Raw Milk 2

[00:00:00]

EAU: Sarah and her husband Brandon had decided to switch their family to raw milk because their oldest son had had some health issues. When they did, his health seemed to improve. "The kids loved it," said Sarah, talking about her other two children. "It seemed to be better for their immune systems. We drank it for five years. The kids thrived on it." The family also had complete faith in the dairy's sanitary practices. In switching over to raw milk, they had been advised to "know their farmer". They believed they had done the right research to make sure the milk they were buying was safe to drink.

EAU: But then one day, Jubilee got sick - very sick. She was vomiting and suffering from a severe case of diarrhea. Instead of improving over the next several days, she got sicker and sicker. Her worried mother took her to the emergency room, taking along a pull-on diaper that had blood in it. The results of the test came back. "It's *E. coli,*" she was told. "Jubilee's kidneys are in danger." Meanwhile, her son Titus, who had just turned six, was also sick but seemed to be handling it better. But then he got sicker and joined his sister in the hospital. He, too, developed hemolytic uremic syndrome, although he didn't need to undergo dialysis. But he did develop pancreatitis from the *E. coli* infection he had contracted from the contaminated raw milk, and then a staph infection. "Watching them in pain was the absolute hardest thing I've ever done as a parent, "she said." The amount of needles for blood draws, medications, transfusions is scary, and the fear of each one only grew making it harder, not easier." It was three weeks before the children were well enough to go home. "I was in the hospital with them the entire time," said Sarah, "I felt like a bat. It was still summer when they went in, and the stores were selling school supplies. When I came out, there were Christmas decorations in the stores." And while the children are doing well now and "playing with the best of them," memories persist.

EW: Wow,

EAU: I know.

EW: that is absolutely heartbreaking.

EAU: so heartbreaking. It's so heartbreaking. So that story was excerpted from an article on food safety news.com. It was also written up in a Michigan food

safety website as well. Um, but it's about the story of Jubilee and Titus Combs, um, who got sick in Kentucky in 2016 from e coli, from Contaminated Raw Milk.

EW: Hi, I'm Erin Welsh

EAU: And I'm Erin Allmann Updyke.

EW: this is, This Podcast Will Kill You.

EAU: We're still talking about raw milk

EW: We are still talking about raw milk. There is so much more

EAU: to talk about.

EW: Yeah. So if you haven't listened to last week's episode on Raw Milk, uh, really what that was was a history of pasteurization and some of the pushback that pasteurization received early on and then continued to receive as the, um, as the decades went on.

EAU: Continues to receive today, perhaps apps.

EW: today. And we also wrapped it up with a look at some of the present day drivers of raw milk. So in that we were talking primarily about the people who are pushing raw milk and some of the reasons that might be, um, not all of the reasons that people, you know, push raw milk. And then the other thing too is that like, you know, to, to separate out, to just reemphasize, to separate that there is a very big difference between the people buying raw milk and people who are pushing raw milk.

EAU: Right at like a large level.

EW: Yeah. Yeah. And so just like to not conflate the two,

EAU: right, there's so much miss and disinformation out there that like, it is really hard. And we'll get into that. I'm gonna get into a lot of detail today on like, what are the claims that people are making about raw milk? Is there any validity to any of them? How do we distinguish what is real and what is not real? And, and how do we balance these supposed risks and supposed benefits,

like how do we do that? So that's what we're gonna talk about today. I'm excited about it. But first

EW: about it. Yep. Quarantine time yet again. We're drinking the same thing yet again. is, uh, Milkin' It. We're,

EAU: Milkin' It.

EW: it, know, obviously it's based on a cocktail called The Pink Squirrel, has, lemme pull up my notes. It has a bunch of things, actually only a few things has heavy cream, obviously has creme de cacao and it has creme de noyo, which, um, is a challenge to find. But know what?

EAU: Will persist.

EW: We will persist, but we will post the full recipe for our quarantine as well as the non-alcoholic placebo, Rita, on our website. This podcast will kill you.com, as well as on all of our social media channels, which if you're not following us on there, what are you waiting for?

EAU: What are you even doing?

EW: Yeah,

EAU: Who are you following? Um, on our website you can also find a whole [00:05:00] bunch of other stuff that's you might enjoy. You can find transcripts from every one of our episodes. You can find our bookshop.org affiliate account and our good reads list. You can find merch that we have, which is phenomenal. You can find a blood mobile who does the music for all of our episodes. You can find sources from every single one of our episodes so that you know where this information is coming from.

EW: yeah. So many sources.

EAU: many sources, well, um, rate, review, subscribe.

EW: There you go. Check us out on YouTube,

EAU: Okay. Are we done with the business part of

EW: I think so. Let's, let's take a break and then get started.

EAU: So, Erin, you talked a lot about what the landscape was like prior to the requirements, prior to the development of pasteurization and requirements for pasteurization, but I just wanna frame ourselves there. Um, prior to like nationwide requirements that all milk be pasteurized in the us most of the estimates that I saw were that milk born outbreaks overall constituted at least 25% of all disease outbreaks that were due to contaminated food and water.

EW: Wow.

EAU: Right? So that's like a really huge number today. Milk and milk products are associated with, on average, and this varies a little bit year to year, but usually 1% or less of these types of outbreaks, which is phenomenal. Yeah. And, and as we'll see, that does not mean that milk itself is a low risk food.

EW: Mm-hmm.

EAU: Like we talked about last week, milk is a beautiful medium for bacterial growth.

EW: It is.

EAU: It means that pasteurization and the widespread use of pasteurization is the thing that has been preventing these outbreaks.

EAU: So what I am going to do in this episode is like lay the, the, the view of the land of what the risks of unpasteurized melk actually are today.

EW: Okay. I, I keep hearing are, do you, how do you pronounce milk?

