What's That Bake Episode 1

Spice Cakes, Leavening, and Really Long Book Titles

(00:00) Upbeat music

(00:08) Well hi, hello there. Welcome to the very first episode of What's That Bake. In this episode we are going to make a spice cake, delve into some food science, and explore some history.

(00:21) Upbeat music

(00:29) So what exactly makes a cake? Well, we have some sugar, some flour. We have some liquid, some fat, and some air. All these things together in the right amounts can make something delicious. Something that is sweet, spongey, and can be decorated.

I guess a birthday, a holiday, or a delightful competitive TV show can also help make a cake, but that's not where I'm going with this.

Oh, and heat. Yes, heat is important, so important that I'm going to go ahead and set my oven to 350 degrees Fahrenheit or 180 degrees Celcius so it can start preheating.

(01:08) Oven settings beeping

(01:15) You can find the list of ingredients that I am using on the web page where you accessed this episode. For this first part, I am going to make the cake. So I'm going to start with the dry ingredients. In one of my bowls I'm going to add 1 cup of flour. Flour is what is going to give this cake structure. Flour has protein, and this protein is going to absorb the liquids to create a bouncy and slightly stretchy texture. When you slice a cake, it doesn't break or crumble. It has a little give when you insert the knife.

Next we are going to add a quarter cup of sugar. The sugar is what is going to make this cake sweet, and it is also going to keep the cake moist. While we aren't adding plain water to our cake, there is some in the applesauce, yogurt, and milk. The sugar is going to grab onto those water molecules and hold them ever so dearly throughout the whole time the cake is in the oven. This will prevent too much moisture from evaporating and drying out the cake.

Next we are going to add in half a teaspoon of baking soda and half a teaspoon of baking powder. Now the reason that we are keeping the wet and dry ingredients separate right now, is because of a chemical reaction that is going to make our cake light and fluffy.

Leavening is a process that adds gases to food. The cakes and breads that you eat have little pockets of air dispersed throughout that gives it the sponge-like texture. Without these little pockets of air, you will likely feel like you are eating a brick of dough, and that's not really pleasant.

There are three main ways to leaven dough or batter. They are chemical, mechanical, and biological. First we are going to discuss chemical ways of leavening. Those are baking soda and baking powder. Baking soda, also known as sodium bicarbonate, is a type of alkaline salt that reacts with an acid to produce carbon dioxide.

Baking powder works similarly to it's soda counterpart, however instead of acid, it requires heat to release carbon dioxide, specifically a temperature higher than 120 degrees Fahrenheit or 50 degrees Celsius. Now baking powder does have some baking soda in it, however it does vary by brand and it is only a small amount. While these are both considered chemical leaveners, they are derived from sodium carbonate which is a natural salt that is mined from mineral deposits of rivers and lakes.

But why do we need both of these? Well this gives the batter two chances to rise. Also the baking soda is going to remove some of the bitter taste from the acids during the reaction.

Lastly we are going to add half a teaspoon of chai spice. This is just for flavor, and you could substitute other spices here if you wish.

Now I'm going to whisk this all together.

(04:05) Whisking dry ingredients

(04:14) Alright, on to the wet ingredients.

In the other bowl we are going to add a quarter cup of milk. This provides some of the liquid that is going to bind with the flour and sugar. You can use dairy milk here, or any plant based milk. The fat content of the milk doesn't really matter in this case, that will be what our oil is for.

With that said, I'll go ahead and add a quarter cup of oil in next. The oil is going to be our main source of fat in the cake. We need some sort of fat to make the cake rich. It is going to add to the moisture, and create a more tender end result.

Next I'll add a quarter cup of applesauce and a quarter cup of yogurt. The yogurt has a little more protein to provide, but the main purpose of these two ingredients is that they are here to provide the acid that will react with the baking soda. Ok, that's the rest of the wet ingredients. I'm going to whisk this all together.

(05:09) Whisking wet ingredients

(05:16) As soon as we mix the wet and dry ingredients together, the reaction is going to start. If you've ever done that volcano experiment with baking soda and vinegar, this is exactly the same. And if you haven't done that experiment, you can go ahead and try it later.

(05:31) Whisking wet ingredients

(05:38) So my oven is almost done preheating. Let's go ahead and prepare the cake pan. We are going to grease the pan, to allow for the cake to come out cleanly. Take the oil that you had set aside and pour it into the cake pan that you will be using. Take your paper towel, and I like to fold it up a few times so it can soak up some of the oil. Dab the towel in the oil and rub it all over the inside of the pan. Make sure to get all the way up the sides and along each of the corners.

