Hello, I'm Heliya Izadpanah, and you're listening to More Than Meat, a podcast series on Animal Agriculture legislation. Today we will be discussing antibiotic use on factory farms, their impact on human populations, and relevant lobbying and legislation.

The majority of antibiotics on the market today are used on "farm" animals living in factory farms. These drugs are not administered to the animals because they are ill. Rather, they are injected into each individual to serve as growth promoters. Enhanced growth means more money for per animal, so animals are made to grow bigger and faster than what is natural. In addition, these antibiotics are used to protect the animals from the filthy conditions they are forced to live in. Animals are crammed together in bloody, feces covered spaces with open wounds and little room to move. Disease runs rampant in factory farms.

But why is mass administration of antibiotics on factory farms so dangerous?

Emma: I think that they are dangerous because the way they are being used right now. They are not being used for medical purposes of treating a sickness or an illness. Right now they are being used in a way of being given to animals on a really regular basis at a low dosage level, so lower than the dosage level that you would give to an animal that was sick with like a bacterial infection and this constant, low-dosage of antibiotics is creating an an environment where bacteria can become antibiotic resistant. So it kind of creates these factors that allow bacteria to evolve, and that allows strains of bacteria to become antibiotic resistant, which is scary, because that means when we need the antibiotics to cure our ear infection, or our pneumonia, they're going to be less likely to be able to do that if we continue misusing our antibiotics right now.

Heliya: This is Emma Brower, a former OsPIRG volunteer and current CalPIRG campus organizer.

Emma: I actually studied biochemistry at the University of Oregon, and didn't realize the extent of the problem until I got involved with this project. 70% of the antibiotics in the U.S. are used on livestock and poultry. And that was really shocking to me, and you know, abhorrent, because you know, we need those antibiotics for our public health and to be able to be healthy in the era when we don't have to have a life sentence because we have ammonia or an ear infection. Like it's a miracle that we're able to have these medicines and we shouldn't be taking advantage of them, so I feel very passionate about the issue because it is very important to me. It didn't make a lot of sense to it was happening to me, but it did make a lot of sense that it happened.

So the mass administration of antibiotics fosters rapid evolution of bacteria that adopt immunity to antibiotics. These superbugs lead to outbreaks of zoonotic diseases such as swine flu, avian

flu, and staph infections. In fact, one strain of staph infections, methicillin resistant staphylococcus aureus, is responsible for killing more people in the United States each year than the HIV virus.

Scientists and doctors worry about the generation of these new superbugs that result from mass administration of antibiotics. The World Health Organization has called drug resistance one of the biggest threats facing global security. At this rate, we are developing new strains of superbugs faster than we can discover new antibiotics. Ultimately, this means that human lives are threatened by diseases that we cannot cure. Antibiotics will no longer be able to be used to treat deadly diseases. In fact, estimates on drug resistant bacteria demonstrate that one person is killed each minute by superbugs.

Furthermore, the consequences of mass antibiotic administration operate through structural racism and wealth inequality, impacting low-income families and people of color more than White and upper class communities. Factory farms are typically zoned in low-income and people of color communities, so their immediate pollution typically burdens these communities the most. They are also operated largely by marginalized populations who need the factory farm jobs. These are the people to first develop antibiotic resistance.

Heliya: So have antibiotics always been used in animal agriculture?

Dr. Riley: ~~So~~ when people discovered antibiotics, it was almost an accident.

Heliya: This is Dr. Lee Riley, a professor of Epidemiology and Infectious Diseases at the University of California, Berkeley. Dr. Riley is also the Head of the Division of Infectious Diseases and Vaccinology at the University.

Dr. Riley: So in the late 1930s, early 1940s, when antibiotics began to be used in humans, in the process of manufacturing antibiotics. So there were the antibiotics that were produced from yeast, right? In the process of extracting the antibiotics from yeast, they discarded the yeast, and they gave the discarded yeast to animals. And they discovered, the farmers discovered, that the animals that received the yeast products gained weight.

Heliya: Oh

Dr. Riley: And then after that, they started using just regular antibiotics, okay? So they discovered that these animals can gain more weight, so the farms can get more profit from the sale of the animals, so it's been around I would say, since the early '50s, this practice of giving antibiotics to animals as growth promoters, and it's continued to increase ever since.