EAU: Okay. I know I was waiting for you to say this because I get made fun of for how I pronounce it. Every single, it's going to, it's gonna keep going, Erin,

EW: It's melk And I feel like this is feeling very deja vu to me. And I think that we may have had this conversation

EAU: the lactose intolerance. Absolutely we did

EW: You say melk right?

EAU: I don't hear a difference between what you are saying and what I'm saying MELK

EW: Where is, where does melk come from?

EAU: what do you say? Milk, milk,

EW: I say milk.

EAU: Melk

EW: Milk. I'm sorry. there's a vowel change there for, for certain.

EAU: Well, I'm sorry. Everyone's gonna be so annoyed with how many times I say the word MELK today?

EW: I just, I have to know, I need to look at like a dialect map to know where melk comes from. Did you pick it up in Illinois?

EAU: California. I dunno. Erin

EW: don't know. Okay.

EAU: don't know either, but I get made fun of for it on the regular, apologies literally everyone listening. I'm shocked that it didn't come out last week. Honestly.

EW: That's fair. Yeah. I don't

EAU: just 'cause I didn't talk about milk as much.

EW: Sorry to like kick off this whole episode making you feel self-conscious.

EAU: It's okay. I only say it a hundred more times. A hundred thousand. Okay, listen. But that's where we're gonna start. Okay. We'll talk about the raw product that comes out of a cow. Primarily we're mostly talking about cow MELK Um, and then related to that, I'll also talk a little bit about what the current legal landscape looks like when it comes to raw and pasteurized milk, not just at the US but across the globe. Like how easy or how hard is it to actually get your hands on raw milk? Um, are there any associations between whether raw milk is legal and easy to get and its potential for causing harm? And then what the differences are truly between raw and pasteurized milk. And hopefully break down some of the very egregious misconceptions that exist on the internet right

now about this. 'cause there are some differences, but it is not what TikTok would like you to believe.

EW: I feel like calling the misconceptions is very generous. It's like flat out lies.

EAU: A lot of them really are, and we'll get into, I think, how those, like, why, I don't know. It's, it's a very effective lies and, and we'll get into it.

EW: totally.

EAU: So one of the things that makes, comparing the number of infections or the numbers even of outbreaks of disease from raw milk versus pasteurized milk, difficult today in our modern system is that there are huge disparities in the number of people who are drinking raw milk versus pasteurized milk. So in the US it's estimated that somewhere between one to 3% of the population is drinking raw milk, whereas close [00:10:00] to 80% of Americans drink milk. Like that's a huge, I didn't know that. So many of us drink milk.

EW: And that's like, what does that mean? Does, does that mean like you're having a glass of

EAU: This is, no, this is based on surveys, uh, from like MMWR and like a bunch of other places that are just like, have you drank milk in the last seven days? Yes or no? And then sometimes it's quantified like, how many glasses do you drink? And blah, blah, blah. Right?

EW: So I guess, do I count as that? Would I check? Yes, because I had half and half in my

EAU: Yeah. Yeah. Absolutely. Yeah. Yeah. But don't know if you answered the survey, would you have clicked yes or no? I don't know.

EW: I just mean like, I guess it's, it's for such a, a bi, like a binary outcome, right? Like yes or no. It's like how much milk

EAU: Erin, you are getting into, like, this is a huge part of it, right? How much milk are you drinking? Are people who are drinking raw milk drinking the same amount as people who are drinking pasteurized milk? Like there, there is a lot of variability in any kind of like nutritional study that we're looking at. But if we just take a bird's eye view, probably about 80% or so of Americans drink milk. Only one to 3% of Americans are drinking raw milk. The vast majority of people who are drinking milk are drinking pasteurized milk. So if we're looking

at numbers of. People who get disease or the number of outbreaks, you cannot just compare the total number of outbreaks or the total number of cases in raw versus pasteurized milk. That will not give you an assessment of risk because that is not how statistics works. You have to compare the proportion of cases. You have to look at how many people are drinking raw milk, how much are they drinking, how many people are drinking pasteurized milk, how much are they drinking? And then figure out what is the likelihood that you would get sick from raw milk versus the likelihood that you would get sick from pasteurized milk. That is what you have to do. We often do not see the data reported in that way, so that is the first problem with how we report the differences in risk. But don't worry, we're going to today. Okay?

EW: Yay.

EAU: So if we just look at those numbers first. There was a paper and there's, I, I cited a bunch of different papers that looked at outbreak rates, uh, over different time periods. Um, but I just picked the one that's the most recent. So a paper that looked at outbreaks in both the US and Canada, where by the way, it's totally illegal to buy raw milk or sell raw

EW: Oh, like entirely.

EAU: yeah, it's, it's not legal there, uh, it still happens, but that it's not, it's not legal. Um, if you look at outbreaks in the US and Canada from 2007 to 2020 in raw milk, there were 20 outbreaks confirmed outbreaks of disease associated with raw milk. That resulted in 440 confirmed cases, 124 hospitalizations and five deaths. In pasteurized milk products around the same time, there were 12 outbreaks, 174 confirmed cases, 134 hospitalizations, 17 deaths, and seven fetal losses. And the majority of outbreaks in that time period, 2007 to 2020 were listeria in pasteurized products. And so that likely accounts for the increased number of hospitalizations, fetal losses and deaths, because listeria can be very serious. See our listeria episode for more. So just a few things right off the bat. Overall, even just the numbers, those raw numbers were higher in raw milk, right? But if you were to ignore statistics, you might say, well, it's much more dangerous to be drinking pasteurized milk. There were more deaths in pasteurized milk, right? But you would be wrong if that is the conclusion that you drew. And we do not have to Erin math this, 'cause I wouldn't trust myself to do these statistics.