Alright, our pan is ready. My oven is just about done preheating. Let's finish mixing the batter. So we are going to take our bowl of dry ingredients and pour it into the bowl of wet ingredients. You can throw the whole thing in there. I'm going to take my whisk and gently mix everything together. Right now as the baking soda meets up with the acid from the applesauce and yogurt, the reaction is going to start. I'm not mixing this too fast. If we mix too vigorously, we are going to knock out too much of that air. Keep mixing this gently for another few seconds.

(06:45) Mixing all ingredients together

(06:51) My batter is starting to look like a thick, pancake-like batter.

Mine is just about incorporated right now. I have no more lumps. If you look closely, you will see tiny air bubbles forming here and there on the surface. That's the carbon dioxide. Let's pour this into the pan and get it in the oven.

(07:13) Scraping bowl with spatula

(07:18) I'm using the spatula to scrape the sides of the bowl and get all that mixture out. It may not look like there is a ton of batter in the pan, but trust me, this is going to rise quite a bit.

Alright, I'm going to stick this in the oven.

(07:34) Putting pan in oven

(07:43) There we go. And I'm going to set the timer to 20 minutes.

(07:47) Oven settings beeping

(07:51) Ok we have a little bit of time now. Let's delve into some of the history.

(07:56) Slow harp and acoustic guitar music

(08:08) In 1796, Hartford Connecticut, a woman by the name of Amelia Simmons published the first American cookbook. Now the title is pretty long, so bear with me, but this is what it is titled:

AMERICAN COOKERY, OR THE ART OF DRESSING VIANDS, FISH, POULTRY and VEGETABLES, AND THE BEST MODES OF MAKING PASTES, PUFFS, PIES, TARTS, PUDDINGS, CUSTARDS AND PRESERVES, AND ALL KINDS OF CAKES, FROM THE IMPERIAL PLUMB TO PLAIN CAKE. ADAPTED TO THIS COUNTRY, AND ALL GRADES OF LIFE.

So yeah, that's... that's the title.

So, during this time, and previously, most published cookbooks encouraged mechanical or manual methods of leavening batter for cakes.

So we already mentioned earlier that baking soda and baking powder are chemical leaveners that release carbon dioxide into the batter to make it light and fluffy.

Some of the manual methods that were popular at that time, and they still are today, involve whipping air into the batter. This method incorporates those pockets of air into the batter before it even goes into the oven.

Some examples of mechanical or manual leavening are whipping egg whites to stiff peaks, or creaming butter and sugar. What this does, in both cases, is it creates air pockets within a protein or fat rich substance. In the case of the egg whites, air is trapped within a structure of protein particles. When the batter is placed in the oven, the heat will expand the air pockets and the protein will stretch and keep those air pockets dispersed.

The same can be seen when creaming butter and sugar. The fat particles in the butter will allow the air pockets to expand when exposed to heat, but keep them dispersed within the cake.

Some bakes that use mechanical leavening are the spongy chiffon cakes, pound cakes, and meringue.

Prior to the invention of the hand turned mixer in 1856 and the electric mixer in 1885, this method of mixing was a very manual process.

So why am I bringing this up? Well, one thing that I'd like to mention is that Amelia included some rather interesting techniques in her book.

In a recipe that she includes for gingerbread cake she lists

(10:38) Pen scratching

(10:41) "Three pounds of flour, a grated nutmeg, two ounces ginger, one pound sugar, three small spoons pearl ash dissolved in cream, one pound butter, four eggs, knead it stiff, shape it to your fancy, bake 15 minutes."

So, what is this pearl ash? Pearl ash is the purified form of something called potash. Potash is a potassium rich substance derived from plant and wood ash and it has actually been used around the world since the 14th century.

In 1790, which was 6 years prior to the publication of this book, an American inventor by the name of Samuel Hopkins received the first ever United States patent for his improvements to the methods of obtaining potash and pearl ash. In his patent, there are 4 steps given to make the purified pearl ash. First he takes raw ashes and burns them further in a furnace.

(11:34) Fire cracking

(11:46) These ashes are then dissolved in boiling water.

(11:49) Water boiling

(11:52) This boiling mixture then produces a lye and then boiling this lye further would eventually produce the substance known as pearl ash.

Pearl ash was used for making soap, ceramics, fertilizer, and other items across the world. In fact, Native Americans had already been using wood ash throughout their lives. It was added as a fertilizer to their soil, and used in cooking. The Hopi and Navajo tribes used ash in dishes that contained blue corn. The addition of ashes prevented the blue color from dulling during the cooking process.

