near the top of the jar. (The ideal pack is when none of the peppers move if you shake the jar.)

Step Six: Ladle pickling solution over peppers in jar, making sure that all peppers are covered and within the required headroom. (You may have to add or remove a pepper.) Remove bubbles.

Step Seven: Put on lids and process.

Marinated Italian Peppers

(Marinated Mushrooms, Artichokes, Cardoni)

Total Preparation Time: 2 hours
How Long Before Use: 1 week
Headspace: ½ inch
Process time: 15 minutes
Jars: 8-ounce, 16-ounce
Yield: 6–8 16-ounce jars

NOTE: This method and recipe can be used for marinated pickled mushrooms as well as for any type of pepper. It does contain olive oil, used in the roasting; take care not to exceed the total amount of oil used as that would change the total acidity of the preserve.

8 pounds red peppers (Carmen, red bell, Marconi)
1 cup olive oil
100% pure sea salt

Pickling Solution

2 cups bottled lemon juice
4 cups white vinegar
8 Tablespoons 100% pure pickling salt

1 teaspoon dried oregano, per jar
1 cup onions, sliced
8 whole cloves garlic, peeled

Step One: Pre-heat oven to 400 degrees. Line jelly roll pans with parchment paper. Set aside.

Step Two: Wash peppers. Remove stems, slice open and remove seeds.

Step Three: Lay peppers flat on the parchment-lined pan. From the 1 cup of olive oil, sprinkle peppers with a few Tablespoons of oil, as needed. Sprinkle lightly with sea salt.

Step Four: Place in oven and roast for 8 to 10 minutes. Remove from oven and cool. Repeat for as many peppers as you have.

Step Five: Once cool, place all peppers into bowl; set aside.

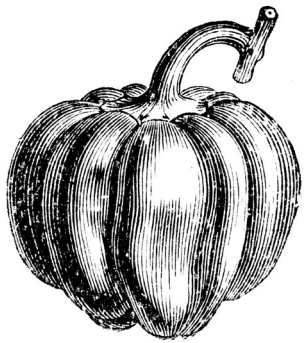
Step Six: Make pickling solution. In large non-reactive stockpot, add the vinegar, water, and salt. Bring to boil while covered over medium heat. Remove from heat.

Step Seven: Place approximately a few strands of onion and cloves of garlic into prepared jars. Add 1 teaspoon of dried oregano per jar.

Step: Eight: Pack jars tightly with peppers, up to shoulder (or curve) near the top of the jar. (The ideal pack is when none of the peppers move if you shake the jar.)

Step Nine: Ladle pickling solution over peppers in jar, making sure that all peppers are covered and within the required headroom. (You may have to add or remove a pepper.) Remove bubbles.

Step Ten: Put on lids and process.



Jardinière

Total Preparation Time: 2 hours
Special Equipment: Spice Bag or non-reactive loose tea ball
How Long Before Use: 1 week
Headspace: ½ inch
Process time: 10 minutes
Jars: 8-ounce, 16-ounce
Yield: 6–8 16-ounce jars

2 cups small cauliflower florets
1 ½ cups pearl onions (can swap out white onions)
1 cup celery, cut into ¼-inch slices
1 cup carrots, peeled and cut into matchsticks
1 cup zucchini, cut into ¼-inch slices
2 cups red bell peppers, seeded and cut into ¼-inch strips
1 cup yellow bell pepper, seeded and cut into ¼-inch strips
1 cup green bell pepper, seeded and cut into ¼-inch strips

Pickling Solution
4 cups white vinegar
2 cups water
2 cups granulated sugar
1 Tablespoon pickling or canning salt
3 bay leaves
¼ cup whole black peppercorns

3 cloves of garlic, thinly sliced

Step One: Wash and cut vegetables into recommended sizes. Set aside.

Step Two: Make pickling solution. In a large, non-reactive stockpot, mix vinegar, water, sugar, and salt. Tie spices into spice bag and place into mixture.

Step Three: Over medium heat, bring pickling solution to boil while covered. Reduce heat and simmer for 5 minutes.

Step Four: Add the prepared vegetables to the pickling solution. Reduce heat, simmer covered for 5 minutes. Remove from heat.

Step Five: With a slotted spoon, remove the vegetables from the pickling solution and place in large bowl; set aside.

Step Six: Into prepared jars, place a few slices of garlic.

Step Seven: Pack vegetable mix tightly to shoulder (or curve) near the top of the jar. (The ideal pack is when none of the vegetables move if you shake the jar.)

Step Eight: Remove spice bag from pickling solution. Ladle pickling solution over vegetables in jar, making sure that all peppers are covered and within the required headroom. (You may have to add or remove a pepper.) Remove bubbles.

Step Nine: Put on lids and process.

VARIATION:

Giardiniera is an Italian version of this pickled mixed vegetable. To make Giardiniera, add 2 Tablespoons of fennel seed and 2 Tablespoons of dried oregano to the spice mixture. For a hot version, substitute a portion of the bell peppers with a few hot peppers.

Pickled Pineapple

Total Preparation Time: 2 hours
Special Equipment: Spice Bag or stainless steel loose tea ball
How Long Before Use: 1 week
Headspace: ¼ inch
Process time: 15 minutes
Jars: 8-ounce, 16-ounce, 32-ounce
Yield: 10–12 16-ounce jars

NOTE: This is a sweet pickle. This pickling method works well for fruits that are higher in moisture content. The quick and thorough cooking in the pickling solution allows the fruit to release its water and begin the acidification process. You'll notice that the pickling solution doesn't use water but juice to account for the change in acidity.

10 cups (3–4 fresh) pineapple, peeled, cored and cut into chunks
Pickling Solution
3 cups brown sugar
1½ cups apple cider vinegar
1½ cups pineapple juice
5 sticks cinnamon, broken
¾ teaspoon whole allspice
½ teaspoon whole cloves

Step One: Place cloves and allspice into spice bag or tea ball; set aside.

Step Two: In large, non-reactive stockpot combine brown sugar and pineapple juice. Add spice bag and cinnamon sticks.

Step Three: Over medium heat, bring mixture to boil while stirring to ensure sugar is dissolved. Reduce heat and simmer covered for 10 to 15 minutes.

Step Four: While pickling solution is simmering, peel, core, and chop into bite-size chunks the pineapple; set aside.

Step Five: Add cut pineapple pieces to simmering pickling solution. Continue to simmer for another 15 minutes.

Step Six: Using a slotted spoon, remove pineapple chunks from pickling solution and place into large bowl. Leave pickling solution in stockpot. Remove spice bag and cinnamon sticks.

Step Seven: Pack pineapple pieces tightly into jars. (Should be up to shoulder (or curve) near the top of the jar. (The ideal pack is when the pineapple pieces don't move if you shake the jar.)

Step Eight: Ladle pickling solution into jars, making sure that pieces are fully covered and within headspace. (You may need to make light adjustments of adding or removing a piece of fruit.) Remove air bubbles.

Step Nine: Put on lids and process.

VARIATION:

You can easily adjust the spices to develop different flavor profiles. Swapping the apple cider vinegar for a different style will also change the flavor. Try a champagne vinegar with a white sugar for a more delicate pickle flavor, which would pair well with strawberries.

Use this pickling solution on:

Apple rings

Pear slices

Strawberries

Peaches

Spicy Pickled Grapes

Total Preparation Time: 2 hours
How Long Before Use: 1 month
Headspace: ¼ inch
Process time: 15 minutes
Jars: 8-ounce, 16-ounce, 32-ounce
Yield: 6–8 16-ounce jars

NOTE: This sweet pickled fruit doesn't require any blanching or cooking of the grape prior to jarring. Note that the pickling time in the jar is longer to allow for the pickling solution to fully 'pickle' the fruit. This method works well for smaller, tougher-skinned fruits.

4 pounds red or green grapes
½ cup Sichuan peppercorns
½ cup coriander seed

Pickling Solution
6 cups apple cider vinegar
4 cups brown sugar
4 cups of water
24 fresh ginger coins, about 1/4-inch thick
12 whole star anise
8 cinnamon sticks
4 bay leaves

Step One: Wash, de-stem, and drain grapes. Set aside.

Step Two: In large, non-reactive stockpot, combine the ingredients of the pickling solution.

Step Three: Over medium heat, bring mixture to boil while constantly stirring. When sugar is dissolved, reduce heat and cover pot to simmer for 5 minutes. Remove from heat.

Step Four: With a slotted spoon, remove ginger, anise, cinnamon sticks, and bay leaves.

Step Five: In prepared jars, put 1 Tablespoon each of peppercorns and coriander seeds. Pack prepared jars tightly with grapes. (Should be up to shoulder [or curve] near the top of the jar. The ideal pack is when the grapes don't move if you shake the jar.)

Step Six: Ladle pickling solution into jars, making sure that grapes are fully covered while allowing required headspace.

Step Seven: Put on lids and process.

VARIATION:

You can easily adjust the spices to develop different flavor profiles. Reduce the number of peppercorns to lessen the overall heat of the final product. Swapping the apple cider vinegar for a different style will also change the flavor. Try a champagne vinegar with a white sugar for a more delicate pickle flavor.

Pickled Blueberries

Pickled Plums

Pickled Cherries

Pickled Peaches

Pickled Gooseberries

Chutneys and Relishes

Branston Pickle, Piccalilli, Chow-Chow, and Caponata are all relishes or chutneys. They share the same basics as singular pickled items in that they call for vinegar, salt and/or sugar. What separates them is how the items are prepared—these recipes have the vinegar and salt (or sugar), and spices cooked together with the fruits and vegetables.

Relishes have a long history of 'use it all up' preserve. There are as many recipes for chow-chow and piccalilli as there are cooks that have made it. Commercial canning and national brands have created a sense of uniformity in flavor and ingredients, but don't let that stop you from adjusting the included recipes to suit your own tastes.

Chutneys are rooted in Indian cuisines and modified by English tastes, then finally exported to the world for everyone else to make their own. Chutneys are distinct by their combination of sweet, sour, and hot flavors. Another common trait of chutneys, but not exclusively defining, is the use of both fruits and vegetables in the mixture. Chutneys are versatile as a condiment, side dish, and cooking marinade. Let your palate be your guide, and adjust the heat levels to your own taste.

I've included a recipe for Mostarda, the traditional Italian mustard pickle, as an example of the unique place mustard holds in all types of preserves. Germans have a pickled cucumber called senfgurken, which are sweet mustard pickles, and many of the previous pickle recipes include mustard seed as a flavoring spice. All of this goes to show that most food preservation techniques are a blend of traditions and methods. Very few fit into neat categories.

Tips for Chutneys and Relishes

Substitute vinegars. White distilled vinegar is the most commonly used in pickling solutions. You can add flavor and depth to your pickling by using cider, malt, rice, or wine vinegars as long as they are at a 5% acidity.

Adjust your spices. Use whole spices with a free hand to create unique flavor profiles. Use your favorite ethnically inspired dishes as a launchpad.

You want it hot? Or not? Any chutney and relish can become a 'hot' product. Add a few of your favorite hot peppers to the mix, and the resulting food will be hot. Chutneys by way of tradition are hot, so the reverse is also true—you can reduce the amount of peppers to make the recipe milder. Of course, the hotter the pepper, the hotter the relish or chutney. Needless to say, wear latex gloves to protect your skin when working with hot peppers.

Give them time to develop their full flavor. The spices in chutneys and relishes develop over time. Though perfectly enjoyable after making, your final product will be much improved by spending a week in the jar.

Can you substitute? Many a Dill Pickle Relish is made with zucchini with no kid ever learning the truth. The recipe for Pear Chutney can easily use apples with good results. As always, look to combine complementary flavors.

Ready?

If you're making refrigerator relish or chutney, have your containers prepared the same way you would for hot-water bath processing. Place containers in the refrigerator after filling, lidding, and cooling.

All recipes make the assumption that you've prepared your canning jars according to the best practices described in the Hot-Water Bath Canning Instructions. When should you get your jars ready? Wash and rinse them when the chutney or relish has finished cooking. If you're using a dishwasher, start the cycle before you begin cooking.

If you're hot-water bath processing, your canner should be filled with water and underway before you start cooking your chutney or relish. If you want to use an Atmospheric / Steam Canner, note that the machine will 'run dry' after 20 minutes of processing. If your processing time is longer than that, the hot-water bath canner is the better tool to use.

RECIPES

Beet & Horseradish Relish

Total Preparation Time: 2 hours
Special Equipment: Food Processor or Blender
How Long Before Use: 1 day
Headspace: ½ inch
Process time: 10 minutes
Jars: 8-ounce, 16-ounce, 32-ounce
Yield: 6–8 16-ounce jars

4 cups medium beets (about 2 pounds)
2 cups onion, finely chopped (2 large onions)
2 cups sweet red peppers, finely chopped (about 3 large peppers)
2 cups white vinegar
½ cup granulated sugar
2 teaspoons pickling salt
1⅓ cups fresh horseradish, grated*

NOTE: Fresh horseradish is pungent. It will smell when you grate it. It can also cause irritation to eyes. Using a food processor is a quick and easy way to grate horseradish.

Step One: In a medium stockpot, fill with water and boil beets for about 20 minutes until they're tender. Remove from heat.

Step Two: Drain water. Remove skins from beets, finely chop. Set aside.

Step Three: Wash red peppers, remove seeds, chop finely. Clean and finely chop onions. Grate horseradish in food processor; set aside. Mix peppers, onions, with chopped beets.

Step Four: In a large, non-reactive stockpot mix vinegar, sugar, salt, and horseradish. Over medium heat, bring to boil. Add beets, peppers, and onions. Reduce heat, then simmer uncovered for about 20 minutes while occasionally stirring. Remove from heat.

Step Five: Ladle mixture into jars. Place lids on and process.

Pickle Relish (Hot Dog Relish)

Total Preparation Time: 2 hours
How Long Before Use: 6 weeks
Headspace: ½ inch
Process time: 15 minutes
Jars: 8-ounce, 16-ounce
Yield: 6–8 8-ounce jars

NOTE: Zucchini can be used instead of pickling cucumbers but garden cucumbers will result in a too 'wet' of relish.

6 cups pickling cucumbers, de-seeded and minced
(about 6 medium cucumbers)
3 cups onions, finely chopped (about 5 medium onions)
3 cups green and red bell peppers, finely chopped (about 3 large)
3 cups sugar
2 cups cider vinegar
2 teaspoons celery salt
1 Tablespoon turmeric powder
1 Tablespoon mustard powder

¼ cup canning salt
4 cups cold water

Step One: Gently wash cucumbers. In a large bowl, mix cold water and salt.

Step Two: Remove the 'blossom end' (opposite of the stem) either scraping off the residue or cutting the end completely off. Place cucumbers in cold saltwater bath. Repeat until all the cucumbers are finished. Set aside.

Step Three: Clean and prepare onions and sweet peppers. Set aside.

Step Four: Rinse cucumbers. Remove seeds and mince. Add to bowl of onions and peppers.

Step Five: In a large, non-reactive stockpot, combine vinegar, sugar, and spices. Over medium heat, bring to boil. Continually stir to dissolve sugar and prevent scorching. Reduce heat, simmer for 3 minutes. Remove from heat.

Step Six: Add vegetables to vinegar solution. Place back on heat and return to boiling. Reduce to simmer for 10 minutes while occasionally stirring. Remove from heat.

Step Seven: Ladle into jars. Place lids on and process.

Bruschetta (Italian Tomato Relish)

Total Preparation Time: 2 hours

How Long Before Use: 1 day

Headspace: ½ inch

Process time: 15 minutes for 8-ounce jars /
20 minutes for 16-ounce jars

Jars: 8-ounce, 16-ounce

Yield: 6–8 8-ounce jars

NOTE: This recipe contains olive oil, used in the roasting; take care not to exceed the total amount of oil used as that would change the total acidity of the preserve.

9 cups paste-style tomatoes (approximately 4 pounds)

2 Tablespoons olive oil

⅓ cup onion, diced (approximately 1 medium onion)

½ cup green bell pepper (approximately 1 medium pepper)

1½ cups red wine vinegar

½ cup white wine (drinkable)

2 Tablespoons balsamic vinegar

2 Tablespoons fresh oregano, chopped

2½ Tablespoons sugar

2 teaspoons kosher salt

1 head garlic

¼ cup fresh basil, chopped

Step One: Wash and dice tomatoes; set aside. Clean and chop onions and garlic.

Step Two: In a large, non-reactive stockpot, add olive oil. Over medium heat, add green bell pepper, onion, and garlic. Cook about 5 minutes until ingredients are softened.

Step Three: Add tomatoes, wine, red wine vinegar, balsamic vinegar, sugar, salt, and spices. Bring to boil while occasionally stirring. Reduce heat and simmer for 10 minutes. Remove from heat.

Step Four: Ladle mixture into jars. Place lids on and process.

Caponata (Eggplant Relish)

(Ajvar)

Total Preparation Time: 2 hours

How Long Before Use: 1 day

Headspace: ½ inch

Process time: 15 minutes for 8-ounce jar /
20 minutes for 16-ounce jar

Jars: 8-ounce, 16-ounce

Yield: 6–8 8-ounce jars

¼ cup olive oil (for frying only)

1 head of garlic, crushed or minced

6 cups eggplant, sliced, pared, and cut in 1-inch cubes
(about 2 medium eggplants)

1 cup green bell pepper, chopped

1 cup onion, chopped

½ cup parsley, finely chopped

1 Tablespoon sugar

1 teaspoon dried oregano

2 teaspoons dried basil

2 teaspoons 100% pure sea salt

½ teaspoon ground black pepper

1 cup tomato paste*

¼ cup water

2 cups red wine vinegar

NOTE: This recipe contains olive oil, used in the roasting; take care not to exceed the total amount of oil used as that would change the total acidity of the preserve.

*If you don't have home-canned tomato paste, use a brand that has no thickeners and few additives.

Step One: Wash, peel, and chop eggplants, onions, peppers, and garlic. Set aside.

Step Two: In a large, non-reactive skillet pan, add olive oil and garlic. Over medium heat, cook garlic until it begins to brown.

Step Three: Add in eggplant, green pepper, parsley, and onion. Reduce heat and cover. Simmer for about 10 minutes.

Step Four: In a small bowl, mix sugar, oregano, basil, salt, and pepper. Then mix in tomato paste, water, and vinegar. Stir until all ingredients are fully blended.

Step Five: Add tomato mixture to skillet. Cover and cook for another 10 minutes, until eggplant is softened. Remove from heat.

Step Six: Ladle mixture into jars. Place lids on and process.

VARIATION:

Caponata is related to Ajvar, the popular Serbian condiment. Ajvar too uses eggplant and bell peppers, but uses sweet red bell peppers in a higher ratio. To turn this recipe into Ajvar, halve the amount of eggplant and omit the green peppers. In its place, use 4 cups of sweet red peppers. Change the red wine vinegar to white wine vinegar. Every other ingredient and step is the same as listed above.

Cherry Chutney (Chutney One)

(Cranberry, Blueberry, Mango, Apple)

Total Preparation Time: 2 hours

Special Equipment: Spice Bag or non-reactive loose tea ball

How Long Before Use: 1 day

Headspace: ½ inch

Process time: 10 minutes

Jars: 8-ounce, 16-ounce

Yield: 6–8 8-ounce jars

10 cups red tart or sweet black cherries — if fresh, pit them; if frozen, thaw. Coarsely chopped.

1½ cups apples, cored, peeled and chopped

1½ cups sweet or red onion, chopped

2 large cloves garlic, finely chopped

½ teaspoon 100% pure salt

1 cup vinegar (wine, cider or white vinegar)

1 cup lightly packed brown sugar

1½ cups dried cranberries (or raisins, sultanas, or dried currants)

4½ teaspoons whole allspice

1 to 2 cinnamon sticks, 6 inches total

Step One: Wash and prepare cherries, apples, onions, and garlic as noted above. Set aside.

Step Two: Prepare spice bag with allspice and cinnamon.

Step Three: In a large, non-reactive stockpot, mix cherries, apples, onion, dried cranberries, garlic, and spice bag. Over medium heat, bring mixture to boil. Continue to boil while stirring for 10 minutes.

Step Four: Add in brown sugar and stir until dissolved. Reduce heat and simmer until mixture thickens to preferred consistency. (About 15–25 minutes, depending on amount of moisture in fruit.) Remove from heat.

Step Five: Remove spice bag.

Step Six: Ladle into jars. Place lids on and process.

VARIATION:

Chutneys are forgiving of their makers. You can add hot peppers or red pepper flakes to increase the heat in any chutney. You can also swap out your favorite dried fruits for any of the items listed. Regardless of how you substitute, keep the ratios intact and don't decrease the amount of vinegar.

Green Tomato Chutney (Chutney Two)

Total Preparation Time: 2 hours
How Long Before Use: 1 day
Headspace: ¼ inch
Process time: 15 minutes
Jars: 8-ounce, 16-ounce
Yield: 6–8 16-ounce jars

NOTES: This recipe is another version of chutney. The ingredients are highly substitutable. Make note that this recipe contains more spices. Read both and make your favorite version.

6 cups green tomatoes, chopped
3 cups red onion, finely diced
3 cups dried pineapple, diced
2 cups golden raisins
6 cloves garlic, minced
¼ cup fresh ginger, minced
2 Tablespoons orange zest
½ cup orange juice
2 cups cider vinegar
3 cups sugar
1 cup water
2 teaspoons mustard powder
2 teaspoons ground cinnamon
2 teaspoons ground cloves
1 teaspoon cayenne pepper

Step One: Clean and prepare, onions, ginger, and garlic as noted above. Set aside.

Step Two: In a large, non-reactive stockpot, mix cranberries, onion, pineapple, garlic, ginger, vinegar, orange juice and zest. Over medium heat, bring mixture to boil. Reduce heat and simmer until cranberries burst, about 10 minutes.

Step Three: Add in sugar, raisins, spices, and water and stir until dissolved. Reduce heat and simmer until mixture thickens to preferred consistency. (About 15 minutes, depending on amount of moisture in fruit.) Remove from heat.

Step Four: Ladle into jars. Place lids on and process.

VARIATION:

This recipe shows both the common elements and the versatility of a chutney. Again, feel free to swap out ingredients as long as you keep the ratios the same.

Mostarda – Cremona style

Total Preparation Time: 2 hours (spread over 6 days)
Special Equipment: Large Stoneware Bowl
How Long Before Use: 6 days
Headspace: ½ inch
Process time: 15 minutes
Jars: 8-ounce, 16-ounce
Yield: 4–6 8-ounce jars

NOTE: A true-to-its-heritage Mostarda uses a European technique of prolonged maceration (and slight fermentation) to both preserve and develop flavor. A good example of a recipe that uses a combination of preservation techniques.

1 cup cherries, pitted
1 cup figs, chopped
1 cup pears, chopped
1 cup dried apricots, chopped
3 cups cane sugar
2 Tablespoons yellow mustard seeds
2 Tablespoons yellow mustard powder
¼ cup white wine vinegar

Step One: Wash and rough-chop cherries and figs. Peel and dice pears. Place into stoneware bowl.

Step Two: Pour sugar over fruit and mix together. Cover bowl with light cotton kitchen towel. Set on counter or table overnight.

Step Three: Drain the liquid in the bottom of the bowl. Place the liquid in a saucepan and bring to boil over medium heat. Reduce heat and simmer for 10 minutes.

Step Four: Pour the cooked liquid over the fruit in the bowl. Cover with kitchen towel. Set on counter or table overnight.

Step Five: Repeat Steps Three and Four for a total of 5 days.

Step Six: On the fifth day, pour both the fruit and the liquid into a large saucepan. Over medium heat, bring mixture to boil. Reduce heat and simmer for 5 minutes. Remove from heat.

Step Seven: Mix white wine vinegar with mustard powder. Add to cooked fruit mixture and mix thoroughly. Add mustard seeds and mix again.

Step Eight: Ladle mixture into jars. Place lids on and process.

VARIATION:

Mostarda is the condiment of northern Italy. Some versions use small-sized whole fruits that remain whole throughout the process. It's a versatile food, with every family having a version of their favorite recipe. A Mantova-style Mostarda is made entirely from quince fruit. Experiment with your favorite fruit combinations.

English Pub-style Mixed Pickle (Branston Pickle)

Total Preparation Time: 2 hours
How Long Before Use: 21 days
Headspace: ½ inch
Process time: 20 minutes
Jars: 8-ounce, 16-ounce
Yield: 6–8 16-ounce jars

NOTE: This cooked root vegetable pickle is a staple of the English pub lunch. Enjoy a 'cheese and pickle' sandwich or serve as a complement to a cheese and charcuterie plate. Worcestershire sauce can be omitted for a 100% vegetarian preserve.

This style of pickle needs aging in the jar for the flavors to fully develop.

If you've preserved tomato ketchup, use it in this recipe. Avoid commercial brands that have added corn syrup and sweeteners or the final product will be too sweet. Otherwise, look for commercial products that do not have thickeners and have the fewest additives.

- 1½ cups carrots, cubed
- 3 cups rutabagas, cubed
- 8 garlic cloves, minced
- 1 cup dates
- 2 cups cauliflower, cubed
- 3 cups onions, minced
- 2 cups apples, peeled and cubed
- 2 cups zucchini, washed and cubed
- 1½ cups brown sugar
- ½ cup ketchup
- ½ cup lemon juice
- 3 cups malt vinegar
- 2 teaspoons salt
- 2 Tablespoons Worcestershire sauce*
- 4 teaspoons yellow mustard seeds
- 4 teaspoons ground allspice
- 2 teaspoons cayenne pepper powder
- 2 teaspoons 'Kitchen Bouquet'

Step One: Wash and peel all fruit and vegetables. Cube the rutabagas and carrots; set aside. Mince garlic; set aside. Finely chop dates, onions, cauliflower, apples, and zucchini; set aside.

