Maggie Fox
Hello and welcome to One World, One Health, with the latest ideas to improve the health of our planet and its people. I'm Maggie Fox. All of us are facing problems such as pollution, climate change, and new and reemerging infectious diseases, and they are all linked. This podcast is brought to you by the One Health Trust, with bite-sized insights into ways to help.

Climate change is causing all sorts of problems from severe storms and flooding to heat waves and droughts. Warming temperatures can also boost populations of mosquitoes and other creatures that can spread diseases, notably ticks. Dr. Katie Clow, of the Ontario Veterinary College at the University of Guelph, has been studying the spread of ticks and the diseases they carry, including Lyme disease.

In this episode, we're chatting with Katie about some of her findings and what they mean for us in our pets. Katie, thanks so much for joining us today.

Katie Clow
It's great to be here, Maggie, thank you.

Maggie Fox
First off, can you tell us a little bit about some of the diseases that ticks carry?

Katie Clow
So there are lots of diseases that can result from tick bites. There's a long list of different viruses and bacteria and parasites that can be found in ticks, and then depending on the host that gets bitten, so what species, disease may result. What's in a tick is very dependent on the tick species. And so we know that certain species can transmit certain things while others can't, and then those risks vary markedly by geography. Wo we have different risks depending on what country you're in, and what kind of habitats you frequent, and therefore what ticks you might be exposed to.

Maggie Fox
So people generally know about Lyme disease. But can you talk about some of the other diseases that ticks transmit to people?

Katie Clow
Yeah, so certainly, as you know, I'm based in Ontario, Canada, and we have a certain population of ticks that we worry about. The blacklegged tick is the most important tick that we're worried about for people and our pets. And this tick, in addition to spreading the bacteria that can cause Lyme disease, can spread one type of Anaplasma bacteria that can cause anaplasmosis in people and dogs and cats and horses.

There's some other pathogens that we find in them as well that are also a risk to human health, such as Powassan virus, which can cause encephalitis in people, Babesia microti, which can cause babesiosis in people. And so all of these things are ones that we're monitoring. There are

other tick populations in the United States that have all sorts of other things in them too. For example, the lone star tick, which we don't find in Ontario yet -- we're monitoring a lot -- but that tick can spread different types of the Ehrlichia bacteria and therefore is a risk for ehrlichiosis in people and pets.

Maggie Fox
Can you tell us a little bit about some of these diseases? Anaplasmosis -- what does that do to people and pets?

Katie Clow
I'm a veterinarian, so most of my work is in animals. So for anaplasmosis, we see it in pets, generally they're just really not feeling well. They can have muscle pain, experienced lameness, fever, not eating, so generally just really not doing very well.

Maggie Fox
And can you tell us a bit more about Powassan virus?

Katie Clow
Powassan virus doesn't affect animals. We don't see clinical disease in our companion animals, but in people it can cause encephalitis, which can be fatal, unfortunately. It's very rare, but it's something that we're interested in because the consequences of getting it are so bad.

Maggie Fox
Encephalitis is a swelling of the brain, and that's very serious.

Katie Clow
Yes, absolutely. Yeah.

Maggie Fox
How are changes in average overall temperatures affecting the distribution of ticks?

Katie Clow
So we've particularly seen this in Canada where, if we go back 20, 30 years, our summers were warm, but ticks didn't have a long enough period to feed, go through their reproductive and development cycle, and then feed again, in order to survive in the environment. As the temperatures are getting warmer and our summers are getting longer, and that period where ticks can feed, develop, [and] feed again, has gotten longer.

So previously ticks, they would have been introduced -- they come in on migratory birds all the time. But a lot of times they would just starve out because there wasn't a period of temperature warm enough for them to be active, out, and feeding. But now, we're seeing in many of our more northern areas that those temperatures are suitable for them to be active, feeding, [and] reproducing, and now we have [a] northward range expansion of particularly the blacklegged tick, where we're finding the tick in new areas every year.

Maggie Fox
And these ticks, they can bite dogs and horses and other livestock as well, right?

Katie Clow
Yes. So depending on the tick species, some species have feeding preferences, and others are more indiscriminate feeders, so they'll essentially feed on most things that have blood. For the blacklegged tick, we find that immature life stages, so the larva, which are the ones that hatch out of the eggs, and then the nymph, which I equate to the teenager life stage, generally feed on birds, small mammals, but we can find them on dogs and cats and people. And then the adults generally like to feed on things that are a bit bigger. They get a bigger blood meal. So of course, deer, blacklegged ticks like to feed on deer, which is where they get their other name from, the deer tick. [They feed on] dogs, cats, and humans as well.

Maggie Fox
Some people worry that because these ticks feed on deer that somehow deer are causing their spread. And if you just got rid of all the deer, you get rid of the ticks. Is that true?

Katie Clow
No. So previously, I think 20, 30, maybe 40 years ago, a lot of research in the state looked at reducing and controlling deer populations in an effort to decline the tick population, because even though white tailed deer, they don't have the bacteria that causes Lyme disease and so they're not important parts of the disease transmission cycle, but they're really important for a vibrant tick population. And there's lots of research that shows that when deer density is high, the abundance of ticks is high.