Heliya: How widespread is antibiotic use in animal agriculture?

Dr. Riley: So it's pretty widespread, you know. It all started in the U.S. and from there it spread out to other countries. The U.S. is actually reducing the use of antibiotics now, because you know, all these things are happening. And California actually just passed this law~~, S.B. 2 0 or something, I forget the number --~~ To really reduce the use of antibiotics in animal feeding operations.

Dr. Riley: But at the same time that animal husbandry is decreasing in the U.S., it's really increasing in major middle-income countries, like China, India, Russia, Brazil, and all these other countries, because you know as their populations get wealthier, they demand more protein-based foods. They demand more protein-based foods. They have to grow more animals. In order to grow more animals they have to use antibiotics. So the use of antibiotics in places like China are going to surpass the U.S. in a few years.

In India, South Korea, Vietnam, Nepal, Yemen, and Russia, companies are using the world's most potent antibiotic, colistin, on chickens. Timothy Walsh, an antimicrobial resistance advisor to the United Nations has called colistin the "last line of defense… [and] the only drug we have left to treat critically ill patients with a carbapenem-resistant infection." "Giving it to chickens as feed is crazy," says Walsh. "Colistin should only be used on very sick patients."

Heliya: But giving antibiotics to chickens doesn't just promote the growth of superbugs and make it hard to cure sick patients. It turns out that there might just be

Heliya: ~~Alright, so is there~~ a correlation between antibiotic use in animal agriculture and obesity.

Dr. Riley: So that's our hypothesis, right? (Coughs) Excuse me. So if -- antibiotics -- you take antibiotics -- that's going to completely disrupt the balance that's in your intestine. It might kill certain types of bacteria, but not others, right?

Heliya: Mhm

Dr. Riley: Maybe the effective, sort of acute use of antibiotics will be short-term disrupting of this equilibrium state. But if you're constantly exposed to all those antibiotics that's going to have a long-term impact, it may permanently change that balance that we have. So ~~as I mentioned in the beginning,~~ if you disrupt the population structure of the bacteria population in the intestine, that's going to change the human body looks like.

Heliya: How so?

Dr. Riley: So the use of antibiotics in animal husbandry is huge. Maybe about 70 - 80% of antibiotics that are manufactured are used for animal husbandry. Not just for treatment, and not just for treatment of infectious disease. It's growth promoters.

Dr. Riley: And actually a lot of antibiotics that they use are excreted in either urine, or manure.

Heliya: Mhm

Dr. Riley: And of course, manure is used as fertilizer, right? So if that's used as fertilizer, for let's say, plant food products, then even if you're vegetarian, you're going to be exposed to those low-dose antibiotics.

Dr: Riley: In fact, the animal industry, they don't really sell their meat until the antibiotic residues are no longer found in the meat. It's probably part of the case that meat has less antibiotics than these plant-based foods that have been treated with animal manure that contain anti biotics. So here we have these conventional wisdoms, that you may be getting antibiotics from animal food and dairy products. Actually, you'll be getting more antibiotics from plant-based foods.

Heliya: So as a vegan, I'm probably getting exposed to more antibiotics than the average --

Dr. Riley: Than non-vegans, yeah.

Heliya: Interesting. (Clears throat) And how did antibiotics enter the American food chain? I realize we briefly just talked a bit about it --

Dr. Riley: So, animals that are produced with antibiotics, they produce the manure, or the urine. The manure is used as fertilizer, or it's just left in these big lagoons, you know, just put there into mountains of manure. And then if it rains, right, it gets washed down, and it goes into the system. You may be drinking low residue antibiotics in the water that we drink. They get into the soil, and then we eat potatoes and carrots and soil-based vegetables. They might contain low doses of antibiotics. If you walk in these farms, these big, intensified farming operations, you will see these stack of -- mountains of -- manure, right?

Dr. Riley: Just take for instance, North Carolina. North Carolina has these big pig farms, right? The amount of manure produced by all the pigs in North Carolina -- you take all the manure

that's produced from them, and stack them into Yankee Stadium. It will be the height of the Empire State building, in just one year. And that's just North Carolina.