Step Two: In a large, non-reactive stockpot, place all ingredients, except 'Kitchen Bouquet.'

Step Three: Over medium heat, bring mixture to boil. Reduce heat and simmer while occasionally stirring for approximately 2 hours, until rutabagas are softened. Remove from heat.

Step Four: Add 'Kitchen Bouquet.' Mix thoroughly.

Step Five: Ladle into jars. Remove air bubbles. Place lids on jars and process.

*You may be asking yourself, "But Worcestershire sauce has anchovies. It won't be safe!" Worcestershire sauce is a fermented fish sauce that is then pasteurized and further heat-treated in the bottling process. This fact, combined with the small amount used, allows this recipe to stay in the safety zone.

Mustards

Mustards are pickled? Why, yes they are. Essentially, mustards are a blended mixture of spiced, pickled mustard seeds. Mustards can be a simple as a three-ingredient Dijon-style or as complex as Cranberry Port Wine mustard, which has dozens of spices and ingredients.

Mustard making is a multiple-day affair. Mustard seeds are soaked in the acid of your choice for 24–72 hours. The actual making of mustard takes less than an hour, and the processing in a hot-water bath or atmospheric canner is ten minutes. But you must be patient before eating your mustard, as it has a long in-the-jar pickling time.

The recipes included use a variety of types of mustard seeds and powders. Black and brown mustard seeds are not common in American grocery stores, but are in Indian and Pakistani grocery stores. If you don't have one in your area, you can purchase black and brown mustard seeds online.

One common complaint about homemade mustard is that it tastes bitter or vinegary. The reason usually is that the jar was opened too soon. A good mustard needs a minimum of four weeks pickling time to fully develop its flavors. That makes tasting as you cook challenging, because you're not tasting the real flavor. Heat mellows the bitterness of the mustard seed, so hot-water processing is recommended for a smooth and flavorful product.

As a rule of thumb, a teaspoon of sugar helps balance the sourness. If you can't quite put your finger on what's missing but are convinced that something is, then add a pinch of salt. (Honestly, that always fixes it.) Mustard seeds will absorb liquids at varying rates, which leads to runnier, watery mustard. Keep some mustard powder on hand to thicken your recipe to the desired consistency. Alternately, sometimes a mustard is too thick after blending. Add a few tablespoons of water as needed to get the mustard to your desired consistency.

The Ball and Kerr brands sell a four-ounce jar that is a good match for mustard preserving. Mustards store safely in the refrigerator for up to four months. They make a unique gift item for the holiday season.

Tips for Mustards

Substitute vinegars and add alcohol. White distilled vinegar is the most commonly used in mustards. You can add flavor and depth to your pickling by using cider, malt, rice, or wine vinegars as long as they are at a 5% acidity. Other mustard recipes use beer, wine, whiskey as their base liquid. As always, experiment with substitutions in equal proportions.

Adjust your spices. Use spices with a free hand to create unique flavor profiles.

You want it hot? Or not? Any mustard can become a 'hot' product. Add a few of your favorite hot peppers to the mix, and the resulting food will be hot. Of course, the hotter the pepper, the hotter the mustard. Needless to say, wear latex gloves to protect your skin when working with hot peppers.

Give them time to develop their full flavor. The spices and vinegars in mustards develop over time. Your final product will be much improved by spending a month in the jar.

Use a blender. Or food processor. Mustards have a wide range of styles. Rustic or country-style mustards have a portion of whole seeds while Dijon-style is very smooth. Using a food processor or blender will aid in getting to the consistency you want.

Ready?

If you're making refrigerator-stored mustard, have your containers prepared the same way you would for hot-water bath processing. Place containers in the refrigerator after filling, lidding, and cooling.

All recipes make the assumption that you've prepared your canning jars according to the best practices described in the Hot-Water Bath Canning Instructions. When should you get your jars ready? Wash and rinse them when your mustard is blended and ready to be jarred. If you're using a dishwasher, start the cycle before you begin making the mustard.

If you're hot-water bath processing, your canner should be filled with water and underway before you start making the mustard. If you want to use an Atmospheric / Steam Canner, note that the machine will 'run dry' after 20 minutes of processing.

RECIPES

Basic Mustard

Total Preparation Time: 3 days in 2 one-hour sessions
Special Equipment: Food Processor or Blender
How Long Before Use: 1 month
Headspace: ¼ inch
Process time: 15 minutes
Jars: 4-ounce, 8-ounce
Yield: 6–8 4-ounce jars

NOTE: 4-ounce jars work well for preserving mustards. Mustards present a challenge in the making as they absolutely require a month in the jar for the flavors to fully develop. Experimentation and practice will build your confidence.

Mustard seeds absorb liquids in varying amounts. Keep some mustard powder on hand and add a teaspoon up to a tablespoon for a thicker consistency.

½ cup yellow mustard seeds
¾ cup apple cider vinegar
⅓ cup water

1½ teaspoons 100% pure salt

Step One: In a lidded container, place yellow mustard seeds and cover with apple cider vinegar and water. Cover and let steep for 48 hours.

Step Two: In food processor, pour in seed mixture. Add salt.

Step Three: Pulse mixture until it reaches desired consistency. (Smoother mustards require more pulsing, coarse mustards require less.)

Step Four: Scoop into prepared jars. Put on lids and process.

VARIATION:

This is a very basic mustard recipe. You can easily add hot pepper flakes for a hotter flavor. All mustard recipes are variations on the ratios and methods here. Change the style of vinegar and sweetener for a complete change of taste. Add more spices for a complex taste. Here are some ideas:

Malt vinegar & sugar

Red wine vinegar & brown sugar

Add 1 Tablespoon each of dried spices for more flavor.

Try these combinations:

Basil & Lemon

Cardamom & Fennel

Allspice & Turmeric

Garlic Powder & Paprika

Honey Mustard

Total Preparation Time: 3 days in 2 one-hour sessions
Special Equipment: Food Processor or Blender
How Long Before Use: 1 month
Headspace: ¼ inch
Process time: 15 minutes
Jars: 4-ounce, 8-ounce
Yield: 6–8 4-ounce jars

NOTE: 4-ounce jars work well for preserving mustards. Mustards present a challenge in the making as they absolutely require a month in the jar for the flavors to fully develop. Experimentation and practice will build your confidence.

Mustard seeds absorb liquids in varying amounts. Keep some mustard powder on hand and add a teaspoon up to a tablespoon for a thicker consistency.

½ cup yellow mustard seeds
¾ cup apple cider vinegar
⅓ cup water
1½ teaspoons 100% pure salt
1 cup honey

Step One: In a lidded container, place yellow mustard seeds and cover with apple cider vinegar and water. Cover and let steep for 48 hours.

Step Two: In food processor, pour in seed mixture. Add salt and honey.

Step Three: Pulse mixture until it reaches desired consistency. (Smoother mustards require more pulsing, coarse mustards require less.)

Step Four: Scoop into prepared jars. Put on lids and process.

VARIATION:

This is a very basic mustard recipe. You can easily add hot pepper flakes for a hotter flavor. Or reduce the honey for less sweetness.

Cranberry Mustard

(Cherry Mustard)

Total Preparation Time: 3 days in 2 one-hour sessions

Special Equipment: Food Processor or Blender

How Long Before Use: 1 month

Headspace: ¼ inch

Process time: 15 minutes

Jars: 4-ounce, 8-ounce

Yield: 6–8 4-ounce jars

NOTE: 4-ounce jars work well for preserving mustards. Mustards present a challenge in the making as they absolutely require a month in the jar for the flavors to fully develop. Experimentation and practice will build your confidence.

Unlike the previous recipes, this one requires cooking because of the addition of the berries.

1 cup red wine vinegar

⅔ cup yellow mustard seeds

1 cup water

2¾ cups cranberries (fresh or frozen)

¾ cup sugar

¼ cup dry mustard

2½ teaspoons ground allspice

1½ teaspoons 100% pure salt

Step One: In a lidded container, place yellow mustard seeds and cover with red wine vinegar and water. Cover and let steep for 48 hours.

Step Two: In food processor, pour in seed mixture and berries.

Step Three: Pulse mixture until it reaches desired consistency. (Smoother mustards require more pulsing, coarse mustards require less.)

Step Four: Transfer mixture to non-reactive medium saucepan. Over medium heat, bring mixture to boil while stirring. Reduce heat, simmer for 5 minutes. Add sugar, salt, mustard powder, and spice. Simmer on low until total volume is reduced by one-third. Remove from heat.

Step Five: Scoop into prepared jars. Put on lids and process.

Spicy Guinness Mustard

Total Preparation Time: 3 days in 2 one-hour sessions
Special Equipment: Food Processor or Blender
How Long Before Use: 1 month
Headspace: ¼ inch
Process time: 15 minutes
Jars: 4-ounce, 8-ounce
Yield: 6–8 4-ounce jars

NOTE: 4-ounce jars work well for preserving mustards. Mustards present a challenge in the making as they absolutely require a month in the jar for the flavors to fully develop. Experimentation and practice will build your confidence.

Mustard seeds absorb liquids in varying amounts. Keep some mustard powder on hand and add a teaspoon up to a tablespoon for a thicker consistency.

- 1 12-oz. bottle Guinness Extra Stout
- 1 cup red wine vinegar
- 1½ cups brown mustard seeds
- 1 teaspoon freshly ground black pepper
- 1 Tablespoon kosher salt
- ¼ teaspoon ground cinnamon
- ¼ teaspoon ground cloves
- ¼ teaspoon ground nutmeg
- ¼ teaspoon ground allspice

Step One: In a lidded container, place mustard seeds and cover with red wine vinegar and Guinness Stout. Cover and let steep for 48 hours.

Step Two: In food processor, pour in seed mixture. Add salt and spices.

Step Three: Pulse mixture until it reaches desired consistency. (Smoother mustards require more pulsing, coarse mustards require less.)

Step Four: Scoop into prepared jars. Put on lids and process.

VARIATION:

This recipe substitutes water for beer. You can use any type of beer, though strongly flavored beers work better than American-style light lagers. You can also substitute whiskey for the beer for a peaty flavor profile.

Salsas and Hot Sauces

Salsas, hot sauces, and savory sauces are in the realm of the pickle. They stand apart from a pickle, or relish or chutney, in that many use a large amount of lemon or lime juice as the acidification. Some use wine yet others use a combination of vinegars and citrus juices. Everything that applies to pickling applies to making these items. Use non-reactive pots for cooking. Use vinegars with 5% acidity. Use bottled lemon and lime juices.

Salsa means sauce in Spanish. Yet the food it refers to is an American hybrid. When we talk about salsas, we're talking about a few styles. Pico de gallo is a fresh salsa made with a mixture of chopped peppers, tomatoes, and onions. This fresh style cannot be preserved as such. Its very nature is that it is fresh. The salsa we can preserve is the cooked style enjoyed in restaurants and found in grocery stores. People often ask about black bean salsas. Beans are very low in acid and cannot, even with the acidification in salsa, be safely hot-water processed. If you really want a bean salsa, make your preferred salsa for canning then add a tin of black beans prior to serving.

That still gives us lots of opportunities to create a dynamic combination of flavors. As the maker, you have total control as to how hot, how garlic-y, and how spicy it will be. How hot is solely determined by the peppers you choose. The Scoville scale is used to measure the capsaicin in a pepper. (Capsaicin is the volatile compound that causes the sensation of heat, and in extremely high amounts, actual burning.) Currently, the hottest pepper in the world is a Carolina Reaper with a measurement of 1,569,300 Scoville units. By way of comparison, a jalapeño pepper has a Scoville measurement of 1000 to 20,000 Scoville units.

This quest for hotness oftentimes obscures the real pleasure of salsa—the robust flavors. The recipes included use a blend of peppers that work together to build flavor. But if hot is your primary goal, then feel free to substitute hotter peppers. Know that you can replace any type and kind of pepper for any other as long as you keep the total measurements as directed in the recipe. As an acidified item, adding low-acid items like peppers and onions willy-nilly will reduce the overall acidity of your product, rendering it unsafe.

Blended hot sauces are essentially salsas that are blended smooth. Some hot sauces omit tomatoes and are solely a mixture of peppers and vinegar. Others use tomatillos or other fruit and flavor in the mixture. Hot sauces are often three total ingredients (peppers, salt, and vinegar). Roasting peppers in the oven or on the grill will caramelize the natural sugars and add a smoky flavor to your hot sauce. (You can roast peppers for your salsas too.)

Hot peppers merit a word of caution. Working with them can cause injury. Really. From accidentally touching your eyes and even more sensitive anatomical parts. Know that hot pepper juice burns. It's also the type of burn that creeps up over time. You may think that working with jalapeños bare-handed is no problem, but an hour later your paws will be red and burning. Many folk cures are floating around to reduce the pain, but the best cure is prevention. Use latex gloves every time you handle a pepper.

Cleaning your tools and workspace after prepping hot peppers also presents dangers. If you run a cutting board loaded with hot pepper juice under hot water, you aerosolize the capsaicin. In other words, you just made pepper gas. While still wearing your gloves, give your tools a good rinse and wash in cold soapy water. Then wash everything in hot soapy water.

Tips for Salsa and Hot Sauces

Mix lemon and lime juice. Recipes that call for either lemon or lime juice taste better using a blend of both.

Smooth or chunky? Decide if you want smoother or chunkier salsa. Remember that the pieces will shrink during cooking and processing. For a chunky salsa, cut tomatoes into two-inch pieces and smaller for smoother.

Thicker? Under heat, tomatoes release their water; how much is variable by tomato. Sometimes a batch of salsa will be too watery for your personal taste. Add a can of tomato paste to thicken.

Cilantro, yes or no? Some people love cilantro. Some people don't. The people that don't have a variant gene that senses cilantro as a soapy taste. If this is you and the recipe calls for cilantro, leave it out. Your salsa will still be good.

You want it hot? Your salsa or hot sauce will be as hot as the peppers you choose to include. Regardless of what type of peppers used, always keep the amount the same as in the recipe.

Use a standing blender. Or Immersion blender. Or food processor. Hot Sauces traditionally have a smooth texture. Using a food processor, immersion blender, or stand blender will aid in getting to the consistency you want. (We use immersion blenders in class. Less mess and less fuss when transferring hot food between a pot and a food processor.)

Ready?

If you're making refrigerator-stored salsa or hot sauce, have your containers prepared the same way you would for hot-water bath processing. Place containers in the refrigerator after filling, lidding, and cooling.

All recipes make the assumption that you've prepared your canning jars according to the best practices described in the Hot-Water Bath Canning Instructions. When should you get your jars ready? Wash and rinse them when your salsa or hot sauce is ready to be jarred. If you're using a dishwasher, start the cycle before you begin making the salsa or hot sauce.

If you're hot-water bath processing, your canner should be filled with water and underway before you start making the salsa or hot sauce. Most salsas and hot sauces take a minimum of 15 to 20 minutes to process in the hot-water bath canner. An Atmospheric / Steam Canner may run out of steam before processing finishes if not filled with an extra inch of water.

RECIPES

Basic Tomato Salsa

Tomatillo Salsa

Mango Salsa

(Peach Salsa, Strawberry, Apple, Nectarine, Papaya)

Hot Pepper Sauce (Tabasco-style)

Hot Pepper Gold Sauce (Taco Sauce)

Basic Tomato Salsa

Total Preparation Time: 2 hours
How Long Before Use: 1 day
Headspace: ½ inch
Process time: 20 minutes
Jars: 8-ounce, 16-ounce
Yield: 10–12 8-ounce jars

8 cups tomatoes, diced
1 large onion, diced
2½ cups peppers, minced*
½ cup white vinegar
2 teaspoons 100% pure salt
¼ cup lime juice
2 Tablespoons of garlic, minced
¼ cup fresh cilantro, finely chopped (optional)

*You can use a combination of hot, sweet, and smoky peppers to achieve the balance of taste you want. Know that the hotter pepper, the hotter the salsa. Even if you think you want your salsa to be mild, add at least two jalapeños. You can also add a few drops of hot pepper sauce to ramp up the heat.

NOTE: This recipe is for a tomato-based canned salsa; it is not pico de gallo, which is a fresh salsa.

Working with jalapeños and every type of hot pepper can cause injury. Wear latex protective gloves when working with hot peppers. Rinse any tools in cold water before washing in hot water to remove residual pepper oils. (Pepper oils aerosolize in hot water and become pepper gas!)

Step One: Wash and dice tomatoes; set aside. (Larger pieces make for a chunkier salsa.) Clean and dice onions; set aside. Peel and mince garlic; set aside. Rinse and pat dry cilantro, mince; set aside. Wash and mince peppers; set aside.

Step Two: In non-reactive, large stockpot, put in all the ingredients.

Step Three: Over medium heat, bring to full boil. Reduce heat and simmer for 20 minutes. Stir occasionally. If you would like thicker salsa, continue to simmer until it reaches desired consistency.

Step Four: Remove from heat. Take out a teaspoon, let cool and taste. You can add hot pepper sauce to make it hotter, or 1 teaspoon of sugar to make it less sour. If you're not sure what it needs, add 1 teaspoon of salt.

Step Five: Ladle into jars. Put on lids and process.

Tomatillo Salsa

Total Preparation Time: 2 hours
How Long Before Use: 1 day
Headspace: ½ inch
Process time: 15 minutes
Jars: 8-ounce, 16-ounce
Yield: 6–8 8-ounce jars

NOTE: Working with jalapeños and every type of hot pepper can cause injury. Wear latex protective gloves when working with hot peppers. Rinse any tools in cold water before washing in hot water to remove residual pepper oils. (Pepper oils aerosolize in hot water and become pepper gas!)

5 cups chopped tomatillos
½ cup seeded jalapeño peppers, minced
4 cups onions, chopped (3 cups yellow and 1 cup red)
1 cup bottled lemon juice
3 Tablespoons fresh garlic, finely chopped
1 Tablespoon 100% pure salt
1 teaspoon black pepper

Step One: Remove the dry outer husks of the tomatillos and wash thoroughly. Set aside. Clean and chop onions; set aside. Wash, destem, and mince peppers; set aside.

Step Two: In non-reactive, large stockpot, put in all the ingredients.

Step Three: Over medium heat, bring to full boil. Reduce heat and simmer for 20 minutes. Stir occasionally. If you would like thicker salsa, continue to simmer until it reaches desired consistency.

Step Four: Remove from heat. Take out a teaspoon, let cool and taste. You can add hot pepper sauce to make it hotter. If you're not sure what it needs, add 1 teaspoon of salt.

Step Five: Ladle into jars. Remove air bubbles. Put on lids and process.

Mango Salsa

Total Preparation Time: 2 hours
How Long Before Use: 1 day
Headspace: ½ inch
Process time: 15 minutes
Jars: 8-ounce, 16-ounce
Yield: 6–8 8-ounce jars

NOTE: Working with jalapeños and every type of hot pepper can cause injury. Wear latex protective gloves when working with hot peppers. Rinse any tools in cold water before washing in hot water to remove residual pepper oils. (Pepper oils aerosolize in hot water and become pepper gas!)

Some people experience skin irritations working with mangoes. Use caution and wear latex protective gloves.

6 cups barely ripe green mangoes, diced
½ cup onion, diced
1½ cups peppers, minced*
1¼ cups apple cider vinegar
2 teaspoons 100% pure salt
¼ cup lime juice
2 Tablespoons of garlic, minced
2 Tablespoons of fresh ginger, minced
½ teaspoon red pepper flakes

*You can use a combination of hot, sweet, and smoky peppers to achieve the balance of taste you want. Know that the hotter pepper, the hotter the salsa. Even if you think you want your salsa to be mild, add at least two jalapeños. You can also add a few drops of hot pepper sauce to ramp up the heat.

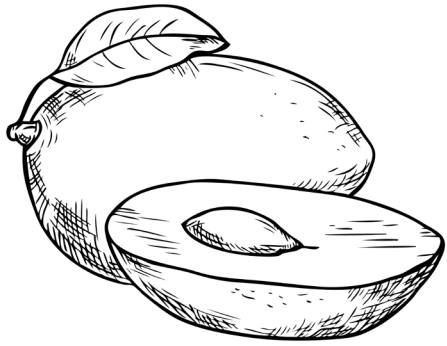
Step One: Peel and chop mangoes into bite-size chunks; set aside (Larger pieces make for a chunkier salsa.) Clean and dice onions; set aside. Peel and mince garlic; set aside. Rinse and pat dry cilantro, mince; set aside. Wash and mince peppers; set aside.

Step Two: In non-reactive, large stockpot, put in all the ingredients.

Step Three: Over medium heat, bring to full boil. Stir often until sugar dissolves. Reduce heat and simmer for 10 minutes. Stir occasionally. If you would like thicker salsa, continue to simmer until it reaches desired consistency.

Step Four: Remove from heat. Take out a teaspoon, let cool and taste. You can add hot pepper sauce to make it hotter. If you're not sure what it needs, add 1 teaspoon of salt.

Step Five: Ladle into jars. Put on lids and process.



Hot Sauce (Tabasco-style)

Total Preparation Time: 2 hours

Special Equipment: Immersion Blender

How Long Before Use: 3 months

Headspace: ½ inch

Process time: 10 minutes / 15 minutes over 1000ft. elevation

Jars: 8-ounce, 16-ounce

Yield: 6–8 8-ounce jars

NOTE: Working with every type of hot pepper can cause injury. Wear latex protective gloves when working with hot peppers. This recipe is a highly volatile mix of peppers. It is recommended that you wear both eye protection and a light face mask. Rinse any tools in cold water before washing in hot water to remove residual pepper oils. (Pepper oils aerosolize in hot water and become pepper gas!)

Hot sauces with vinegar develop flavor in the jar. Letting this sauce 'rest' for 3 months before eating makes it taste even better.

10 cups washed, de-stemmed, and chopped hot pepper of choice (Serrano, Jalapeño, Reaper)

3 cups white vinegar

2 teaspoons 100% pure salt

Step One: Wash, de-stem, and chop peppers.
(For lesser heat, remove seeds.)

Step Two: In large, non-reactive stockpot, add all ingredients.

Step Three: Over medium heat, bring to full boil. Reduce to simmer for 15 minutes. Stir frequently. Remove from heat.

Step Four: Using immersion blender, puree the mixture.
(Protect your face from any splatter; it will burn!)

Step Five: Pour into jars. Put on lids and process.

VARIATION:

The type and kind of peppers used is the sole determining factor of how hot this sauce will be. I've come across many colloquial names for these types of sauces, many of them incorporating the word 'death' in the naming! Make and use wisely.

Habañero Gold Sauce

Total Preparation Time: 2 hours
Special Equipment: Immersion Blender
How Long Before Use: 1 week
Headspace: ½ inch
Process time: 30 minutes
Jars: 8-ounce, 16-ounce
Yield: 6–8 8-ounce jars

NOTE: Working with habañeros and every type of hot pepper can cause injury. Wear latex protective gloves when working with hot peppers. Rinse any tools in cold water before washing in hot water to remove residual pepper oils. (Pepper oils aerosolize in hot water, creating pepper gas!)

Hot sauces with vinegar develop flavor in the jar. Letting this sauce 'rest' for a week before eating makes it taste even better. The carrots provide a natural sweetness that balances the heat of the peppers.

6 cups carrots, chopped
4 onions, chopped
6 cups white vinegar
1 cup lime juice
12 garlic cloves, minced
2 Tablespoons salt
6 cups habañero peppers, stemmed and chopped

Step One: Wash and peel carrots; set aside. Clean and chop onion; set aside. Wash, de-stem, and chop peppers. (For lesser heat, remove seeds.)

Step Two: In large, non-reactive stockpot, add all ingredients except the peppers.

Step Three: Over medium heat, bring to full boil. Reduce to simmer for 15 minutes. Stir frequently.

Step Four: Add in peppers. Simmer another 5 minutes. Remove from heat.

Step Five: Using immersion blender, puree the mixture. (Protect your face from any splatter; it will burn!)

Step Six: Pour into jars. Put on lids and process.

VARIATION:

You can substitute the type of peppers for an even hotter sauce. The Scoville Scale (SHU) is the unit of measurement to determine 'hotness' of a pepper. A habañero rates between 100k–350k SHU. A jalapeño rates approximately 3k SHU, while the Trinidad Scorpion is 2.2m SHU.

Tomato and Other Savory Sauces

Tomato and other various savory sauces use acidification as the first chemical action to render them inhospitable to pathogens. A sauce's usability can be further extended by hot-water bath processing or, and this is where it gets tricky, pressure canning.

A blended sauce of tomatoes, plums, tomatillos, or other vegetables toes the line of an acceptable pH measurement and will still be acidic enough for hot-water bath canning. These recipes should be followed carefully, as there is no room for experimentation. If you have invested in an electronic pH meter, these products should all be tested prior to processing. (See Resource Guide for sources.)

You shouldn't be afraid to attempt making sauces, but you should be cautious about proper acidification. The basic Italian tomato sauce recipe is a pantry staple item that can serve as the starter to many meals. It is important to think of these recipes as handy shortcuts to future cooking and not a fully-fledged meal-in-a-jar. (Meal-in-a-jar recipes are discussed in the next section, Pressure Canning.)