Adding ash to these corn based meals helps break down the cells in the corn, allowing our bodies to absorb more nutrients. As the cells break down, the blue of the corn becomes more vibrant as the ash reacts with the natural coloring. At this point, nutrients that were previously trapped in these cells are now available for us to digest. This is very important in indigenous cooking, as these meals provide a good source of niacin, which is also known as vitamin B3.

While all this is happening, you would also notice the corn mixture becoming light and airy. Hmm how could this be?

Well corn is naturally acidic, and it turns out that pearlash is alkaline. Does this sound a little familiar? Maybe something like our friend the baking soda? Pearlash was the precursor to baking soda, which was discovered a little later in 1801 by German pharmacist, Valentin Rose the Younger.

Going back to Amelia, American Cookery was the first published cookbook to list pearl ash as an ingredient, and it was here that it publicly entered the world of baking.

(13:43) Slow harp and acoustic guitar music

(13:54) Alright, let’s take a look at another one of Amelia’s recipes.

This one, she simply titled “another plain cake,” she lists the ingredients as

(14:03) Pen scratching

(14:06) “Two quarts milk, 3 pounds of sugar, 3 pounds of shortening, warmed hot, add a quart of sweet cyder, this curdle, add 18 eggs, allspice and orange to your taste, or fennel, carroway or coriander seeds; put to 9 pounds of flour, 3 pints emptins, and bake well.”

(14:29) Record scratch

(14:30) What? 9 pounds of flour? 18 eggs? How big is this cake? Who is she baking for? I know that I don’t want that many people over to my home. Also, at the end of this book there is a note on this recipe where she says that 9 pounds of flour is incorrect, and that it should actually be 18 pounds of flour.

It is likely that some of her recipes were created for larger parties. In fact, the very beginning of her book does specifically say “Directions for Catering.” So maybe if you have a large dinner party coming up, think about making a 20 plus pound cake.

(15:10) Indistinct crowd conversation followed by a door slamming

(15:16) Ok back to the recipe. In many of her cake recipes, actually 16 of them, she lists something called emptins as an ingredient. So what is that exactly. Well let's take a look at the recipe that she provides for it. She says:

(15:32) Pen scratching

(15:35) “Take a handful of hops and about three quarts of water, let it boil about fifteen minutes, then make a thickening as you do for starch, strain the liquor, when cold put a little emptins to work them, they will keep well cork'd in a bottle five or six weeks.”

So what she’s doing here is pretty much making beer. When the beer is done, she strains it and is left with the muddy dregs in the bottom of the pot. This is the emptins. Emptins is sort of a slang term derived from emptyings, as in the emptyings of the pot, or whatever is left over after making the beer. She takes some of the emptins, some beer, and some flour and makes a yeasty liquid. This is similar to the sourdough starter that a lot of people keep in their fridge, give it a name, and feed it like a pet.

This brings us into the 3rd type of leavening that I mentioned earlier, biological leavening. Biological leavening uses fermentation to add air to dough and batter. Yeast, like baking soda, also causes bubbles of carbon dioxide to be released in batter and dough. What yeast does a little differently is, that instead of reacting with acid, it breaks down sugar, it ferments. Fermentation is one of the oldest cooking techniques, because it just naturally happens. Anything containing yeast, mold, or bacteria will eventually ferment if left untouched. What yeast does, is that it breaks down sugars and starches and converts them into ethyl alcohol. A byproduct of this reaction is carbon dioxide. So that gas right there is why Amelia is using these emptins in her bake.

Some other yeasty bakes that you may be aware of are breads, donuts, and heavier cakes. Today we have some other forms of yeast. These are active dry and instant yeast. What these really are, are granules of yeast that are alive inside of a dry shell. The active dry version has been dried at high temperatures and must be dissolved in warm water before adding to a dough or batter. The water hydrates the outer shell and allows the part that is still alive to get out and do its thing.

The instant version has been dried at lower temperatures, and this can be added directly to a mixture without dissolving beforehand. We have these two convenient ways to use yeast now, but they both do the same thing as these emptins.

One downside of using biological leavening is time. Fermentation is not an instant reaction. It often takes hours, or even days, to reach the desired texture, and this is all before anything even goes in the oven.

So you can understand how chemical leaveners, and their ability to produce carbon dioxide instantly, became a necessary component in baking.

