

But Why: A Podcast for Curious Kids

Why is Milk White?

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[00:00:22] [Jane] This is But Why. But Why is a podcast for curious kids from VPR. I'm Jane Lindholm. Summer has finally arrived here in Vermont and many kids all around the U.S. are out of school, or almost out of school, for the long lazy days of summer or the hectic days spent shuttling between various activities that occupy your interests or keep you safe while the adults around you need to go to work. We thought it would be a good time to visit a kind of place we have a lot of here in our state. Any guess what it might be? Let's hear the voices of who we visited. (sounds of farm animals) In case it's not yet clear, But Why is headed to the farm, specifically Billings Farm and Museum in Woodstock, Vermont where we met with a human who knows a lot about the animals.

[00:01:11] [Christine] Hi, my name's Christine Scales, I'm the Interpretation and Education Coordinator here at Billings Farm and Museum in Woodstock, Vermont.

[Jane] Billings Farm has been a dairy for about 150 years. It's seen a lot of changes in that time. 35 years ago, around when some of your parents might have been born, it became a working museum, so it's a little different than some of the other farms you might see. Many farms have just one type of animal....cows, pigs, or chickens for example, but at Billings Farm they have a lot of different types of animals, the way a farm might have been a long time ago. The star of the farm at Billings is still the dairy cows, though. They milk their herd twice a day and turn a lot of that milk into cheese. Several of you have sent us questions about cows.

[00:01:58] So let's get a mooooooove on and answer them.

[00:02:04] [Paul] My name is Paul. I'm six. I'm from Chicago, Illinois and my question is "How do cows make the milk inside of them?".

[00:02:15] [Coco] My name is Coco. I'm seven years old and I'm from Willmette, Illinois and my question is "How do cows make milk?".

[00:02:28] [Jane] How do cows make milk?

[Christine] First, for a cow to make milk she has to have a baby. So when she has her baby she'll start producing milk. And basically the cows have to eat a lot of food and they eat hay and they eat grass and they eat things like beet pulp to give them energy; lots of things with nutrition and they have to drink a lot of water. So I think around 86 per cent of milk is actually water so they drink about a bathtub full of water a day. So all of that gets into their bloodstream, all the nutrients get into their bloodstream and it travels into their utter. And there are some glands in their utter that actually convert all these nutrients into milk and they store the milk in their udders until the cows are milked by the farmers.

[00:03:11] [Jane] Cows are mammals just like humans. The word "mammal" comes from the Latin word for breast. Mammals feed their babies milk from their breasts, their mammary glands, when the babies are born. So the mother cows are making milk to feed their baby calves.

[00:03:26] But humans figured out they could drink the milk as a source of nutrition.

[Christine] Over the years, (cows) have been bred to make more milk than their babies can safely drink. So that's why we have milk that we can drink and use to make cheese and ice cream and butter and things like that.

[Jane] But not all cows are raised for producing milk.

[Christine] All cows make milk except for the boy cows, of course, but all cows do make milk. But not all cows make enough milk for more milk than their baby needs. So there are kinds of cows that are bred to make meat and they only pretty much produce enough milk for their babies, so you wouldn't really want them on a dairy farm because you're not going to get too much milk out of them.

[Jane] Milking cows is a big part of what goes on at any dairy farm. At Billing's, the cows are milked twice a day, first at 4:30 in the morning and then again in the afternoon. [00:04:18] At some other farms, cows are milked three times a day. Milking is done by machine at most farms. Most milking machines look kind of like a little octopus with four cups that go over the cow's teats. (noise of machine milking) The machine squeezes and pulls at a certain rhythm. It doesn't hurt the cows. In fact, it actually relieves the pressure by getting all the milk out of the cow's udders. Each cow can make between four and eight gallons of milk each day. At Billing's Farm, there are humans who put the machines on the cows but in some farms the process is entirely done by the machine. Milk flows into a system of pipes and then it's cooled down and ready to go on to be processed as the milk you see in a plastic container at the store or as cheese or yogurt. Most milk is processed by doing something called "pasteurization" which heats it up really quickly to a hot enough temperature to kill bacteria before cooling the milk back down again very quickly. Unless you drink something called raw milk, your milk has been pasteurized.

