USDA APHIS Defend the Flock
"Preventing Avian Influenza Introductions:
Focus on the Big Risks"

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DOCTOR JULIE GAUTHIER: Hello, everyone, thank you for joining the webinar. Today's presentation, "Preventing Avian Influenza Introductions: Focus on the Big Risks" is part of the USDA's Defend the Flock campaign promoting awareness about the importance of biosecurity and ways to prevent the spread of infectious poultry diseases.

We are here today to support you and your flock with expanded biosecurity resources, I'm Doctor Julie Gauthier with the USDA. Today I'm joined by Doctor Tim Boyer, a biological scientist with the Center for Epidemiology and Animal Health in the USDA APHIS, and Doctor Carol Cardona, the Pomeroy chair in avian health for the college of veterinary medicine at the University of Minnesota.

We will give you 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 the captions, type the caption URL that you see on this slide. Bit.ly/APHIS_Fall21Web_CC, type that into your browser. The URL appears at the bottom of every slide, so you can link to captions at any time during the program. Please note that the URL is case sensitive.

To submit questions, click the Q&A button, also located at the bottom of the screen. APHIS and our guests will answer all your questions after the webinar has concluded. The Q&A will be posted along with the recording on APHIS website. Be sure to follow the Defend the Flock campaign on Facebook and Twitter to find out when the Q&A and recording are available. We will share those on-line destinations at the end of the webinar.

Now we will take a few minutes to introduce ourselves. I'm Julie Gauthier, and I'm the assistant director for poultry health with the USDA APHIS veterinary services. I'm an epidemiologist by training, and I have operated a small family farm raising poultry. In my USDA role, I lead subject matter experts, who coordinate the National Poultry Improvement Plan.

Doctor Boyer, please tell us a little bit about yourself.

TIM BOYER: Hi, it's a pleasure to be here. So, I'm a biological scientist at the USDA APHIS Center for Epidemiology and Animal Health. I am on the Transboundary Disease Analytics Team. In my role there, I have worked on epidemiologic investigations of avian influenza and virulent Newcastle disease, among others, to identify risk factors, introduction and spread of

those diseases. I also create the -- simulations of outbreaks in livestock and study the epidemiologic behavior of those diseases and to evaluate control measures and to support animal emergency preparedness activities. I received a Master of Public Health and a PhD from the University of Minnesota, environmental infectious diseases from the school of public health there. I've been working in animal health and infectious diseases for roughly 15 years.

>> Thanks, Doctor Boyer. Doctor Cardona, please tell us about yourself.

CAROL CARDONA: I'm Carol Cardona at the University of Minnesota where I hold the BS Pomeroy Chair in avian health. I'm part of the secure food systems team, the risk analysis team that is part of the secure supply plans. I got my veterinary degree from Purdue University and my PhD from Michigan State University. I did a residency in poultry medicine at the University of California, at Davis, my home state. I'm a diplomate of the American College of Poultry Veterinarians. I have worked in, with avian influenza viruses for most of my career, and I enjoy working collaboratively with producers to help them create cooperative disease control plans.

>> Thank you, Doctor Cardona. Talking to people about poultry biosecurity is a significant part of my job as it is for my guests as well. I thought about the term biosecurity the other day, and I realized that I really take it for granted, both its mean and how the concept started. It's a term that today I see it used

to refer to actions to protect any living things, not just poultry, but also organizations developing biosecurity plans for other farm animals use the term -- developing plans for people, plants, water, ecosystems, or entire nations. But I suspect the poultry industry invented and used that word first. I think it was right around the time of that devastating highly pathogenic influenza outbreak in Pennsylvania in the 1980's, I investigated it and the first publication I came across was a benefit analysis of management options for broiler breeder farms that was in the late 1980's.

Tim, what do you know about the origin of the term biosecurity? When did agriculture producers start using that word and why?

TIM BOYER: Well, it's hard to nail down exactly, when agricultural producers started using that specific word, biosecurity. Many of principles and measures that make up biosecurity are old and have evolved over time as our understanding of disease risk has changed. But historical record that I found helpful in thinking about this was the proceedings of the U.S. Animal Health Association annual meetings, you can think the thinking about what they called sanitation hygiene changed over time. But the first time I saw the term biosecurity used in those documents was in 1981, it was a recommendation to create educational programs directed toward Turkey growers to inform them about the risk of low path avian influenza in their flocks without adequate biosecurity. So, on this big 600-page document covering a wide variety of animal health topics species, biosecurity was only

mentioned in the context of poultry. So, I think you are right about the poultry industry being an early adopter of that term. The next time I saw it show up was in 1984, and now the word appears many times, all of them are related to one event that you just mentioned, the highly pathogenic avian influenza outbreak in Pennsylvania. That year there was a discussion about how biosecurity practices used at that time weren't sufficient to prevent the spread of HPAI, and once the response really ramped up and there were major efforts to educate and step up biosecurity during the response and that seemed to be helpful in controlling the spread and then there was also recommendations that moving forward from that outbreak, each state should activate and maintain a sustainable state industry task force that's concerned with poultry biosecurity against avian influenza and other infectious diseases, so it seems like 1984 was the watershed moment for that term biosecurity.