EW: a shame though. I, I, I miss some air

EAU: Thank you. I wish I could have done it. I thought about it, but luckily I found a paper that did the math for us and they were looking at data

EAU: it was from a slightly different set of years, I think it was like 2009 to 2014 or something like that, based on US data. They looked at how much milk and what type of milk products are people drinking, and based on all the outbreak data from that time, they estimated that a person consuming raw milk is 840 times more likely to become ill, and 45 times more likely to be hospitalized from that illness compared to somebody drinking pasteurized milk

EW: 840

EAU: 840 times more likely to become ill, 45 times more likely to be hospitalized. Most years, over 95% of outbreaks and cases of disease from milk is from raw milk, not from pasteurized milk. And it is true that milk is not the [00:15:00] biggest contender when it comes to foodborne diseases overall, whether it's raw or pasteurized. But again, that is because of pasteurization and because the vast majority of people are drinking pasteurized milk. Prior to pasteurization, 25% of foodborne illnesses were coming from milk because that milk was primarily raw milk.

EW: Mm-hmm.

EAU: It's also estimated, and this is really important for every case that is associated with an outbreak, like an identified recognized outbreak associated with milk, there are likely 26 to a hundred other illnesses that are never reported. So these are all underestimates.

EW: For, okay.

EAU: For milk born disease.

EW: milk borne disease. Okay.

EW: Okay. Um, so it might be a bit early to ask this,

EAU: Go ahead. Anyways,

EW: mentioned listeria. What are the other pathogens or diseases associated with

EAU: so glad you asked. It's not too early. That's exactly what I was gonna talk about next. I

EW: You're welcome for the segue.

EAU: thank you. There are a lot of different pathogens that can be transmitted via milk. You talked about a lot of them last week. There are a few that constitute the majority each year of the outbreaks and the sporadic cases that are associated with milk. Salmonella and campylobacter are two really big ones. Both of these can cause Guion Beret syndrome, which is a long-term neurologic complication that arises after infection. Um, listeria is a very big one in pasteurized and raw milk. Listeria, of course, can cause very severe infection in older people and in young babies. Um, but it also most severely. A person is pregnant when they're infected, can cross the placenta and result in fetal death or severe fetal complications.

EW: Yeah, it's heartbreaking,

EAU: E Coli is also very common in raw milk, including the serum RO 1 57, H seven, which can cause severe illness, including something called hemolytic uremic syndrome, which is very devastating, can cause internal bleeding, kidney failure, and death, and is far more likely to happen to children than adults.

EW: Just because of like susceptibility, vulnerability kind

EAU: Yeah. And really across the board, all of these illnesses are more likely to result in severe disease in children because their microbiomes, their immune systems are just not as, you know, equipped to deal with these infections. Most of these infections cause like diarrheal illness, so nausea, vomiting, diarrhea. Sometimes, especially with e coli, we can see bloody diarrhea or dysentery.

EW: Okay. Yep.

EAU: But milk can also harbor brucellosis, cryptosporidium mycobacterium, which causes tuberculosis, staphylococcus, streptococcus, and a ton of other pathogens as well. But those tend to be the top causes of disease in humans.

EW: It is, it's interesting and part of the reason, I know that I talked about it last week, but part of the reason I was very curious about the specific pathogens today is like what has changed or ones have come to light in terms of being more, uh, more seen as a, as a risk or a threat. I think part of it is just that a lot

of the diseases that used to be such a huge driver, we, we vaccinated like diptheria,

EAU: A hundred percent Right. We don't see dip theory and milk, thank goodness.

EW: yeah.

EAU: Um, of course this year in particular and last year, we've also seen a lot of reports of dairy cows and their raw milk being contaminated with H five N one or avian influenza. So viral,

EW: the most curious about,

EAU: yes. Viral illnesses, including avian influenza and other influenzas can absolutely be found in the milk. Thus far, the only people who have gotten sick from raw milk are from those handling and processing it, as far as I could tell. So there have been outbreaks in dairy workers, they think from getting that raw milk like in their eyes and things like that. During the processing process?

EW: You mean getting sick with H five N one?

EAU: Yes, yes. Becoming ill from H five, N one from milk, but not from consumption of raw milk. Yet there have been a number of dairies that have had to recall them, their milk, because it was found to be contaminated with H five N one though,

EW: and so what does, what does contamination with H five N one mean? Are we finding, you know, just genetic material? Are these viable viruses? Like, I mean, obviously some of them are, at least if they're, if they're causing illness, um, in people who are handling the cows. But what, yeah, what does that mean from. Like a

EAU: Is a good question. I don't know. And I don't know. I think what, what this highlights is that you can't necessarily test for everything, right?

EW: right, right, right. You can test for the things that you know that you are testing. You can look for things, but you can't find

EAU: Exactly. You can't find everything. I don't know exactly what the methods are that they are using to test for avian influences specifically. I did not look into that. I'm sure that there's a protocol, but I don't know what it is. For all

of the bacterial species, it's usually that they are, you know, plating and culturing these, which is a fallible system. You might have things that are present in low [00:20:00] levels or only in certain batches that you're not testing and therefore not catching. So just because you have a facility that is testing their milk does not mean that that milk is guaranteed to be free of pathogens if it's not pasteurized.

EW: Right.

EAU: And these pathogens are introduced in a bunch of different ways, right? Into the milk. Milk itself is not really a sterile fluid, right, but even if it were, as soon as it leaves the tet, is that the right word? By the way, Tet utter individual nubbin like the nipple of the cow.

EW: the I.

EAU: I think it's the teat. Pretty sure

EW: I think that makes sense.