[00:05:24] I am six years old and I live in Santa Clara, California. My question is "Why is milk white?"

[00:05:36] [Violet] Hello. My name is Violet. And I'm five and a half years old and I live in Boston, Massachusetts. And my question is "Why is milk white?"

[00:05:51] [Christine] Milk looks white to us because of the fat in the milk and also because of the protein called casein that's in the milk and it kind of reflects the wavelengths that make it look white to us. So if you've ever seen skim milk next to maybe a whole fat milk, it might actually look a little bit more blueish because it doesn't have the fats in it to make it look white.

[00:06:14] [Adera] Hi, my name's Adera and I'm five years old. I'm from West Hartford, Connecticut and my question is "Why do most people drink cow's milk and not other mammal's milk?"

[00:06:32] [Christine] That's a good question. Some people actually do drink other mammal's milk. So some people drink camel's milk or goat's milk or sheep's milk or even yak or buffalo milk in different parts of the country. We mostly drink cow's milk because cows make a lot of milk and they're easy to milk and they're easy to take care of. And, you know, European settlers, when they came to this country, they brought their cows with them. And so that's why we have a lot of cows, especially in this country.

[00:06:58] [Jane] You're not very likely to find camels milk or yak milk at your local store or even buffalo or sheep milk but sometimes you can find cheese made from some of those milks and goat's milk might be something you could find at your store, so give it a try. See how different it tastes from the cow's milk that you might drink. Naomi and Philip have questions about the noise that cows make.

[00:07:19] [Naomi] Hi my name is Naomi, I'm nine years old, I live in New York. My question to you is "Why do cows moo?". Thank you.

[00:07:28] [Philip] My name is Philip and I live in Berkeley, California and I want to know why cows moo! I'm six years old.

[00:07:41] [Christine] Cows moo for a lot of reasons. It's kind of their way of talking so they'll moo to communicate with other cows, they'll moo to communicate with people, they'll moo when they see the food cart coming down the aisle and they say "Give me some of that hay!" and, you know, when they're outside they'll moo to their friends, they'll moo when they want something... attention or food or things like that, so it's kind of just their way of talking.

[00:08:08] [Jane] Now, I know from experience cows don't always moo when you put a microphone in front of them. But we did get one calf to moo when we visited Billings Farm. (sound of calf mooing....resembles a lawn mower)

[00:08:21] [Christine] Cows spend a lot of time eating...they have to, especially dairy cows, they make milk and that takes a lot of food and a lot of energy. So they basically spend their whole day eating and drinking water. And some sleeping. But really they eat a lot all day.

[00:08:36] [Jane] It's hard to moo with a mouthful of grass. Some cows spend most or all of their time in barns but the cows at Billing's Farm do go outside for part of the day to eat grass.

[00:08:47] That's something Colton was curious about.

[Colton] Hi, my name is Colton and I live in California and I'm five years old. And my question is "Why do some animals eat grass?"

[Jane] Why do some animals eat grass?

[00:08:57] [Christine] So animals who eat grass have special insides that help them to digest the grass that humans don't have. So that's one of the reasons why we don't eat grass...our stomachs can't really handle it and they can't really break it down. So animals who are herbivores, which means that they only eat vegetables, they'll eat grass a lot of times and they either have a special stomach or a special enzyme in their stomach that helps them to break down a part of the grass that's called cellulose, which is really difficult for us to break down. But they'll have an enzyme that can break it down and they can get the nutrients out of it. Animals like cows or sheep or goats... they actually do this thing where they will chew their grass and swallow it and then it will go down into their first chamber of their stomach and will start to digest and then they'll spit it back up and then they'll keep on chewing it. And that's called "chewing your cud". So that's another way that they can eat grass and that just takes a little bit extra to break it down like that.