(18:45) Slow harp and acoustic guitar music

(18:58) Alright, we got some examples of leavening, we got a few 18th century recipes, we also have a cake in the oven right now. If you take a look at it, you should see it starting to rise. We saw the beginning of the first rise when we combined the wet and dry ingredients together. Now we are seeing the second rise. This is the baking powder activating with the heat, and producing that carbon dioxide. Some of the cake moisture has evaporated and you should see the surface looking a bit more solid. We know the cake will still be moist because the sugar is still holding onto some of that liquid.

(19:35) Upbeat music

(19:47) We've talked about some ingredients that have been brought in over the years to successfully leaven our bakes and make them spongy and tasty. But what about the unsuccessful attempts? Things that bakers and cooks have mixed in that helped a baked good look delicious, but maybe wasn't safe for us to eat. Over the years there have been many harmful additives incorporated into foods. Things such as food colorings, fillings, and even leaveners.

Fredrick Accum, a german chemist, published a book in 1820 titled

(20:23) Pen scratching

(20:25) "A treatise on Adulterations of Food, and Culinary Poisons, exhibiting the Fraudulent Sophistications of Bread, Beer, Wine, Spirituous Liquors, Tea, Coffee, Cream, Confectionery, Vinegar, Mustard, Pepper, Cheese, Olive Oil, Pickles and Other Articles Employed in Domestic Economy, and Methods of Detecting Them."

Ok seriously why are these titles all so long?

Anyways, I went online and found some digital scans of the second edition, which is also dated in 1820, so I believe this was probably released later in the same year. The cover of this book looks like something straight out of the Halloween section at your local craft store. The cover is a dark forest green. The center image is of a large spider on its web having just caught a fly. Around this web there are 12 snakes with interlocked heads and tails. At the top of the cover there is a banner with a skull and crossbones and the words “There is Death in the Pot.” Turn to the first page and below the title there is an image of what looks like a bust statue of a skeleton draped in a scarf with two snakes flanking each side and a plaque with the same words “There is Death in the Pot.”

(21:50) Growing drone

(21:57) Fredrick clearly has some pretty strong feelings about adulterated food. He goes on to discuss in detail all the different additives that he has encountered, and ways to test different food items, and other household products.

I think my favorite line that he has included in the preface is

(22:15) Pen scratching

(22:18) “But of all possible nefarious traffic and deception, practised by mercenary dealers, that of adulterating the articles intended for human food with ingredients deleterious to health, is the most criminal, and, in the mind of every honest man, must excite feelings of regret and disgust.”

So Fredrick here is furious with these merchants, and I honestly don’t blame him. People were unknowingly ingesting all sorts of things, and many of which were poisonous. Some examples he gives are how red food colorings often contained lead or copper, tea leaves were dyed or mixed with common shrub leaves, and olive oil often became rancid because it was mixed with poppy seed oil.

Moving onto baking, he provides a little discussion about one ingredient commonly added to flour, called alum. Alum is a type of salt derived from aluminum, or aluminium, or for the Andy Dwyer fans out there alumilum.

At the time in London, breads were often judged by how white they looked. Bleached flour was the preferred ingredient and was more expensive than unbleached flour. Bakeries that could not afford the more expensive flour, had to purchase the lesser alternative. Alum was often mixed into cheaper flours and worked as a bleaching agent during the baking process. Alum was thought to link a number of health concerns, such as constipation and rickets.

John Snow, no not him, this guy’s a doctor. John Snow was an English physician, and in 1857, published an article on how alum in bread could be a cause of rickets. He noted that in areas in and around London, those with bright white breads which possibly had the additive, had higher cases of rickets in children than areas with more rustic and unbleached breads.

This was met with disagreement from bakers and other medical professionals. Immediately after this article was published, another soon appeared written by a doctor J.M. Coley, who disputed Snow's comments. Coley theorizes that Snow is only taking a physiological approach and writes

(24:45) Pen scratching

(24:47) "Dr. Snow's theory is without foundation; otherwise, every child partaking of the bread made by London bakers would necessarily have rickets, which is well known, is not the fact."

Going back to Fredrick Accum and his passionate telling of adulterated foods, I'd like to point out that he's left a lovely little note in the margins of this section. It reads

(25:11) Pen scratching

(25:14) "On Saturday last, Mr. Wood, a baker, was convicted before T. Evance, Esq. Union Hall, of having in his possession a quantity of alum for the adulteration of bread, and fined in the penalty of 5 pounds."