EAU: as soon as it leaves, it's coming into contact with the skin of that teat. And the udder, which is teeming with bacteria. It can very easily be contaminated with fecal matter, uh, from the cow, which can be anywhere on its skin. It can, you can have bacteria that are introduced from the environment itself, from the milking equipment, from storage equipment, from the milk handlers, or down the line from improper processing or storage conditions that allow the bacteria that are already present to multiply into quantities that could now cause harm. So there are a lot of ways that milk can end up contaminated. So that kind of bleeds into the question of what are the regulations surrounding raw milk and what, what, who, who is allowed to have it? Where does it come from and is it only in the US our FDA, that has brainwashed us into thinking that our milk needs to be pasteurized. No the short answer of that. The legality of raw milk or the requirements of pasteurization, uh, across the globe do vary, just like they vary state to take within the us but they are fairly global. So in Canada it's illegal to sell unpasteurized milk, though you can get soft cheeses made from unpasteurized milk.

EW: Okay. Can I ask a question about that? Like, there a risk difference between cheeses made from raw milk versus consuming just raw milk straight out of the, you know, teat?

EAU: Yeah, that's a good question. There definitely are outbreaks that are associated with both soft cheeses and with on pasteurized milk products. Most of the papers that I looked at, I, they tried to focus just on milk itself, just to not conflate the two, if that makes sense. Um, so I don't know exactly, like, is soft cheese much more risky than just raw milk? I, I mean they all pose a potential risk. Um, I don't know, like the num numerical differences necessarily.

EW: I just didn't know if there was anything in the process of making, I don't know anything about making cheese and if there's anything in the processing aspect of that, or like the culturing aspect, if that changes

EAU: risk profile. I don't know. That would be a milk expert question. that,

EW: You're not a milk expert. Um, you're a, you're a milk expert.

EAU: I, Erin, stop it. Okay. Listen. In the UK it is illegal to sell unpasteurized milk only from certain places, like at the farm or farmer's markets or direct online sales or something like that, and they have to come with a health warning label on it. And then there's requirements in terms of annual inspections. Animals have to be free from TB and brucellosis. Bacterial counts have to be under certain loads, et cetera. Apparently though in Scotland it's illegal period. In Ireland, it's mostly legal. There are some regulations regarding registration and inspection. And the EU laws vary very significantly in all the different member states. Australia pretty strict. It's illegal to package deliver or sell unpasteurized milk. And in New Zealand it has to be bought only by home delivery or direct farm sales.

EW: Okay.

EAU: In the US things have been changing very rapidly.

EW: Very rapidly.

EAU: So this data is probably a little bit outdated, but I tried to get like, you know, an assessment that was like, seemed reliable. So there was a paper from 2019 that said that as of then 23 states and Washington DC prohibited all sale of unpasteurized milk for human consumption.

EW: Right, which is, there's a workaround, right?

EAU: you can sell it for dog and cats and then

EW: And then cat dies,

EAU: no one is in your house telling you that you can't drink it once you have it in your house.

EW: Right.

EAU: Um, 27 states at the time in 2019, and I think this has changed, um, allowed the sale of unpasteurized milk with variation in what those requirements were. Like some, like here in California, you can buy it in retail stores. Um, in some places it can only be sold on the farm where it's produced. Some you can sell at farmer's markets, et cetera. So there's a lot of variation, but here's what's really important, there are a lot of people who say, well, the only way that raw milk is risky is if you are not getting it from the right source. If you get sick, it's your fault because you didn't do [00:25:00] your research.

EW: Yeah. Yeah,

EAU: That is untrue. An analysis from 2022 showed that the vast majority of outbreaks that were associated with raw milk are happening in states where it is easier to buy legal raw milk. We're not talking about black market raw milk that's causing illness, especially in states where it is legal to be sold in retail stores. The easier that it is to get raw milk, the more risk there is of raw milk causing illness,

EW: And these, these states, this include the ones where it says not for human consumption.

EAU: I believe so. No, I mean, this was mostly in places where it is made for human consumption. So presumably farms are having to be tested to more rigorous standards if they are selling something for human consumption, and yet they are then causing more illness like that is what we see. So

EW: Not

EAU: is all of.

EW: I guess.

EAU: Right. It's, it's not surprising, but it is like contrary to what a lot of the rhetoric is about raw milk and that if you just do your research, if you know the farm is clean, if you know your farmer, if you trust them, and, and that's just not

the reality. You cannot guarantee that raw milk is free from pathogens. You can't guarantee that anything is completely free of pathogens, but we can greatly reduce the pathogen burden by pasteurizing milk. There are other ways that things can get contaminated. That is why we can still see occasional outbreaks in pasteurized milk products because they can be contaminated after the pasteurization process itself in other parts of the processing, handling, and storage of milk. But without that step to ensure that the first product that you're getting is not contaminated, you cannot guarantee that that milk is not going to make you sick, period.

EW: Period.

EAU: So are there any benefits? To milk period. Uh, or to raw milk compared to pasteurized milk

EW: I was like just talking about again, like it's still, I, I can't get over how, how strange it is. If you think about it, that we are still drinking like a, a food, a milk that is made for another species,

EAU: babies. There has been,

EW: as adults.

EAU: we're so weird. We just drink baby food all day. Um, there's also, I will say, been a lot of debate in the, like, literature at large about like, is milk even good for us? Should we be drinking it? Should we not? Like.

EW: There's too much, there's too much, there's too much to think about in the world.

EAU: Exactly.

EW: think about that question.

EAU: So across the board though, globally milk is an important source of nutrition for a lot of people. It is a good source of fat. It is a good source of protein. It has a lot of calcium, which is important for our bone health, and it's a good source of vitamin B12. It has other vitamins in it. It's got other B vitamins. It has some vitamin C, maybe a little sprinkle of vitamin D, but it's actually not great sources of any of those other vitamins. It's like B12, calcium, fat protein. That's what you're really getting from milk. There's nothing inherently magical about it. There's nothing that we need that we can only get from cow's milk.

Everything that you get from cow's milk, you can get from other nutritional sources.

EW: What are some other good sources of B12 and calcium?

