

But Why: A Podcast for Curious Kids

How Is Bread Made?

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[Jane] This is *But Why: A Podcast for Curious Kids*. I'm Jane Lindholm. On this show, we take questions from kids just like you, and it's my job to search out the answers. If you have a question, have an adult record it and send it to questions@butwhykids.org.

Before we get to this week's question I'd like to thank our sponsor, Cabot. The farm families who own Cabot Co-op have something new for busy families: Cabot's award-winning cheeses now come pre-sliced for when your family is on the go, for picnics, or for parties. Do you love cheese? Cabot has lots of cheesy recipes that kids love, on their website [Cabot Cheese-dot-co-op](http://CabotCheese-dot-co-op).

This week we're talking all about baking.

Maybe you spend time in the kitchen with your parents or your family baking cookies cupcakes muffins and pies. Or maybe you just enjoy eating those things. Well one of you wanted to know more.

[Kareena] Hi my name is Kareena. I live in Los Angeles, Ca. And I want to know how bread is made?

[Jane] To get Kareena an answer, I took a field trip.

[Robyn] Hey my name is Robyn Sargent, and we are at the King Arthur Flour Baking School in Norwich, Vermont. We're going to go ahead and make bread so everybody get ready, we're going to have a lot of fun.

The first steps are to make sure that we have the right kind of flour. We're going to be using an unbleached all-purpose flour. In flour, there are a few proteins that when you work them and when they get wet, they develop the stretchy substance that's called gluten. So we want to make sure that we have enough of that gluten to trap the air that the yeast makes. It's called carbon dioxide and it's what makes the bread rise kind of like a balloon.

So I have here a cup measure, and when I measure my flour I use a measuring cup and I'm going to fluff the flour up. I'm going to sprinkle it into the cup and then I'm going to draw a level measure across the top and that's going to give me a cup of flour. That's going to go in my bowl and I actually need about three of those cups of flour in the bowl.

Then the next thing is to add some milk powder and I like to use milk powder, because the milk is going to tenderize my bread but I don't have to have liquid milk at home, I can just keep my dry milk right in my pantry. So I add about two tablespoons of that to my flour. And then two teaspoons of sugar. Sugar is going to make the bread a little slightly bit sweet. But mostly it's going to do something for feeding yeast which love sugar. So once yeast gets a little bit of sugar, it starts to produce a little bit more of that carbon dioxide. So it's going to help leaven the bread. We also want to remember the yeast. I like to use dry so I have that here and that goes in. And then a little bit of salt. Now salt is kind of important because if you forget the salt your bread doesn't taste very good. So the salt's really going to help give us some flavor. It's also going to help the yeast a little bit and prevent it from working too fast. And indirectly we get better color in our loaf of bread when we have a little bit of salt there, so we want to make sure not to forget that.

After we do that we're going to blend everything together because we don't want lumps and I'm going to work in a little bit of butter. So in goes a tablespoon of that, and then once that's worked in a little bit we're going to add one cup of warm water. And when I say warm I don't mean boiling water because that could kill the yeast but I mean water that's really just comfortable to touch. Think about water that you'd like to climb into if you take a bath.

So I mix in my water and then I stir that all together until it makes kind of a shaggy mass we call it. And now I'm ready to turn it out onto a lightly floured board and I'm going to start kneading the dough just turning it kneading it until it gets nice and soft and smooth. It's kind of like clay. So it's really fun to play with. The next thing we want to do is once the dough is smooth and soft is we want to get it back in the bowl to let it rise. So I like to use a little bit of cooking spray. If you don't have cooking spray, you could use a little butter or a little oil.

The dough will go back in the bowl and we're going to cover that with plastic and let it rise for about 30 or 45 minutes. It's going to get really puffy and look kind of like a marshmallow. The temperature really matters with dough so if it's really warm it's going to rise really fast. It could even take 25 minutes. And if it's really cold in your house it could take as much as an hour.

So once the dough is risen, and I just happened to have one here that's all ready to go, I can see all the little air bubbles on the surface of the dough. You can actually smell that it smells kind of like a little bit more like bread than it did before. And also just sort of look and feel and you can feel how soft and tender it is when you touch it. If you stick your finger in it now, all you're going to see is just where it's poked. It doesn't bounce back at all. So what's happening is the yeast is actually enjoying being in this nice warm

environment kind of like us when we have a good meal and it's producing lots of carbon dioxide bubbles which are getting trapped by that gluten I talked about in the dough.