Dr. Riley: So how do farmers, um, sort of manage this amount of manure that's produced by animals, right? It's very complex. It's not easy, you know. Only part of it can be used as fertilizer. The rest has to be disposed of somehow. So yeah, they dig these manure lagoons. They stack these manure lagoons, and if they dry, they can be blown by the wind. You can breath manure dust that contains antibiotics. It's a mess.

~~Heliya: That is a mess, yeah.~~

Heliya: So what do gut microbiota have to do with body physiology?

Dr. Riley: The number of cells that make up the total against the population of bacteria in the intestine is about the same number as the number of cells that make up the human body. So if you were to describe human beings, we're actually only half human, right? Because half the cells, the other half of cells that are in our body belong to the bacteria. So these two populations of cells, the human cells -- the mammalian cells, and these bacteria cells, they have to compete for nutrients that come in through the mouth of the humans

Heliya: Oh!

Dr. Riley: So if you disrupt this balance, of the energy source, the nutrients, of course it's going to impact the body, one way or the other, right?

Heliya: Yeah

Dr. Riley: So, it's a huge impact within the body physiology. There's certain types of bacteria populations, for instance, that will process short chain fatty acids, or process the polysaccharides and convert them into short-chain fatty acids, which in fatty acids are a huge source of calories. Right? So if there are certain portions of populations that are able to process polysaccharides *increase* in population, right, then for some reason, you have more short-chain fatty acids absorbed, okay, with the same diet that you have, that will cause your body to gain weight. But if you decrease that population, maybe then you absorb less short-chain fatty acids, so your body may actually lose weight.

Heliya: Interesting

Dr. Riley: So whatever happens to these bacteria populations has a huge impact on what the body looks like.

While using antibiotics as growth promoters was banned in the United States in 2017, widespread administration still continues for "medical" reasons. The exception to this rule is the State of California. On October 10, 2015, California Governor Jerry Brown approved Senate Bill 27. This Bill modified a previous law, which regulated the distribution and use of livestock drugs to licen sed individuals. The Bill dictates that as of January 1st, 2018, factory farms may not administer medical grade antibiotics to animals unless those antibiotics are prescribed by a vet. In addition, administering antibiotics to increase efficiency and promote weight gain are absolutely prohibited. The Bill mandates that the State's Department of Public Health, Department of Food and Agriculture, and veterinary medical board develop antimicrobial stewardship guidelines. It also mandates that the department of food and agriculture gather data from sales and usage of antibiotics, and that the department acquires copie s of feed directives to implement the bill.

Does this bill ban antibiotic use altogether? No, but it brings the use of the drug down to a reasonable scale, a return to what the drugs were intended for: to cure disease. Allowed use of antibiotics on factory farms are first and foremost to treat disease or infection, second, to control the spread of disease or infection, and third, for use in surgeries and medical procedures. The decision to bring in antibiotics in each of these cases is to be made by a licensed veterinarian. Antibiotics may not be used to cause weight gain, or to improve "efficiency."

So what happens if a factory farm violates SB 27? Violators are subject to a fine of $250 dollars for each day that violations occur. If violations are repeated, the fee increases to $500 per day of violation. Funds acquired from the fines are then deposited into the Department of Food and Agriculture Fund.

In some regards, SB 27 seems like symbolic law. Its meager penalties and lack of clarification on specifically who will be penalized -- a foreman, a factory manager, a vet, a technician, laborer, or company CEO -- make its consequences appear negligible. Nevertheless, the fact that California is saying "No" to antibiotics is a monumental show of governmental regulation for the good of the people. Furthermore, the fact that California has such such high populations of both human and non-human animals may force large companies that cater to multiple states to adopt the same antibiotic free standard across the board.

Of course, assessing the value of the Bill will take time. It will also take time for the impact of the Bill to materialize. With this in mind, the Bill's drafters acted with foresight to include a section on reporting requirements. SB 27 states that the California Department of Agriculture

will be required to report to the state legislature within a year (by January 1, 2019) on monitoring and outreach efforts, and on whether there is enough data to provide relevant statistics.

Heliya: So with the Bill that California passed in 2015 to eliminate the widespread use of antibiotics beginning in January 2018 in the state, how long is it going to take for that to make a difference in our produce?

Dr. Riley: We don't know. We don't know. We don't even know if it's going to make a difference.

Heliya: That's scary.