But cows and sheep and goats, that grass is basically the main thing that they eat whether it's

hay, which is kind of like dry grass, or grass that's green out in the pasture. That's pretty much the main source of their food.

[00:10:27] [Jane] Coming up: Answers to your questions about pigs and chickens and roosters, oh my! Plus "Why are some fences electric?"

[00:10:37] [Jane] Today we're answering questions about farms at Billing's Farm and Museum in Woodstock, Vermont. (sound of pigs) That's a pair of three month old pigs named Thelma and Louise. On a farm, animals are not pets. The farmers are keeping them for a reason and every animal has a purpose.

[00:10:56] Billings Farm Education Director Christine Scales says most people raise pigs for meat but pigs also do something else on the farm that's helpful.

[00:11:04] [Christine] So pigs are great recyclers. They'll eat just about anything. So any kitchen scraps you have or, since we're a dairy farm, they get fed milk from the cows. You can give them just about anything to eat and they'll be happy and they grow really big really fast. And so a lot of farms raise them for meat and that's a good way to recycle all of your kitchen scraps and things like that into other food that you're going to eat.

[00:11:27] [Jane] When we visited, the pigs were eating sticks of butter. They also eat a lot of leftover bread from local bakeries. Benny and Nora want to know about part of the anatomy of a pig.

[00:11:37] [Benny] I'm Benny and I'm 4 years old and I live in Vermont. I'm wondering why do pigs have curly tails?

[00:11:54] [Nora] So I'm from Vermont, my name is Nora and I'm 3 1/2 years old. Why do pigs have curly tails?

[00:12:02] [Jane] Why do some pigs have those cute curly tails?

[00:12:05] [Christine] Nobody really knows why pigs have curly tails. Some people think that farmers just kind of liked the way that their curly tails looked and so they tried to breed pigs that had curly tails and some people think that pigs sometimes will fight with each other and they think that the curly tails are harder for the other pigs to grab with their mouth. But nobody really knows for sure and when pigs are born they actually have straight tails and then their tails curl as they get older. And there's no bone or anything in there, it's all cartilage like your ear is. But yeah, nobody's really quite sure why. Maybe there's some good stories out there.

[00:12:44] [Kieran] Hi my name is Kieran. I live in Vienna, Virginia. I am 4 years old and I'd like to know why do pigs have more udders than cows?

[00:12:58] [Jane] Kieran asks about udders but we should probably explain that what we think Kieran really means is teats or nipples. If you've ever seen a dairy cow that hasn't been milked in a while you'll notice that the udder is underneath her hind legs. And you can tell that it's full of milk, it kind of swings when she walks and looks very heavy. That's where the milk gets stored for the babies or, in the case of dairy cows, for the milking machine before it leaves the cow's body.

The teats are where the milk comes out. All cows have four teats.

[Christine] So pigs have more (we call them teats) than than cows do because they have more babies than cows do. So cows usually only have one baby at a time. Sometimes they'll have twins or very, very rarely they'll have triplets, but pigs can have 8 to 12 babies at a time so more teats means more places for the babies to eat so they don't have to fight over getting all their food.

[00:13:52] (sound of chickens) [Jane] Next door to the pigs there's a coop full of chickens and when one of the hens stood up when we visited, there was a surprise underneath her.

[00:13:59] [Christine] There are four eggs that one chicken was sitting on. So she was sitting on some other chicken's eggs, too. They sit on their eggs to warm them up so if they were trying to hatch these eggs (these eggs aren't fertilized because we don't have any roosters but, if they were fertilized,) the hen would sit on the eggs for about 21 days to keep them warm and then the chicks would hatch out of the eggs.

[00:14:22] [Jane] That answers part of a question from Gabriel.

[Gabriel] Hi, my name is Gabriel, I live in Sunrise, Florida and I want to learn why eggs in the fridge do not hatch.

[00:14:38] [Jane] Why don't eggs in the fridge hatch?