Now we are ready to shape our loaf of bread. So I'm going to put the dough out on to my flour-lined bench. And what I'm going to do is something we call degassing. So I'm patting out the dough and I'm letting all of those bubbles sort of flatten out and re-disperse in the dough so that I get a more even flavor and a more equal crumb structure. So the middle isn't all big holes or little holes, they're all more like the same size. So I shape it into an oval so I'm going to spray my pans and place the dough into the pan. And this may seem a little funny but what you're actually going to do now is flatten the dough with the palm of your hand until it fills up all the little corners of your loaf pan.

And now we're ready to spray the tops and cover it with plastic and we're going to put this back in that warm place and let it rise. What's really important is that the dough just comes over the top. It crests the top of the pan and then you're ready to bake it. If you put it in the oven when it's really high and it looks like a chef's hat it's going to end up collapsing and you're going to have like a big hole in the middle of your bread. You don't want that. So we want it to just crest the top in a dome and then it goes in the oven and then you're going to get a nice tall little mushroom top that takes, again, anywhere between 30 to 60 minutes depending how warm your house is.

So after you look and you see that your dough has risen up to the top of a pan it's time to think about baking the bread. So you're going to have your oven temperature set at 350 degrees Fahrenheit, about 175 degrees Celsius. Make sure you place a rack in the center of your oven because that's where the even heat is. Take the plastic off your dough and place the bread pan carefully in the center of the oven. Make sure someone helps you put it in the oven because the oven's really hot. So after about 30 to 35 minutes take a peek. Have an adult help you if needed and check to make sure that the bread has a nice golden color on the top. It's really likely that the bread is done at this point. So have your adult help you check by turning the dough out and slapping it on the bottom tapping it on the bottom to make sure it makes that hollow sound. And that can really help you decide whether or not the bread is done.

If it's done, make sure to take it right out of the pan and let it cool. If it stays in the hot pan it can get kind of wet underneath because there's steam trapped underneath it.

So once your bread is cooled completely and you really want to make sure it is nice and cool because warm bread holds a lot of moisture in the form of steam. And if you try to cut the bread it can kind of squish it and then it seems wet inside. So we want to make sure it's nice and cool. So then we're ready to eat the bread which is the part we've been waiting for, right?

Now we're ready to slather it with whatever we want, peanut butter, jelly, Nutella. I just like butter. Just give me some butter. Are you ready for a bite?

[Jane] I'm ready for a bite. Yeah.

Bread makes no sound on the radio. Delicious. Thank you, Robyn.

[Robyn] Great, you're welcome. It was a lot of fun.

[Jane] Did that seem complicated? You were writing that all down, right? Just kidding. Most people bake with a recipe. A recipe is the map for how to make something. So it has a list of ingredients and measurements or amounts that you should use and step by step instructions for how to combine them all, how long you should mix, what tools you might want to use, and how to cook it, how hot should your oven be, how long do you need to cook it for, what's it going to look like when it's done? That's what a recipe tells you. We have a link to the bread recipe that Robyn showed us how to bake on our Web page: but-why-kids-dot-org.

Ask an adult for some help and give it a shot. Robyn says bread isn't as complicated as it seems.

[Robyn] One of the things I love most about bread is that anyone can make it and have a lot of fun doing it. Try it. It's fun!

[Jane] If you bake a loaf of bread, send us a picture! We'd love to see what you come up with.

[Sloane] Hi I'm Sloane, and I'm from Austin, Texas and I'm ten. My question is who made the first cake? Because it seems so complicated to make all those instructions to bake a cake.

[Jane] Believe it or not, Sloane, cake actually started out as bread. And cake recipes have been developed over time by a lot of different people. The earliest cakes were probably more like bread sweetened with honey.

Over the years bakers got creative and started adding nuts and dried fruit. In Europe, cakes like gingerbread, or fruit cake became popular. Now sometime in the mid-17th century, that's the sixteen hundreds, round cakes became popular. They were made with yeast just like bread to make them rise. But then in the mid-1800s something amazing happened. People discovered how to make baking powder. Baking powder is a mix of chemicals called sodium bicarbonate and acid salts. They can make a cake rise without using yeast and in the 1800s companies started selling them and suddenly making cakes became much easier for a home cook to make. So that's when the cakes

you're probably familiar with today would have become popular, round cakes with creamy frosting.

Bakers would figure out the recipe and maybe publish a cookbook and that's how people would learn how to bake it themselves. They look at the cookbook and follow that recipe then someone else might make small changes to that recipe and invent a different kind of cake. And then they share that recipe with other people.

But baking is pretty exact because it's that reaction of baking powder, flour, eggs and butter that makes a cake and fluffy and delicious.