EAU: B12 is literally any animal product, any. If you are totally vegan, then that's when it becomes an issue worth. Where are you getting your B12 but like eggs, meat, any other dairy product like cheeses. Anything else that comes from an animal has B12 in it. Calcium, you can actually get, like shellfish, have a lot of calcium in them. You can also get calcium from lentils. Like you do not need milk to get your calcium. There's lots of other places

EW: I didn't know that shellfish have calcium. Should I

EAU: I feel like I wanna double check myself to make sure I'm not crazy, I'm pretty sure that's right. Yep. Shellfish is a fair source of calcium. Yep.

EW: Amazing.

EAU: Okay. Just to make sure I'm not telling anyone lies. So what then, if milk can give us things that are beneficial for us, what are the differences between raw milk and pasteurized milk in terms of its nutritional quality? The short answer is that due to the effects of pasteurization alone, there are essentially no major changes to overall protein content or digestibility. No changes to fat content, minimal changes to vitamin and mineral concentration and bioavailability, including calcium, no change in calcium bioavailability, and in short, there are no substantive differences that occur due to the process of pasteurization. The nutritional quality [00:30:00] overall of pasteurized milk versus raw milk is very similar, but this is, this podcast will kill you, so we won't just broad strokes it. Let's dig. Shall we

EW: Let's, let's get the details.

EAU: So I already said Milk has a lot of different vitamins in it. Fat soluble vitamins like vitamin A and E, also B 1, 2, 6, 12, folate, which is B nine, vitamin C. You might recall from our rickets episode that milk is actually naturally rather deficient in vitamin D,

EW: I do recall.

EAU: Which is why it's often added to commercial milk products because vitamin D and calcium work really well together, and they're both important for

your bone health. And so it's added to pasteurized milk products after the point of pasteurization so that you can get enough vitamin D from your milk. So if you're drinking raw, un pasteurized milk straight from the tea, you are actually gonna be getting less vitamin D than somebody who's drinking store-bought milk. But that's not because of pasteurization when it comes to the rest of the vitamins A uh, but most of the other B vitamins, the c and e, there is maybe some evidence that there's a slight decrease in vitamin B12, but this is less than a 10% decrease. And so pasteurized milk is still considered a very good source of B12 in your diet. The rest of the B vitamins, some studies don't really show any significant change. Some studies show slight declines in some of the other vitamin concentrations, but again, milk is not necessarily the best source of these other B vitamins to begin with, and so our diets are not reliant on milk to obtain these vitamins. And vitamin CI think I mentioned in last week's episode, milk is not a good source of vitamin C, and vitamin C is easily ruined via heat as well as oxidation. It's photo sensitive, and so milk that is stored for any length of time is going to be a very poor source of vitamin C. There are some studies that show an increase in vitamin A with pasteurization. Why? I don't know. Um, but there's that,

EW: Okay.

EAU: so the bottom line is that the process of heating milk and then cooling it back down, which is what pasteurization is, does very little to affect the overall nutritional profile of milk. There is a lot of variation that is possible in vitamin content of milk between cows, between farms, within one individual cow at different phases of its life. So it could be that milk from one particular farm has significantly higher concentrations of some of these vitamins than milk from other farms. These differences are not due to pasteurization.

EW: Okay. So, um, real quick, a question about pasteurization, maybe this is again, jumping ahead or maybe it's the perfect segue, two. Um, but it, the pasteurization, there are different types of pasteurization. The half and half in my fridge is ultra pasteurized. Um, a example. And then there's also UHT. What are the, what are the differences between these and do these different types of pasteurization impact the nutrient differences between the two

EAU: Great question. Let me scroll to where I have some data on that.

EW: the perfect segue.

EAU: So yes, there are different types of pasteurization. It's gonna differ like farm to farm or company to company as well as like country to country. So the

US most of our milk is pasteurized by what's called HTST, high temperature short time, which is just like a standard pasteurization, which means that the milk is heated to about 70 degrees Celsius or 161 degrees Fahrenheit for at least 10 to 15 seconds. And then rapidly cooled down to less than 40 degrees Fahrenheit. Um, ultra high temperature or ultra pasteurized, those are the same things. So that's UHT or ultra-pasteurized that is heated to a much higher temperature. So at least 280 degrees Fahrenheit, or 137 Celsius, and sometimes even higher for two to three seconds. So shorter time, higher temperature, and then there. And that. Milk can sometimes actually be shelf stable. So that's why in a lot of other countries when you buy milk, it's not in the refrigerated section. You don't have to refrigerate it until after you open it because it was pasteurized and then packaged in a way that it is essentially like considered sterile really.

EW: I remember that in Finland and Panama.

EAU: Yes. And then some small batch farms might use even lower temperatures for pasteurization, but the lower the temperature, the longer time that you have to leave it at that temperature. So yes, there might be differences in the amount. We'll talk in a little bit about proteins. Um, and so there might be differences in the amount that vitamin levels are affected, like 5% versus 10% versus whatever declines and in the amount of changes to the proteins in milk that we see with ultra high temperature versus lower temperature pasteurization.

EW: Mm-hmm.

EAU: Um, and a lot of studies don't necessarily distinguish between these when they're looking at the effects of raw [00:35:00] versus pasteurized milk. They're not distinguishing lower temperature pasteurization versus higher temperature pasteurization. They're lumping all pasteurized milk products together. So there's not as much data on like the differences between ultra high and regular pasteurized versus lower temperature pasteurized.

EW: Got it.

EAU: But it's a really good question. Um, if we get back into the concentrations of different vitamins and minerals, total calcium content, bioavailability of calcium not changed With pasteurization, though the amount of free calcium might be slightly decreased after pasteurization. There is also no substantial difference in lactose concentration in raw versus pasteurized milk.

EW: This is such a common

EAU: really is

EW: that people make.

