

10/5/20

Defend the Flock

Introductions

Hello, everyone. Thank you for joining the webinar. Today's presentation, Defend the Flock, Controlling Salmonella in Commercial Poultry Through Biosecurity is part of the Defend the Flock campaign. We are here today to support you and your flocks with biosecurity resources. I'm Dr. Taylor Gaines. Today I'm joined by my colleague, Dr. Kathryn Burden, laboratory coordinator for the National Poultry Improvement Plan, and Dr. Charles Hofacre, president of the Southern Poultry Research Group and professor emeritus at the University of Georgia.

A few housekeeping items before we get started. First, we want to let you know that real-time streaming captions are available for this program. To view, you can click on the CC in the bar at the bottom of the screen or type the caption URL that you see on this slide. The URL appears at the bottom of every slide so you can link to captions at any time during the program. Note that the URL is case sensitive.

To submit questions, click the Q&A button at the bottom of the screen. The Q&A will be posted along with a recording of this webinar on the website. Be sure to follow Defend the Flock campaign to see when these items will be

posted.

Now we will take a few minutes to introduce ourselves.

I'm Taylor Gaines, I'm a veterinarian in the US poultry health team. I graduated with a DVM and a Master of Public Health from Virginia Maryland College of Veterinary Medicine. Dr. Burden tell us a little bit about yourself.

>> Thanks so much, Dr. Gaines. Hey, everyone, my name is Dr. Katy Burden. I'm the laboratory coordinator within National Poultry Improvement Plan. I got my DVM from the University of Georgia and I have a bachelor of poultry science and in dairy science.

>> Dr. Hofacre?

>> I'm Chuck Hofacre. I got my masters in poultry science and DVM from Ohio State, and master's in Avian Medicine and PhD from University of Georgia, the first veterinary that Ross breeders had in the United States, and I was at the faculty at the vet school for 18 years.

>> Thank you, Dr. Hofacre. Now we will turn things over to you to begin our discussion about Salmonella and how it affects poultry.

What is Salmonella?

>> First off, Salmonella is a gram-negative bacteria, it's a bacteria that's in the same family as the bacteria that

causes airsacculitis most frequently in broilers and that's E. coli, so Salmonella is in that family, two major groups, there's typhoids that cause disease in chickens and the paratyphoids, those are the ones that we will spend most of today discussing. Those are the Salmonellas that can lead to food borne illness in people.

This quote from Doctor McCapes, from the proceedings of a Salmonella symposium is one of my favorites, it sums up what we are trying to fight against as we try to control Salmonella, it's an organism that has a simple life. It tries to find an intestinal tract of a host animal. And that can be multiple different species, it doesn't have to be a chicken. Multiply in that intestine and then get out of the host intestine and then find another host intestine to get into.

So, Salmonella are not all the same, there's 2,500 different Salmonella serovars within those paratyphoids. And just like people, not all those Salmonella behave the same. Some are heat tolerant, some live only in the intestines and won't get into the internal organs, some survive a long period of time for years in a dry environment. We can't think of Salmonella as all being the same. Therefore, the strategy that we put in place to eliminate or reduce the level of Salmonella in our flocks may vary with the Salmonella serovar that we have infecting those flocks.

Next slide, please.

We can't forget the typhoids, because the typhoids, *Salmonella pullorum*, *Salmonella Gallinarum*, nearly wiped out the broiler industry and breeder industry in the United States in the 1930s, it's really the impetus for the creation of the National Poultry Improvement Plan. Because these two types are, they specifically infect chickens, they won't make people sick, but they will kill hens. So adult chickens can be killed by this. It will have a negative impact on their body weight, reduced egg production and the typhoids are diseases that we have tried to eradicate from poultry in the United States.

An example, one of the old names for *Salmonella pullorum* is bacillary white diarrhea, bacteria diarrhea in baby chicks, you can see that picture in the left, that's *Salmonella Gallinarum*, it makes baby chicks sick if they get *Salmonella pullorum* or *Gallinarum* from the hen.

Next slide.

So, let's talk more about the paratyphoids, next slide.

Sources of Salmonella and How it Spreads

The sources of *Salmonella* for, are hens or for broilers is a long list. Because *Salmonellas* aren't specific host in a chicken. And we will talk some about each one of these.

Next slide.