A recipe I encourage you to try is the version of "V8" vegetable juice and its variation, Bloody Mary Mix. Both are hearty and delicious solutions to an abundant tomato harvest. And homemade ketchup is a revelation to anyone whose palate (rightfully) rejects the oversweetened and garishly dyed commercial product. Homemade ketchup is also the starter needed for many barbeque sauces. It's one of those items you think you don't need to make and preserve until you realize how versatile and useful it is.

Chimichurri is one of the rare preserved items that contains spinach. In its original Basque form (via Argentina and Uruguay) the greens are parsley. The recipe included allows for both variations. If you're not familiar with this flavorful meat condiment, try out a small batch.

Tips for Tomato and Savory Sauces

Substitute vinegars and add wine. These recipes call for white distilled vinegar; you can safely substitute red wine vinegar or wine to these sauces and still have the correct pH measurement.

Adjust your spices. You can adjust your seasonings to your personal tastes, but do not exceed the amounts of garlic and onions, as too much will reduce the acidity to an unsafe measurement.

You want it hot? Or not? Any sauce can become a 'hot' product. Try adding a powdered or dried pepper here to increase the heat without lowering the acidity. Of course, the hotter the pepper, the hotter the sauce.

Use a standing blender. Or Immersion blender. Or food processor. Sauces traditionally have a smooth texture. Using a food processor, immersion blender, or standing blender will aid in getting to the consistency you want. (We use immersion blenders in class. Less mess and less fuss when transferring hot food between a pot and a food processor.)

Ready?

If you're making refrigerator-stored sauce, have your containers prepared the same way you would for hot-water bath processing. Place containers in the refrigerator after filling, lidding, and cooling.

All recipes make the assumption that you've prepared your canning jars according to the best practices described in the Hot-Water Bath Canning Instructions. When should you get your jars ready? Wash and rinse them when your sauce is blended and ready to be jarred. If you're using a dishwasher, start the cycle before you begin making the sauce.

If you're hot-water bath processing, your canner should be filled with water and underway before you start making the sauce. Most sauces take a minimum of 25 minutes to process in the hot-water bath canner. An Atmospheric / Steam Canner does not produce enough steam for that length of time. Don't use them here; use the hot-water bath canner instead.

RECIPES

Tomato Vegetable Juice (Fake8)

(Bloody Mary Mix, Tomato Juice)

Total Preparation Time: Two hours

Special Equipment: Immersion Blender

How Long Before Use: 1 day

Headspace: ½ inch

Process time: 40 minutes

Jars: 8-ounce, 16-ounce, 32-ounce

Yield: 6–8 32-ounce jars

NOTE: This recipe and its variations all rely on the addition of lemon juice directly to the canning jar to meet the necessary acidification. Don't skip it.

The amount of tomatoes in relation to the other ingredients is a critical ratio to ensure safety. You can double or half the recipe but you must keep the ratios intact. Do not randomly increase the amount of the other vegetables.

8 quarts tomatoes (measure after washing and chopping)

1 cup onion, chopped

1 cup carrot, chopped

1 cup celery, chopped

3 bay leaves

3 teaspoons 100% pure salt

Lemon juice

Step One: Wash all the fruit and vegetables. Rough-chop into small pieces.

Step Two: Add all ingredients (excepting lemon juice) to large stockpot. Heat to boil over medium flame, then simmer, covered, for 20 minutes.

Step Three: Remove bay leaves. In batches, press the mixture through a conical sieve or food mill. (This removes seeds, skins, and larger pulp.)

Step Four: Add 2 teaspoons of lemon juice to each prepared canning jar. Pour Tomato Vegetable juice into jars. Put on lids and process.

VARIATION:

For 100% Tomato Juice, follow the same steps using only tomatoes.

For Bloody Mary Mix, follow the same steps as Tomato Vegetable Juice using these ingredients:

8 quarts of chopped tomatoes
1 cup of green peppers, chopped
½ cup carrots, diced
½ cup celery, diced
1 cup onion, diced
¼ cup diced jalapeño (or hotter pepper if desired)
3 garlic cloves, minced
1 bay leaf
¼ cup sugar
¼ cup bottled lemon juice
1 Tablespoon salt
1 Tablespoon celery salt
1 Tablespoon Worcestershire sauce*

*You may be asking yourself, "But Worcestershire sauce has anchovies. It won't be safe!" Worcestershire sauce is a fermented fish sauce that is then pasteurized and further heat-treated in the bottling process. This fact, combined with the small amount used, allows this recipe to stay in the safety zone.

Basic Italian Red Sauce

(Pomodori Verdi or Green Tomato Sauce)

Total Preparation Time: 2 hours

Special Equipment: Conical Sieve or Vittorio Tomato Strainer

How Long Before Use: 1 day

Headspace: ½ inch

Process time: 35 minutes

Jars: 16-ounce, 32-ounce

Yield: 6–8 32-ounce jars

NOTE: This recipe makes a simple 'ragu-style' tomato sauce that can be used as is or serve as a base for more complex recipes. This is the only tomato sauce that can be processed in a hot-water bath canner; recipes containing vegetables render this sauce low-acid and must be pressure-canned. Dried and powdered spices are used to add flavor without drastically affecting the overall acidity of the sauce.

Paste varieties of tomato have less juice and more pulp which works best for sauce and paste. Try Amish Paste, Roma, Jersey Devil, and the mother of all paste tomatoes—the San Marzanos.

*2 Tablespoons of lemon juice must be added to each prepared jar prior to filling with sauce.

32 cups of tomatoes, measured after chopping (about 25 pounds or half-bushel)

¼ cup dried oregano

¼ cup dried parsley

¼ cup dried basil

¼ cup garlic powder

¼ cup onion powder

2 Tablespoons sugar

2 Tablespoons 100% pure salt

½ cup balsamic vinegar

Lemon juice

Water

Step One: Wash and rough-chop tomatoes.

Step Two: In large stockpot, place tomatoes. (Use two stockpots if need be!) Splash 1 cup of water into stockpot. (Add another cup of water to the second pot if using.) Over medium heat, cook until tomato skins begin to peel back and they release juice.

Step Three: Using Vittorio tomato strainer or conical sieve, press cooked tomatoes through strainer to remove seeds and grind skins. Do in batches until complete.

Step Four: In large, non-reactive stockpot, pour sieved puree and remaining ingredients.

Step Five: Over medium heat, simmer for approximately 30 minutes. Stir frequently. Simmer longer for thicker sauce.

Step Six: Place 2 Tablespoons of lemon juice into prepared jars. Ladle sauce into jars. Put on lids and process.

VARIATION:

You can adjust the spices included in this recipe to suit your personal tastes as long as the total measurements do not exceed the totals in the recipe.

This recipe easily becomes Pomodori Verdi or Green Tomato Sauce if you substitute the ripe red tomatoes for green tomatoes and use a white balsamic vinegar.

(**Red Tomato Sauce** pictured on page 166)

Tomato Paste

Total Preparation Time: 6 hours (4-hour cook time)

Special Equipment: Slow Cooker or Oven Roasting Pan
Vittorio Tomato Strainer or Conical Sieve

How Long Before Use 1 day

Headspace: ¼ inch

Process time: 45 minutes

Jars: 4-ounce, 8-ounce

Yield: 8–10 8-ounce jars

NOTE: Tomato paste is the next step after making tomato sauce. Cook your sauce until the moisture is evaporated and it becomes a paste. The method here is like making fruit butters...which is what tomato paste is.

Paste varieties of tomato have less juice and more pulp which works best for sauce and paste. Try Amish Paste, Roma, Jersey Devil, and the mother of all paste tomatoes—the San Marzanos.

32 cups peeled, cored chopped tomatoes (this is about 25 pounds or a half-bushel)

1½ cups chopped sweet red peppers

¼ cup lemon juice

2 bay leaves

1 teaspoon salt

1 clove garlic, finely chopped

Water

Step One: Wash and rough-chop tomatoes. Wash, de-seed, and finely chop sweet red peppers. Peel and finely chop garlic.

Step Two: In large stockpot, place tomatoes and red peppers. (Use two stockpots if need be!) Splash 1 cup of water into stockpot. (Add another cup of water to the second pot if using.) Over medium heat, cook until tomato skins begin to peel back and they release juice.

Step Three: Using food mill or conical sieve, press cooked tomatoes and peppers through to remove tomato seeds and grind skins. Do in batches until complete.

Step Four: In large, non-reactive stockpot or oven roaster or slow cooker, pour sieved puree and add salt, lemon juice, and bay leaves.

Step Five: Cook over low heat for approximately 3 hours, until mixture is reduced by ¾. If using a slow cooker, set at the lowest temperature and cook uncovered. If using an oven roaster, cook uncovered in oven set at 200 degrees. Stir frequently.

Step Six: Test for doneness*. Remove from heat. Remove bay leaves.

Step Seven: Ladle into jars. Place lids on and process.

*How to test for doneness: Take a teaspoon of tomato paste and place onto small plate. Let cool. The tomato paste should remain intact; if a pool of liquid forms around the mound, then more cooking is required.

Ketchup/Catsup

Total Preparation Time: 2 to 5 hours (up to 3 hours of cook time)
Special Equipment: Food Processor or Blender
How Long Before Use: 1 day
Headspace: ½ inch
Process time: 20 minutes
Jars: 8-ounce, 16-ounce
Yield: 6–8 16-ounce jars

NOTE: Homemade ketchup can be used as a condiment but it also serves as the base for many barbeque-style sauces. As the spices are contained and controlled in a spice bag, use a free hand to adjust or add in your favorite spices.

12 cups tomatoes, measured after chopping
2 cups onions, cut into chunks
2 cups sweet red bell peppers, cored, de-seeded, quartered
3 cups cider vinegar
2 cups brown sugar
4 teaspoons salt
2 teaspoons dry mustard
1 teaspoon whole allspice berries
1 teaspoon whole cloves
½ teaspoon of red pepper flakes
1 cinnamon stick, broken

Step One: Wash and chop tomatoes, green peppers, and onions. Place in large, heavy-bottom stockpot. Over medium heat, simmer for 15 to 30 minutes, until ingredients are soft. Remove from heat.

Step Two: With immersion blender, blend into smooth puree.

Step Three: Add vinegar, brown sugar, salt, red pepper flakes, and mustard powder. Create spice bag with whole allspice, cloves, and cinnamon stick and place into pot.

Step Four: Over medium heat, bring mixture to boil. Reduce heat to low simmer. Continue to simmer uncovered while occasionally stirring until total volume is reduced by half.

Step Five: Remove from heat. Remove spice bag.

Step Six: Ladle into jars. Put on lids and process.

VARIATION:

Substitute half the tomatoes with peeled peaches for Peach Ketchup.

Add ¼ cup of your favorite curry powder for a version of German-style Curry Ketchup.

Substitute half the tomatoes with chopped mushrooms for Mushroom Ketchup. Historically, mushroom was the main ingredient in *kietchap*, which is Indonesian and Malaysian in origin. It was brought to England in the 1700s and evolved to become a favored condiment. Founding First Lady Martha Washington includes a version of the recipe in her household recipe book.

Basic Tomato Barbeque Sauce

Total Preparation Time: 2 hours
Special Equipment: Immersion Blender
How Long Before Use: 1 day
Headspace: ½ inch
Process time: 20 minutes
Jars: 8-ounce, 16-ounce
Yield: 6–8 8-ounce jars

NOTE: If you've preserved your tomato sauce, use it in this recipe. Avoid commercial brands that have added corn syrup or sweeteners or the final product will be too sweet. Otherwise, look for commercial products that have the fewest additives.

This recipe requires the addition of 1 Tablespoon of lemon juice per jar prior to filling.

6 cups tomato sauce OR 10 cups of fresh tomatoes (cooked and run through conical sieve or food mill to remove seeds and grind skins)
1 cup onion, diced
1¾ cups brown sugar
4 Tablespoons mustard powder
2 Tablespoons 100% pure salt
2 teaspoons ground black pepper
1 cup white vinegar
1 Tablespoon garlic powder

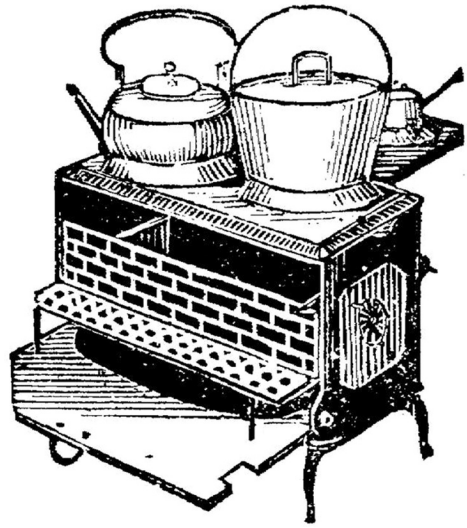
bottled lemon juice

Step One: Combine all the ingredients in a large stockpot. Over medium-high heat, bring to boil while occasionally stirring.

Step Two: Reduce heat to low simmer and continue cooking for approximately 45 minutes or until mixture reduces until thickened. Remove from heat.

Step Three: Using immersion blender, puree mixture.

Step Four: Add 1 Tablespoon of lemon juice into each prepared jar. Ladle sauce into jars. Put on lids and process.



Blueberry Barbeque Sauce

(Peach Barbeque Sauce, Cherry Barbeque Sauce,
Cranberry Barbeque Sauce)

Total Preparation Time: 2 hours

Special Equipment: Immersion Blender

How Long Before Use: 1 day

Headspace: ½ inch

Process time: 20 minutes

Jars: 8-ounce, 16-ounce

Yield: 6–8 8-ounce jars

NOTE: If you've preserved your homemade ketchup and hot sauce, use those in this recipe. Otherwise, look for a commercial ketchup that has the fewest additives.

7 cups fresh blueberries or frozen (thawed)

1 cup ketchup

½ cup apple cider vinegar

3 cloves garlic, minced

½ cup honey

2 Tablespoons fresh ginger, minced
(1½ tablespoons of crystallized ginger)

1 teaspoon ground black pepper

½ teaspoon red pepper flakes or hot sauce (optional)

Step One: Combine all the ingredients in a large stockpot. Over medium-high heat, bring to boil while occasionally stirring.

Step Two: Reduce heat to low simmer and continue cooking for approximately 15 minutes or until mixture reduces until thickened. Remove from heat.

Step Three: Using immersion blender, puree mixture.

Step Four: Ladle into jars. Put on lids and process.

VARIATION:

Substitute the blueberries with peaches, cherries, or cranberries for a variety of flavors.

North Carolina-Style Vinegar & Mustard Barbeque Sauce

Total Preparation Time: 2 hours
How Long Before Use: 1 day
Headspace: ½ inch
Process time: 20 minutes
Jars: 8-ounce, 16-ounce
Yield: 6–8 8-ounce jars

NOTE: If you've preserved tomato ketchup and hot sauce, use it in this recipe. Avoid commercial brands that have added corn syrup or sweeteners or the final product will be too sweet. Otherwise, look for commercial products that have the fewest additives.

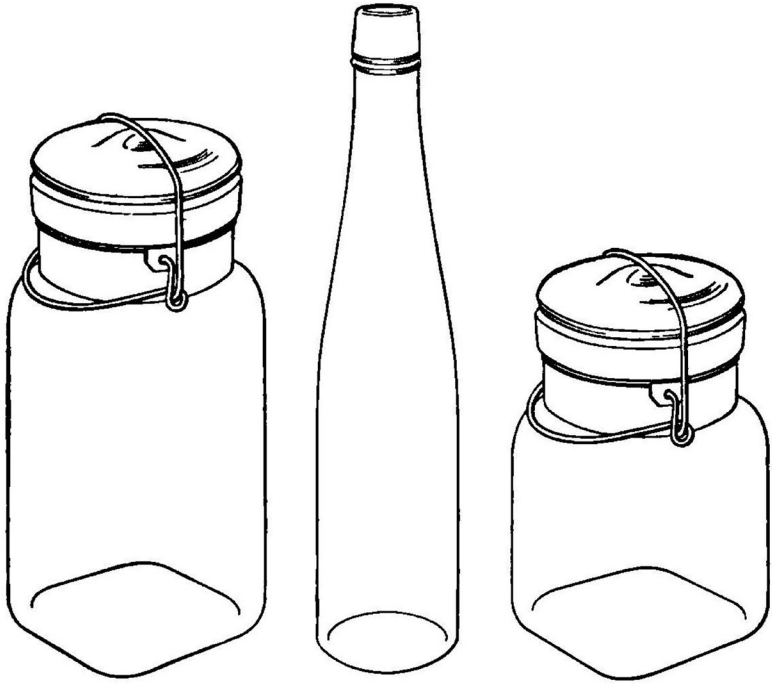
This is a super easy recipe that can be made and used the same day. The advantage of canning a large batch is that you'll have it readily on hand to use as a dipping sauce or marinade.

6 cups distilled white vinegar (No substitutes; it would negatively affect the final taste of the sauce.)
1½ cups ketchup
1½ cups unsweetened apple juice
1 cup mustard powder
2 Tablespoons hot sauce
3 Tablespoons light brown sugar
3 Tablespoons salt
2 Tablespoons crushed red pepper
2 Tablespoons finely ground black pepper

Step One: Step One: Combine all the ingredients in a large stockpot. Over medium-high heat, bring to boil while occasionally stirring.

Step Two: Reduce heat to low simmer and continue cooking for 10 minutes. Remove from heat.

Step Three: Ladle sauce into jars. Put on lids and process.



Plum Sauce

Total Preparation Time: 2 hours
How Long Before Use: 1 day
Special Equipment: Immersion Blender
Headspace: ½ inch
Process time: 10 minutes
Jars: 8-ounce, 16-ounce
Yield: 6–8 16-ounce jars

NOTE: This recipe uses green chili peppers that can cause burning to skin. Wear latex protective gloves when working with hot peppers. Rinse any tools in cold water before washing in hot water to remove residual pepper oils.

10 cups plums (about 4–5 pounds), pitted and chopped (do not peel and measure after chopping)
2 cups firmly packed brown sugar
1 cup granulated sugar
1 cup cider vinegar
¾ cup finely chopped onion
2 teaspoons finely chopped green chili peppers
2 teaspoons mustard seed
1 Tablespoon 100% pure salt
1–2 cloves garlic, minced
1-inch piece ginger root, minced

Step One: Wash and pit plums. Finely chop; set aside.

Step Two: In large stockpot, combine all ingredients except plums.

Step Three: Over medium-high heat, bring mixture to boil.

Step Four: Add plums. Reduce heat and simmer until mixture has reduced in volume by half. Remove from heat.

Step Five: Using immersion blender, blend into smooth puree. (You can blend less for a chunkier sauce.)

Step Six: Ladle into jars. Put on lids and process.

Storing Your Home-Canned Goods

Your home-canned jars need to be treated with extra care to get the best quality product for the entire year.

**Keep your canned goods in a cool and dry place. Stay away from extreme heat and cold; basements are often an ideal storage choice.*

**Keep your canned goods out of direct sunlight. If the intensity of the sun can roast an ant, it can cause a lid to become unsealed.*

**Don't stack jars standing on top of one another. The weight may cause a lid to unseal.*

**Wipe down the outside of jars. There could be some residue from the canner on the outside of the jar that may mold.*

**Take the screw bands (rings) off. These are reusable, so reuse them. They are also made of cheap metal and will rust if any standing water is in between the band and the jar. And finally, if something bad is happening in your jar, you won't see it as the headspace is covered by the band.*

Steak Sauce (Fake1 Sauce)

Total Preparation Time: 2 hours
How Long Before Use: 1 day
Special Equipment: Immersion Blender
Headspace: ½ inch
Process time: 15 minutes
Jars: 8-ounce, 16-ounce
Yield: 6–8 8-ounce jars

NOTE: If you've preserved tomato ketchup, use it in this recipe. Avoid commercial brands that have added corn syrup and sweeteners or the final product will be too sweet. Otherwise, look for commercial products that do not have thickeners and have the fewest additives.

6 cups ketchup
3 cups onion, chopped
6 large cloves of garlic
1½ cups water
1½ cups Worcestershire sauce*
1½ cups lemon juice (bottled)
1½ cups white vinegar
¾ cup soy sauce
¾ cup brown sugar
⅓ cup mustard powder

Step One: Clean and chop onions and garlic.

Step Two: In large stockpot, combine all ingredients.

Step Three: Over medium-high heat, bring mixture to boil.

Step Four: Reduce heat. Simmer while stirring occasionally for approximately 30 minutes until mixture has thickened. Remove from heat.

Step Five: Using immersion blender, blend into smooth puree.

Step: Six: Ladle into jars. Put on lids and process.

*You may be asking yourself, "But Worcestershire sauce has anchovies. It won't be safe!" Worcestershire sauce is a fermented fish sauce that is then pasteurized and further heat-treated in the bottling process. This fact, combined with the small amount used, allows this recipe to stay in the safety zone.

Spinach and Herb Chimichurri

Total Preparation Time: 2 hours
Special Equipment: Food Processor or Blender
How Long Before Use: 1 week
Headspace: ¼ inch
Process time: 15 minutes
Jars: 8-ounce, 16-ounce
Yield: 6–8 8-ounce jars

NOTE: This is a version of the Argentinian condiment used as an accompaniment to roasted meats and vegetables. The vinegar used is critical to making low-acid greens safe for long-term preservation.

Working with jalapeños and every type of hot pepper can cause injury. Wear latex protective gloves when working with hot peppers. Rinse any tools in cold water before washing in hot water to remove residual pepper oils.

Sauces with vinegar develop flavor in the jar. Letting this sauce 'rest' for a week before eating makes it taste even better. The spinach provides a natural sweetness that balances the heat of the peppers.

1 pound fresh spinach leaves
1 pound fresh parsley or cilantro
8 garlic cloves, peeled
2 cups white vinegar, divided
2 jalapeño peppers, stems removed
½ cup lime juice
1½ teaspoons 100% pure salt

Step One: Thoroughly wash greens and herbs to remove any dirt or grit. Gently pat dry.

Step Two: Using food processor or blender, pulse until smooth the spinach, garlic, herbs, and jalapeños. This can be done in batches with the ingredients mixed together.

Step Three: In a medium non-reactive stockpot, place the blended ingredients. Add the vinegar, lime juice, and salt.

Step Four: Over medium heat, bring mixture to boil. Reduce heat and simmer at low boil for 3 minutes while continually stirring. Remove from heat.

Step Five: Ladle into jars. Put on lids and process.

Rosemary Onion Confit

Total Preparation Time: 2 hours
How Long Before Use: 1 day
Headspace: ½ inch
Process time: 10 minutes
Jars: 8-ounce, 16-ounce
Yield: 6–8 8-ounce jars

NOTE: The difference between a confit and a pickled onion is the long slow cooking time which caramelizes the sugar. This recipe also uses soy sauce in place of salt.

12 cups (approximately 3 to 4 pounds) white onion, chopped
1 cup red wine vinegar
¾ cup sugar
1 Tablespoon rosemary
1 Tablespoon soy sauce
1 teaspoon ground black pepper
2 Tablespoons olive oil

Step One: Clean and thinly slice onions into 1/8- to 1/4-inch strings. Set aside.

Step Two: In large, non-reactive stockpot, add the olive oil to coat the bottom of the pot. Over medium heat, warm oil.

Step Three: Add the sliced onions. Thoroughly stir so all pieces are coated with oil. Reduce heat to low-medium and simmer about 30 minutes. Stir occasionally; onions should be browned and tender.

Step Four: Add the remaining ingredients and simmer for 5 more minutes. Remove from heat.

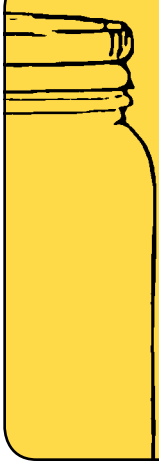
Step Five: Ladle into jars. Stir mixture after each filling to keep ratio of liquid-to-solid even. Put on lids and process.

Chapter Nine
Pressure Canning

The pressure canner transformed home food preservation. In every single other technique and method of preservation, we adjusted sugars, salts, and acids to effect a chemical change to the food. With pressure canning, you don't have to do any of that. Pressure canning allows you to preserve food in its most natural state. That tin can of carrots from the grocery store—make your own. That aluminum can of soup—make your own. As long as you follow the correct preparation and a few common-sense guidelines, then operate your machine correctly, you will have at your disposal a safe and effective way to preserve food.

Many people have heard stories of someone 'blowing up a pressure canner.' And unfortunately, we have graphic proof that a pressure canner can be altered to become a weapon. Like any other tool, when used incorrectly a pressure canner can be dangerous. Most accidents with a pressure canner come down to the combined human foibles of impatience and lack of common sense.

Modern (manufactured after 1970) pressure canners are equipped with a pressure-release safety vent. If you look at the top of a canner, you'll see a little red or black rubber circle in a small hole in the lid. This is the safety release. If too much pressure is generated in the canner, this rubber seal will blow off and release the pressure built up in the canner. These rubber seals are replaceable. Do not alter, reuse, or attempt to create a homemade seal for the safety release. So if you 'blow your seal' or if it becomes dried out over time, replace it. They cost about a dollar.



A Pressure Canner is a tool. The Hot-Water Bath Canner is a tool. They are not interchangeable tools. Yes, there are a few items that can be processed either way. They are the exception, not the rule.

Most often, the preservation method is the combination of the chemical change and the physical action. You wouldn't put a pickled thing in a pressure canner; it would render the final product into mush. Same thing for many sweetened preserves. Think about what you want to preserve and how you want to preserve it, then choose the correct tool for the job.