[Christine] So most of the eggs that you buy at a grocery store probably haven't been fertilized by a rooster. So there's no chick growing inside of it. Even if the egg had been fertilized, when you put it in the fridge it stops growing because it needs to be warm, so it would need the warmth of the mother hen sitting on it or maybe an incubator to have the baby develop and grow.

[00:15:06] [Evelyn] Hi my name is Evelyn and I'm five years old and I live in Frankfurt, Illinois and my question is "How do chicks grow in their eggs?"

[00:15:16] [Christine] That's a really good question. When a hen lays a fertilized egg, like I said, she'll sit on it for about 21 days and during that time the chick inside of the egg is growing and is changing. It's kind of the same way that any animal grows inside of any mammal...they would grow inside of their mom but it just happens outside. So the yolk that's inside is a source of nutrients and the chick will kind of grow over the 21 days and develop and look at their feathers on them and then they peck their way out of their eggs and that can take up to a day. It's a really long process but they peck their way out of their eggs and they just kind of sit there and dry out for a while and then they're chicks, they're ready to go.

[00:15:58] [Jane] As Christine said, Billings Farm doesn't have roosters so their eggs aren't fertilized. You need a rooster, which is a male chicken, to mate with a female, a hen, in order to get babies. But many farmers don't want baby chicks, they just want the eggs. So at a farm that just produces hens you won't find many or even any roosters around. That's the same for people who keep chickens in their backyard often. Most just want the eggs so they don't keep any roosters around but at least one of you has a rooster and had a question about it.

[00:16:29] [Lauren] Hi, my name is Lauren and I'm eight years old and I live in Maryland and I have a rooster named Mr. President and he crows a lot. So I was wondering "Why do roosters crow?"

[00:16:42] [Christine] That's a great name for a chicken, first of all. Second, rooster's crow for a lot of different reasons. It's kind of their way of singing like birds sing. So a lot of birds will sing in the morning when the sun rises and roosters will do the same thing. So actually before the sun rises the roosters will crow. They kind of know based on the rhythm of the days when to crow but they'll crow lots of times other than when the sun is rising, too, and they'll crow kind of to talk to other chickens, to the hens they maybe watch, if they hear a loud noise maybe they'll crow. They might crow for territorial reasons to kind of say "Hey, this is my space and I'm claiming it.". So a lot of different reasons roosters crow, it's another way that they kind of talk, kind of like we said the cows moo to talk and these guys crow to talk.

[00:17:27] [Anna] My name is Anna, I live in Washington. I am 10 years old. Why are roosters illegal?

[00:17:34] [Christine] So roosters aren't illegal everywhere but roosters are sometimes illegal in cities or in places where lots of people live because they crow and they make a lot of noise. But hens can actually crow too, especially sometimes if there's no rooster around. One of the hens will take on the role of the rooster and she will actually crow and it's a very funny sound. But I would say that's probably why they're illegal in some places but, if you're out here in the country, you could probably have a rooster.

[Jane] Billings Farm doesn't have any roosters but we were able to find some crowing sounds for you. (crowing sounds)

[00:18:10] In another barn at the farm there are four horses.

[00:18:11] [Christine] So we have draft horses here on the farm. So they're not really horses that we use for riding. A draft horse is a horse that we use for work. So they pull things like our wagon for wagon rides, they could do work around the farm, maybe pull a plough or something like that. So we have two teams of draft horses and they're both called Belgians, that's their breed. We have Ruby and Rosie, who are half sisters, and we have Max and Banner.

[00:18:40] [Jane] Before there were tractors, horses did a lot of the hard work on the farm pulling plows through fields for planting, pulling wagon loads.

[00:18:47] These horses were bred for size.

[Christine] Ruby and Rosie are about 16 hands high and a hand is four inches so they're pretty tall and Max and Banner are even taller; Max and Banner are about 18 hands high so they are about 6 feet tall at their shoulders. They're big guys. Ruby and Rosie probably weigh around 1800 pounds each and Max and Banner are about 2000 pounds each. I think Banner is 2300 pounds. They're big guys and they're very muscular. You know, they're bred to do work. And originally they were actually bred to carry knights into battle.