Keep in mind that Salmonella can be transmitted from one generation to the next generation. That's why NPIP began working with the elite pedigrees and the GGP's and the grandparents of the primary breeders so we stop this could from coming down through the chain. We also want to look at the paratyphoids, to try to keep them from transmitting from one generation to the next and getting all the way down to the consumer and causing food borne illness.

Next slide.

So, I will give you an example of why I think Salmonella can be transmitted from one generation to the next. Doctor John and I did a study many years ago, what we look at 49 poultry farms made 200 almost 40 farm visits, collected almost 7500 samples, and 1600 isolates of Salmonella. We also had the primary breeder for that broiler company supply us with Salmonella isolates so we can see through the generations. And what we found was the next slide, please.

That the major Salmonella was Salmonella Kentucky. And we fingerprinted it and we called it Salmonella Kentucky number one. We found others, but that Salmonella Kentucky number one, that fingerprint was exactly the same Salmonella that we found in the primary breeders, we found

it in the pullets, we found it in the adult hens, in the broiler house, and we also found it in ceca in the processing plant. So, the same type, Salmonella Kentucky was being transmitted all the way through multiple generations all the way to the processing plant.

That's why it's important for us to reduce or eliminate Salmonella at each of those steps through the broiler production chain.

Next slide, please.

So, is Salmonella actually truly egg transmitted?

Doctor Richard Gast at USDA here in Athens, Georgia, looked at the true transovarial transmission of SE he infected hens with SE cracked the outside of the eggs and cultured just the internal eggs, one in 20,000 eggs had Salmonella on the inside. We know the rate of transmission is higher than that. My opinion, why so much Salmonella ends up going through the generations, is that as the egg cools, the hen lays an egg, the temperature is, say 150 degrees, the outside temperature is 46 degrees, the minute that egg comes out of that hen, it begins to cool. It begins to cool and suck air in from around that nest, wherever that egg is being laid. Or if it's on the floor, floor eggs. In the summertime, if we have eggs in a cooler, and take them out, what happens when you have a glass of iced tea in the

summertime and you walk outside? It sweats. Well, that sweating allows bacteria to get into that egg. So, egg cooling, egg sweating, cleanliness of shell eggs, is very important for us to reduce the transmission of Salmonella from one generation to the next.

Next slide, please.

Controlling Salmonella

To me, controlling Salmonella is a numbers game. We want to reduce the number of Salmonella that our flocks are exposed to, we can reduce it by biosecurity, by reducing the Salmonella in inputs into that flock or by the interventions that we put in place to help reduce the level of Salmonella that our hens are exposed to. A hen that's older can keep from becoming infected with Salmonella by, as many as 100 to a thousand Salmonella cells by some of the, by normal flora and by other immune responses say from vaccinations. So, if we keep the numbers low, then the natural protective mechanism by the older bird can help reduce the chance of colonization. Next slide, please. How can we control Salmonella in our poultry? Well, once Salmonella is established in a flock of birds, it's nearly impossible to eliminate that Salmonella. So, our goal needs to be, don't let them be infected in the first place. Even antibiotics

cannot be very successful in eliminating Salmonella positive flocks and making them become Salmonella negative.

So, once introduced, once a flock is Salmonella positive, it's difficult to eliminate and we have to test the birds or their environment to determine if Salmonella is present. And one way to test a breeder hen environment or breeder hen flock is to culture the chick papers from the hatchery. Because if they have transmitted it to the next generation, it will show up in that meconium, the first feces from baby chicks.

Next slide.

A flock of hens that is positive for Salmonella really the only opportunity to eliminate it is to eliminate that flock of hens. That seems pretty harsh, but in my experience of dealing with Salmonella for almost 40 years, is that once a breeder flock is positive, they are always going to be positive and they will intermittently shed. It can take a long time to eliminate Salmonella by this stamping out method. But in reality, that's the only way to do it, to eliminate it, especially those that can cause human illness like Salmonella, typhimurium. So, biosecurity is not going to completely eliminate the risk but help us reduce the numbers.

Next slide. So, this student whose now a veterinarian over in the UK, I asked him to stand in front of a mirror, I

want you to stand in front of a mirror, you as a poultry manager, are the most critical factor, the decisions you make in managing your flocks are critical in your success to control Salmonella. Next slide.

How to prevent Salmonella from getting into our flocks

So, how do we prevent Salmonella from getting into our flocks? Next slide.