Other safety issues are related to heat and pressure. The vent stem where the regulator sits? Yes, if you remove the regulator, 220-plus-degree steam shoots out that tiny hole. Guaranteed to give you a first-degree burn, maybe second-degree, if you don't move your hand or arm fast enough. Another danger is projectile lids. The internet is littered with pictures of pressure canner lids embedded into ceilings. Again, physics and common sense: IT'S A PRESSURE CANNER... IT IS PRESSURIZED! If you try to loosen and remove the lid of a pressure canner while it is still filled with pressurized steam, the lid will fly up into the air. The lids are heavy. They will do damage where they land. Hopefully, it's not on your foot.

Lastly, but so very dangerous, is forcing a pressure canner to cool off quickly. Pressure canners are designed to build and retain heat; that's their superpower. The machine does not cool down instantly. Back to physics: When metal gets hot it expands; it's why higher-quality pressure canners don't need rubber gaskets, and heat expands the metal to make the seal. Which also means that the lid will not come off until the pressure canner has cooled down to a temperature that allows the metal to retract to its normal, non-heated state.

Trying to pry the lid off will turn that lid into a projectile as described above. Trying to force the pressure canner to cool by submerging it in cold water or a snow bank (people have done that) causes the metal to contract so quickly as to break it apart. And 'break apart' is a nice way to say that it becomes shrapnel—small, sharp metal objects that have been forced to release their energy. You've just turned your pressure canner into a weapon.

In class, we designate one pressure canner as the "Wrong Pot." I demonstrate many of the terrible things you can do when you make poor choices with your tools. I show them the family canner I rescued from my in-laws and point out that my father-in-law WELDED the safety release shut. Our favorite 'don't do this' demo is showing how high a lid will fly by prying off the ten-pound solid aluminum lid of an All-American canner at six pounds of pressure. (Our record is five feet.) I show them an older pressure canner with an entire chunk missing from it where someone set it in an ice bath to cool and half the canner shattered. (Luckily, it was in a sink where the damage was contained, and no one got hurt.)

If I haven't been clear enough, a pressure canner is a fantastic tool. Understand its function, understand its limitations. Understand the potential for danger when misused. Familiarize yourself with your specific machine before you begin your preservation project. Every pressure canner is slightly variant in its design, but the core function remains the same: to create a pressurized container that will raise the internal temperature of the jarred food to the

set temperature. It is important to follow the process through its entire cycle without taking any short cuts.

The 'venting of the canner' as recommended by all manufacturers and the Center for Home Food Preservation is often questioned as being necessary. Venting is the simple act of allowing pressure to build in the canner, then releasing the pressure, and starting the pressurization process again. It can take around 15 minutes to do. Here's why you must do it: air trapped in the pressure canner lowers the overall temperature inside the device and results in underprocessing, which can result in pathogens. So vent your canner each and every use.

Note that with dial gauge pressure canners, the gauges can go out of calibration. Your local Master Food Preserver can test your gauge at no charge. If you purchase an estate canner and are unsure if the gauge is correct, again your local extension office can test it for you. If your gauge is out of calibration, they are easily replaceable at a relatively low cost. Modern gauges will fit pressure canners made in the 1940s through today. (See Resource Guide.)

If it's your first time using a pressure canner, familiarize yourself with every part and function of the machine. I highly recommend canning jars of water as a way to practice using the canner. You won't have to worry about pathogens in the end product and will become comfortable and confident with practice.

STEP-BY-STEP REVIEW OF THE PRESSURE CANNING PROCESS

1. Clean and prep jars by washing with very hot soapy water; rinse thoroughly in hot water (do not dry). Immediately use. If you have a dishwasher, load jars and run on sanitize cycle.
2. Place lids into boiling hot water. (This softens or 'activates' the rubber edge on the lid.)
3. Pour jelly into hot drained jars. Leave correct headspace as directed in the recipe. (Headspace is the air left between the jelly and the rim of the jar, necessary to set seal.)

4. Carefully wipe rims of jars to remove drips. Place lids on jars.
5. Place bands on jars and 'finger tighten.' (As soon as you feel the natural resistance of the band on the jar when turning, stop.)
6. Place jars into pressure canner filled with approximately three inches of water. (Jars should be on rack and not touching the bottom of the canning pot.)
7. Put the lid on top of the pressure canner and secure.
8. Turn on the heating element, leaving pressure regulator valve* open/removed.
9. Canner should remain under high heat until steam begins to escape through open pressure regulator valve. As soon you see a steady output of steam, start timing for TEN minutes. This is to vent the canner and remove any air pockets.
10. After venting, place regulator weight onto open regulator valve (or close regulator valve).
11. When pressure is the correct amount as indicated in the recipe, begin timing. (You may have to adjust the heat to prevent overpressurizing.)
12. Process for the amount of time listed in the recipe.
13. When complete, turn off heat. Remove/open pressure regulator to vent out steam.
14. Let pressure canner return to zero pressure and then remove the lid.
15. Jars should remain in the pressure canner with lid off for ten minutes, then remove jars and place jars on flat counter/table surface and let cool 24 hours.

*The Pressure Regulator Valve is also referred to as a Petcock, Valve Stem, or Steam Pipe.

ELEVATION adjustments:

MEATS *using a dial gauge canner use 11 pounds of pressure for locations less than 2000 feet in elevation, then add a pound of pressure for every additional 2000 feet in elevation. So, if you live in Red Lodge, Montana, at an elevation of 5582 feet, the correct amount of pressure for you to safely can meat is 13 pounds. If you're using a weighted gauge pressure canner, use 10 pounds of pressure for elevations 2000 feet and under, and 15 pounds of pressure for elevations over 2000 feet.*

VEGETABLES *using a dial gauge pressure canner use 6 pounds of pressure for locations less than 2000 feet in elevation, then add a pound of pressure for every additional 2000 feet in elevation. So, if you live in Red Lodge, Montana, at an elevation of 5582 feet, the correct amount of pressure for you to safely can vegetables is 9 pounds. If you're using a weighted gauge pressure canner, use 5 pounds of pressure for elevations 2000 feet and under, and 10 pounds of pressure for elevations over 2000 feet.*

Vegetables (and a few fruits!)

Much like the sailors of the 1800s, your palate grows tired of the same foods eaten day after day. It may seem absurd given the current popularity of pickled things, but a body grows weary of eating pickled and salted foods all the time. Vegetables preserved in water with a pressure canner are as close to fresh as you can get in the middle of winter. They have a bright color and texture and can be used in any dish you want to prepare. Vegetables preserved with a pressure canner also retain a decent amount of their nutrient values. Less than fresh, of course, but more than three months of freezing.

The "recipes," per se, are simple. The time and work involved is in preparing the foods for jarring. Again, vegetables can be Cold Packed or Hot Packed. Hot Packs do result in a higher-quality product because air pockets in the vegetables are eliminated, and heat releases extra moisture that may affect the total volume in the jar. The cooking time is minimal: five to ten minutes for most vegetables. A Hot Pack is advised for vegetables with a high moisture content.

This will allow them to release some of their liquid prior to canning and not in the jar, which may cause too much liquid in the jar. This results in jar or seal failure. Mushrooms, onions, and greens must be Hot Packed.

Vegetables are then packed loosely or tightly into the jar and covered with either boiled water or boiled juice. Recipes and instructions for baked beans and sauce-cooked beans are in the Meals-in-a-Jar section. There are a few fruits that produce a good end product with pressure canning. Just a few, though. The high moisture content of fruit causes it to break down into mush during the prolonged elevated heat of pressure canning.

Vegetables have a predetermined processing time based on the density of the vegetable. This time will change depending on what size jar you choose; a quart jar processes longer than a pint jar. Elevation also changes the length of processing. If you are above sea level, look up your actual elevation and adjust the processing time based on the calculations in the facing sidebar.

You can mix vegetables together in a jar. The rule for determining the correct processing time is this: Find out the processing time of each vegetable; whichever one takes the longest amount of time, use that.

Older recipes will call for salt to be added to the jar before packing vegetables. Salt is used for flavor only and not required for preservation. If you do choose to use salt, use a salt that is 100% pure without any additives.

One of the frustrating outcomes of pressure canning is "liquid loss." It is common to find that when you remove your cooled jars from the canner that one or two jars have lost a fair amount of the liquid that was covering the vegetable. Unlike hot-water bath or atmospheric canning, this change in the headspace is allowable up to half. Meaning that your canned vegetable is still safe and usable if the lid is sealed and half the liquid remains. If the loss is more than half, put those jars in the refrigerator and eat them first.

Why does liquid loss happen? In every instance, it's an operator error. No one likes to hear that, and we'd like to think it's random, but it's not. Use best practices to ensure the liquid remains in the jar. Remove any air bubbles from the jar before placing the lid. Vegetables absorb liquids, so make sure your headspace is correct and allows for absorption and expansion. Heat fluctuations during processing may cause the jars to become overpressurized and force out liquid. Jars need to remain in the canner undisturbed until all pressure is vented and the lid can be removed. When the lid is removed, wait ten minutes to allow jars to return to normal pressure before removing from canner. Remember, you can do everything 100% correctly and still encounter some fluid loss due to absorption.

FOOD PRESERVATION QUICK REFERENCE CHART

LOW-ACID FOODS – PRESSURE CANNER

Type of Food	Style of Pack	Jar Size	Head Space	Process Time (Min.)	Dial Gauge (PSI)	Weighted Gauge (PSI)
Asparagus	Hot and Raw	Pints - Quarts -	1 inch 1 inch	30 minutes 40 minutes	11# 11#	15# 15#
Beans - Lima (fresh) Shelled	Hot and Raw	Pints - Quarts - Pints - Quarts -	Small beans 1 inch small 1½ inch Large beans 1 inch 1¼ inch	40 minutes 50 minutes 40 minutes 50 minutes	11# 11# 11# 11#	15# 15# 15# 15#
Beans - green and wax	Hot and Raw	Pints - Quarts -	1 inch 1 inch	20 minutes 25 minutes	11# 11#	15# 15#
Beets	Hot	Pints - Quarts -	1 inch 1 inch	30 minutes 35 minutes	11# 11#	15# 15#
Carrots	Hot and Raw	Pints - Quarts -	1 inch 1 inch	25 minutes 30 minutes	11# 11#	15# 15#
Corn (cream style)	Hot	Pints	1 inch 1 inch	85 minutes	11# 11#	15# 15#
Corn (whole kernel)	Hot and Raw	Pints - Quarts -	1 inch 1 inch	40 minutes 40 minutes	11# 11#	15# 15#
Peas (fresh green)	Hot and Raw	Pints - Quarts -	1 inch 1 inch	40 minutes 40 minutes	11# 11#	15# 15#
Peppers	Peeled	Half Pints - Pints	1 inch 1 inch	35 minutes 35 minutes	11# 11#	15# 15#
Potatoes (white, cubed or whole)	Hot	Pints - Quarts -	1 inch 1 inch	35 minutes 40 minutes	11# 11#	15# 15#
Pumpkin and Winter Squash (cubed)	Hot	Pints - Quarts -	1 inch 1 inch	55 minutes 90 minutes	11# 11#	15# 15#
Spinach and Other Greens	Hot	Pints - Quarts -	1 inch 1 inch	70 minutes 90 minutes	11# 11#	15# 15#
Soups (vegetable, dried beans/pea, meat, poultry-NO seafood)	Hot	Pints - Quarts -	1 inch 1 inch	60 minutes 75 minutes	11# 11#	15# 15#
Meat (ground or chopped)	Hot	Pints - Quarts -	1 inch 1 inch	75 minutes 90 minutes	11# 11#	15# 15#
Meat (strips, cubes or chunk)	Hot and Raw	Pints - Quarts -	1 inch 1 inch	40 minutes 75 minutes 90 minutes	11# 11#	15# 15#
Poultry (without bones)	Hot and Raw	Pints - Quarts -	1 inch 1 inch	75 minutes 90 minutes	11# 11#	15# 15#
Poultry (with bones)	Hot and Raw	Pints - Quarts -	1¼ inch 1¼ inch	65 minutes 75 minutes	11# 11#	15# 15#

ACID FOODS –BOILING WATER BATH AND/OR PRESSURE CANNER

Type of Food	Style of Pack	Jar Size	Head Space	Boiling Water Bath	Pressure Canner	Dial Gauge	Weighted Gauge
Apple Sauce	Hot	Pints - Quarts -	½ inch ½ inch	20 minutes 25 minutes	8 minutes 10 minutes	6# 6#	10# 10#
Apples (sliced)	Hot	Pints - Quarts -	½ inch ½ inch	25 minutes 25 minutes	8 minutes 8 minutes	6# 6#	10# 10#
Berries (whole)	Hot	Pints - Quarts -	½ inch ½ inch	20 minutes 20 minutes	8 minutes 8 minutes	6# 6#	10# 10#
	Raw	Pints - Quarts -	½ inch ½ inch	20 minutes 25 minutes	8 minutes 8 minutes	6# 6#	10# 10#
Cherries (sweet or sour	Hot	Pints - Quarts -	½ inch ½ inch	20 minutes 25 minutes	8 minutes 10 minutes	6# 6#	10# 10#
	Raw	Pints - Quarts -	½ inch ½ inch	30 minutes 30 minutes	10 minutes 10 minutes	6# 6#	10# 10#
Peaches, Apricots and Nectarines	Hot	Pints - Quarts -	½ inch ½ inch	25 minutes 30 minutes	10 minutes 10 minutes	6# 6#	10# 10#
	Raw	Pints - Quarts -	½ inch ½ inch	30 minutes 35 minutes	10 minutes 10 minutes	6# 6#	10# 10#
Pears (halved)	Hot	Pints - Quarts -	½ inch ½ inch	25 minutes 30 minutes	10 minutes 10 minutes	15# 15#	10# 10#
Plums	Hot and Raw	Pints - Quarts -	½ inch ½ inch	25 minutes 30 minutes	10 minutes 10 minutes	15# 15#	10# 10#
Rhubarb (stewed)	Hot	Pints - Quarts -	½ inch ½ inch	20 minutes 20 minutes	8 minutes 8 minutes	15# 15#	10# 10#
Fruit Juices	Hot	Pints- Quarts- Half-Gallons-	¼ inch ¼ inch ¼ inch	10 minutes 10 minutes 15 minutes	NOTE: Times are not available for processing fruit juices in the pressure canner.		
Fruit Purees	Hot	Pints - Quarts -	¼ inch ¼ inch	20 minutes 20 minutes	8 minutes 8 minutes	6# 6#	10# 10#
Tomatoes* (no liquid added)	Hot	Pints and Quarts -	½ inch	90 minutes	25 minutes	11#	15#
Tomatoes* (packed in water)	Hot and Raw	Pints - Quarts -	½ inch ½ inch	45 minutes 50 minutes	10 minutes 10 minutes	11# 11#	15# 15#
Tomatoes* (packed in juice)	Hot and Raw	Pints and Quarts -	½ inch	90 minutes	25 minutes	11#	15#
Tomato Juice*	Hot and Raw	Pints - Quarts -	½ inch ½ inch	40 minutes 45 minutes	15 minutes 15 minutes	11# 11#	15# 15#

*To ensure safe acidity in ALL canned tomato products, add boiling lemon juice or vinegar or citric acid directly to the jars before filling with product.
PINTS: 1 Tablespoon bottled lemon juice OR 2 Tablespoons vinegar OR ¼ teaspoon citric acid to each pint of tomatoes
QUARTS: 2 Tablespoon bottled lemon juice OR 4 Tablespoons vinegar OR ½ teaspoon citric acid to each pint of tomatoes

NOTE: To offset an acid taste in tomato products, add sugar if desired.

Tips for Vegetables

Use the freshest vegetables you can.

Salt is optional. You can add a touch of salt if desired. One teaspoon per quart of 100% salt with no additives.

Spices are also optional. Adding dried herbs and spices is allowable.

Mix vegetables together. You can mix vegetables together in a jar. Check the processing time for each vegetable used and process for the longest time given.

Consider using the Hot Pack method. Blanching or light cooking of vegetables eliminates air pockets and releases moisture, resulting in a better quality final product.

Ready?

All recipes make the assumption that you've prepared your canning jars according to the best practices described in the Hot-Water Bath Canning Instructions. When should you get your jars ready? Wash and rinse them when your vegetable is prepped and ready to be jarred. If you're using a dishwasher, start the cycle before you begin prepping the vegetables.

Your canner should be inspected before use. Do you have the weighted gauge? Is the dial gauge accurate? If it has a rubber seal, is it supple and not cracked? Is the safety valve rubber seal present and in good condition? Place the rack in the canner and fill with three to four inches of water. Put the pressure canner on the burner you intend to use. See the preceding chart for the correct processing times for vegetables.

Meat and Fish

There is a story of family legend told by my father-in-law. During World War II, Uncle Wally served in the Marines in the Pacific theater and saw some of the most brutal and horrific battle conditions ever witnessed. American Marines suffered from terrible living conditions and constant battle, and, unknown to many people, near-starvation. As the men fought to take each island, their supply lines were unstable and they were often left without food.

In the winter of 1944, Wally's mother butchered and canned a chicken. She carefully wrapped the jar in cushioning, placed it in a box, and mailed it to

Wally in the Pacific Theatre. That jar of canned chicken found him in the summer of 1945 on a now-forgotten Philippine island. The story goes that Wally and his buddies tore into the box to find the jar unbroken and still sealed. They ate every molecule. Wally claimed to his dying day that it was the best meal he ever had.

Canning meats is rarer today than a few generations ago. Yet the knowledge and details of how to do it are helpful. Modernity has given even rural areas a reliable, steady source of electricity with which to power freezers. This has diminished the practical need to can meats and fish for survival. People living in hunting and fishing regions have more opportunity to can meats and fishes. As a practice, it can be useful for venison, salmon, and other game. There are types of meats and fishes that are better suited to canning than others. Canned meats that turn out the best quality are low in fat, whether the fat is trimmed or cooked prior to canning. Too much fat often results in an unsafe product. The opposite is true for fish; higher-fat fish work best.

Theoretically, meats and fishes can be packed using a Cold Pack or a Hot Pack, but a Hot Pack results in a safer-quality product. So do it that way. Like our vegetables, the meat and poultry are packed into the jar and covered with hot liquid. Broth or tomato sauce is best for red meats, and broth for poultry. Fish are deboned and prepped into fillets and packed into jars with no added liquid.

Working with meats and fishes requires a laser-like focus on food safety practices. Use a diluted bleach solution to rinse any tools used both before and after coming into contact with meats and fish. Meat and fish have a small window for safe canning. They both should be processed within two days of harvest. People harvesting deer from areas with known cases of Chronic Wasting Disease (CWD) need to exercise extreme caution. CWD is a prion disease related to Bovine Spongiform Encephalitis (BSE) and in infected humans becomes Creuzfeldt-Jacobs Disease (CJD). No cooking nor preservation method will prevent prions from infected meats from being transferred to a human. Preserve only the venison flesh while taking great care to dispose of the offal. State Departments of Natural Resources carefully and closely monitor outbreaks of CWD. If you're a hunter, check with your local DNR about areas with verified cases of CWD. This disease and caution only apply to deer. Other wild game do not have any prion diseases that can be passed on to humans. I have personally known two people who have died of Creuzfeldt-Jacobs Disease; it is a brutal and cruel death. I cannot stress enough that you must use extreme caution if hunting in areas with known outbreaks of CWD.

The most common way to can meats is to preserve chunks in broth or tomato sauce or as cooked meatballs made from ground meat, also preserved

in broth or tomato sauce. Poultry too should be cooked, at least partially cooked, then placed into a quart jar either with or without bones and covered with broth.

Let's be honest. The most useful way to can meat items is when they are incorporated into a full meal that can then be canned. You'll find more recipes and techniques in that section. And if you really need to know how to can turkey gizzards and squirrel, the Resource Guide will have info to the State Extension offices that specialize in those recipes.

Tips for Meats, Poultry, and Fish

Hot Packing jars results in a better quality product. When it comes to food, safety is paramount, but producing a high-quality canned item will ensure that you'll use it.

Fill your canner with at least six inches of water. Meats and fishes require long processing times. You need to make sure that your canner is filled with enough water so it doesn't 'run dry.' A best practice is to place jars in the canner and fill with water until the level comes up to the bottom of the screw band.

Are you sure you don't want to freeze it? Canning meats alone takes more time and energy than freezing them. Unless you have a particular need or are in a place with limited or unreliable electricity, freezing really is the better method of preservation.

Ready?

All recipes make the assumption that you've prepared your canning jars according to the best practices described in the Hot-Water Bath Canning Instructions. When should you get your jars ready? Wash and rinse them when your meat or fish is prepped and ready to be jarred. If you're using a dishwasher, start the cycle before you begin prepping the meat or fish.

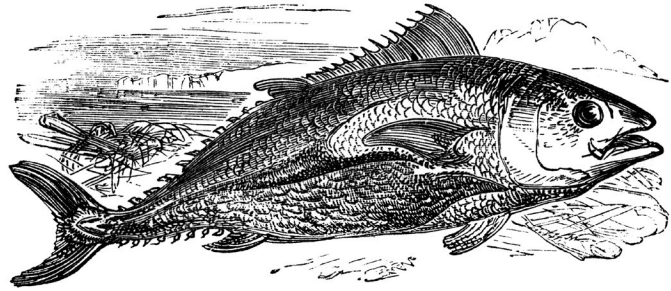
Your canner should be inspected before use. Do you have the weighted gauge? Is the dial gauge accurate? If it has a rubber seal, is it supple and not cracked? Is the safety valve rubber seal present and in good condition? Place the rack in the canner and fill with six inches of water. Or place jars into canner and fill with water until the level reaches the bottom of screw band. Put the pressure canner on the burner you intend to use.

RECIPES

Ground Meatballs
(Meat Chunks)

Fish (Salmon, Trout, Tuna)

Poultry



Meatballs

(Meat Chunks)

Total Preparation Time: 2 hours
How Long Before Use: 1 day
Headspace: 1 inch
Process time: 75 minutes for pints / 90 minutes for quarts
Pressure: 10/11 pounds
Jars: 16-ounce, 32-ounce
Yield: 5–6 32-ounce jars

NOTE: This is the master recipe for making any type of meatballs in a broth or sauce. Meatballs can have spices for flavor but not any fillers or extenders like breadcrumbs.

Meatballs

5 pounds ground meat (beef, venison, bear, turkey, etc.)

Spices to taste (salt, pepper, cayenne, garlic powder, onion powder, etc.)

16 cups (4 quarts) vegetable, chicken, or beef stock OR tomato sauce

Step One: Shape meat into 1- to 2-inch-diameter balls.

Step Two: In large frying pan over medium heat, cook meatballs until thoroughly done. Remove from heat. (You may need to do these in batches.)

Step Three: Place meatballs on plate covered with paper towel to absorb excess fat. Set aside.

Step Four: In large stockpot over medium-high heat, bring broth to boil for 5 minutes. Remove from heat.

Step Five: Pack meatballs into jar. They should not fill beyond the shoulder of the jar.

Step Six: Ladle broth or tomato sauce over the meatballs to required 1-inch headspace.

Step Seven: Place on lids. Process.

VARIATION:

Whole muscle can be trimmed of excess fats and cut into 1- to 2-inch chunks and preserved using the meatball recipe.

Fish

Total Preparation Time: 2 hours
How Long Before Use: 1 day
Headspace: 1 inch
Process time: 100 minutes
Pressure: 10/11 pounds
Jars: 8-ounce, 16-ounce

NOTE: This is the method to be used in pressure canning all fish. Only fish that are high in fat content are good candidates for this style of preservation. Salmon, tuna, halibut, trout all can very well. Fish should be cleaned and bled within 2 hours of catching and kept on ice until use.

Step One: Prepare fish as you would for cooking. Debone larger fish and leave the backbone in smaller fish. Cut into fillets that will fit into the jar of your choice.

Step Two: Soak in a saltwater brine for 1 hour. (1 cup of 100% pure salt per gallon of water.)

Step Three: Drain fish for 10 minutes.

Step Four: Pack fish fillets tightly into jar, skin side against the glass, to the required 1-inch headspace.

Step Five: Place on lids. Process.

Poultry (and Rabbit)

Total Preparation Time: 2 hours

How Long Before Use: 1 day

Headspace: 1¼ inch

Process time: 75 minutes for pints / 90 minutes for quarts

Pressure: 10/11 pounds

Jars: 16-ounce, 32-ounce

NOTE: This is the method to be used in pressure canning all white meats. Chicken and small game should should be cleaned and bled within 2 hours of catching and kept refrigerated until use. (Rabbit should be soaked in a brine of 1 Tablespoon of salt per quart of water prior to cooking.)

Step One: Prepare as you would for cooking. Bake or boil until two-thirds done. Cut into pieces that will fit into the jar of your choice.

Step Two: If cooked by boiling, reserve the broth. OR boil 1 gallon of water.

Step Three: Pack deboned meat pieces tightly into jar up to shoulder.

Step Four: Pour broth or boiled water over the meats to required 1¼-inch headspace.

Step Five: Place on lids. Process.

Meal-in-a-Jar

Now I'll take back everything I said about canning meat and fish. Canning fully prepared meals that include meats is one of the best and most useful things a pressure canner will do for you.

Chili, soups, stews, and sloppy joes are just a few of the things you can make and preserve. Meals-in-a-Jar can really change your cooking life. They're a great solution for busy families and harried workers. Canning a batch of your favorite soup in a dozen pint jars a few times results in grab-and-go lunches for a year.