EAU: who is lactose intolerant is not any more likely to tolerate raw milk compared to pasteurized milk. And I have a study to back myself up. I'm not making this up. The idea is in raw milk proponents that there is so-called good bacteria, which produce lactase enzyme in raw milk. While there are a lot of bacteria in raw milk, and some of them might include lactobacillus, which can produce a lactase enzyme. Some of them might include bifidobacterium, which is a marker for fecal contamination in your milk, but both of those can produce a lactase enzyme. They are not present to an extent that it changes the lactose concentration of raw milk. To do that. You add back in bacteria in order to make yogurt and yogurt does have significantly less lactose because of the amount of lactobacillus or human derived bifidobacterium that are added after pasteurization of that milk. Does that make sense?

EW: it makes total sense.

EAU: Yeah. Um, milk is across the board pasteurized or on a great source of protein. 80% of the protein in milk is in the form of casein, which is incredibly heat stable does not change with pasteurization. The rest of the proteins in milk, a lot of them are whey proteins, which is a whole group of proteins, and these are more heat labile so they can denature and break into smaller pieces or change their shape after the process of pasteurization.

EW: Okay.

EAU: But there is no evidence that this increases the allergenicity of milk. Like kids who are allergic to milk are usually allergic to whey protein, and they are no more likely to tolerate raw milk than they are pasteurized milk. They're still allergic either way.

EW: yep.

EAU: And there are a lot of other proteins, um, in this milk that some people who love raw milk get really excited about because they're like, oh, some of these proteins are like bactericidal. Um, and these are things like lactoferrin, lysozymes, lacto peroxidase, bacterin. Um, these are things that are present in milk as an immune response in the cow to help protect the cow against infection.

EW: Okay.

EAU: So they might be there in higher. Concentrations if that cow say, has subclinical mastitis or something like that. Um, but these proteins are all still present in pasteurized milk and much of them retain 70% or more of their activity after pasteurization. So in short, protein content is not significantly change, though some way proteins do change their shape or structure due to the heating process itself.

EW: But there's, there are no consequences to

EAU: Digestibility to protein availability or to allergenicity of the milk. Milk have so much more. Aaron, um, is a really good source of fat as long as you're drinking whole milk. this is where we can get into some really big differences between commercially produced milk and raw milk. Um, the milk that you get straight from a cow can vary anywhere from like three to over 6% milk fat,

EW: Mm-hmm.

EAU: which is huge variation.

EW: it is huge.

EAU: But if you are producing something commercially in large batches, like the milk that you're buying from a store, you don't want variation. You can't reliably test variation. You need standardization. So in the process of making like big quantities of milk to sell in stores, milk from a bunch of cows and sometimes even from a whole bunch of farms is mixed. And then often it is skimmed, which means the fat is removed and then fat is added back in to make standardized versions of milk. So you can buy non-fat milk where all the milk has been removed. You can buy milk where it was skimmed, and then 1% of fat was added back in, or 2% or whole milk is usually standardized at about 3.5%.

EW: Interesting. Okay.

EAU: Okay? But raw milk can vary drastically in its fat content and it can vary batch to batch. That doesn't have anything to do with pasteurization. Pasteurization is not significantly changing the fat content of milk,

EW: Right. It's just milk processing.

EAU: It's just part of the milk processing process. Another part of the milk processing process that's not pasteurization is that the milk

EW: is [00:40:00] hilarious, by the

EAU: is processing process. Um, is that milk in stores is generally homogenized, and that's an entirely separate process from pasteurization. It entails, uh, reducing the size of the milk fat globules to really tiny so that they're more well evenly suspended in the milk so it doesn't settle out with gravity.

EW: not getting the, yeah.

EAU: That, that, uh, increases the stability of milk. Uh, also makes some people like think it looks less gross 'cause it's not chunky.

EW: Mm-hmm.

EAU: Um, but this, uh, is not due to pasteurization. That's due to homogenization. You can buy non homogenized pasteurized milk. I used to buy it all the time in Hawaii. That was the milk that we bought. So just saying, um. And yeah, so that's, um, that's all of the, the major differences. The biggest difference between raw and pasteurized milk, like the true big difference is the bacterial loads. Raw milk has significantly higher loads of bacteria across the board every single time, and that is why it poses a higher risk of infection. Not all of those bacteria are pathogenic, but some of them are

EW: you're right. Right. And so how does that, like what sort of is the inspection process? And I know that there are standards that farms have to meet, whether that milk ends up being pasteurized or not, but, but what is, what is the acceptable level of bacteria in

EAU: Aaron, that varies. Across the board. It varies country to country. It varies state to state. Same thing with how often does your farm need to be inspected? How often do you need to be reporting that, who are you reporting it to? All of that is going to vary. So yes, there are requirements that are supposed to be in place for farms that are producing raw milk for consumption and farms that are producing milk to be pasteurized for consumption. Um, but it, it's really like it's a patchwork, right? It's gonna vary place to place. So I don't have like a good summary of what the general requirements are.

EW: it. Okay. And so let's say that you are selling raw milk, and course it has bacteria in it. And let's just say it happens to have some disease pathogenic

bacteria that lead to an outbreak and you're, you're based in the us what happens?

EAU: Oh gosh. Uh, if that outbreak is identified, then usually it's going to be the either FDA and or CDC working together to piece together where that outbreak originated from. And sometimes that's really hard. Sometimes it's really hard to pinpoint it back to a single farm or to a single producer. Um, but if it can be, then usually that milk has to be recalled and then there's steps in place where that farm has to be inspected, things like that. Um, but I, I will confess, I didn't dig deep into like what the step-by-step details are of what happens after that point. But I do know from looking at all of this outbreak data that a lot of times we don't necessarily get what was the one farm. for a lot of different reasons. Sometimes people just aren't forthcoming with that kind of information and things like that.

EW: Yeah. Okay.

EAU: But the last thing that I wanna talk about before we end here is a big claim that a lot of raw milk proponents make that may or may not have merit. We'll get into it, but every time I've seen it presented online, it is presented without any nuance or it is exaggerated to the point of being untrue, like not true at all. Um, and that is this claim that raw milk, the consumption of raw milk reduces the risk of asthma or allergies.