>> Interesting history. Carol, what are your thoughts about the concept of biosecurity?

CAROL CARDONA: I don't have a lot to add to that, but I do know my older veterinary friends do circle around the idea that was a made-up term, that its origins, it did originate with the poultry industry or with USDA APHIS in their work with the poultry industry. But it was just a word that came out, that was completely constructed. And I think the first time I was exposed to the concept of biosecurity was when I did my residency at the lab in California, and we watched videos about how to apply

biosecurity to poultry farms. And it was -- that was created by USDA APHIS after the 1984 outbreak in Pennsylvania. That was the first time I personally was introduced to the terms. Although I had gone to veterinarian school, we didn't talk about biosecurity at that time.

>> I would like to track down those old videos and take a look at them again. Tim, what's your definition for biosecurity.

TIM BOYER: For me, it's a broad term that covers a wide range of operations or structural measures, procedures that are intended to protect animals against disease and reduce the risk of introduction and spread of disease agents. It's about risk and requires a risk assessment that's unique to each production facility and planning, and implementation to reduce those risks.

DOCTOR JULIE GAUTHIER: Carol, what is your definition?

CAROL CARDONA: I think of biosecurity slightly differently. I defined it as the only sustainable way to economically produce poultry ethically. Biosecurity is the only way we have for many diseases to protect birds from disease agents so, that's the only way to maintain their health, but it's also the only way to maintain their well-being. So, I think about it as biosecurity is a, is something that gives us something that we can't do another way.

DOCTOR JULIE GAUTHIER: Let's dive into the details of those principles and move on to the next slide. The National Poultry Improvement Plan developed the biosecurity principles in 2016. And since last year, larger poultry producers must have a

biosecurity plan in place that includes each of these principles for them to be eligible for USDA indemnity in the event of a highly pathogenic avian influenza outbreak. Tim, how did NPIP arrive at these 14 biosecurity principles? And why are they considered the minimum measures that all poultry farms should follow.

TIM BOYER: After the 2015 outbreak, there was recognition that there was a gap to effective biosecurity and also there was a need to give government entities better insight into what producers were doing to protect themselves for the purposes of indemnity. So, I think the first step to address that was an effort by the University of Minnesota and Iowa State and APHIS and many others who developed a biosecurity checklist. I think it was based on expert opinion and the epidemiologic experience with past outbreaks. The checklists were reviewed by industry and states, and the NPIP fleshed them out and added an auditing component to it, and those become the 14 biosecurity principles.

The reason they are considered minimum measures, they really describe the elements and categories of information that are needed to have a successful biosecurity program. But they don't provide the specifics for each one. An analogy that I thought was helpful was recipes for cooking. All recipes have minimum requirements to be successful, they need a list of ingredients, the quantities of each ingredient, a list of required equipment. They need to tell you what to do with all the ingredients and what order and for how long. And every recipe

needs those things, but the specific elements and the level of detail required are going to be different for baking a cake from scratch versus making toast.

And it's the same for biosecurity programs, all of them need to follow those 14 principles. But the specifics of what is included and how it's implemented are going to vary according to what is appropriate for a particular site or production system. For example, the fifth principle addresses personnel. And it says to describe procedures and biosecurity and personal protective equipment required for a site dedicated personnel and for non-farm personnel. Also, procedures for personnel who have had recent contact with other poultry species, so, for personal protective equipment, that might mean specific clothing and boots, or it might mean building specific clothing and boots. Disposal boots, clothes, masks, maybe a Danish entry system those 14 principles, they don't tell you what you have to include among those things. That's up to you to determine what's appropriate for your system based on your evaluation of risk.

DOCTOR JULIE GAUTHIER: I like your analogy, Tim. It's making me a little hungry. Carol, from your perspective, how did the 14 principles come to be?