There are a few restricted items that result in an unsafe product. Flour, barley, cornstarch, pasta, and rice will absorb any liquids and become mush. The glutinous mass then sits thickened in jar where it will not reach the necessary safe temperature. If you want to can chicken soup, make the soup with everything except the noodles. Cook fresh noodles and add the soup before serving.

Also, consider choosing vegetables for your soups and stews that are sturdier and will withstand the long processing time required for the meat. Root vegetables hold up very well in soups and stews. Vegetarians can also take advantage of the convenience of meals-in-a-jar. Textured vegetable protein or lentils can be safely substituted in chili, sloppy joes, or other recipes calling for ground meats. Vegetable soups should be processed as you would mixed vegetables; identify the vegetable with the longest processing time and use that as the timing for the soup.

Because low-acid foods run a higher risk of deadly pathogens, you should stick with tested recipes and not stray too far from that path. The good news is that within those recipes is room to adjust and change flavors. (The Resource Guide also includes books and websites that have more tested and safe recipes.)

Tips for Meal-in-a-Jar

Substitute ground meats. If a recipe calls for 'ground beef,' you can substitute ground poultry or ground game meats. Many a kid has eaten venison sloppy joes and been none the wiser.

Balance jar filling. When filling jars with soups and stews, make sure you keep an equal balance of broth or gravy to meats and vegetables. This ensures that the temperature is reached in the middle of the jar.

Spices are adjustable. Feel free to add or subtract dried spices to create flavors you enjoy.

Vegetarians welcome. Substitute texturized vegetable protein for any ground meat in a recipe. Use vegetable broths in place of meat broths.

Ready?

All recipes make the assumption that you've prepared your canning jars according to the best practices described in the Hot-Water Bath Canning Instructions. When should you get your jars ready? Wash and rinse them when your dish is finished cooking and ready to be jarred. If you're using a dishwasher, start the cycle an hour prior to the end of cooking.

Your canner should be inspected before use. Do you have the weighted gauge? Is the dial gauge accurate? If it has a rubber seal, is it supple and not cracked? Is the safety valve rubber seal present and in good condition? Place the rack in the canner and fill with six inches of water. Or place jars into the canner and fill with water until the level reaches the bottom of the screw band. The pressure canner should be on the burner you intend to use.

RECIPES

Summer Barbeque Beans

Candied Yams (or Sweet Potatoes)

Chicken or Turkey Soup
(Turkey Soup, Broths, Bone Broth)

Soup

Curried Pea Soup

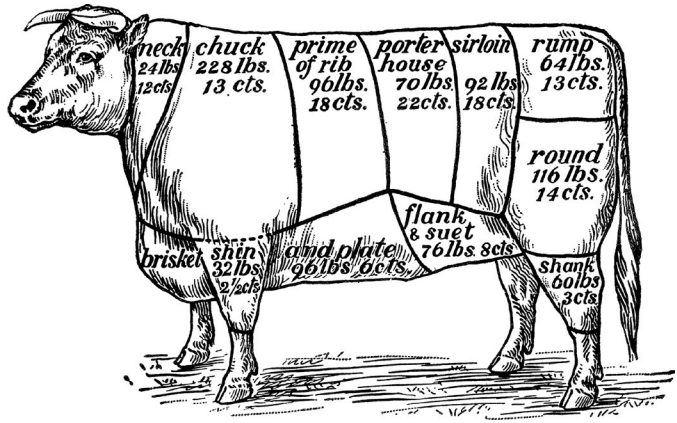
Clam Chowder Soup Base
(New England and Manhattan versions)

Beef Stew with Vegetables (or other game meat)

Chili con Carne
(Kidney beans, Pinto beans)

Sloppy Joe (Loose Meat, Meaty Manwich, Spanish Hamburger)

Italian Sausage and Peppers



Summer Barbeque Beans

Total Preparation Time: 3 hours
How Long Before Use: 1 day
Headspace: 1 inch
Process time: 75 minutes
Pressure: 10 pounds
Jars: 16-ounce
Yield: 6–8 16-ounce jars

NOTE: This is a version of the picnic favorite.

2 pounds of dried pinto beans
4 cups water and 8 cups of water, in two separate measures

Barbeque Sauce
3 Tablespoons black strap molasses
1 Tablespoon white vinegar
2 teaspoons kosher salt
¾teaspoon dry mustard
1 cup brown sugar (light or dark)
1 cup red onion, chopped

Step One: Rinse and clean dried beans, removing any debris.

Step Two: In large, heavy-bottom pot add 8 cups of water and the dried beans. Over a medium flame, bring to boil for 2 minutes. Reduce heat, cover pot, and simmer for approximately 40 minutes. Occasionally stir to prevent scorching or sticking. Remove from heat.

Step Three: Drain beans through sieve. Return beans to pot. Add 8 cups of fresh water.

Step Four: Add onions. Over medium heat, return to boil for 15 minutes. Remove from heat. Cover pot and let steep for 30 minutes.

Step Five: In large saucepan, mix 4 cups of water, molasses, vinegar, salt, mustard, and brown sugar. Over medium heat, bring mixture to low boil. Remove from heat. (This is the barbeque sauce for the beans.)

Step Six: Using a slotted spoon, fill the prepared jars ¾ way with the beans and onion mixture.

Step Seven: Ladle the barbeque sauce mixture over the beans, leaving the required 1-inch headroom.

Step Eight: Place lids on jars and process.

VARIATION:

You can 'heat' this recipe up by adding 1 teaspoon to 1 Tablespoon of cayenne pepper powder to the barbeque sauce. You can also add or increase dried spices to suit your tastes.

Candied Yams (or Sweet Potatoes)

Total Preparation Time: 2 hours
How Long Before Use: 1 day
Headspace: 1 inch
Process time: 60 minutes
Pressure: 10 pounds
Jars: 16-ounce, 32-ounce
Yield: 6–8 16-ounce jars

12 cups yams, peeled and cut into 1-inch chunks
12 cups of water

Syrup
2 cups brown sugar
2 cups orange juice
1 cup sugar
1 cup water
1 teaspoon vanilla
2 teaspoons cinnamon
1 teaspoon nutmeg
¼ cup lemon juice

Step One: In large saucepan, mix orange juice, brown sugar, water and spices. Over medium heat, bring mixture to boil. Reduce heat to simmer for 5 minutes. Remove from heat and set aside.

Step Two: In large stockpot, add water. Over medium heat, bring to boil.

Step Three: Peel and cut yams.

Step Four: Add yams to boiling water and blanch for 5 minutes. Remove from heat.

Step Five: Using slotted spoon, remove yams from pot and place in bowl. Set aside.

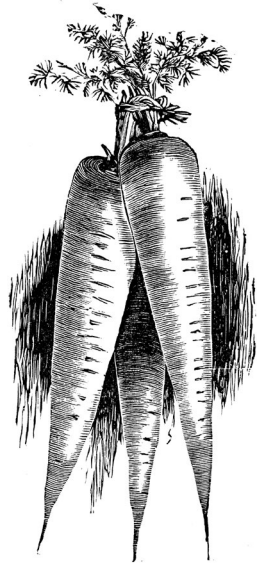
Step Six: Pack yam chunks into prepared jars. (Pack up to the shoulder of the jar.)

Step Seven: Ladle the syrup mixture over the yams, leaving the required 1-inch headroom.

Step Eight: Place lids on jars and process.

VARIATION:

This method and recipe can be used to make candied carrots.



Chicken or Turkey Soup

(Turkey Soup, Broths, , Bone Broth)

Total Preparation Time: 2 hours
How Long Before Use: 1 day
Headspace: 1 inch
Process time: 75 minutes for pints / 90 minutes for quarts
Pressure: 10/11 pounds
Jars: 16-ounce, 32-ounce
Yield: 5–6 32-ounce jars

NOTES: What to do with a turkey carcass after the holidays is a perennial dilemma. No one wants to waste it yet everyone is tired of eating it. Making a soup or broth is the ideal solution.

Bone broth is essentially a broth that is cooked very long over low heat and strained to remove any fat. Really. That's it.

Stock

Chicken carcass, including any meat, skin, cooking juices
1 cup onions
1 cup chopped celery
1 Tablespoon 100% pure salt
1 teaspoon ground black pepper
20 cups of water

Step One: Wash and rough-chop onions and celery.

Step Two: In a large stockpot, place carcass and bones. Add onions, celery, salt, and pepper. Cover with water.

Step Three: Over medium-high heat, bring to boil. Cover and reduce heat to simmer for 12 hours. (Broths can be simmered for up to 24 hours but exercise caution when leaving cooking pots unattended.) Remove from heat.

Step Four: Strain broth from solids. Use for soup in next steps OR strain again and preserve for broth/bone broth.

Step Five: Ladle into jars. Place on lids. Process.

Soup

16 cups of poultry stock (if you don't have homemade, use a concentrated commercial stock)

3½ cups diced turkey or chicken

1½ cups diced celery

1½ cups carrots, sliced into coins

1 cup onion, diced

1 teaspoon 100% pure salt

1 teaspoon ground black pepper

1 teaspoon dried parsley

1 teaspoon dried thyme

1 bay leaf

Step One: Wash and dice celery; set aside. Peel and slice carrots into coins; set aside. Clean and dice onions.

Step Two: In a large stockpot, pour stock. Add remaining ingredients.

Step Three: Over medium-high heat, bring to boil. Cover and reduce heat to simmer for 10 minutes. Remove from heat.

Step Four: Ladle into jars. Jars should be filled with an equal mix of solids and broth.

Step Five: Place on lids. Process.

Curried Pea Soup

Total Preparation Time: 2 hours
Special Equipment: Immersion Blender or Stand Blender
How Long Before Use: 1 day
Headspace: 1 inch
Process time: 60 minutes for pints / 75 minutes for quarts
Pressure: 10 pounds
Jars: 16-ounce, 32-ounce
Yield: 6–8 16-ounce jars

2 Tablespoons olive oil
1 cup onion, chopped
1½ cups (12 ounces) fresh or frozen green peas (thaw if using frozen)
5 cups chicken broth (you can substitute vegetarian chicken broth or vegetable broth)
1 Tablespoon garlic, minced
1 Tablespoon curry powder
1 teaspoon 100% pure salt
1 teaspoon ground black pepper

Step One: In large stockpot, pour olive oil. Over medium flame, heat oil. Add onions and salt; cook until softened, about 3 minutes.

Step Two: Add garlic and continue to simmer. Stir to keep onions and garlic from scorching or browning.

Step Three: Add peas, broth, and curry powder. Increase heat to bring to boil, then decrease to simmer. Cover pot and simmer on low heat until peas are tender, about 30 minutes. Remove from heat.

Step Four: Carefully blend mixture into puree (or desired consistency). If using a stand blender, puree in batches.

Step Five: Fill prepared jars. Place on lids and process.

VARIATION:

This recipe can be easily adapted for many pureed vegetable soups. Try substituting the peas with broccoli, corn, tomato, or asparagus.

Clam Chowder Soup Base

(New England and Manhattan versions)

Total Preparation Time: 4 hours
Headspace: 1 inch
Process time: 100 minutes
Pressure: 10/11 pounds
Jars: 8-ounce, 16-ounce
Yield: 8–10 16-ounce jars

NOTE: Clam chowders are cream soups and cannot be safely pressure-canned. But! The base minus the dairy ingredients can be preserved. Making bases for your soups is a handy time-saver and a great way to use windfalls of specialized ingredients.

½ pound diced salt pork
1 cup onion, chopped (about 1 medium)

14 cups chopped clams with juice
8 cups peeled and diced potatoes (about 8 medium-sized white potatoes)
8 cups boiling water
1 teaspoon salt
1 teaspoon ground black pepper

For Manhattan-style clam chowder, include these:

2 cups of crushed tomatoes
½ cup chopped celery
½ teaspoon dried thyme
½ teaspoon dried parsley
1 bay leaf

Step One: Clean and chop onion; set aside. Wash, peel, and chop potatoes; set aside.

Step Two: In large stockpot over medium heat, cook chopped salt pork until light brown. Remove from heat. Drain fat.

Step Three: Add the chopped onions to the stockpot and reheat until onions are tender but not browned.

Step Four: Add clams with juice, potatoes, salt, pepper, and water. Increase heat to bring mixture to boil for 10 minutes. * Remove from heat.

Step Five: Ladle mixture into prepared jars, stirring pot after each filling to keep an equal balance of liquid to solids. Remove air bubbles.

Step Six: Place lids on jars. Process.

*For Manhattan-style clam chowder add those ingredients at Step Four. (Remove bay leaf before pouring into jars.)

How to prepare for eating:

For New England-style clam chowder: for every 16 ounces of soup base, place 2 Tablespoons of butter and 2 cups of whole milk in the appropriate size saucepan. Over low heat, reduce milk and butter mixture by half. Add soup base. Increase heat to simmer for 5 minutes. Serve.

Beef Stew with Vegetables (or other game meat)

Total Preparation Time: 2 hours
How Long Before Use: 1 day
Headspace: 1 inch
Process time: 75 minutes for pint jars / 90 minutes for quart jars
Pressure: 10 pounds
Jars: 16-ounce, 32-ounce
Yield: 6–8 16-ounce jars

NOTE: Pressure canning recipes that include vegetables will have a shorter cook time in preparation to account for the long pressure canning time. The pressure canning process cooks and preserves the food.

1 Tablespoon vegetable oil
4 to 5 pounds stewing beef, cut into 1½-inch cubes
12 cups potatoes, peeled and cubed
8 cups carrots, peeled and sliced
3 cups celery, chopped
3 cups onions, chopped
4½ teaspoons salt
1 teaspoon dried thyme
½ teaspoon freshly ground black pepper
(Other dried spices as suits your taste)
10 cups water

Step One: Wash, peel, and cube/chop vegetables as indicated. Set aside.

Step Two: In a large frying pan over medium-high flame, heat oil. In batches, brown cubed beef. (Add a Tablespoon more oil if needed.)

Step Three: In large stockpot, add browned beef, vegetables, and spices. Add water.

Step Four: Over medium flame, bring mixture to boil while frequently stirring. Reduce heat and simmer for 5 minutes. Remove from heat.

Step Five: Ladle mixture into prepared jars, stirring pot after each filling to keep an equal balance of liquid to solids.

Step Six: Place lids on jars. Process.

Variation:

Any type of lean red meat can be substituted for the beef. Try venison, elk, buffalo, or other game meats.

Chili Con Carne

(Kidney beans, Pinto beans)

Total Preparation Time 3 hours

How Long Before Use: 1 day

Headspace: 1 inch

Process time: 75 minutes for pints / 90 minutes for quarts

Jars: 16-ounce, 32-ounce

Yield: 6–8 16-ounce jars

NOTE: The first question asked when reading this recipe is "Can I substitute commercially canned beans?" The answer is no. During the pressure canning process, the beans absorb liquid; using commercial beans that have not been properly prepared often results in a mushy product and worse—a product that has become so thickened that the 250-degree heat hasn't reached the center of the jar, rendering it unsafe.

Because the first step of making the chili is making the beans, many makers prepare a larger number of beans than the recipe requires and preserve a batch of beans alone.

You can substitute TVP (texturized vegetable protein) for the meat in the recipe to make it 100% vegetarian.

3 cups dried pinto or red kidney beans

12 cups water in two separate measures

2 teaspoons 100% pure salt

Chili

3 teaspoons 100% pure salt

3 pounds ground beef

1½ cups onions, chopped

1 cup red bell peppers, chopped (use a few jalapeños for a spicier chili)

1 teaspoon ground black pepper

4 Tablespoons chili powder (use 2 more Tablespoons for a spicier chili)

8 cups tomatoes, crushed (measure after crushing)

Step One: Rinse and clean dried beans, removing any debris.

Step Two: In large, heavy-bottom pot add 6 cups of water and the dried beans. Over a medium flame, bring to boil for 2 minutes. Reduce heat, cover pot, and simmer for approximately 40 minutes. Occasionally stir to prevent scorching or sticking. Remove from heat.

Step Three: Drain beans through sieve. Return beans to pot. Add 6 cups of fresh water and 2 teaspoons of salt. Over medium flame, bring back to boil for 2 minutes. Reduce heat and simmer for 30 minutes.

Step Four: Clean and chop onions and peppers; set aside.

Step Five: In a large frying pan over medium heat, brown ground beef. Add onions and peppers. When beef is completely browned, remove mixture from heat and drain fat.

Step Six: In large stockpot, add meat mixture. Add tomatoes and spices.

Step Seven: Drain beans. * Add beans to pot filled with meat and tomato mixture. Over medium heat, simmer for 5 minutes. Remove from heat.

Step Eight: Ladle mixture into prepared jars, stirring pot after each filling to keep an equal balance of liquid to solids.

Step Nine: Place lids on jars. Process.

VARIATION:

Any type of lean red meat can be substituted for the beef. Try venison, elk, buffalo, or other game meats.

*Reserve the liquid from this stage of cooking if you'd like to preserve the beans alone. To do that, fill jars to shoulder of canning jar with the cooked beans. Use reserved liquid to ladle over the beans to a headspace of 1 inch. Same processing time as above.

Sloppy Joe (Loose Meat, Meaty Manwich, Spanish Hamburger)

Total Preparation Time: 3 hours

How Long Before Use: 1 day

Headspace: 1 inch

Process time: 75 minutes for pints / 90 minutes for quarts

Jars: 16-ounce, 32-ounce

Yield: 6–8 16-ounce jars

NOTE: You can substitute TVP, texturized vegetable protein for the meat in the recipe to make it 100% vegetarian.

If you've canned tomato sauce and tomato ketchup, use those. Otherwise, use a commercial brand with no fillers and the fewest additives.

4 pounds lean ground beef (can use venison, turkey, or elk OR combination of meats)

3 cups onion, peeled and diced

1½ cups green pepper, cored and diced

2 cups tomato sauce

2 cups tomato ketchup

2 cups water

1 Tablespoon 100% pure salt

1 teaspoon brown sugar

2 Tablespoons mustard powder

2 Tablespoons cider vinegar

¾ teaspoon black pepper

Step One: Wash, de-seed, and dice green pepper; set aside. Clean and dice onion; set aside.

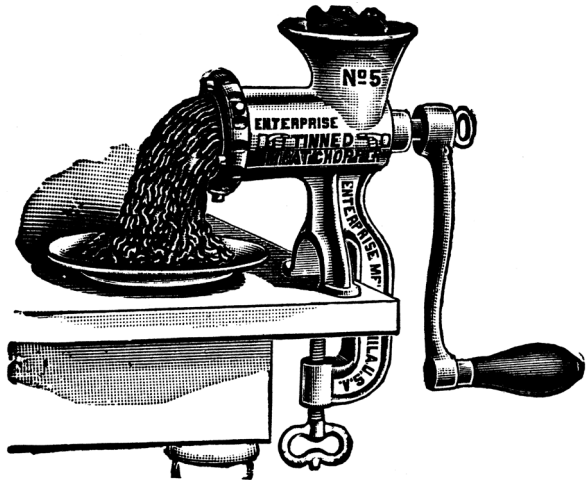
Step Two: In large frying pan over medium heat, sauté meat and onion until thoroughly cooked. Remove from heat.

Step Three Drain fat and return to frying pan.

Step Four: Add the remaining ingredients. Over medium heat, bring to boil and simmer for 5 minutes. Remove from heat.

Step Five: Ladle mixture into prepared jars, stirring pot after each filling to keep an equal balance of solids to sauce.

Step Six: Place lids on jars. Process.



Italian Sausage and Peppers

Total Preparation Time: 2 hours
How Long Before Use: 1 day
Headspace: 1 inch
Process time: 75 minutes for pints / 90 minutes for quarts
Pressure: 10/11 pounds
Jars: 16-ounce, 32-ounce
Yield: 5–6 32-ounce jars

NOTE: Choose your jar size first as that will determine how you prepare the sausages. Quart jars fit about 4 whole sausages while pint jars fit 2 sausages that are halved.

20 Italian sausage links (Can use sweet or hot peppers. Or mix of both.)
2 Tablespoons olive oil
4 cups red or green bell peppers, sliced into strips
2 cups yellow onions, thinly sliced
16 cups (4 quarts) vegetable, chicken, or beef stock

Step One: Wash peppers, de-seed, slice into strips; set aside. Clean and thinly slice onions; set aside.

Step Two: In large frying pan, place the olive oil and warm over medium heat. Add sausages, peppers, and onions. Saute until onions and peppers are lightly browned (about 5 minutes).

Step Three: Remove onions and peppers and place in small bowl; set aside.

Step Four: Continue cooking sausages until cooked throughout. Remove from heat.

Step Five: Place sausages on plate covered with paper towel to absorb excess fat. Set aside.

Step Six: In large stockpot over medium-high heat, bring broth to boil for 5 minutes. Remove from heat.

Step Seven: Pack a few pieces each of peppers and onions into prepared jars.

Step Eight: Pack sausages into jar. They should not fill beyond the shoulder of the jar.

Step Nine: Ladle broth over the sausages to required 1-inch headspace.

Step Ten: Place on lids. Process.

VARIATION:

Any type of sausage can be preserved using this recipe. Onions and peppers can be omitted.

Chapter Ten
Fermentation

As mentioned earlier in Part One, fermentation is a broad description for creating a modified environment to encourage a sympathetic microbe to inhabit a food. The by-product of fermentation is acidic, and depending on the type of microbe, it can be acetic acid, lactic acid, carbon dioxide, or alcohol (to name a few). These by-product acids prolong the viability and add flavor to food. Bacteria, yeast, molds, and complex combinations of them act as fermenting agents. Know that different microbes impart different flavors. The trick is to get the microbe you want in and keep the ones you don't out.

Thinking back to our first rules of food safety, foods that are exposed to moderate temperature and oxygen and are in the midst of decay will attract microbes. The ancient historian Herodotus makes note that most men are afraid of spoiled food, yet the Egyptians 'spoil' their bread on purpose. This purpose—fermentation.

Beginning a fermentation depends on how we manage the pursuit of microbes. This falls into two distinct methods: either modifying a food to attract a specific microbe, or introducing a specific bacterium to food. Sauerkraut, kimchi, and sourdoughs are examples of creating an environment to encourage yeast, mold, or bacterial growth. Cheese, salumi, and kombucha are foods that are prepared, then introduced to a microbe or microbial colony 'starter' that begins and accelerates the fermenting action.

In modern kitchens, we don't encounter the same climatic challenges as the Nuer, Nuba, and Dinka do in Sudan. (Sudan being the home of the most kinds of fermented foods—80!) We are able to control for temperature and humidity, the two variables that can negatively affect the results of fermented foods. This allows us the freedom to choose and experiment with fermenting for flavor versus for survival.

The longer food is fermenting, the stronger the flavor of the final product. Often, a food is called by a different name based on the length of fermentation. Scandinavian gravlax only becomes that after the prepared salmon cures for the prescribed time. A shorter cure time, and it is surlaks. And of course, gravlax is similar to lox. In fact, many revered local culinary delicacies are often related to other items from different areas. Slight variations in spices and technique are often the only difference.

Fluid word meanings also influence our preservation methods. Often, the word 'cure' is used interchangeably with the word 'ferment,' especially when talking about meat and dairy products. When making a sausage that is then set into a smokehouse or stillroom to 'cure' or 'age,' it's put into an environment that will allow microbes to take root and produce the by-products that both add flavor and extend viability. Aged beef, hams, and salumi are all fermented

to some extent. (We'll separate out the recipes for those in the section on curing and smoking.)

Vinegar-pickled cucumbers were discussed earlier in the acidified foods section, but now is the time to mention the Half-Sours, Full-Sours, and Jewish pickles. Practically speaking, it makes more scientific sense to include this style of 'pickle' under fermentation based solely on which process is used to make it. So a ferment it is. Familiar to families of Eastern European descent and common in the Midwest is a variation of fermented vegetables that uses both a vinegar and salt pickling solution, and fermentation to create a distinct taste. This hybrid method makes a unique variety of pickled cucumber but can also be used on other thicker-skinned vegetables, like green beans, carrots, and Brussels sprouts.

Alcoholic beverages are fermented liquids. Vintners may cringe at the use of the word 'wine' but many households around the world grew up drinking a variety of homemade wines. The English classify them as 'country wines,' as the making of them was the purview of rural residents and poor people. One of the more valued skills in a prison is knowing how to make 'raisin jack'—an alcoholic drink made of raisins and pretzels. Again, anything can be fermented. Nomadic tribes have a long tradition of fermented milk drinks. In west African countries, palm wine made from fermented palm leaves is still popular. Beers are made from fermented grains using a similar process. Not to discount the euphoric effect of drinking fermented beverages, but more essential to the existence of these drinks is the fact that in many areas potable water was and is a rare thing. Sure, you can stop and boil found water to render it safe. But if one is traveling across a desert or unsure of the water supply, carrying a skin of wine or beer ensures you have a safe source of water.

The recipes included in this section range from easy to challenging. Using some of the modern tools available, as well as your newfound understanding of why fermentation works, will allow you to experiment with developing flavors you enjoy.

Tools and Techniques

Because of the wide range of foods that can be fermented and the techniques used, the tools discussed here are the ones used in most home-kitchen fermentation projects. Historically, a ferment can be started with nothing more than a banana leaf and a hole in the ground, but we're going to use modern food safety practices and leave the old ways behind us.