EW: I am so glad that you're getting into this there is so much Yeah. Misinformation and just like, uh, drawing conclusions that are not

EAU: Yeah. Yeah. So let's, let's get into what the data actually does show, shall we?

EW: Mm-hmm.

EAU: 20 plus years ago, there were a few really big, like landmark studies, um, most of them done in Europe that were digging into this association that we've talked about before on the podcast, where people started to notice that there was a big difference in kids who grew up on farms, living on a farm, who exposed to farms, who had a decreased risk of atopic diseases like allergies, asthma, and eczema later in life at this point now in 2025, there have been a bunch of papers that have shown this association, and because of this observational association, people understandably are trying to drill down into what is it about farms, like what are the exposures that people are being exposed to that reduce the risk? We'd love to reduce the risk of allergies and asthma. Is it the diversity of

microbes? Is it the number of microbes they're being exposed to? Is it the animals? Is it the plants or the animal feed? Is it the dirt or is it the milk?

EW: Is it the milk?

EAU: Is it the milk? Um, and I will confess, I wrote and rewrote this section about a thousand times because the truth is that this data is a little bit messy. It does not fit into a 92nd Instagram reel, and it's very easy to skip [00:45:00] the nuance, but that's not how I roll. So

EW: That's not, this podcast will kill you.

EAU: there are several large studies. They have names like Alex Par, pha, Gabrielle, and Pastor. Those are the biggest ones. There are several others. I know they all have acronym names.

EW: like, it's

EAU: Um, and they're really big studies. There are like several hundred to sometimes several thousand kids, uh, across Europe, mostly Germany, Austria, the Netherlands, Sweden, Poland, Finland, Switzerland, France. And there might be a few countries I missed that have been looking into these associations. And by and large, they have looked at kids who live on farms, kids who don't live on farms, kids who drink farm milk, and kids who drink what they call shop milk

EW: Okay.

EAU: and looking at are their associations here on.

EW: does not necessarily mean raw

EAU: So this is the first part where we get into nuance.

EW: Yeah.

EAU: Farm milk means milk that comes from a farm and is not sold in a store. Most of the time this is drunk raw from like the, the kids on the farm are drinking the majority of farm milk. Kids who don't live on farms drink much less farm milk. It's much less likely for them to drink farm milk. Um, it's usually raw. It is not always raw. Um, in different studies, different percentages of

families say that they boil their farm milk before drinking it. So I'm gonna say farm milk for right now, and that could be boiled or raw farm milk. On the whole consumption of farm milk does seem to confer a lower odds of developing asthma, allergic rhinitis and eczema.

EW: How much lower odds?

EAU: It depends in the big analysis, when they lumped all the kids together and just looked at, like across a bunch of this, this was from a meta-analysis from 2020, if they lump all of the different studies, all of the kids and just say, do you drink farm milk? Do you not drink farm milk? The. Odds of developing asthma. If you drink farm milk, were 0.7 compared to if you didn't drink farm milk. Now, odds ratios are also really hard to interpret because if that were a risk, we would say it was a 30% reduction in risk. But you can't say that because odds ratios overestimate the risk reduction.

EW: Yes.

EAU: that's why it gets even more

EW: interval and

EAU: Yeah, these were all significant associations, though I will say that. Um, and it's similar, so it was a 0.68 odds ratio for allergic rhinitis, and then 0.65 for, uh, atopy or uh, eczema. But again, these are, it's really difficult to interpret this into risk, but it is a reduction in the odds, a significant reduction in the odds that you would develop these atopic diseases. Now, in these studies and in this meta-analysis. If they, 'cause there's only a few studies where you could actually stratify the data by whether the kid who's tweaking this milk lives or doesn't live on a farm, which you kind of have to do because there's a lot of other things going on on farms that we know are also associated with reduction in the risk of atopic diseases. And once you stratify by whether or not the kid lives on a farm, you actually lose the significance of this protective effect for everything except asthma. There still seems to be, regardless of whether or not you grew up on a farm, if you're drinking farm milk, you have a slightly lower odds of developing asthma. And it's about same, about 0.7,

EW: Okay. So it seems like most of the differences can be explained away simply by living on a farm and whatever that entails. Not necessarily milk itself, with the exception of asthma.

EAU: potentially. Yes, potentially.

EW: And again, we're still not distinguishing, uh, farm milk from raw milk, boiled milk that's been boiled, et

EAU: Exactly and that, and that's really hard to do.

EW: Mm-hmm.

EAU: I will also say that. All of these studies that are frequently cited that have this really great data have been done in Europe, where milk is also primarily treated with ultra high temperature pasteurization. Um, none of these studies that I could tell looked at how much milk kids are drinking, whether they're kids who drink farm milk versus non-farm milk. And there's some data that maybe kids who are drinking farm milk also drink more of it. So is it also just that you're drinking more milk? Um, we're also not looking at if you're drinking shop milk, is it whole milk? Is it 1%? Is it 2%? There are a lot of people who have looked at this and said, okay, well this is observational data. What do we think is in the milk? What could possibly be in the milk in this farm milk that's, that's contributing to this? And so the, one of the big hypotheses is that it's the ratio of fat types. So like farm milk seems to have a higher proportion of Omega-3 fatty acids compared to omega [00:50:00] six fatty acids. This is so detailed. Erin. Um. Now, why is that? Is that changed with pasteurization? Like all of these are still open questions.

EW: And what is Homogenization also? What role

EAU: What role does that play? I don't know. I haven't seen any papers on it. I will say there was a study from 2017 that looked into the same association in the United States, and they did not find a significant protective effect of raw cow's milk on the development of asthma allergies, or any other atopic diseases in the us. That's just one study.