[00:19:22] [Jane] Wow! Who knew! Here's another question from Nora in Sharon, Vermont.

[00:19:28] [Nora] So why do horses have hooves and we don't have hooves?

[00:19:33] [Jane] We don't have hooves, why do horses have hooves?

[Christine] So a long, long time ago horses actually had toes. Their ancestors had toes and as

they kind of evolved they needed to run really fast so they just kind of...their hooves kind of evolved out of that. So a hoof is actually just one big toe. So it's a big kind of middle toe. And it was more support for their legs as they ran so they could run faster. So you can actually still see horses' other toes. They're not really toes anymore but you can see where their toes kind of were on their legs if you look at something called their chestnuts. So you can still kind of see as they evolved they didn't use those other toes anymore but they're still there. So it's pretty cool.

[Jane] Hooves offer a sort of protection for the horse.

[Christine] So it's like wearing a really nice comfy shoe with a good support so that they can run. I mean, they weigh a lot so they need good feet to support all that weight that's, you know, hitting the ground when they run. So it protects their legs and, you know, we like to keep their hooves really nice and healthy because it hurts if they're not. They're basically giant fingernails so they can crack and things like that, so maybe you've seen a horse wearing horse shoes. So sometimes we put horse shoes on their hooves and that helps to keep their hooves really nice and healthy and keep their feet nice and healthy.

[00:20:57] [Charlotte] Hi. My name is Charlotte. I live in Dallas, Texas and my question is "Why do horses stand up when they sleep?"

[00:21:00] [Christine] So horses don't actually need to lie down in order to sleep. They will lie down sometimes just because they think it's comfier or if they need to get a really deep sleep. Sometimes they lie down but they don't really need a lot of very deep sleep so they'll sleep standing up because a long time ago, when they had to worry about predators, it was a lot faster for them to just take off if there was danger if they were sleeping standing up....as opposed to if they were sleeping lying down, they would have to spend all that time getting up before they could run away from the predator.

[00:21:36] [Jane] Our last farm question comes from Bee.

[00:21:39] [Bee] I'm 5 years old and I'm from Charlotte, Vermont and my question is "Why are some fences electric?"

[00:21:49] [Christine] Electric fences, when an animal touches them, they give him a little bit of a shock so the animals know... they learn pretty quickly not to go near the electric fence. Electric fences are a lot easier to put up than wood fences or vinyl fences and they're also a lot cheaper to put up than wood fences or vinyl fences. So a lot of farmers will use electric fence as the easy way to keep their animals contained in a certain place so they're not running around loose. And that's a little bit cheaper and easier than a wood fence and it's definitely safer than something like barbed wire which animals can get caught in and get scraped on, or things like that.

[00:22:27] [Jane] But if you touch an electric fence that's on, it will hurt you, too. So it's good to know what you're looking for when you're on the farm.

[Christine] An electric fence kind of looks like a very thin metal wire and then it usually has stakes that go into the ground so it just kind of looks like a really thin metal wire and then sometimes, near the stakes, there will be yellow things that you can look out for. But it should be a smooth wire and that's kind of how you could tell.

[Jane] Christine says the fences give a little bit of an uncomfortable jolt if you touch them.

[00:22:54] So the bottom line is that you should probably avoid touching an electric fence on any farm but that's kind of what the animals learn, too. So it's a good way to keep animals in and kids out.

That's it for this episode and our visit to Billings Farm and Museum in Woodstock, Vermont.

[00:23:08] Thanks very much to Christine Scales and everyone at Billings for letting us come visit.

If you have a question for But Why, have an adult record it and send it to Questions at But Why Kids.org. We love hearing from you.

[00:23:21] But Why is produced by Melody Bodette and Me, Jane Lindholm, at Vermont Public Radio. Our theme music is by Luke Reynolds. [00:23:28] Special thanks to Noah Cutter and Jonathan Butler at VPR for doing a ton of work behind the scenes in the last few weeks. We'll be back in two weeks with an all new episode. Until then, stay curious!