The most commonly used fermentation tool is the stoneware crock. Crocks are made in sizes usually beginning at one gallon and going up to 50 gallons. Crocks are made of a locally sourced clay and fired multiple times for strength. They are 'salt-glazed' to seal the material and make it watertight. What makes a stoneware crock so useful for fermentation is its ability to hold foods at a steady temperature. Crocks of all sorts and sizes were (and are) used for everything from holding umbrellas to fermenting pickles. Given their long history, crocks in and of themselves have become sought-after collector's items. Older crocks may have cracks, but if they are watertight, they are still good to use. Many a family has fought a battle over custody of Gramma's crock, but in truth, crocks are still made and readily available. If you have a crockpot, you have a crock. Take it out of its heating element and use it for fermentation. (See Resource Guide.)

In class, we use food-grade plastic buckets as our fermentation crocks. These can be purchased new or recycled from friendly restaurants and bakeries. (Most commercial kitchens receive food deliveries in five-gallon buckets and are happy to see them put to good use.) We've found no difference in the quality of sauerkraut or half-sour pickles in using food-grade buckets versus stoneware crocks.

Glass canning jars can also be used for fermentation projects. Larger, wide-mouth, two-quart jars work very well for smaller batches. They work especially well for fast fermenting foods like kimchi and tsukemono (Japanese quick pickles). Japanese-specialty grocery stores also sell a specialized kitchen-counter fermenter for making tsukemono. These devices have the ventilation and compression tool built into the box for ease of use. If you're a fan of Japanese-style quick pickles, this tool is a must-have. They are relatively inexpensive and easily found online.

More important than the container is the 'lid' you put on top of it. For a fermentation to be successful, the microbes must actively digest the oxygen and produce carbon dioxide. CO_2 is a gas that needs to escape its container or become pressurized to cause a small eruption. From bubbling jars of kimchi oozing to exploding bottles of wine, carbon dioxide will find a way to escape its confines at all cost. Better to have a lid that allows for the CO2 to escape and prevent oxygen (and insects and pathogens) from entering.

Many contraptions have been invented to do just that. Stoneware crocks often come with a wooden lid. The wood does the basic job of letting the gases do their thing but does little to prevent pathogens. A better solution for fermenting using crocks or buckets is the Water Bag. Using a zipper-seal plastic bag, fill it half full with water and add a tablespoon of salt. Seal it, then put it into

another zipper-seal bag. Rinse and place on top of your beginning ferment. (We call them 'babies' in class.) The weight of the water keeps the material from floating, and the nature of the water is to level itself in the container, effectively creating a barrier, but not so tight as to prevent the carbon dioxide from escaping.

The water bag method also solves another challenge: keeping the food material below the fermenting liquid. Many families used a combination of a plate weighted down with a brick. (My husband keeps his grandmother's 'pickle brick' as a fond memory of her.) 'Pickle weights' can be purchased in many diameter sizes to fit a variety of jars and crocks. The water bag solution is easily the best and most cost-effective way to go.

Mason jar fermenting can be easily lidded by using a lightly tightened lid and band for kimchi, using a device called an 'airlock.' This simple device comes in a few designs and styles but serves the same function: It allows carbon dioxide to escape while keeping oxygen and vermin out. An airlock is made of plastic, shaped like a tube with bend and reservoir to hold water. (Much like the design of a toilet.) The stem fits into a hole in a tightened lid. Water is placed in the reservoir, and a loose-fitting cap goes on top of that. For longer fermentations, the water may need to be replaced.

The airlock system is also used for beer- and wine-making, giving rise to some giggly names for the tools involved. The hole that the airlock fits into, whether it is in a jar, carboy, jug, or barrel, is referred to as a 'bunghole.' Originally, it was used when talking about barrels and casks but has spread to common usage. Airlocks with matching-size bunghole caps and lids are available at many retailers. (See Resource Guide.)

An innovation designed for Mason jars is the 'pickle pipe.' Recently released to the commercial market, 'pickle pipes' are described as a 'waterless airlock.' Essentially, the silicone lid has a protruding nipple with a small slit. It is flexible and permeable enough to allow for the carbon dioxide to escape and seal out pathogens. These have not yet been tested by any of the scientists that are part of the Center for Home Food Preservation but are receiving solid reviews from the field. Like all food preservation, experience is the best teacher. They are worth trying. (See Resource Guide.)

Earlier, I mentioned that fermentation could range from quite simple to agonizingly complex. Wine and beer making have exacting specificity to ensure successful making. Lifetimes are devoted to cultivating the best grapes and harvesting the perfect yeasts to create the finest wines. With absolute honesty, I have made the most exquisite rhubarb sparkling wine, but highly doubt I could replicate the exact conditions and mistakes that allowed that miracle to occur.

One must have a happy and hearty constitution to endure the vagaries of winemaking. Decent country wines need a minimum of six months of fermentation and even then you may discover you've made something undrinkable.

Home-brewed beer has experienced a boost in both popularity and accessibility to equipment and supplies. Most towns and cities have clubs that assist and share information about the brewing craft. Larger cities often have at least one retail store that specializes in beer- and winemaking supplies. And the most recent innovation is a 'shop' that assists you in the making of your beer and allows you to ferment it on their premises—an excellent way to learn the basics and meet fellow enthusiasts.

I encourage you to try making a batch of 'country wine' at home. The equipment needed is similar to other fermenting projects. Both beer and wine fermenting are done in a carboy, which is a cylindrical glass jug. Five-gallon sizes are available for larger projects, but one-gallon glass cider jugs can be recycled for fermenting use. You'll also need a food-grade plastic bucket, airlocks, and food-grade plastic tubing. It's often recommended to have a hygrometer to measure specific gravity, which measures the sugar and de facto alcohol content of your wine. But following a recipe that is already calibrated precludes the need for the tool. Not to mention the adventure of not quite knowing how powerful your wine is.

The steps and tools for making kombucha are similar to winemaking, though simpler in execution. In winemaking, you often add a particular strain or variety of yeast to yield a type of wine. The biologically active element of kombucha is a symbiotic mix of both bacteria and yeasts, referred to as a SCOBY (Sympathetic Colony of Bacteria Yeast). A SCOBY can be grown from scratch using atmospheric attractants, but more often is shared among makers.

Reminiscent of sourdough bread starters, a SCOBY can be nurtured as a 'mother' and split off to be used in multiple batches of kombucha. A kombucha SCOBY is sometimes referred to as a 'mushroom,' so don't panic if you see a recipe that tells you to put 'mushroom' in the liquid. Local makers are often happy to share and trade 'baby' SCOBYs with friends and neighbors. Many health and natural food stores will sell you a SCOBY. You can also grow a SCOBY from a purchased kombucha beverage and begin your own 'mother.'

Kombuchas are fermented in jars and buckets, depending on the batch size. Because the SCOBY is working to digest the sugars in the liquid and producing acetic acid, the kombucha becomes both acidic and inhospitable to other pathogenic microbes. You will have to cover the vessel with a cheesecloth or superfine fabric to prevent insect infestation. Or you can use a bung and airlock system, depending on your fermenting container. Kombucha can

be made with any sweetened liquid—teas, fruit juices, and herb extracts can all be combined to create a wide variety of flavors.

Once the desired flavor is reached, the liquid is strained from the 'mother' and placed in refrigeration to both preserve it and slow any further fermentation. (Temperature plays a significant role in ALL fermenting; high temperatures accelerate fermentation, and lower temperatures slow it down.) The SCOBY should be placed in a new sweetened liquid to nurture its growth and future use.

More than any other preservation technique, fermentation offers the most variety of styles. Included are recipes that will allow you to experiment and give you a range of fermentation projects. If one style of fermentation intrigues you, invest the time in learning more about it. The Resource Guide includes recommended titles to further your exploration.

Details about the specific tools and steps for making the recipes are within the actual recipes.

Tips for Fermentation

Scrupulously clean. Fermentation works when the environment is attractive to the desirable microbes. Cleaning and disinfecting all containers and tools ensure that no pathogens are lingering behind.

Use only pure salt. For brining and salt solutions, use only 100% salt products. Whether you choose canning salt or sea salt, make sure that your salt has no chemical additives.

Quick Ferments. Look to Asian-inspired recipes for fast-fermenting recipes. Japanese tsukemono is ready to eat within 8–24 hours, and Korean kimchi is often ready to eat within 72 hours.

Ferments prolongs, not preserves. Fermented foods vary wildly in their use-by date. Before you begin making, determine if you can consume the food within the safe period. If not, you may have to use an additional preservation method (canning, freezing, or dehydrating).

Experiment with flavors. Apples add sweetness to sauerkraut. Fermented cranberries have a rich sour taste. Harvest Roots Ferments in Alabama makes kombucha with locally foraged items like Honey Locust seed pods.

Embrace failure and happy accidents. More than any other preservation technique, fermentation works with nature. And no one can predict what nature will do. Sometimes a kraut crock will turn gray and mushy. Sometimes the wine becomes ropey. Sometimes a bug gets in and spoils an entire batch. Follow your best practices and food safety guidelines but know that it could still go wrong, or right, and get rhubarb sparkling wine.

Ready?

All recipes make the assumption that you've prepared your fermenting container and tools. Some recipes require unique ingredients. Kimchi isn't a kimchi unless it has gochugaru. Take inventory of your ingredients before you begin, as some items cannot be substituted.

RECIPES

Sauerkraut

(Red Cabbage Sauerkraut, Sauerkraut with Apple and Juniper)

Total Preparation Time: 1 hour

Special Equipment: Fermenting crock, or 2- to 5-gallon food-safe pail, Sauerkraut pounder (Kraut Hammer)

How Long Before Use: 3 weeks for half-sours, 6 weeks for full-sours

Ferment time: 3 to 6 weeks

Yield: varies

Note: A sauerkraut recipe is less a recipe and more of a methodology. Sauerkraut, like the fermented cucumber pickles, relies on the correct ratio of salt and water to attract the beneficial bacteria that begin the lacto-fermentation process.

As cabbage transforms into sauerkraut it loses about ¾ of its total mass. For example, 25 pounds of cabbage becomes about 5 pounds of sauerkraut.

When your kraut has reached 'peak ferment,' you have several choices to further preserve it. Placing the kraut in the refrigerator slows the fermentation down, extends its usability, and preserves the beneficial bacteria. You can also place it in freezer bags and freeze, or canning jars and hot-water bath process. These methods extend the usability to 6 months and 1 year, respectively. Both freezing and hot-water bath processing kill any of the probiotic bacteria.

25 pounds of white cabbage (about 5–6 heads of cabbage)

1 cup of 100% pure canning/pickling salt

2 cups warm, distilled water

2 Tablespoons 100% pure canning/pickling salt

Step One: Remove outer leaves of cabbage.

Step Two: Using large sharp knife, slice cabbage into long, thin shreds. (You can use a large mandoline or 'kraut cutter.') Place shreds into very large bowl.

Step Three: Sprinkle shreds with salt. Using hands, mix salt thoroughly with cabbage. Set aside for 15 minutes.

Step Four: Wash and sterilize fermenting vessel with hot soapy water.

Step Five: Transfer cabbage shreds, including liquid, to fermenting vessel.

Step Six: Place container on floor or other solid and stable surface. With sauerkraut stomper, begin pounding the cabbage. (Make an improvised sauerkraut stomper by wrapping a heavy-duty plastic freezer bag around the end of a baseball bat secured with a rubber band.)

Step Seven: Pound cabbage until enough liquid is released to completely cover the surface by about 1 to 2 inches. (Sometimes, a cabbage does not have enough moisture in it to cover, regardless of how much it's pounded. In those cases, mix 2 cups of room-temperature distilled water with 2 Tablespoons of canning salt until salt is fully dissolved. Pour into fermenting vessel. Pound for a few minutes to fully integrate.)

Step Eight: Cover fermenting vessel with fitted wooden lid or water bag.*

Step Nine: Place fermenting vessel in a cool, dry location away from direct sunlight to ferment. (Ideal fermentation temperature is 68 to 72 degrees for the first week, then 55 to 65 degrees after that. Dry basements are ideal as they maintain a relatively consistent temperature.)

Step Ten: Check on your fermenting vessel daily. Check for any evidence of spoilage or rot. You may notice some bubbling; this is normal and can be skimmed. Your crock should have a vinegary scent; if it smells of mold or rot and any strands of cabbage are gray, soft, or otherwise discolored, your batch has been contaminated and must be discarded.

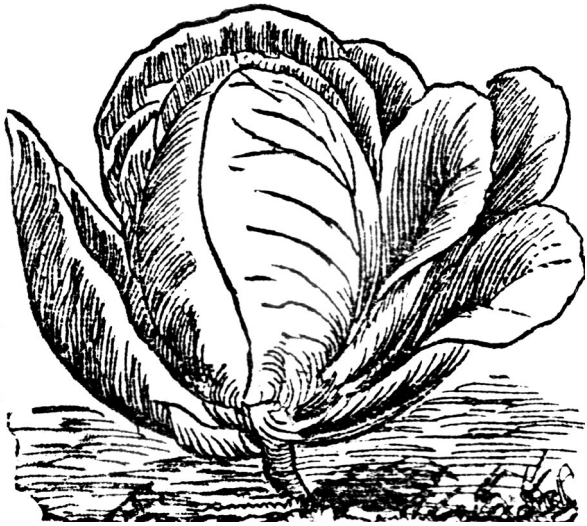
Step Eleven: Fermentation time is variable based on temperature. Taste your kraut at about 3 weeks. It can take anywhere from 3 to 6 weeks to achieve 'peak ferment.'

*A water bag is an ideal cover for your fermenting vessel. Take a 1-quart, 1-gallon, or 2-gallon heavy-duty plastic freezer bag and fill halfway with room-temperature water. Add 1 Tablespoon of canning salt. Seal. Place that bag into another bag and seal. Rinse with warm water. Lay flat on top of fermenting vessel and adjust so that it fully covers the opening.

The water bag acts as a weight to keep the cabbage submerged in the saltwater and a seal against vermin and pathogens while allowing fermenting gases to escape.

VARIATION:

Substitute red cabbage and add a Tablespoon of sugar to the salt for a sweeter sauerkraut. You can also mix in caraway seeds to flavor your sauerkraut. A Bavarian version uses the addition of 1 apple and a half-teaspoon of dried juniper berries per 5 pounds of cabbage.



Fermented Cucumber Pickles (Half-Sour / Full-Sour / Jewish Pickle)

(Original recipe by Marcin Filutowicz, Professor of Bacteriology at the University of Wisconsin at Madison, and adapted for home preservationists by Christina Ward.)

Total Preparation Time: 1 hour

Special Equipment: Fermenting crock, quart-sized canning jar, or 2-gallon food-safe pail

How Long Before Use: 3 weeks for half-sours, 6 week for full-sours

Ferment time: 3 to 6 weeks

Jars: 32-ounce

Yield: 1 32-ounce jar

NOTE: The fermented cucumber pickle developed in the Baltic region and was exported throughout eastern Europe to evolve into the American versions of full-sours, half-sours, Jewish Pickles. There are variations in spices and ferment times that lend themselves to the familiar naming. Literally, half-sours are fermented for less time than full-sours. A variation that is less familiar in the U.S. is the Polish *ogorek konserwowy*; this is a sweet fermented cucumber pickle that is the historical parent to American 'bread and butter' pickles.

This recipe can be increased make sure the salt-to-water-to-cucumber ratios remain intact. The recipe calls for distilled water; this is important because many municipal water supplies use chlorine and other chemicals to purify. Distill your tap water by boiling it for 10 minutes. Cool to room temperature before using.

See the variations for a Polish version that uses the same method, but adds vinegar to the water and salt mixture.

This recipe makes a small batch of approximately 1 quart of fermented cucumber pickles.

10 pickling cucumbers (number one- or two-sized)

1 Tablespoon mustard seeds

2 cloves peeled garlic

1 stem of whole, mature dill, including flower

2 Tablespoons 100% pure pickling/canning salt

1 quart distilled water

Step One: Wash cucumbers. Remove the 'blossom end' (opposite of the stem) either scraping off the residue or cutting the ends completely off. Place cucumbers in cold saltwater bath. Repeat until all the cucumbers are finished. Set aside.

Step Two: Peel garlic; set aside. Rinse and gently pat dry dill; set aside.

Step Three: Wash and sterilize fermenting container with hot and soapy water. Rinse well.

Step Four: Place mustard seeds, garlic, and dill into fermenting container. Tightly pack cucumbers into jar, crock, or bucket.

Step Five: Mix salt and distilled water. Stir until salt is fully dissolved.

Step Six: Pour mixture over cucumbers until they are completely submerged.

Step Seven: Lightly cover to keep cucumbers submerged yet allowing air to flow. If using a canning jar, cover with cheesecloth held on by rubber band or canning jar lid fitted with an airlock, or a Pickle Pipe. If using a crock or pail use a water bag.*

Step Eight: Place fermenting vessel in a cool, dry location away from direct sunlight to ferment. (Ideal fermentation temperature is 55 to 65 degrees. Dry basements are ideal as they maintain a relatively consistent temperature.)

Step Nine: Check on your fermenting vessel daily. Check for any evidence of spoilage or rot. You may notice some bubbling; this is normal and can be skimmed. Your crock should have a vinegary scent; if it smells of mold or rot and the cucumbers are gray, soft, or otherwise discolored, your batch has been contaminated and must be discarded.

Step Ten: Fermentation time is variable. For full-sours / Jewish pickles, ferment for approximately 6 weeks. For half-sours, ferment for approximately 3 weeks.

*A water bag is an ideal cover for your fermenting vessel. Take a 1-quart, 1-gallon, or 2-gallon heavy-duty plastic freezer bag and fill halfway with room-temperature water. Add 1 Tablespoon of canning salt. Seal. Place that bag into another bag and seal. Rinse with warm water. Lay flat on top of fermenting vessel and adjust so that it fully covers the opening.

The water bag acts as a weight to keep the cucumbers submerged in the saltwater and a seal against vermin and pathogens while allowing fermenting gases to escape.

A special note about fermentation locations: Be careful where you choose to place your fermenting vessel as it can absorb microbes that can both contaminate or negatively flavor your ferment. This holds true for sauerkraut and other ferments. As I tell everyone in class, don't put your crock next to the cat's litter box!

VARIATION:

This is Bucia Magrecke's version of Polish-style vinegar fermented pickles. At Step Five, mix a pickling solution of 1 cup of white vinegar and ¼ cup of 100% pure canning salt per one quart of distilled water. Bring solution to a boil in a covered pot, then cool completely. Then resume Step Six.

Mak Kimchi

Total Preparation Time: 2 hours

Best time to eat: 1 week

Keeps: 3–4 weeks, refrigerated

Yield: 1 quart

NOTE: Korean cabbage condiment is enjoying popularity in the U.S. Creative cooks are experimenting and tweaking the concept of kimchi to the delight of eaters. Kimchi allows for this kind of experimentation as long as the defining element of kimchi is present: Gochugaru.

Gochugaru is the powdered pepper that gives kimchi both its distinct color and flavor. Gochugaru comes in a fine or coarse powder. Though it comes in hot and mild varieties, overall it rates low on the Scoville heat scale (4000–8000 SCU). You'll find gochugaru at Asian grocery stores.

Kimchi is another example of a boosted ferment. The addition of the fermented fish sauce kick-starts the fermentation process. For vegetarians, there is a 'vegetarian fish sauce' on the market. You'll find it in the refrigerated section of larger Asian grocery stores.

The recipe below is a simple and traditional kimchi. Once you determine your preferred level of heat and ferment, feel free to experiment and add other shredded vegetables like carrots, radishes, mustard greens, or jicama.

2 pounds of Napa cabbage, cut into 2-by-1-inch rectangles
¼ cup of yellow onion, thinly sliced
4 green onion stalks, the green stem sections only and cut into 2-inch-long pieces
2 teaspoons minced garlic
2 teaspoons finely grated ginger
2 Tablespoons fish sauce
2 Tablespoons 100% pure salt
1 teaspoon sugar
3 Tablespoons gochugaru
¼ cup water

Step One: Rinse cabbage and cut into 2 by 1 inch-sized pieces. Place into large bowl and cover with salt. Mix thoroughly. Set aside for 45 minutes.

Step Two: Clean and mince garlic. Peel and grate ginger. In small bowl, mix garlic, ginger, sugar, and gochugaru with fish sauce to form a paste. Set aside for 15 minutes.

Step Three: Wash green onions and cut green stems into 2-inch pieces. Clean onions and slice into thin strings. In a large bowl, place both onions; set aside.

Step Four: Drain cabbage in large strainer. Rinse and set aside in strainer for 15 minutes to fully drain. Add drained cabbage to onions.

Step Five: Mix gochugaru paste with cabbage and onions. (Use latex gloves and use hands to thoroughly and evenly mix together.)

Step Six: Pour ¼ cup of water into bowl containing the remains of the gochugaru paste. Use spatula to scrape and mix together. Set aside.

Step Seven: In large-mouth quart-size canning jar, pack the mixture tightly into jar. Pour reserved water mixture into jar. Do not fill beyond shoulder of jar.

Step Eight: Using a plastic canning jar lid or two-part lid, lightly place onto jar. (The kimchi needs airflow to expel carbon dioxide. You can also use a canning jar lid fitted with an airlock or a Pickle Pipe.)

Step Nine: Set on jar on plate (to catch any overflow during active fermentation) and place on counter or table at room temperature for 3 days.

Step Ten: Remove lid and check fermentation. Taste a piece to determine if it is at 'peak ferment' for your taste. If it is, place in refrigerator to slow ferment. If it is not, leave on counter at room temperature for another day. Taste again.

Kimchi when refrigerated will continue to ferment but at a much slower rate. The flavor develops over time.

Daikon Radish in Soy Sauce (Daikon Shoyu-zuke)

(Adapted from *Quick & Easy Tsukemono* by Ikuko Hisamatsu)

Total Preparation Time: 4 hours

Special Equipment: Stoneware Bowl or Japanese Pickle Press (see Resource Guide)

Best time to eat: 6 hours later

Keeps: 2–3 days

Yield: 2 cups

NOTE: Kombu is dried kelp. Yuzu is citrus fruit, related to grapefruit and lemons. Mirin is a sweet, low-alcohol sake used in cooking and as a condiment. The Japanese ingredients can be found at Asian grocery stores and sometimes at 'high-end' specialty markets.

Depending on the freshness of the daikon, its juice may come out in the pickling process and thin the seasonings. Increase this recipe in ratio if you'd like to make more.

2 cups daikon radish, sliced (about 1½ pounds)

2 Tablespoons 100% pure salt

½ cup yuzu (use lemon if you can't find yuzu)

1½-inch-long piece of dried kombu

¼ cup soy sauce

1 Tablespoon sake

1½ teaspoons mirin

Step One: Peel and slice daikon into coins or half-moons, about ⅜-inch thick.

Step Two: Spread sliced daikon in single layer on a cutting board or parchment-lined jelly roll pan. Sprinkle daikon with salt and allow to sweat for 30 minutes.

Step Three: Use small grater or zest tool to make medium shreds of yuzu rind; set aside.

Step Four: Cut (julienne) kombu into very thin strips; set aside.

Step Five: Rinse daikon pieces and pat dry; set aside.

Step Five: In stoneware bowl, combine soy sauce, mirin, and sake. Add daikon, yuzu rind and kombu strips. Lightly mix.

Step Six: If fermenting in bowl, place a heavy plate or water bag on top of the mixture. If using a pickle press, transfer the mixture to the container. Place on lid and adjust press mechanism so it rests tightly against the daikon.

Step Seven: Place on counter or table at room temperature. Lightly turn mixture after 1 hour to ensure an even distribution of flavor and fermentation.

Step Eight: After a total of 4 hours, remove from pickle press or leave in stoneware bowl. The fermented pickle can be eaten or placed in refrigerator to slow ferment. Conversely, you can allow fermentation to continue for about 24 hours. This results in a strongly flavored pickle. Regardless, this daikon pickle tastes best when eaten with 48 hours.

VARIATION:

Any vegetable can be made into a tsukemono using this method and recipe. Try it with parsnips, carrots, broccoli florets, asparagus, and beets.

Garlic in Miso (Ninniku Miso-zuke)

(Adapted from *Quick & Easy Tsukemono* by Ikuko Hisamatsu)

Total Preparation Time: 1 hour
Special Equipment: Wide-mouth 16- or 32-ounce Canning Jar
Best time to eat: 6 days to 3 months
Keeps: 1 month at room temperature / 6 months refrigerated
Yield: Varies

NOTE: Miso here is used as a catch-all description of the thousands of varieties of fermented soy bean powder and paste that is a staple of Japanese cuisine. This recipe demonstrates using a fermented food as a base to begin fermentation in other foods.

This method of fermentation is found throughout Asian food culture. Most Japanese home cooks keep a bed or jar of miso paste, refreshing it with new paste throughout the year. You can do this too. To maintain your miso paste ferment, stir it daily, occasionally refresh it with new paste, and keep it covered to prevent infestation of molds or vermin. Adding and removing a hot pepper every two weeks will impart heat to any of the fermenting vegetables as well as act as a natural barrier to pathogenic microbes.

Related to miso fermentation is nuka fermentation. Nuka, like miso, is a fermented then dried product. It's made from rice bran instead of soy bean. Less common in American versions of Japanese cuisine, it can be found in larger Asian food stores. Prepare a nuka paste in the same manner as the miso paste.

Traditionally, this fermented garlic is eaten whole as an appetizer or mashed as a condiment. Miso can be found at Asian grocery stores and specialty and natural food markets.

And finally, as with all fermented foods, the flavors change and develop over time. A six-day-old fermented garlic will taste vastly different than after a month of fermentation. If this is your first time making, taste a clove once a week to discover what your preferred peak flavor is.