But in efforts to sort of reduce the deer population, they weren't very successful in keeping the tick population down. The only place that seems to work is in a very controlled, small area where you can continually make sure that deer aren't there versus in a natural sort of open habitat. You can't really keep the deer population down to the level that it needs to be, which is very, very low. Deer have other ecological benefits as well, and so it's not a great One Health solution, right? If we think about that, and so it's not something that's pursued anymore. Certainly deer are an important part of the story and for understanding ecology. But they're not...getting rid of the deer is not a suitable mechanism for us controlling Lyme disease.

Maggie Fox
You mentioned a One Health approach. What would a One Health approach to controlling ticks look like?

Katie Clow
I think One Health is very relevant when we're talking about ticks and tick-borne diseases, because we need collaboration across disciplines. And so myself as a veterinarian, certainly, I have animal health in mind. Physicians have human health in mind. There are a lot of environmental changes that are happening that are facilitating tick populations. And certainly we

can't target one aspect [while] forgetting about the others. There can be a lot that is learned between veterinarians and physicians by communicating about tick risk. Certainly veterinarians, when they're talking about tick risk to pets, they can talk about it for humans as well, and same with physicians.

Prevention is fairly similar across the board. There are differences between species, but talking about tick checks, and all of those sorts of things is relevant. And then certainly, if we think about a wide scale understanding of the tick population, there's not one thing that we can do -- take out a wildlife population or destroy our forests so that ticks don't have habitat. Those aren't feasible solutions, because we're part of a broader ecosystem where forests and wildlife have inherent value and important value. So we need to understand the ecology, we need to work together to understand that, we need to work together for education. And then it's really about innovative solutions and controlling tick populations, which we're still not there on a broad scale. But thinking about the ecology and those impacts and working together using a One Health approach will really help us get there.

Maggie Fox
Because, as you mentioned, you keep talking about the cycle. This isn't a case of just the virus being in the tick and the tick bites someone -- it has to go through several iterations of development, correct?

Katie Clow
Absolutely. Ticks have various life cycles, they're feeding on different creatures in each life cycle, they pick up the pathogen generally from the creature that they're feeding on. And so it's highly complex, and that's why we really need an integrated approach because we're not going to understand it by looking simply through one lens or another lens.

Maggie Fox
How do you even keep track of what's going on with all these ticks that are living on all these different animals?

Katie Clow
We do quite a bit of surveillance and there's different ways that tick populations are tracked. Passive surveillance is something that maybe many of the audience, viewers are familiar with, and that's when you find a tick on yourself or your pet, you can report it to the health unit, to different research avenues.

In Canada, we have something called etick.ca, where you can take a picture and upload it, and then all of those submissions are tracked. And we run passive surveillance studies where we have participating veterinary clinics and they'll submit ticks from the pets that come in. That's a great way for us to get a large number of ticks to look at what the patterns are without a huge investment in time [or] going out into the field.

But doing fieldwork is really important for confirming if a tick population is there and then understanding changes over time. We go out in the field quite a bit to do tick dragging, which is essentially like you're dragging a flannel cloth and the vegetation and the ticks stick to it. And we can count the ticks and standardize that and we can test them for pathogens and we know what's going on.

In Canada, we have a National Sentinel Surveillance Network, where we have sites across the country where every year we're doing tick drag. It's a huge collaborative effort, as you can imagine, Canada is a big country. We have over 200 sites that we visit each year. But it's giving us this really great longitudinal data set where we can follow tick populations, blacklegged ticks and other ticks, and what they're carrying over time.

Maggie Fox
And you've got a website yourself that helps people learn about ticks and monitor them.

Katie Clow
Yeah, we have petsandticks.com. We used to have a pet tick tracker as part of that website. But our lab now collaborates with etick.ca, and everything just goes to E-tick which is great. We have pets and people all in the same spot and we can learn about that together. There's some educational resources up there, and we're hoping to boost that over the summer as well as we've gotten some funding to focus more on the educational aspect of the website.

Maggie Fox
This greater distribution of ticks, it might bring ticks to people who aren't normally aware of them. How much of a problem is that?

Katie Clow
Education and tick awareness is really the most important thing we can do. We don't have a ton of great tools in our toolbox for preventing tick-borne disease other than having people knowledgeable about ticks and making sure that if they go out into tick habitat -- so that varies based on the tick but we're really thinking brushy, natural areas -- that they are covering up and applying insect repellent, which can have some effectiveness against ticks staying in places where it's not as brushy so unmarked trails, and then making sure you do a really good tick check when you get home. If anything is on you, you're removing it as quickly as possible.

Then for our pets, tick checks are really important too. Cats and dogs also have the benefit that there are things they can take each month from their veterinarian that will kill ticks that bite them. And that's sort of the first line of prevention that we recommend for our companion animals. But it requires education for everybody to know that those risks exist and certainly as tick populations are expanding into new areas, that education needs to be ongoing because people won't know that it's a risk until it's potentially too late.

Maggie Fox
Katie, thanks so much for taking the time to chat with us.

Katie Clow
Thank you for having me, Maggie.

Maggie Fox
If you liked this podcast, which is brought to you by the One Health Trust, please share it by email or on social media. And let us know what else you'd like to hear about at owoh@onehealthtrust.org. Thanks for listening.

Ramanan Laxminarayan
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