If that square box in the center is our chicken house, and we have a brand new chicken house, never put any chickens in there, never put any feed, never go into that house, don't let any insects get in there, we are not going to have Salmonella in that house. But the minute we bring in chickens or people or litter or feed or let rodents or wildlife get in this there, we have the opportunity for Salmonella to come in there. Rather than focusing on all those things at once, let's break it down and look at those areas that may be the most critical for us, for one complex, insects may be the big problem. For another complex, it might be vehicles. Or people. So, it's not always the same in every location, nor is it the same for every poultry house.

Next slide.

Flies. Since you were a child, what do you do when a fly lands on our plate? You are out having a picnic. You

shoo it away, because your mother told you flies carry germs, well, Salmonella is a germ, and flies can carry Salmonella for as far as three miles. Just the common house fly can be a source of Salmonella. Next slide.

Darkling beetles, I don't think there's a chicken house in the United States, maybe very few in the world that don't have darkling beetles. These guys live down in the litter, they burrow in the litter and burrow into the dirt floor, they will do it through seven stages, those worm looking things are the pupa, and the adults are the dark black beetle. And that is the gizzard of a baby turkey. If I were to put a pile of feed in front of a bunch of chickens or turkeys, which do you think they are going to eat? They are probable going to eat the beetles, they look for things scurrying around. University of Arkansas found that Salmonella typhimurium can live in the intestines of a beetle for at least of 60 days, it might be longer. So if we have a downtime of 60 days, that doesn't necessarily mean that we have gotten rid of all the beetles, we may have cleaned and disinfected but if the beetles come back in and they can still have Salmonella in their intestines and a chicken eats the beetle. We haven't made a whole lot of headway. Next slide. There are three species of rats and mice that live and can be commonly found in chicken houses in the United States. The roof rat,

the Norway rat, and the house mouse, understanding their behavior and location and understanding which one you have in your poultry house will help you know how to control them. For example, the roof rat, where do you think they live? Up in the roof. They live in that false ceiling, they live in the insulation, they come down the wires suspending the feeders for water and eat and drink and go back up. Their feet never touch the ground. If I put rat bait all around the perimeter of my poultry house, are they going to kill roof rats? No, they never go there. We need to know what type of rodent we have infesting our poultry house to know how to properly eliminate them.

And it might be Norway rats on one farm, and another farm, five miles down the road, might be roof rats or it may be the house mouse. Next slide.

Kate Hayes, which she was working on her master's, was trying to understand that concept of how important it is to control rodents. So, around their breeder farms, they had bait stations, about it stations tin traps, the traps that catch them and don't let them get back out. She counted the numbers and she monitored the level of mice and as you can see, the number went up in the fall, came back down in the winter and spring, back up in the fall the next year, came back down. Why do you think the number of mice would

come up in the fall? Why is it, we probable will see more mice inside of our poultry houses now than we did two months ago? It's because it's getting cool, they are looking for a warm place to eat and we are harvesting crops, when we do that, we disrupt their habitat and they look for a nice safe place, like a chicken house. Next slide.

So, Kate cultured the inside of those boxes and Salmonella levels inside of those boxes came up in the fall and went down in the winter. Back up in the fall, down in the winter. Where is Salmonella coming from in those bait boxes? From the mice. The mice are bringing Salmonella and are a big risk for us on all our farms. Next slide.

Cleaning and disinfecting. I didn't write this list as an exhaustive list; this is what you have to do. I wrote it as an example of things you can do, but I want to emphasize, whenever we clean out, let's say a broiler breeder house, we are going to take out the slats, remove the litter, blow down, maybe wash down, where do you think the mice went that were down under the slats living down in the droppings from the hens? They went away. When we take those slats out, they go away. Where do they go? Next door, they go in the woods, they go into the walls. Then when the house warms back up and everything is setback up again and there's food and water for them, where do you think they

come? They come right back in again. So, we want to bait for rodents the minute the birds leave the house. That way they are accustomed to eating and drinking and would replace it with bait and that helps reduce the risk of them running away and coming back again.

We want to have our insecticide as the last thing we do before we bring in litter. Why? Because those beetles are migrating away, same way, but we can't bait them in the way we do the rodents, but if we put a barrier of insecticide so as they come back in, they have to go through that barrier of insecticide, residual insecticide and it will kill them. That way we kill them before they come in and live and reproduce and infect our flocks. Next slide.

Feed. I have been involved in one large outbreak that was associated with feed. The initial introduction was by feed, but it wasn't maintained by the feed. So, feed can be a source of Salmonella. Especially for your breeders, it's important that we understand that and minimize the risk from the types of ingredients we use to pelleting our breeder feeds and the use of organic acids and formaldehyde products. So, I could spend a whole talk just talking about feed. So, keep in mind, though, that our feed source can be a source of Salmonella.