So in the 20th century, the 1900s, there was a new invention: the cake mix. You might have grandparents or great grandparents who remember when cake mixes were invented. Companies realized that people want to make cakes at home, but might not have the time or skill to do it right, so they started selling boxes with all of the flour, sugar, and baking powder, all of those dry ingredients that go into a cake already together in one box. Cooks just needed to add water, oil, and eggs and with a few stirs they had a cake ready for the oven.

When you're baking a cake you might be tempted to take a little taste of that cake batter. It looks so good! But someone has probably told you not to eat it because it has raw eggs in it. Gilbert, who is eight and lives in North Carolina, wants to know why are raw eggs bad for you to touch or eat in the first place?

Well, Gilbert it's not that eggs themselves are necessarily bad to touch when they're raw, the concern is that they might have bacteria on them that's dangerous and can make you sick. So if you touch a raw egg and then touch your mouth there's a chance that if there is any bad bacteria in that egg, it might get into your mouth and into your stomach and you could get sick.

Raw eggs sometimes have a bacteria in them called salmonella and that can make you really sick. Nobody wants to get salmonella. Cooking the eggs kills the bacteria and makes the egg safe. So the easiest way to make sure you're preventing any kind of illness is just not to touch the raw eggs or to make sure that you wash your hands very carefully after you have touched them. Don't put your hands in your mouth until you've washed them and wash down very carefully any surfaces where you've been cooking where those eggs might have touched.

In our last episode about summer we had a question about poisonous berries.

[Melbourne] Why are some berries poisonous and some not?

[Jane] Now I did some research on that and I told you about a theory that some plants have developed a way to be poisonous to some animals but not to others. After that

episode I got a note from a botanist, that's someone who studies plants and she said she didn't think that theory is correct.

[Katrina] Hi everyone. I'm Katrina Adams and I'm the education director of the Botanical Society of America. I wanted to chime in on a question that came up earlier about why some berries are poisonous. First of all, what a great question! If berries are a plant's way of getting animals to spread their seeds then it doesn't make much sense for them to be poisonous does it? The second thing I want to say is that why questions are the hardest ones for science to answer. It's relatively easy to figure out what berries are poisonous and what poisons they contain, and it's not that hard to learn how a particular plant poison affects animals or humans but understanding why those traits evolve is much trickier.

Now it's true that some birds can eat berries that are poisonous to humans, but we don't really see plants making poisons that are targeted at particular animals like humans or birds and I don't know of any plant that has poisonous berries where the rest of the plant isn't also poisonous.

In fact most times, berries are the least poisonous part of a poisonous plants, although the seeds inside the berries can be really poisonous. So I think that plants probably evolved the poisons to keep insects or bacteria or fungi from eating their leaves or roots or seeds. So the fact that some of the plant's poisons end up in the berries is just a side effect of it being poisonous plant. So why can birds and other animals eat some berries that are poisonous to humans? I think a lot of it comes down to the digestive system of different animals. Does the seed coat that protect the seed have a chance to break down and release poisons or do the seeds just go straight through the birds without being digested?

Even in humans how well you digest your food makes a difference. Humans are really good at cooking or otherwise preparing poisonous plants in ways that remove the poison so we can eat them. Some animals also have behaviors that help them eat poisonous things without getting sick. Amazon McCaws often eat very poisonous seeds and they seem to be fine. Bird scientists studying these birds noticed that they spend time eating clay. And they predict that the clay acts like an antidote for some of the poisons that are in the seeds they're eating. Anyway, I hope we've learned a little bit more about plants and poisons. I admit I'm biased and most people won't agree with me but I think plants are even cooler than animals because we know less about them and there's so much left to be discovered. Stay curious.

[Jane] Thank you, Katrina Adams, for giving us more insight. That's it for this episode. As always if you have a question, have an adult record it on a smartphone and send it to questions@butwhykids.org.

Also we're still looking for kids to answer this question from Finn: Is it OK to do something you're told not to do and then never tell anybody?

[Jane] We've gotten a few terrific answers to this question but we really want to hear more from kids for this episode because you probably already have a lot of adults telling you what to do and not do and what's right and what's wrong.

And we think it would be more interesting to have you tell your peers, other kids like you, what you think about this question. So maybe tell us about an experience where you lied or you hid something that you had done. How did that make you feel? Or think about Finn's question and tell us if you can imagine any situation where it might be OK to do something you've been told not to do. Or maybe you just think it's always wrong? We want to hear what you think.

Have an adult you feel like you can trust with this topic record you using a smartphone. Tell us who you are where you live and how old you are. And send those thoughts to questions@butwhykids.org

But Why is produced by Melody Bodette, and me, Jane Lindholm, for Vermont Public Radio. Our theme music is by Luke Reynolds. Thanks today to Sara Simon and Jonathan Butler for technical help. We'll be back in two weeks an all new episode. Until then, stay curious!