1 cup freshly peeled cloves of garlic

1 cup miso (choose whichever variety appeals to you)

4 Tablespoons mirin

5 cups water

Step One: Separate and peel garlic cloves. Cut off hardened end of each clove.

Step Two: In medium saucepan, pour water and bring to boil over medium heat.

Step Three: Place garlic cloves into boiling water and blanch for 2 minutes. Remove from heat. Remove garlic cloves with slotted spoon. Place in bowl, pat dry, and set aside.

Step Four: In a medium bowl, mix miso and mirin to make a paste.

Step Five: Spoon miso paste into bottom jar. Add single layer of garlic. Cover with more miso paste. Add another layer of garlic. Repeat until garlic is gone. (Final layer should be miso paste.)

Step Six: Cover with a piece of cheesecloth held in place with a rubber band. (You can also use a canning jar cover fitted with an airlock or a Pickle Pipe.

Step Seven: Place on counter or table at room temperature.

Step Eight: Eat or refrigerate when fermentation has achieved desired flavors. (Miso-fermented garlic can be excessively salty. Rinse the cloves prior to eating if you'd like.)

VARIATION:

As mentioned above, the miso paste style of fermenting vegetables can be used for nearly any vegetable. Try this with radishes, turnips, carrots, ginger, etc.

You can also substitute a seasoned mirin to add a subtle flavor to the paste.

Lacto-fermented Granola

(Recipe courtesy of Erika Kent)

Total Preparation Time: 1 hour
Special Equipment: Dehydrator
Ferment time: 24 to 36 hours
Dehydrate time: 24 hours at 110 degrees
Yield: Approximately 12 cups

NOTE: This recipe illustrates the wide breadth of how fermentation can add nutritional value and flavor to everything. It also combines preservation techniques, beginning as a fermented food and then dehydrated. The beneficial bacteria die at temperatures 150 degrees and above; the slow dehydration at 110 degrees allows the probiotics to remain intact.

10 cups rolled oats
1 cup expeller-pressed coconut oil
1 cup full-fat plain yogurt
1½ cups Grade B maple syrup
3 Tablespoons cinnamon
1½ teaspoons ground nutmeg
1 teaspoon vanilla extract
1 teaspoon salt (salt can be reduced to your personal taste)
1 cup nuts meats
1 cup apple, chopped

Step One: In a small saucepan over low heat, melt coconut oil.

Step Two: In large bowl, pour oats. Pour melted coconut oil over oats and mix. Add yogurt and mix again until oats are thoroughly coated.

Step Three: Cover with cheesecloth or cotton kitchen towel. Leave on counter or table at room temperature for 24–36 hours.

Step Four: In a small saucepan over low heat, mix maple syrup, spices, and salt until blended. (Do not boil.) Let cool.

Step Five: Wash, peel, core, and chop apple. Add to oat mixture. Add nuts to oat mixture.

Step Six: Add cooled spiced syrup to oat mixture. Mix thoroughly.

Step Seven: Spread mixture evenly on dehydrating trays. Gently press; should be about ½-inch thick.

Step Eight: Set dehydrator to 110 degrees. Dehydrate for 24 hours.

Step Nine: Remove from machine. Break into smaller pieces. Place in airtight container to store.

(**Lacto-Fermented and Dehydrated Granola** pictured on page 175)

Master Kombucha

(Recipe from Kombucha Kamp)

Total Preparation Time: 1 hour

Special Equipment: Fermenting container (a half-gallon canning jar works well), light cotton cloth and rubber band

Ferment Time: 7 days

Yield: Approximately 2 quarts

1 cup sugar

4–6 bags tea of your choice (for loose leaf, 1 teaspoon equals 1 bag)

Kombucha Starter Culture – SCOBY

1 cup starter liquid (this is an already fermented kombucha liquid)

8 cups purified or bottled water

Step One: Boil 4 cups of water.

Step Two: Place tea into fermenting container. Add the boiled water. Let steep for 15 minutes. Remove tea.

Step Three: Add sugar. Mix until dissolved.

Step Four: Fill container to shoulder line with cold, purified water.

Step Five: Add SCOBY and starter liquid to container.

Step Six: Cover with cloth. Secure cloth around neck of container with rubber band.

Step Seven: Set in warm area out of direct sunlight. (Ideal temperature range is 70–80° Fahrenheit.)

Step Eight: Let ferment for 7 days. Check for doneness.*

*__Test for doneness__. Gently insert a straw into the container beneath the SCOBY and take a sip. If it is too tart, then add a tablespoon of sugar and ferment for one more day. (Make a note to reduce the fermenting cycle next time.) If it is too sweet, allow for longer fermentation while checking every day.

VARIATION:

Flavor of kombucha is infinitely changeable based on the type of tea, your SCOBY, or what starter liquid used. Some makers will mix juice with the tea prior to adding the SCOBY. Others will add herbs to the mixture to add even more flavor. Feel free to experiment.

Kvass

Total Preparation Time: 3 days, in bursts of one-hour activity

Special Equipment: Fermenting crock, half-gallon-sized canning jar, or 2-gallon food-safe pail

How Long Before Use: 3 days to 3 weeks, depending on ferment time

Ferment time: 3 days to 3 weeks

Storage Container: 32-ounce canning jar or recycled 2-liter plastic soda bottle

Yield: 3 liters

NOTE: Kvass is a fermented beverage rooted in Eastern European fermentation traditions. At its simplest, kvass is sweetened water fermented with rye bread. Whether beer, wine, or kvass, fermented water is a classic method to make potable water. Kvass is lacto-fermented and has all the probiotic benefits as well as being slightly alcoholic! There are now different flavors and styles of kvass. Below is a recipe for basic kvass with some variations for experimentation.

Water quality can affect fermentation of kvass. Use distilled, softened, or filtered water if yours is chemically treated, hard, or has a high mineral content.

2½ gallons of water

1 pound rye bread (use a bakery or homemade regular, dark, or 'black' bread that does not contain preservatives)

½ cup of raisins

4 cups of sugar

1½ teaspoons of dry yeast (the type used for making bread)

Step One: In a very large stockpot, fill with water. Over medium heat and with pot covered, bring water to boil. Remove from heat.

Step Two: Add raisins to the boiled water. Keep covered.

Step Three: In oven, or in steps using a toaster, toast slices of bread until very dark (almost burnt).

Step Four: Add toasted bread to pot of boiled water. Keep covered and let steep for 8 to 12 hours.

Step Five: Using a slotted spoon, remove bread from boiled water. Discard bread to compost.

Step Six: In a bowl, mix sugar and yeast together. Add them to the mixture in pot. Stir gently until sugar is dissolved.

Step Seven: Place lid back onto pot and let steep for 6 hours. Stir every 2 hours.*

Step Eight: Using a slotted spoon, remove raisins. Discard to compost.

Step Nine: Strain mixture into recycled 2-liter bottles or half-gallon canning jar. Leave 2-inch headspace from top of container. Put on lid, then place into refrigerator for 12 hours.

*As with all ferments, temperature and environment affect the length of fermentation. The recipe is a general guideline as to how long it will take. Check your kvass; it may need more or less time to achieve 'peak kvass.' The longer it ferments, the less sweet and higher in alcohol content it becomes.

VARIATION:

Substitute mint leaves for the raisins. You can also add orange and ginger slices for a spicier flavor. Some recipes use honey as the sweetener. Other recipes call for the addition of whey or a ½ cup of sauerkraut juice; these would act as a fermentation booster and are a perfectly fine addition. Regardless of how you experiment, keep the core elements in place: purified water, rye bread, sugar, yeast.

A distinct style of kvass is beet kvass. My friend Chef Sarah Jonas highly recommends beet kvass as part of a martini. She says the sweet-and-saltiness complements a vodka martini perfectly—just a splash instead of olive juice, and a pickled onion garnish.

To make beet kvass, at Step Two in the recipe add 3 pounds of beets that have been scrubbed, trimmed, and cut into 1-inch cubes.

Chapter Eleven
Curing and Smoking

Evidence of cured foods is found in the earliest human settlements. The discovery of salts was a tipping point of human development as the ability to store and transport food allowed early people to roam away from their stable food sources. Some of these recipes have survived since antiquity. Native Americans from the North American plains salt and smoke bison high over an open fire, as their ancestors have done for millennia. Salt was so critical to Roman society that it was a form of currency paid to Roman soldiers, and the source of the English word *salary*. (From the ancient Latin *salerium*.) The cured fish dishes found in Arctic cultures are eaten in Scandinavian-influenced areas but are often repulsive to many others. I mean really, if you didn't grow up in Norway or Minnesota eating lutefisk, would you be tempted to eat a salted, dried, then dipped in lye and washed in water for five days whitefish? All to say that every culture and geographic region on Earth has a tradition of salting, curing and smoking foods, and infinite variations in how and what they preserve.

The recipes and techniques that have survived through to today are foods that, through the art and skill of the makers, are tasty to eaters beyond their own geographic region. The salumi of the Caesars would still appeal to salami fans today. Foods like ham, bacon, dried sausages, and kippers are a combination of curing and dehydration; some are a further combination of curing, fermentation, and drying.

The hurdle created by curing is the reduction of water activity. Much like using sugar in jams to absorb available water and prevent pathogens from growing, the salt in curing reduces water activity. Salts penetrate cell structures and change how they absorb and retain moisture. Like how sugars interact under heat, salts cause the oxygen molecules to attach to them. Fundamentally, meats present a larger challenge to preserving because of the difficulty in reducing water activity before decay and pathogens invade. It is tricky business that will result in serious foodborne illness if incorrectly done. The recipes included here have a lower degree of difficulty but still need to be followed exactly. If after trying a few simple cures you are determined to explore more challenging preservation projects, take the time to seek out professional classes in your area. Death by salami is not something anyone wants written in their obituary.

The race against rot is why people began experimenting with other salts to use in preserving. In the middle 1400s, saltpeter, which is potassium nitrate, was added to sodium chloride (table salt). As with early food preservation and preparation, no one knew or understood why it worked to make meats last longer without rot, only that it did. (Keep reading to see why it works.) Saltpeter

itself was identified by 13th-century Arab scientist Hasaan al-Rammah who was distilling various minerals in water in hopes of finding salts. (This also goes to show how valuable salt was to society.)

Cures contain additional chemical salts: sodium nitrite and sodium nitrate. Nitrite is a molecule made of one nitrogen and two oxygen atoms. If a third oxygen atom is added to the molecule, it becomes nitrate. Added to a cure mixture, the salt forces the water molecules to release from the food (reducing water activity) and then the nitrites and nitrates bind with the oxygen molecules in the free water, which effectively removes it from the meat. The nitrogen element will also bind with the remaining iron in the blood which gives cured meats their distinctive pink color when they are cooked.

Working with nitrates and nitrites requires exacting care as they are lethally poisonous to humans in relatively small amounts. Measuring the correct amount of the nitrites to add requires an analytical chemistry scale that you don't have. If you choose to add nitrites and nitrates, use a premade mix of the salts sold specifically for curing. It's marketed as a "Curing Salt," "Prague Powder," "Tender Quick." It is immediately recognizable as it is dyed pink to differentiate it from other types of salt. (Curing salt is not Himalayan Pink Salt. That's something altogether different.)

Nitrites and nitrates have been identified as cancer-causing after cooking in high heat (like open-fire grilling). The increasingly bad reputation has led to people shying away from their use. For a meat to be properly cured, which means that the water activity is completely removed and there is no opportunity for pathogens (ahem, botulism-causing spores) to grow, you must use nitrite and nitrate cures.

Brines are a liquid combination of salt, and sometimes flavoring ingredients, in which the food is submerged. In many recipes for pickling, a quick brining is recommended to accelerate the release of the moisture in the food. For many dishes, the brining is an identifying element of the recipe, as in corned beef. A food that is brined is often referred to as 'cured,' but that's a misnomer; the nitrites and nitrates are the defining elements of a cure. You can absolutely prepare a salt-based brine without added nitrites, but you then must take additional steps to ensure safety. The item can be cooked. Or dehydrated. Or pressure canned. But it will not be safe unless those steps are taken.

Sugars add flavor and reduce bitterness in cured foods. You'll notice the 'sweetness' in bacon more than any other cured food. Sugar also adds a subtle nutrient to the lactic-bacteria population that is also present in many cures. That's correct—a cured meat is also slightly fermented. It's why you sometimes hear the old term 'pickled' beef. Some recipes call for vinegar, alcohol, and

orange juice as ingredients. This acidification adds another layer of preservation and flavor to the cured meat.

Wet cures, where the meat is fully submerged in a liquid cure, are more efficient at reducing water activity than dry cures. A dry-cured item, like a prosciutto, requires a carefully controlled environment where variables like humidity and temperature are rigorously managed. For home cooks, wet-cured preserving is safer and will result in a high-quality product.

Getting the cure 'right' is the easiest step in the entire process. Much more challenging is controlling the environment for temperature, humidity, and airflow. Yes, meat curing has been successfully done for nearly a thousand years, but do keep in mind that a very high percentage of the population also died due to foodborne illness. Of course, you can cure meats at home. To do it safely and successfully you'll want to research and invest in modern tools like a meat-curing chamber. These can be bought or built and are a significant commitment of money and square footage. As the saying goes, in for a penny, in for a pound. So if you actually buy or build a curing chamber, know that you can use it for aging cheeses as well.

Smoking as preservation technique is a misnomer in the modern kitchen. Smoking is done for flavor, and the recipes and techniques included here are solely for taste. Smoker attachments for your oven or grill are readily available in the marketplace. Specialty woods for smokers are also easily purchased. (See Resource Guide.) A meat thermometer is required for smoking. The heat produced in the smoke chamber is not the same temperature in your meat. For a safe and quality product, the internal temperature of the smoked item needs to reach the minimum recommendation for safety. The recipes will include the temperature for the individual foods.

Proper smoking for long-term storage of food requires a smokehouse or closet-sized smoking unit. (But if you've already built your cure chamber you should go ahead and build your smokehouse too.) The recipes included here are a small sample of what the home cook can easily do with inexpensive tools. If you want to pursue smoked meats as a hobby or reliable preservation skill, the Resource Guide includes books and sources for more information.

Tips for Curing and Smoking

Scrupulously clean. Meats are more susceptible to contamination. Cleaning and disinfecting all containers and tools ensures that no pathogens are lingering behind.

Use only pure salt. For brining and salt solutions, use only 100% salt products. Whether you choose canning salt or sea salt, make sure that your salt has no chemical additives.

Curing means nitrites and nitrates. Meat is not 100% cured until the water activity is reduced, and the only way that is achieved is using a Curing Salt that contains nitrite. Prague Powder, Tender Cure, Curing Salt are common names for the mix of nitrite and salt.

Wet cures are safer than dry cures. A wet cure (meat submerged in liquid cure mixture) is more efficient at removing the water activity than a dry cure. If you want to dry-cure meats, please apprentice yourself to a master charcuterie maker.

Smoke for flavor. Smoking is an ancient form of food preservation that requires specialized equipment. Luckily, you can smoke foods for flavor alone.

Take the temperature. Meats have a minimum acceptable temperature to be safe from pathogens. When smoking or cooking after curing, use a meat thermometer to check if it's safe.

Ready?

All recipes make the assumption that you've prepared your curing container and tools. Or prepared your oven or grill smoker. Take inventory of your ingredients before you begin, as some items cannot be substituted.

RECIPES

Cured

Gravlax

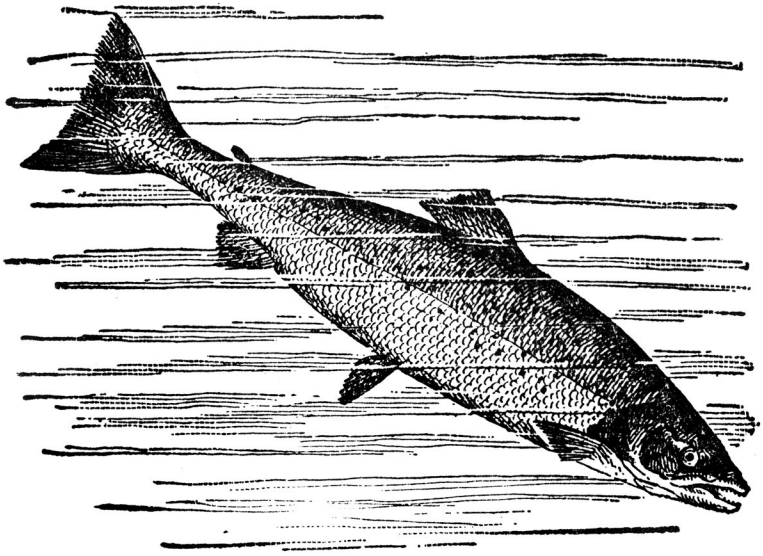
Smoked

Meatloaf

Pork Roast

(Chicken)

Blueberries



Gravlax

Total Preparation Time: 1 hour
Best time to eat: 2 days
Keeps: 3–4 days, refrigerated
Yield: 2 pounds

1 side of salmon (about 1kg)
1 Tablespoon mixed black and white peppercorns
⅓ cup pure cane sugar
¼ cup 100% pure coarse sea salt
⅓ cup baby dill

NOTE: Gravlax is a Scandinavian cured salmon that is like lox. For complete safety, cure in the refrigerator and not at room temperature. If you're concerned about fish-borne parasites, freeze the salmon for 24 hours prior to preparation.

Step One: Choose the prime, middle-section fillet. Inspect and remove any pin bones. Trim thin pieces of meat from the sides and tail end to create a relatively even rectangle. (Thin pieces will overcure and become inedible.)

Step Two: Crush peppercorns with mortar and pestle. Mix with sugar and salt; set aside.

Step Three: Rinse and pat dry dill. Roughly chop.

Step Four: In a glass or ceramic dish, place the prepared salmon skin-side down. Lay half the chopped dill on top of the salmon. Pour the sugar, salt, and pepper mixture on top of the salmon. Lay remaining dill on top. If you have a second fillet, place it on top of the prepared one first, essentially sandwiching the dill and cure between the fillets.

Step Five: Place piece of plastic cling film lightly over fillets. Place heavy plate or cutting board with weight on top of the plastic wrap.

Step Six: Leave on kitchen counter for 3 hours, then place in refrigerator. (If you have 2 fillets, turn them every 12 hours.)

Step Seven: After 48 hours, remove salmon from refrigerator and covering. Scrape or rinse cure from the salmon. Thinly slice and serve.

VARIATION:

This is gravlax at its most basic. The recipe can be enhanced by adding ¼ cup of Aquavit or caraway-flavored vodka to the cure mix. 2 Tablespoons of lemon juice is also a common addition to the cure.

Smoked Meatloaf

Your favorite meatloaf recipe.

Total Preparation Time: 2 hours

Special Equipment: Foil pan and small rack

Smoker Temperature: 240–250 degrees

Smoke time: 3 hours

Chip Type: Cook's choice

Chip Amount: 2 cups

Yield: 2 pounds your favorite glaze or barbeque sauce.

Step One: Place 2 cups of wood chips in a large bowl and cover with 4 cups of water. Soak for 1 hour prior to smoking.

Step Two: Heat smoker to 240 degrees.

Step Three: Prepare your meatloaf.

Step Four: Place meatloaf into pan. (Choose pan that fits into your smoker. Pan should be larger than meatloaf for maximum airflow. If you have a rack, place rack in pan and meatloaf on rack. If you do not have a rack, poke holes into one disposable pan and place meatloaf into that pan. Place that pan into another pan to catch drips.)

Step Five: Put meatloaf pan into smoker. After 1½ hours, remove meatloaf from smoker and cover with glaze. Place back into smoker.

Step Six: Remove from smoker after another 1½ hours. Remove from smoker when done.*

*Doneness is determined by internal temperature. For meatloaf, the temperature at the absolute center of the meatloaf should be 155 degrees.

Smoked Pork Roast

(Smoked Chicken)

Total Preparation Time: 15 minutes (with 2 hour rest time)
Special Equipment: Foil pan and small rack
Smoker Temperature: 225 degrees
Smoke Time: 3 hours
Chip Type: Apple wood chips
Chip Amount: 2 cups
Yield: 2 pounds

1½- to 2-pound pork tenderloin
½ cup apple juice or cider
3 Tablespoons honey
Your favorite spices

Step One: Place 2 cups of wood chips in a large bowl and cover with 4 cups of water. Soak for 1 hour prior to smoking.

Step Two: Trim any fat or silver skin from roast. Rub roast with your preferred spice blend.

Step Three: In a large bowl, mix apple juice and honey. Place trimmed and spiced pork roast into bowl. Cover with plastic wrap and refrigerate for 1 hour.

Step Four: Heat smoker to 240 degrees.

Step Five: Place tenderloin into pan. (Choose pan that fits into your smoker. Pan should be larger than meatloaf for maximum airflow. If you have a rack, place rack in pan and meatloaf on rack. If you do not have a rack, poke holes into one disposable pan and place meatloaf into that pan. Place that pan into another pan to catch drips.)

Step Six: Put tenderloin pan into smoker. Check after approximately 3 hours for doneness.*

Step Seven: Remove from smoker.

*Doneness is determined by internal temperature. For pork tenderloin, the temperature at the absolute center of the roast should be 155 degrees.

VARIATION:

This method and recipe can be used for chicken as well. Chicken, like pork, is a lean meat and needs to be brined or marinated before smoking. You can use apple juice, wine, beer, or a brine of 1 gallon of water and 1 cup of 100% pure salt.

The smoking time for chicken will depend on whether you're smoking a whole chicken or pieces. If you're smoking a whole chicken, spatchcock prior to brining or marinating. (Spatchcocking is the technique of removing the back and breastbone of the bird so that it lays flat.) Estimate about 40 minutes per pound of chicken.

Smoked Blueberries

Total Preparation Time: 2 hours
Smoker Temperature: 200 degrees
Smoke time: 40 minutes (check every 10 minutes after 20 minutes)
Chip Type: Cherry wood chips
Chip Amount: 1 cup
Yield: 16 ounces

1 pint of blueberries
1 Tablespoon fresh lemon juice
Zest of lemon
1 cup light brown sugar
1 Tablespoon lemon-infused olive oil

Step One: Place 1 cup of cherry wood chips in a large bowl and cover with 2 cups of water. Soak for 1 hour prior to smoking.

Step Two: Heat smoker to 200 degrees.

Step Three: Gently wash blueberries, then pat dry.

Step Four: Place blueberries into pan. (Choose pan that fits into your smoker. Disposable aluminum foil pans work well.) Cover with lemon juice, zest, olive oil, and brown sugar. Mix together.

Step Five: Put blueberry mixture into smoker. Check them after 20 minutes and every 10 minutes after until done.*

Step Six: Remove from smoker. Let cool. Store.**

* Blueberries are done when they are tender but not mushy.

** Smoked blueberries should be refrigerated or stored in a vacuum-sealed container.

Variation:

You can use this method to smoke other small, thin-skinned fruits. Try cherry or grape tomatoes. Peaches and mangoes work well too; just cut in half and remove pit prior to smoking.

Chapter Twelve
Dehydration

Drying foods can be as simple as exposing them to the sun for a length of time. But factor in insects, humidity, and pathogens, and we find that dehydrating presents challenges for those in temperate climates.

The *pemmican* of Plains and Great Lakes Native Americans is made exactly the same way as it has been since time immemorial. Pieces of bison (or deer, or elk, or bear) are dried, then pummeled into a powder and mixed with berries and fats, then dried again. That ancient recipe reveals a truth about many dehydrated foods: sometimes they don't taste very good. Sure, it serves the primary need of delivering energy to a body, but many dried foods, especially those low in fat and carbohydrates, tend to taste bland as there aren't many sugars nor fats to deliver them to your palate. Fruits, because of their concentration of carbohydrate sugars, dehydrate very well into an instant snack product. Vegetables dry well with an eye toward future use when reconstituted. And meats are tasty when treated with spices prior to drying.

In a modern kitchen, we are able to control for those many variables. There is a range of tools and machines available to you to make the dehydrating job safe and efficient. Note that the more moisture to be removed from a food, the harder the machine needs to work to do it. Making jerky, dehydrating a brined meat, can require 12 hours of dehydration time. A cheaply made machine will not do the task efficiently. In general, dehydrators that have both a controllable heat source and a circulating fan are the best. This means that the very cheaply priced, round stackable tray units heated by a light bulb without a fan are poor choices. In fact, they are a waste of money and often break on first use.

Depending on the type of oven you have, your oven can serve as your dehydrator. If your oven can be set to a temperature below 170 degrees, then you use that. If not, you'll need a separate dehydrating machine. Yes, it is possible to purchase or construct a solar dehydrator. Where to find plans are included in Resource Guide.

The best choice for a dehydrating machine is the one that fits your budget and level of commitment. If you're just getting started, try using your oven first. If you love dehydrating, then investigate purchasing a quality machine. For ease of use, cleanup, reliability and flexibility, you can't match an Excalibur brand dehydrator. They range in price from about $150 to a thousand dollars, depending on model size and heating and circulating capabilities. Excellent dehydrators are made by the Nesco company and are sold under the name American Harvest dehydrators. Entry-level units begin at under $50. Regardless of the brand you choose, the style is most necessary to the function. Box-style dehydrators are more efficient and better-designed machines than round, stackable dehydrators. Box dehydrators use racks that slide in and out,

with the heat and circulation fan at the back of the unit to evenly distribute heat, whereas round units have stackable trays with the heat element and fan at either the top or bottom of the unit, which makes for uneven circulation and dehydration.