CAROL CARDONA: Well, none of these principles are really new with this particular part of NPIP. Many of them are included in other programs, like the salmonella program or the mycoplasma program. These principles are well established. But my perspective, you know, I completely agree with Tim on

this, as to where they actually arose, how they arose. But I think when I look at them, I think that they really represent parts of pathways.

So, if we look at, for example, an avian influenza, we might say wild birds would be the reservoir host or a good source of avian influenza virus, so we can see that we have this number 6 as a listing of wild birds and something that we should have a wild bird control program or exclusion program. And wild birds would, the pathway might be that they could contaminate, come to your farm, and eat spilled feed in your perimeter buffer area, that would be next to the barn, for example. So, you can see that perimeter buffer area control is part of the, is also part of one of the principles, number 4. And then you can see that someone would have to walk through that contamination fecal material from wild birds on the ground and walk into your barn exposing your turkeys or chickens. And so, you can see the line of separation is also a principle, number three.

So, these principles to me represent the various component parts of pathways for how avian influenza or other pathogens might make their way into, onto a farm and into a barn, and thus expose the birds. And so, if any one of these is mitigated, you reduce your chances of being exposed. And if all of those component parts are addressed, you reduce your risk of infection even more.

DOCTOR JULIE GAUTHIER: These principles seem to be good common sense. How do we know they work to prevent

spread of avian influenza from farm to farm? Tim, what's the evidence?

TIM BOYER: There's been a lot of work and research providing evidence of the effectiveness of biosecurity. There is a number of epidemiologic studies of avian influenza infection with risk factors related to biosecurity or lack of biosecurity, it's difficult to quantify the effectiveness of biosecurity measures. I was looking at one interesting study recently that looked at the prevalence of diseases in small flocks in California, from that pretty high prevalence. But some biosecurity measures like dedicated footwear and sourcing birds from hatcheries that are NPIP compliant were associated with lower prevalence of some of the pathogens, that's just one example that biosecurity can reduce the risk.

DOCTOR JULIE GAUTHIER: Carol, what else do you have that these principles work?

>> I would go to the risk assessments and the secure poultry supply plan give you a lot of good evidence, hundreds of pages, and hundreds of references of evidence. But in addition to that, we use those citations, we add to that expert interviews, we work with the industry to talk to them about their experiences with biosecurity, and then we use those mitigation measures, and we model what those mitigation outcomes might be in disease transmission. And we see that the flow or the exposure, the movement of infection on the transmission of infection of avian influenza can be stopped by the implementation of specific types

of mitigations, because as I said before, it interrupts a pathway. Then we write a guidance about that, and you can -- and then, because we have written those guidances, the industry in outbreaks have put those into use in cooperation with their state permitting authorities. And so, we know that they work because we have seen that product and animals can be moved from not known to be infected premises using this guidance because those principles work.

DOCTOR JULIE GAUTHIER: Thanks. Let's move on to the next slide. And talk about all the biosecurity principles, how they were developed with avian influenza prevention in mind. It covers more than just avian influenza. There are other, maybe more common infectious diseases, that cause serious problems for poultry, such as infectious bronchitis, and -- causing a discharge and respiratory distress in the center image, or Newcastle disease which can cause the nervous systems signs that you see in the image at the bottom. I should point out that avian influenza can cause anomalies, respiratory signs and -- signs and it's not possible to determine the cause without tests.

Tim, how well do the principles apply to preventing other diseases besides avian influenza?

>> The principles are designed for keeping pathogens out in general, not just avian influenza, that just happens to be a challenging pathogen. For example, having measures in place to establish a perimeter buffer area, having procedures for vehicles

and people entering the perimeter buffer area, that should help reduce the risk of avian influenza and other pathogens that persist in the environment and can be spread by fomites. Another is sourcing birds from flocks that are monitored for poultry pathogens according to NPIP guidelines, that will reduce the risk of introducing a number of pathogens to that particular pathway.

>> So, the biosecurity principles are clearly not just for avian influenza. And in what ways does biosecurity contribute to raising healthy poultry in generally Carol?

CAROL CARDONA: There are some other good examples that you have to think about, obviously avian influenza is not the only concern, as you have pointed out. Salmonella is a big food safety concern and can also be a major poultry pathogen. We know that avian influenza has reservoir host in wild aquatic birds, while salmonella has reservoir host in rodents. So rodent control is part of the NPIP plans. In addition, getting your poultry from known sources is another biosecurity principle that helps to prevent the vertical transmission of Salmonella to pults or chicks. In addition, I just want to point out that biosecurity not only helps to limit the spread of the things we can't see, it also can limit the spread of things that we can see. So many of our listeners are probably well familiar with the fact that people tend to build houses next to poultry farms or might build houses or live near places where people have small poultry flocks. And the dogs, cats, all kinds of wandering people can also come on to a poultry farm and cause damage. Dogs in particular can prey on chicken

flocks and cause a lot of damage. Biosecurity is not just for the things you can't see, also the things that you can.