EW: Right.

EAU: But even if this is true, there is no evidence whatsoever that you can cure allergies or asthma or eczema by using raw milk. That is how it is interpreted, and that is just not true.

EW: yikes? Okay. Yeah. That's dangerous.

EAU: The problem is all of this data is that exposing kids to farm milk, much of which is raw,

EW: Mm-hmm.

EAU: early in life, is what confers the protection. And we know that kids, especially young kids, are the highest risk for severe outcomes from milk born disease. So this is messy, but this is also like, what I want to point out is that this is what so many of these disinformation campaigns do, and they do it so effectively they will take this finding that. Unprocessed farm milk consumption in children under five in Europe might be associated with a decreased odds of developing childhood asthma and amplify that without any nuance. Without any context. And lead to a claim that raw milk will cure your asthma.

EW: Right. That from, from that to Raw Milk Cures asthma is, such a leap that and a dangerous one at that.

EAU: Yeah. And it's not so that's straight up not true. But even if this association is true, it's not an either or. Farm milk may decrease the odds of developing allergies or asthma, and it definitely increases the risk of milk born infection by what? 840 times Probably.

EW: times. Yeah.

EAU: So I think that the conclusion that I want to come to is that there may be some, as yet not well described, people are still looking into it. Features of relatively unprocessed, non-homogenized, non skimmed, maybe even non-pasteurized milk that for some children might reduce the odds that they develop atopic diseases later in life. At this point, based on all of this data, we don't know if it is pasteurization that is like negating that effect, that is blunting this effect. We do know that pasteurization is the one and best tool that we have to reduce the risk that your kid gets really sick or dies from the milk that they're drinking.

EW: Yeah.

EAU: The end,

EW: The end. It is, um, I, I feel like the hygiene hypothesis is so attractive because it seems to answer so many questions. oh, well that's, that's the problem of our modern society. That's happened. And it's just, it's a really, um, it's a really catchy hypothesis, but it just is not, does not seem to be very well supported

EAU: Well, I will also say people have, because the hydrogen hypothesis is more specifically like, ooh, the number and diversity of microbes and stuff like that. And like there isn't in these papers that have looked at like, what is it in the milk? There's no evidence that it's the bacteria in the milk that are protecting you from atopic diseases. If anything, it's maybe these like micro RNA is another hypothesis and or the fat, like, you know, distributions and like ratios. And that likely is way more influenced by what your cows are eating and how much and how old they are and how much milk are they producing, and like all of that kind of stuff than it is from pasteurization because the effects of pasteurization itself on fat content are very minimal.

EW: Mm-hmm. Mm-hmm. That was an excellent deep dive, Erin.

EAU: Thank you. I was so like, I, I, yeah. Thank you. I'm really glad that enjoyed it. I,

EW: No, of course. I mean, first of all, I always do. Second of all, I, I really didn't like, there's so much out there and you know, and we, we both talked about like watching various tiktoks to be like, okay, what is, what's the vibe ha, like, what's going on? What are people saying? And I think that the most frustrating thing, and which again is parallel to our episodes on vaccines and what we've talked about with vaccines, is that people want to be healthier. They want do, to make the right decisions. and so there is an a very understandable, I think, [00:55:00] uh, psychology of if I change this one thing, then my whole life will be different. a very attractive idea, it's not. It's not the reality, just in the way that like something like the rise in asthma and allergies overall is not gonna be readily explained by one

EAU: One single thing. Yep.

EW: so I think it's, um, I think it's really important to go into the nuance, especially, and, and I think what's really, what's really challenging about all of that is that there is not room in short form videos to go into that nuance. And so the conclusion just gets presented as fact when it is a false entirely.

EAU: Well, and the other thing that I see a lot of online, and it's very compelling, is it's, it's a bunch of firsthand accounts, right? And we know because we use them in our podcast that firsthand accounts are very compelling and they're an important part of the story. But when you see over and over again firsthand accounts of people saying, I could never tolerate milk, I could never drink it. And I switched to raw milk and now everything is better and I feel better and I look better and I'm, everything is better. And I like, I don't want to

negate somebody's personal experience. And at the same time, we know that raw milk is significantly higher risk. And what else is different about either other things that you changed in your diet at the same time or about the other things going on in that milk besides just the pasteurization process? Like why do we have to demonize the thing that has prevented so many kids from dying? I'm sorry, but like.

EW: Oh no, absolutely. And also just the, the power of hope, yeah,

EAU: Well, I've got lots of sources, uh, to back up everything that I said and also so that everybody can read more, um, do your own research as they say. Um, there was a really great overview actually, that I loved by Lucy, uh, in 2015 called Raw Milk Consumption Risks and Benefits from the Journal Nutrition Today. It really just like sums up everything that I went over. Um, the paper that looked at the actually comparing risks of raw versus unpasteurized milk directly was from emerging infectious diseases from 2017, and that was titled Outbreak Related Disease Burden Associated with Conception of Unpasteurized Cows, milk and Cheese, United States 2009 to 2014. Um, there was liter, I mean just, just countless others. Um, so you can find the sources from this episode and every single one of our episodes on our website. This podcast will kill you.com.

EW: Uh, thank you so much to Blood Mobile for providing the music for this episode and all of our episodes. Totally forgot where I was in the, the outro here.

EAU: Thank you to Tom and Leanna and Brent and Pete and everybody on the audio and video editing and mixing teams. We love you guys.

EW: all of these teams. That Exactly right. And thank you to you listeners for listening. I am watching

EAU: yeah,

EW: Weird still. Hi. Um, let us know what you. Think and send us your recommendations for other topics to cover. We, know, we're really leading into this

EAU: yeah. We are, we are. It's fun. And thank you as always to our patrons. Your support means so, so, so much to us. We really, we really appreciate it.

EW: We do. We do. Until next time, wash your hands.

EAU: filthy animals. I.