Dr. Riley: They have to do it. The problem is, as I mentioned, these other major food exporting countries. They're increasing the use of antibiotics, and we import the food from them. So the problem in California, to a certain extent, by not having antibiotic-laden food products made in California, and we're still importing them. And other states are not necessarily doing the same thing, so you know, I'm not sure if it's going to make that much of an impact. We're actually doing a study to look at this issue.

Heliya: That's good. Is there anything that individuals or community-based groups can do to reduce their antibiotic intake from produce?

Dr. Riley: I think that if people begin to see that many of the diseases they are experiencing in their communities are related to these drug resistant pathogens, and the obesity situation is really increasing -- you know obesity is related to all sorts of cardiovascular diseases and diabetes, and these you know, lipid related disorders. I think that they're going to realize that this is a huge public health issue. And they may try to influence the politicians to do something about this. And California, you know, California has done it already. I know there's more that they can do. I think like legislations don't usually work in things like this. They've previously tried to do this in other places and they've previously tried to do this nationally, and it really didn't work that well. I think another really big thing the general public needs to do is kind of start demanding of the food producers that they stop using antibiotics. You know, get pressure in these large food production companies to really stop the use of antibiotics. That may have more of an impact than some of these legislations.

Fortunately, some figures from the general public have started making demands. Emma Brower, a Calpirg staff member, has been one of these heroes.

Heliya: Thank you so much for the work that you do.

I got involved as a volunteer in my University. So at first I was working on that with the project on McDonald's as a volunteer. Then the next quarter I became a campaign coordinator, so I was running a project on campus targeting food waste. So then over the summer we worked to not only to reach out to students, but to citizens as well, about the situation. So we talked to people at their homes about the problem. So I did that in Eugene, Oregon, but this was happening all across the country. I've been in California working as part of the full time staff. So once I graduated I decided to come out here as staff to help students to continue to work on these really important issues. We haven't been working on the internet campaign as much in California because there was this really great bill that was passed I think two years ago that basically said in California factory farms can't use antibiotics for non-medical purposes. So it's been really good in that regard, but I think in the future we'll continue helping in California with the fast food chains, continuing to influence them in California. I've been helping students plan and execute their projects not only on this campaign, but around renewable energy, saving the bees, or registering young people to vote. So I'm planning on continuing to work on that project, as well as lots of other projects.

Emma: So we work with national coalition partners -- so other groups across the country who are working on the same issue -- and for a while we were trying to get legislation passed that would prevent factory farms from being able to use antibiotics in that way that wasn't really working. We went back to the drawing board and kind of saw that there was this really great opportunity to influence large fast-food chain restaurants that were big buyers of factory farmed meat. And we knew if we could -- so first we started with McDonald's by showing them that their client base and their customer base would be much happier with them and much more inclined to eat at their restaurants if they used antibiotics in a safe way. So CALPIRG canvasses and coalition partners across the country. They mobilize the public. So from the public they collected signatures. They sent a petition directly to McDonald's, photo petitions, which were taken of people waving signs outside of McDonald's restaurants, saying, "McDonald's, you know we would love a Big Mac if you stopped using antibiotics. And I think because of the amount of people that were demonstrating this, McDonald's came out as saying that they would stop serving chicken raised with these antibiotics. That was a great start, a lovely victory. And of course we weren't done because that didn't solve the problem all the way. It was one step. And so then we went to Subway, and said, "Subway, if McDonald's can do this, than surely you can do that, and better." After a similar strategy of mobilizing the public and their customers, Subway came out as saying they would stop serving all products raised with antibiotics….It's had a domino effect. Now we've been able to get KFC as well, and Wendy's, and that has moved the chicken market!

Heliya: And of course, some restaurants, like Chipotle, have been against antibiotics from the beginning, using them to market themselves as healthy, people friendly food makers.

Emma: So a few years ago, three or so years ago, chicken was only about 4% not raised on antibiotics. Now, we've been able to raise the market to over 50% not being raised on antibiotics... Yeah, so now we're going back and targeting for things like pork and beef. And we're looking to get restaurants not only to be looking at chicken, but also the next step of larger animals.

Heliya: That's fantastic. Perhaps one day in the near future, we will see a global ban on antibiotics as growth promoters throughout the food industry. A big thank you to our guests, Dr. Lee Riley, and Emma Brower for joining us.

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