I can only imagine how satisfied Friedrich must have been. 5 british pounds in 1820 is roughly worth 500 pounds today, or over 600 USD, so that's quite a hefty fine.

But anyways, Friedrich had also included another ingredient that was often added to flour. This was subcarbonate of ammonia. He describes that subcarbonate of ammonia is another type of salt that was often added to spoiled or soured flour. This flour would have produced a very stiff and dense dough. Adding the salt would allow for ammonia gas to be released during baking and the dough to swell up and become airy. Wait, this is chemical leavening again!

It's true, subcarbonate of ammonia was often added to breads and crackers to create a light and airy texture. The ammonia gas however left a bad taste, so this was only used in crispy bakes where the gas could completely escape.

So there we have it. A few different types of leavening, a few recipes, a few books with very long titles. While researching this, almost every book I found from the 18th and 19th century all had very long titles. I tried searching around to see if there was a reason for this. Not much of an explanation was given, but it seems to be done for marketing purposes. Honestly, it made me think of digital content creators now and how they add dozens of hashtags to make their posts visible in our searches. I imagine Amelia and Friedrich would have taken advantage of this. Something like hashtag pies, hashtag imperial plumb, hashtag culinary poisons. Ok I'll stop there.

(27:21) Upbeat music

(27:33) Alright, our cake has been baking for 20 minutes now. The surface of mine is looking a little golden brown.

I'm going to open the oven door and test the cake with a toothpick. You can also use a thin knife. Just insert it vertically into the center of the cake and if it comes away clean, the baking should be about done. We are also going to listen to the cake too. I hear a little bit of bubbling coming from the pan. This is just the remaining moisture in the cake. A little moisture is fine, but too much means the cake isn't done yet. If it sounds like your bowl of rice krispies, pop it back in the oven for another 5 minutes and check again. If it is quieter than your cereal, then it's done.

Since mine is done, I'm going to take it out of the oven and set it aside. We want the cake to rest in the pan for a little while. The cake itself is pretty fragile while it is this hot. There is still a lot of steam coming from all of those air pockets, and we want some of that to escape. As this steam escapes, the cake is going to deflate a little, and that's ok.

While this is resting, I'm going to start on the icing. The icing is pretty simple. All you need is two ingredients: sugar and a liquid. I'm going to use a quarter cup of strained applesauce as my liquid. You can also use apple juice. I'm going to grab a bowl, your regular cereal bowl is fine for this, and I'm going to add the applesauce. I also have two cups of powdered or confectioners sugar. This may look like a lot, but it will all mix in and create a smooth icing. I'm going to add half of this sugar to the applesauce and mix it in.

(29:19) Mixing icing

(29:26) Confectioners sugar is known as a quick dissolving sugar. You will notice this as you mix it in. It immediately starts dissolving in the liquid, and you start seeing something that looks like icing.

Alright, I'm going to mix the rest of the sugar in. Now confectioners sugar tends to have starches mixed in that prevents the sugar from clumping together. These starches, with the sugar, are what is causing this icing to come together and thicken. Usually this starch is made from corn or potatoes.

Now you can add other things to this too. You can add some spices, maybe some cinnamon. You can add vanilla extract. I'm going to keep mine simple with just these two ingredients.

(30:15) Mixing icing

(30:21) So the icing is about done now. I'm going to cover it and set it aside. You can put this in the fridge too if you don't plan on icing your cake right away. Just let it come back to room temperature and mix it up before you pour it on.

We do want to wait until our cake is completely cool before icing it. If we put the icing on while the cake is warm, the sugar will melt and the icing will become runny.

I'm looking at my cake now and I can see the edges have pulled away a little bit from the sides of the pan. This is good, this will let our cake come out a little bit easier. I'm going to take a butter knife and run it around the edges to make sure nothing is still stuck.

I have my cooling rack ready. If you don't have a cooling rack, you can let this cool on a wooden cutting board, or something that can absorb some of the heat.

Some people like to place the cooling rack on top of the cake pan and flip it over, but I like to live on the edge and kind of flip the pan and slam it on the rack. Alright one two three…

(31:25) Pan clinks on rack

(31:26) Ok it looks great.

Once this is cooled, you can ice it however you want. Maybe make some stripes, some other shapes, smooth it all over, whatever you want.

So there we have it! A cake recipe, a little bit of history, and a little bit of science.

If you want to try out some of the other forms of leavening, look up some recipes for breads and meringues.

Thank you so much for joining me for this episode of What's That Bake.

And remember, there is death in the pot.

(32:00) Upbeat music

(32:11) Fades out