DOCTOR JULIE GAUTHIER: That's an excellent point and on the next slide, we will talk about how the biosecurity plan is meant to be site specific. And it takes into consideration the physical layout of the farm and how it's managed. There are so many options for biosecurity measures, they can vary greatly in cost and difficulty in implementing them. So, among all those options, how should a producer decide which measures to put in place on a particular farm, and what should a producer focus on? Tim, would you talk about how a producer can choose from the menu of options?

TIM BOYER: Well, like you said, it depends on the specifics of the farm characteristics. What might be right for one farm might not be for the other, the whole point of creating a biosecurity plan is to evaluate and manage risks. These 14 principles are methods for reducing the risks. I guess I would start by thinking about what's my biggest concern. What am I doing now for biosecurity? How do my current practices fit into these 14 principles? And how is my current biosecurity mitigating the risks of the biggest concern? Can I identify any gaps or reasonable measures that would be acceptable to me and my workers that are sustainable that would help close those gaps? For example, are the PPE requirements and procedures for my site, are they adequate? How about for non-farm personnel? How about for non-farm personnel, are there

changes that we can make to those requirements that will reduce my risk of disease on my farm? The nice thing about these 14 principles is that they allow you to tackle things in bite size pieces so you don't get overwhelmed with thinking about all the ways that disease could enter your farm.

DOCTOR JULIE GAUTHIER: Carol, what is your advice about selecting appropriate measures?

>> I like all the things that Tim said. And I completely agree. I think, you know, acceptable to workers and feasible are really, really critical, and I just want to point out the picture here is something that, you know, we have often thought, or we have, in the past, supported this kind of boot dip approach. So, this is an iodine foot bath. Iodine is, requires about at least 30 seconds to kill about 80 percent of the viruses and bacteria that you might step into, that you might have on your boots and might not want to track into your poultry house, well 80 percent are not good enough for most people. You really have to stand in that iodine foot bath for a good minute if not more. If you think that's simple and easy, just try standing in a bucket of water and see how well your mind doesn't wander and you don't think about other things, and you don't wish like heck you could get out of that bucket. It's not a particularly good barrier. So, I just want to point that out. And I think most of our poultry industry has gone away from using this as a sole barrier to, for footwear. So, you hear people talking about changing boots or using barn specific boots, which is a much more feasible and much more acceptable way to introduce

workers to the Line of Separation strategies.

DOCTOR JULIE GAUTHIER: That gets me thinking about what other biosecurity measures might seem to make a lot of sense, like a foot bath. But haven't really turned out to be worth it. Tim, can you think of any examples of biosecurity measures that just might not be worth it?

TIM BOYER: Well, the main one that comes to mind for me is the one that Carol just discussed, that's foot baths. Along with the soaking time required, the solution that you use needs to be fresh and changed frequently. There should be no organic material on your boots for it to be able to do its job. So, if you are not going to do those things consistently, then that measure might not be worth it? It could even do more harm than good. So, the measures that aren't worth it are the ones you are not going to do or not going to do correctly.

DOCTOR JULIE GAUTHIER: Good points. Carol, would you like to add to that discussion of items that might not be worth introducing in your plan?

CAROL CARDONA: I guess one of mine is signs. A lot of times we put up a sign outside of the farm to say stop, don't enter. And very, very often they are in English, and whereas the most likely person to enter your farm might be Spanish speaking or might speak some other language. So, it's important to have your signs in probably multiple languages. In addition, I really frankly don't read signs very well if I go through the same door every day.

So, I think it's important to kind of change those up. If you really want people to pay attention, you have got to think about moving the signs, changing their shape, adding color, whatever it is. So, when things are, you know, that is something that you potentially could do if things, if you are in a dangerous time, really think about freshening up your signs and making them surprising to the people who see them every day. And get workers and visitors and everybody else engaged.

DOCTOR JULIE GAUTHIER: Good tips. The next slide let's move on to talking about risk factors for introducing avian influenza to a poultry farm. And you provided this chart, Carol. I found it very helpful to illustrate the importance of the different categories of biosecurity measures. Could you describe the chart and tell me what -- what does the size of the pie pieces indicate?