Next slide.

Water. Birds drink twice as much water as they eat feed. So, if they eat one and a half pound of feed, they are going to drink three pounds of water. Or almost a half a gallon of water, per bird.

And if that water source has Salmonella in it, then they are going to drink Salmonella. But also if you look at that nipple drinker, even though water flows out, Salmonella can get up inside of those water lines, if you ever cut a water line and run your finger on the inside of it, that slippery slimy film is bio film and Salmonella makes bio film and Salmonella can live inside those water lines. So, chlorination and water disinfection is important for us as a Salmonella control program. It's even an easy thing to do. Next slide.

Last topic I will talk about is poultry litter. Like every living organism, Salmonella needs water to survive and reproduce. I did say there are some that can live in dry environments, but they won't reproduce. And if the water activity in the litter gets above 25 percent, that's enough water for Salmonella to reproduce. We want to try to keep water activity low. That will keep Salmonella from reproducing. It won't kill it, but it won't reproduce. Another thing about Salmonella, just like E. coli and some of the other pathogenic bacteria, they like an alkaline environment, high PH litter environment. We want to do things that we

drive the PH of the litter down and use products like propionic acid and aluminum sulfate to keep that PH low so it's less than a happy place for the Salmonella to survive and reproduce. With that I will be happy to turn over the program to Dr. Burden.

>> Thank you, Dr., as always that was very informative. The next part of this presentation is going to focus a lot on what you can do within the house to help mitigate Salmonella, I'm going to go ahead and apologize, this part I get really excited about. So, I'm going to try to speak slowly so that everybody can hear me, and I speak clearly. But so, we will just jump right in on this slide.

There are a few things that I like to do when I go into a chicken house, and that's actually to look around and see if we have got anything that doesn't belong there. So, one of my favorite pastimes is to go in at night or to go in with some of the people that work there and kind of see how they handle themselves inside the house. On this slide we actually have a picture of a pine ciscan and some of you may know that in 2009, there was a large surge of the pine ciscans in the eastern US. What happened there was a lot of those pine ciscans had some type of pullorum we do have some birds, there was a American gold finches that died in 1998 because of Salmonella so there are those wild birds

and song birds that can get into the house and wreak havoc. Just a few things that I have seen in houses and all them can carry Salmonella, I have actually seen pets walking through houses with owners, I have seen dogs that are used as retrievers, almost, to find dead birds in the house. I have seen cats that have been used for rodent control. And that's, while a cat might actually be able to catch some mice, that's kind of frowned upon, because it's really hard to swab a cat's rear end to make sure that they aren't carrying Salmonella. That's always a fun time to try to swab a cat's rear end. The other thing that we have seen, I have seen a skunk in a house, early morning, that was kind of weird, armadillos, sparrows and finches. Next slide, please, ma'am.

So a few other things that I have seen, I have seen snakes, I have seen multiple robins that are usually nesting on the eaves of the house on the outside and on the fans and grills and stuff like that. I have seen pigeons, a lot of us know that, or if you didn't know, pigeons can also carry Salmonella and spread it around. A lot of the times it's Salmonella typhimurium they have but there can be other Salmonellas as well. Just like Dr. Hofacre was saying, mice and rats throughout the house, you will see different times. I have seen a lot of them when you clean out a house, they

run to the house next door or run to the house across the street so that they can continue to eat and feel safe in the chicken house. So, baiting before you actually clean out is a great idea to keep those mice and rats from moving. Next slide.

So, some of the things you can actually do when you are talking about a commercial poultry house is, you can go in and you can either go in at night or go in during the day and make sure that all the lights are off, it's not bright in there, and you can see where light is leaking through in the house.

So if you have got a curtain sided house, which some of our older houses are like that, the houses in the Midwest and out west are still like that, that poses a large opportunity for things to get into the house because you got a curtain sided house instead of a solid wall house. You can see if there's any light that is actually coming through into the house. That's where you need to pay attention to make sure that this wildlife is not getting in.

The last thing that you could do is, look at structural problems for the house itself. Next slide.

So, what we mean by structural problems is, with our older houses or areas where erosion is prevalent, you might see that, some of your foundation is starting to get exposed.