For optimum results in drying fruits and vegetables, a few simple preparations are in order. Fruits, especially those that quickly oxidize and discolor when exposed to air, should be placed in a cold bath of ascorbic acid and water. You can use lemon juice, crushed vitamin C tablets, or commercial Fruit Fresh. You could also blanch cut fruit pieces in a light sugar syrup. Vegetables should be blanched prior to drying to stop enzymatic decay. Fruit and vegetables should be peeled, as the outer peel/skin will become tough and stringy. But there is no harm in leaving the skins on—maker's choice. Cut produce into uniform sizes, so they dry evenly which results in a better quality product.

Do set the temperature as directed in the recipe. Too high of a temperature will result in fruit with crispy outer edges and mushy interiors, or the outside of the produce hardens and traps the moisture inside. In either scenario, there is too much moisture remaining in the produce, and it isn't safe for long-term storage. How dried you want your food to be is up to you. Vegetables like onions, garlic, tomatoes, celery, etc., can be dried to the nth degree, entirely devoid of moisture, then ground into a powder. You can dehydrate a *mirepoix* mix that can then be used as an instant soup starter.

Fruits will have a 'wetter' end product than vegetables. The sugar in fruit absorbs some of the moisture to form a sticky and sweet, almost syrupy finish. Fruit leathers are a dried fruit puree. These are popular with snackers for their quick release of complex carbohydrates. Like any food, you can make it very unhealthy by adding extra sugar, which is what the majority of commercial manufacturers do. Homemade fruit leathers can use any combination of fruits to delicious effect. Do take the additional step of sieving out the tiny seeds of berries. If you don't, your fruit leather results in a sharp and crunchy and not very edible thing.

Fruit leathers require a solid bottom tray for a dehydrating machine. These are standard with a new machine. There are some alternative 'MacGyver'-style solutions to having a fruit leather tray. Don't try them. Most are about lining a tray with parchment or wax paper. Fundamentally, dehydrating is about circulating heat and air to remove oxygen. Blocking the path of air circulation stymies the process. Worst case scenario that I've seen, the paper comes in contact with the heating element and starts the machine on fire. So, please, no paper of any kind in your dehydrator.

Meats are dehydrated with good results. Jerky is made from flavored and salt-cured meat or poultry pieces that are then dried. The salt of the cure absorbs moisture in concert with the evaporation to make a tasty and chewy food. When the salt-cured meat is mixed with fruit and other herbs and dried, it's similar to the Native American food pemmican. You can even use higher-fat ground meats combined with a salt cure and flavors to make a homemade version of the gas-station snack stalwart, Slim Jims.

Lean cuts of meat produce the best whole-piece jerky. Start with a lean cut and trim away as much fat as possible. Also take care to remove the 'silver skin' or tough connective tissue. Too much results in a tough and stringy jerky. Meat dehydrates at a higher temperature than fruit and vegetables. Again, air circulation is required for success. If using your oven, place a metal cooling rack on top of a jelly roll pan, then place your meat strips on the racks. Elevating the meat that few inches allows the air to circulate. Flipping the pieces over halfway through the process helps ensure even drying.

All dehydrated foods will reabsorb moisture if not stored in an airtight container. Zipper-seal plastic bags, canning jars, plastic containers can all be used. Know that with each exposure to air, the dehydrated food absorbs just a little bit more moisture. Vacuum-seal storage systems are ideal for longer storage. They 'suck' out all the oxygen in a plastic bag for a hermetic seal.

Newer to the market is a tool that is used with a vacuum-seal bag machine that removes air from a canning jar. This too is a good longer-term storage solution. (Of course, when the jar is opened, it needs to be vacuum-sealed again.) Freezing dehydrated foods also extends their usability. It is good practice to seal and store dehydrated foods in small batches so they can be unsealed and used without the hassle of resealing and the constant re-exposure to oxygen.

Jerky products average about $18 per pound. Fruit 'roll-ups' are loaded with sugar. Sun-dried tomatoes are priced to astronomically high amounts. Dehydrating foods makes both health and economic sense.

Tips for Dehydration

Use a quality dehydrator. A dehydrating machine should have a temperature control setting and circulating air fan. Cheap dehydrators break easily and don't do the job.

No paper in the dehydrator. A fruit leather tray is non-porous and made for a dehydrator. Don't use wax or parchment paper as it may ignite and cause a fire.

Remove the seeds. Fruit purees with tiny seeds make terrible fruit leather. Take the time to remove the seeds through a sieve or food mill.

Use the oven. If your oven can be set to 140 degrees, it can be utilized for dehydrating fruits and vegetables. If it can be set to 170 degrees, it can be used for dehydrating meat.

Soak fruit in citric or ascorbic acid before dehydrating. This prevents browning and discoloration.

Dried vegetables can be ground into powders. Dehydrated vegetable powders are a quick and easy way to boost the flavor in any dish.

Lean meats equal good jerky. Take the time to thoroughly trim fats and connective tissue ('silver skin') from the meat before immersion in the marinade. The prep work at the beginning of the process results in higher quality of jerky.

You want it hot? Any jerky can be a 'hot' product. Add your favorite dried hot peppers to the mix, and the resulting food will be hot. Of course, the hotter the pepper, the hotter the jerky.

Ready?

All recipes make the assumption that you've prepared your dehydrator or oven.

RECIPES

Fruit pieces
Vegetable pieces
Herbs
Fruit Leather
Beef Jerky (whole muscle jerky)
Jerky Marinades

Fruit Pieces

Making individual dehydrated fruit pieces follows the same overall procedure.

Step One: Wash and peel fruit.

Step Two: Evenly cut into bite-size pieces.

Step Three: Dip in an ascorbic or citric acid solution. This can be a vitamin C tablet dissolved in water, water acidified with lemon juice, or orange juice.

Step Four: Drain fruit from liquid. Flavor as desired. (Cinnamon, nutmeg, or other spices can be added.)

Step Five: Lay out evenly in dehydrator to allow airflow.

Step Six: Set dehydrator to 110–120 degrees. Dehydration time will vary.

Step Seven: Remove from dehydrator. Let cool. Store in airtight container.

(**Dehydrated Blueberries and Cherries** pictured on page 170)

Vegetable Pieces

Making individual dehydrated vegetable pieces follows the same overall procedure.

Step One: Wash and peel vegetables.

Step Two: Evenly cut into bite-size pieces.

Step Three: Blanch in boiling water for 2 to 3 minutes.

Step Four: Remove from liquid.

Step Five: Lay out evenly in dehydrator to allow airflow.

Step Six: Set dehydrator to 110–120 degrees. Dehydration time will vary. (To make a vegetable powder, dehydrate at lowest temperature until vegetables are completely dried, then grind into powder.)

Step Seven: Remove from dehydrator. Let cool. Store in airtight container.

Herbs

Making dehydrated herbs follows the same overall procedure.

Step One: Rinse and shake dry herbs.

Step Two: Lay out evenly in single layer on dehydrator racks to allow airflow.

Step Three: Set dehydrator to 95–110 degrees. Dehydration time is 1 to 2 hours.

Step Four: Remove from dehydrator. Let cool. Store in airtight container.

Fruit Leather

Total Preparation Time: 1 hour

Temperature Setting: 140–145 degrees

Dehydration Time: 4–10 hours

How Long Before Use: Immediate

How Long Preserved: 3 months in airtight container, 6 months if frozen

NOTE: Fruit leathers are a dehydrated fruit puree. Fruit leathers can be a single fruit or blend of fresh fruit. Fruit with small seeds should be sieved or milled to remove seeds.

All fruits (except lemons and grapefruit) make a quality fruit leather. Mix flavors as you're inspired. No sugar is needed, but if you want to sweeten, add 2 Tablespoons of sugar, honey, or another sweetener per 2 cups of puree.

Step One: Select ripe or slightly overripe fruit. Sort and thoroughly rinse or scrub the fruit under running water. Remove and discard blemished or defective parts. Peel tough-skinned fruits such as winter apples, oranges, peaches, pears, and tomatoes, if desired. Pit and core fruit as needed, removing all hulls and stems. Fruit with small seeds should be run through a conical sieve after cooking.

Step Two: Cut fruit into chunks and place in heavy-bottomed pot. Place enough water in the bottom of the pan to prevent scorching, about 1 inch. Then bring to a boil. Turn down the heat until fruit is at a low simmer. Cover pot and simmer for 15 to 20 minutes or until the fruit is soft and a thermometer placed in the fruit mixture registers at 160°F.

Step Three: Place cooked fruit in blender or press through a conical sieve to remove small seeds. Add 2 Tablespoons lemon juice per 2 cups of fruit. If desired, add 1 to 2 Tablespoons of sugar, corn syrup, or honey per 2 cups of fruit. A small amount of your preferred spice (¼ teaspoon or dash per 2 cups of puree) may also be added.

Step Four: Place sheets or trays of fruit concentrate in the dehydrator. Set temperature control at 140° to 145°F or follow manufacturer's directions. Test every hour for dryness, more frequently toward end of drying time.

Step Five: Test for dryness. Properly dried fruit leather will be translucent and slightly tacky to the touch but easily peeled from the tray. Test for dryness by touching the leather in several places; no indentations in the leather should be seen. Lift the edge of the leather, which will adhere tightly to the surface, and peel it back about an inch. If it peels readily, it is properly dried. If the leather cracks or chips, it has dried for too long but is still edible.

Step Six: Storage. After loosening the edge of the leather from the tray, loosely roll the leather in plastic wrap or waxed paper in one piece. Store the roll in one piece or cut into 1-inch strips. Place the strips or rolls of leather in a plastic bag, glass container, paper bag or other container.

If the leather has not dried completely, it may become sticky or develop mold growth during airtight storage.

Store fruit leather in a cool, dry, dark place. It will retain good quality for up to 1 year in the freezer, several months in the refrigerator, or 1 to 2 months at room temperature (70°F).

Beef Jerky (whole muscle jerky)

Total Preparation Time: 4 hours over 3 days

Keeps: 4 weeks in airtight container / 1 year in freezer

Yield: 1 pound

NOTE: The recipe calculations are based on 1 pound of meat. Rarely will you make only 1 pound of jerky. Calculate the weight of your meat after trimming and increase the marinade recipe keeping all ingredients in ratio. The amount of salt, whether it is in the form of salt crystals or soy sauce, is critical to the curing—the reduction of the water activity.

The best cut for making jerky is the eye of round. Though other, less fatty cuts will work, they may yield a lower-quality jerky.

A half-frozen piece of meat is much easier to slice than raw. Try freezing your eye of round for a few hours prior to slicing.

See a selection of marinade recipes after the instructions.

Step One: Select a large eye of round cut of red meat.

Step Two: Remove from packaging. Place in heavy-duty freezer bag and freeze for 2 hours.

Step Three: Remove from freezer. Trim exterior fat and silver skin and any other tough connective tissues. (If left on, these will become tough and stringy.)

Step Four: Slice into ¼-thick or less pieces. Place in bowl and set aside in refrigerator.

Step Five: In large, lidded, plastic or glass container, mix your chosen marinade.

Step Six: Place meat slices into marinade. Cover and marinate in refrigerator for 24 to 48 hours. (Do not exceed 48 hours as the salt will fully break down the tissues.)

Step Seven: If using a dehydrator, place strips on rack. If using oven, line a jelly roll pan with parchment paper, then place drying racks on top of that. Lay the meat strips on the rack. (Regardless of oven or dehydrator, leave room between meat to allow airflow.)

Step Eight: Set dehydrator to 160–165 degrees. If using oven, set at 170 degrees. (If you have a convection oven, use that setting to increase the airflow.) Dehydration time will vary. Begin checking for doneness* after 4 hours, though complete dehydration may take up to 8 hours.

Step Nine: Remove from oven or dehydrator. Cool completely. Store in airtight zip-style bag, vacuum-sealed canning jar, or in freezer for longer storage.

*Test for doneness: Jerky should appear glossy and be bendable without breaking. The longer the meat is dried, the less moisture is present and the longer it can be stored without additional preservation.

Jerky Marinades

These recipes are the amounts needed to marinate 1 pound of meat.

Basic Jerky Marinade

⅓ cup Worcestershire sauce
⅓ cup soy sauce
1 Tablespoon honey
1 teaspoon freshly ground black pepper
1 teaspoon onion powder
½ teaspoon liquid smoke
1 teaspoon red pepper flakes

Hot & Tangy Jerky

1 cup water
1 teaspoon salt
¼ teaspoon cracked black peppercorns
¼ teaspoon cayenne pepper powder
1 teaspoon onion powder
1 teaspoon garlic powder
2 Tablespoons steak sauce
3 Tablespoons Worcestershire sauce
½ teaspoon paprika

Western Barbeque Jerky

1 teaspoon salt
1½ teaspoon brown sugar
¼ teaspoon ground black pepper
⅓ cup red wine vinegar
⅛ teaspoon cayenne pepper
⅓ cup ketchup
1 teaspoon onion powder
½ teaspoon garlic powder
1 teaspoon mustard powder

Mild Mexican Jerky

1 cup water
1 teaspoon 100% pure salt
¼ teaspoon pepper
1 teaspoon chili powder
½ teaspoon garlic powder
½ teaspoon crushed oregano
1 teaspoon paprika

Jerk Jerky

2 teaspoons 100% pure salt
1 Tablespoon soy sauce
2 Tablespoons balsamic vinegar
¼ cup pineapple juice
3 Tablespoons lime juice
6 minced garlic cloves
3 minced habañero peppers
2 teaspoons ground allspice
2 teaspoons dried thyme
1 teaspoon ground black pepper
1 teaspoon nutmeg
1 teaspoon dried oregano
1 teaspoon ground cinnamon
½ teaspoon ground cayenne pepper

Garlicky Beef Jerky

¼ cup Worcestershire sauce
¼ cup soy sauce
1 Tablespoon tomato sauce
1 Tablespoon vinegar
1 teaspoon sugar
1 teaspoon garlic powder
½ teaspoon onion powder
1 teaspoon 100% pure salt

Resource Guide

Throughout this book, you've been sent here to find out more about books, websites, tools and where to get them. These are my personal recommendations based on my long experience. I am not sponsored nor receive any compensation for mentioning any brands or companies. (Though if you do make it to Brubaker's Store in Lena, Wisconsin, say hello to the women who work there; they have been sending me Mennonite tracts for years.)

All books, tools, and specialized ingredients can be found on Amazon but local and independent retailers sure do appreciate your support.

Books and Websites

The Center for Home Food Preservation is the clearing house for safe food preserving information. They have available to you, for zero cost, tested recipes, how-tos, and safety bulletins. Go here to find out how to get the safest recipe for canning your turkey gizzards and more. (**nchfp.uga.edu**)

Your state extension office also has free food preservation recipes. Google your local state extension office to get started.

For a daily reminder of how prevalent foodborne illness is around the world, go to food scientists Doug Powell and Ben Chapman's BarfBlog. (**www.barfblog.com**) You may never eat at a restaurant ever again.

Books about canning and food preservation pop up like mushrooms after the rain. The challenge is finding material with safe and tested recipes and practices. Don't be swayed by beautiful pictures. The authors of these books may vary slightly in technique, but the recipes produce high-quality jars. Here are some recommended titles for you to learn more:

CANNING

The Ball Blue Book is often called the 'bible' of canning with good reason. It includes hundreds of tested recipes for sweetened preserves, pickling, and pressure canning.

Put 'em Up is a series of four books by Sherri Brooks Vinton. These titles explore numerous canning, pickling, and dehydrating variations, with an eye toward the modern palate and busy maker.

The Complete Book of Small-Batch Preserving by Ellie Topp and Margaret Howard is now in its second edition and rightfully so. This book is very much about canning for flavor and enjoyment. Recipes produce under six jars of modern jam, jelly, and pickle flavors.

250 Home Preserving Favorites from Jams and Jellies to Chutneys and Marmalades by Yvonne Tremblay is another favorite. The recipes lean more to the gourmet maker and include rarified ingredients with impressive results.

WEBSITES: There are too many sites in the ether promulgating bad practices, unsafe techniques, and recipes that will kill you. Except for Master Food Preserver Cindy Shipp's site **www.sbcanning.com**. Cindy has taken on the burden of reviewing, testing, and developing recipes that are safe. She has a dedicated crew of volunteers who scan magazines and websites to ferret out bad info and make it right. Her site has every conceivable hot-water bath and pressure canning recipe you could ever want to preserve.

FERMENTATION

The Art of Fermentation and Wild Fermentation by Sandor Katz have become the ultimate resource for understanding the very nature of every style of fermented foods.

The Big Book of Kombucha: Brewing, Flavoring, and Enjoying the Health Benefits of Fermented Tea by Hanna Crum and Alex LaGory is everything you ever wanted to know about SCOBYs, how to grow them, and how to make infinite flavors of kombucha.

Preserving the Japanese Way is a window into the world of complex ferments and tsukemono as well as the final dishes made with them. Author Nancy Singleton Hachisu does yeoman's work making the history and laser-like focus on Japanese cuisine understandable to American cooks.

The Cheesemaker's Manual by Margaret Peters-Morris is the number one recommended title by our local cheese guru Steve Shapson. I've taken his class, and making soft cheeses is a fun project. If you can find a cheesemaking class in your area, I recommend taking it. The process makes much more sense when you have a pro walk you through it.

The Home Winemaker's Companion: Secrets, Recipes, and Know-How for Making 115 Great-Tasting Wines by Ed Halloran has been in print for nearly 20 years. It's no wonder why. Halloran's easy to follow instructions and explanation's make this book a solid reference for the home winemaker.

CURING AND SMOKING

The Art of Making Fermented Sausages by Stanley Marianski. In the world of making cured sausages, Marianski is the king. He gives very scientific and practical techniques for the homemaker. Again, please study this book before you fling a rope of sausages over a crossbeam and hope for the best.

DEHYDRATION

The Complete Idiot's Guide to Dehydrating Foods by Jeanette Hurt is a practical and actually complete primer on all things dehydrating. It may seem an odd recommendation, as this one is part of the "Idiot's" series, but it really is an excellent source for recipes and ideas.

Equipment

CANNING

Canning equipment is often found in both big box and independent hardware stores during the canning season. If you're close to a rural area, the local 'farm & barn' store will have canning supplies. In Wisconsin, Farm & Fleet is a favorite. Tractor Supply Inc. also carries a full stock of canning supplies. These stores all have the best prices on supplies and canning jars during the summer and fall canning season.

I'm a fan of Amish and Mennonite stores. They're easy to find in the Midwest. For the rest of the country, two Mennonite stores have websites where you can order both canning as well as all other preservation supplies. Lehman's in Kidron, Ohio, has become a tourist attraction in the center of Ohio Amish country. The enormous store is also a museum. (**www.lehmans.com**)

Kauffman's Fruit Market is in Lancaster, Pennsylvania. (**www.kauffmansfruitfarm.com**) They too stock canning supplies. Less selection than Lehman's but one of the only online sources of the Dutch-Lite Brand of pectin and ClearJel. The boxes of SureJel are common at the grocery store, but get expensive at nearly $3 per 50 grams. If you're going to make large batches of jams, jellies, or pie fillings, you'll want to explore buying pectin and ClearJel in bulk. Cindy Shipp's great recipe site also sells bulk pectins and ClearJel as a service to the community. (**www.sbcanning.com**)

Kauffman's Fruit is often mistaken for Kaufmann's Mercantile. (**www.kaufmann-mercantile.com**) The Mercantile is a high-end retailer of lifestyle and household goods. They are a good source for European canning jars. Crate & Barrel, Sur la Table, and Williams-Sonoma also stock European brands of canning jars.

Canning has become popular enough that Targets and Walmarts also stock canning jars and a limited amount of equipment year-round. So do many larger grocery store chains. You'll be paying a premium price for jars at specialty, department, and grocery stores. If you're able to stock up at a 'farm & barn' store at sale time, you'll definitely be money ahead.

Homebrewing stores stock and sell pH meters. You're looking for a digital meter with an immersion tip. My favorite and recommended is the Hanna Instruments Checker (model HI98103). It's under $50 and runs on replaceable watch-sized batteries. Easy to use and reliable. Of course, Amazon has it.

Atmospheric/steam canners have only recently been approved as safe for items requiring hot-water bath processing. Because they are relatively new to

the market, they are not as available at stores. Your 'farm & barn' store will have them, or you can get them from Lehman's Non-Electric Hardware. (**www.lehmans.com**)

Pressure canners too are a touch more rarified. Entry-level models will be found at all the above locations but the higher-end models will not. The pressure canner I heartily recommend is the All-American brand. This machine is Wisconsin-made and will last multiple lifetimes. Cabela's Sporting Goods and other specialty stores sell them but check if it's in stock before you shop as they are often only sold via a store's website. Red Hill General Store (**www.allamericancanner.com**) stocks All-Americans, all their replacement parts, as well as other canning equipment. These are expensive machines. I know of folks who have had luck setting an Amazon price alert on the model they want and then waiting for a sale. It happens. Amazon and Red Hill also stock replacement gauges for all makes of pressure canners.

FERMENTATION

Lehman's Non-Electric Hardware store (**www.lehmans.com**) is my favorite and most comprehensive supplier for every piece of equipment you will need. They sell all sizes of crocks, weights, and lids. They also sell fermenting kits to get you started and all the airlocks and conversion tools to turn your canning jars into fermenting vessels. The tool that I buy whenever I visit the store is a 'kraut hammer.' You'll hear them called by various names, pickle packer or sauerkraut stomper, yet this three-foot-long wooden tool is your sauerkraut making best friend. It's worth investing in a good one, and the Stompers sold by Lehman's are handmade by a local woodworker. It's worth the $30.

Lehman's also stocks kombucha making supplies. SCOBYs can be acquired locally. Ask your local health food store for a lead. Hannah Crum literally wrote the book on kombucha. Her website (**www.kombuchakamp.com**) has everything you could possibly want or need to make kombucha. Your local homebrewing emporium will stock a variety of wine yeasts that do the trick for making country wines. Recycled glass gallon jugs work great, and the airlocks used for other fermentation projects are the same used for winemaking. As with anything, it's possible to spend a lot of money on supplies but know that you don't need to. Get the basics to start and explore and expand as your interest grows.

I also want to mention Steve Shapson again. (**www.thecheesemaker.com**). He teaches cheesemaking, and I have personally taken his classes. It's great fun when it works and heartbreaking when it doesn't. He has everything you need to begin exploring the possibilities presented by fermented milk.

CURING AND SMOKING

Smokers too will cost anywhere from under $50 to thousands of dollars for tricked-out standalone units. The Weber Grill Company makes very good smoker attachments for their standard grills. High-end brands of ovens offer smoker accessories. Nordic Ware makes my favorite. It's a smoking chamber that works on any stovetop. At around $60, it's affordable for people who are looking to move beyond the outdoor grill.

Cabela's and Walmart sell hardwood chips designed for smoking projects. Your local 'farm & barn' or outdoors store will have them as well, not to mention a plethora of online stores.

Curing requires some very specialized and expensive equipment, most importantly a curing chamber. A plugin-ready curing chamber will set you back at least $1500. There are many DIY instructions for 'hacking' a refrigerator into a curing chamber. Cured meats often have specific bacteria introduced to the meat to give it a distinct flavor. You don't have to live in the Piedmont to make salami. The bacterial cultures are readily available from Sausagemaker. (**www.sausagemaker.com**) This web store has everything you need to cure sausage and other meats. They even have build-your-own curing chamber plans.

Cure salt or Prague Powder is available from specialty outlets, but it's also widely seen in outdoor stores like Cabela's and of course, online. Penzeys Spices (**www.penzeys.com**) is a great source for fresh and rare spices. Whether you create your own blend or go with one of their premixed blends, the quality is top-notch. Penzeys steak seasoning blends work very well in jerky brines, their pork rubs will work for boosting flavor in a cure, and their pickle spice is my favorite.

DEHYDRATION

Choosing the right dehydrator is the key to successful drying. Do not cheap it out. Investing in a quality machine saves you money over time. The Excalibur and the Nesco F80 Square are both solid and reliable machines. The Nesco costs around $80 and the Excalibur machines vary in price from $125 to $400 depending on size. Both machines come with open trays for fruit, vegetable, and meat drying, and the flat insert needed for fruit leathers. Often the dehydrating machines available at department stores are of the lowest quality. I recommend using Amazon price alerts to find the best deal on the exact make and model you want.

Most effective in low-humidity areas, solar dehydrators can be built in an afternoon. There are many plans available for free on blogs and websites. Mother Earth News recommends this one; it's intricate and sturdy. If you're committed to solar, this one is for you. (**www.motherearthnews.com/diy/tools/solar-food-dehydrator-plans-zm0z14jjzmar**)

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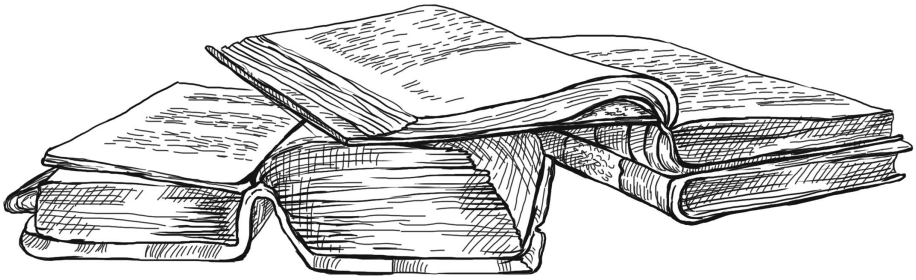

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