Make sure that there's no holes down in the foundation or cracks in the foundation for animals to get in. The further away vegetation is, the less likely you are going to have a habitat or place for snakes, rats, or mice to hide in. If you put a little bit of gravel out there or concrete pad to keep that vegetation away or keep the grass cut really short, you can help deter pests from making their way into the house. You also need to make sure that you know where your biosecurity areas start and make that evident so you are not actually bringing in your pets or not actually bringing in pests that don't need to be in there.

One of the things that you need to pay attention to on the outside of the house, this goes for the backyard because they experience it as well as well, you need to make sure that there's no wild birds that are hanging out in the eaves of your house. You need to look, if you see any robins' nests, see any sparrows, pigeons, make sure you do something to keep the wild birds off the sides of your house. Next slide.

So, some of the things that we can do to actually prevent Salmonella from infecting your poultry, it has to do with your equipment, shoes, and clothing. If you have got residual bacteria from a previous swab, the Salmonella can actually be found in that fecal material and that dust material

that's still in that house. You need to try to clean the surfaces before the disinfectants are applied. This helps to improve the efficiency or the effectiveness of the disinfectant. Going back to what Dr. Hofacre told us, we need to do some sort of the cleaning before the disinfectant. And the equipment and clothing, if you are using the same between multiple houses, you can increase the production from one house to the next. Next slide.

Another thing to think about is actually how you are going to handle dead birds in the house. So, your mortality and morbidity, the dead birds you all should remove them in a timely manner and dispose of them appropriately.

Carcasses can serve as a reservoir for Salmonella and can infect all the other birds in the house. Personnel should try to work from the healthiest birds or the youngest birds to the sicker or older birds to reduce the potential for spread.

Know the status of your spike males, your replacement hens or your replacement pullets and if you are working exclusively in Turkey operations, you need to know if the semen you are using for artificial insemination is contaminated prior to bringing it into the house. Next slide.

One of the biggest things that you can do is, you can actually rely a lot on training. So, are you training the people that work on your farm? They should all be trained,

and they should adhere to standard operating procedures. Usually the standard operating procedures are created by identifying potentially risky situations such as the business. Does this person have birds at home? Make sure they don't have the dangerous contact or those high-risk contacts. Sometimes we will see that people will have pet birds at home and they don't tell their employers and they will actually bring something into the chicken house. Well that's super risky. The 14 biosecurity principles can help producers identify these potential areas of risk. Next slide, please.

So basically, when we are talking about Salmonella, and we are talking about biosecurity, biosecurity is a supplementary measure to keep diseases out of the house but is also a method to keep other houses from getting a disease. Mainly for Salmonella, we are talking about birds that might already have it so your biosecurity will actually help reduce introduction of new Salmonella serotypes and will keep your neighbors from getting your Salmonella.

Next slide, please.

Now I'm going to turn it back over to my colleague, Dr. Gaines and he will talk more about the biosecurity resources that are available from USDA APHIS.

New Resources from USDA

TAYLOR GAINES: Thank you, Dr. Burden and Dr. Hofacre. I will conclude our presentation with an overview of the resources available through USDA APHIS that will help you implement some of the biosecurity practices that we have discussed here today.

APHIS veterinary services have developed a library of checklists that provide practical tips and recommendations, we encourage you to visit the Defend the Flock website to view and download these materials. All the checklists are available in multiple languages including Spanish, Chinese, Vietnamese, and Tagalog. On our website you will find lots of free tools including recordings of prior webinars, newsletters and videos and other resources, we are excited to announce the Defend the Flock calendar is back for 2021. To order, please visit bit.ly/APHIS_publications and search for PA-2261. You can also go to our home page and submit a photo for a future calendar. APHIS has also created social media content to help promote biosecurity, infographics covering many of the best practices that we covered here today are available in English and Spanish. We hope that you will share these with your colleagues and fellow poultry keepers on Facebook, Twitter, Instagram, and other social media channels to make sure people are using

biosecurity every day, every time, no matter the size of the flock.

Be sure to check out more helpful information on our social media channels. This presentation along with answers to your questions will be available for downloading from the website shortly. Be sure to follow Defend the Flock on Facebook and Twitter to be notified when the presentation is available. And use the hash tag flock defender when sharing or posting information to help spread the word that biosecurity is the best way to keep flocks safe from Salmonella and other infectious disease. Before we go, on behalf of APHIS, thank you, Dr. Burden and Dr. Hofacre, for sharing your valuable insights and knowledge with us today. And thank all of you for joining us on this webinar. And let's keep our poultry healthy together.