CAROL CARDONA: This chart is derived from a risk assessment, and actually it summarizes multiple risk assessments. And it's the mitigation measures that provide the greatest impact on transmission. So, we are turning our risk assessment inside out and making it into a biosecurity sort of weighted chart. So, the size of the pie chart indicates the amount of impact that that measure had on preventing the transmission of infection.

So, for example, if we look at the strict line of separation enforcement with PPE, that had, that was, I think 22 percent impact -- or, no, 15 percent impact on our, on the spread of

infection. Whereas feed truck restrictions had less than 5 percent impact on the transmission of avian influenza.

>> Tim, can you comment about how well these categories align with the risk factors identified in your research, and can you tell us how some of these categories are related and might overlap?

TIM BOYER: Yeah, many of these categories have been identified as risk factors in the epidemiologic work that we have done here over the past several years. There's some overlap between those different outbreaks, but they also each identified risk factors unique to each situation in that reflects that that risk is contact specific. It can vary according to the type of production system, the part of the country where the farms are located, the virus strain. But a lot of risk factors identified in those studies, they fall under perimeter buffer area enforcement, since that's the first line of defense. Multiple studies have identified vehicles or personnel coming close to the barns that haven't followed bio secure entry procedures, factors related to strict line separation have been identified, things like having a hard surface entry pad that is clean and disinfected has been found to be protective and an expert study found barn enclosure defects as a risk factor which also falls under that category and that study also identified shared equipment and vehicles, inadequate visitor restrictions, so procedures have been identified. Downtime for employees, bird proof confinement have come up in some studies and bio secure dead bird disposal has been identified multiple times as has bio

secure garbage management. Some of these things that come up repeatedly and relates to where the virus is on the farm. It's in infected birds, it is in dead birds and some of these things that come up repeatedly are related to business operations that have to happen and can't go away completely, you can't keep everyone out of the barn, but you can do things to mitigate these factors and reduce the risk of disease coming on to your farm. And these are not all independent from each other, bio secure dead bird disposal, truck and driver biosecurity, visitor restrictions, they all fall under strict perimeter buffer area enforcement, bird proof confinement, and showering and changing clothes those fall under strict Line of Separation enforcement with PPE. So, if you have strict perimeter buffer area enforcement, entry is limited to clearly identified access points, marked with signs non-essential vehicles aren't entering into the perimeter buffer area, employees, visitors, truck drivers service personnel are trained and screened and understand the procedures to follow entering that area, you really are addressing multiple risk categories.

DOCTOR JULIE GAUTHIER: So, let's dig a bit more into research and talk about what did we learn from the largest U.S. outbreak of avian influenza back in 2015, and tell us about the differences between farms that became infected and those that didn't?

TIM BOYER: During that outbreak, APHIS conducted what they call a case-controlled study during that outbreak where they interviewed participants where from infected premises and from

non-infected premises that were in the same geographic area. They asked many, many questions related to premises characteristics, farm and barn infrastructure, environmental factors, like wildlife, things related to service personnel and vehicle and equipment. Other barn level and farm level biosecurity procedures, and what they found was that rendering trucks and garbage trucks coming near barns and company service personnel visiting in the previous 14 days were risk factors for disease spread. Having visitors change clothes was protective, and that may be an indicator of just generally heightened attention to human cause risk pathways, because the required change of clothing are more likely to require other visitor related action. The most important risk factor was being located within 10 kilometers of an infected premises in the study and that gets to the height and risk of where HPI is known to be in the area and the need to be especially diligent about biosecurity in those situations. So those were the biggest ones that showed up in the final statistical analysis, there were a lot of interesting results in the study that describe differences in biosecurity practices between the case and the control farms. Those can help inform biosecurity planning, for example, a much higher percentage of control farms had hard surface entry pads that were cleaned and disinfected than case farms. And one counter intuitive result was in there was the higher percentage, more than twice as many than the case farms to the control farms. Sometimes weird results like that lead to new insights. So, was it something

related to the shower issue, was it a compliance issue? But you know showering in your biosecurity plan is one thing, but actually doing it is another.

DOCTOR JULIE GAUTHIER: That's an excellent point. Carol, what do you consider to be the important lessons that we learned from studying, we went from studying the 2015 outbreak?

CAROL CARDONA: Well, I think it's important to remember that this was about the 2015 outbreak. So, you know, I guess I would ask Tim about why, how this might, you know, if he thinks this would apply to the next outbreak. We don't know when or where that would happen. Do you think it would?

TIM BOYER: Well, no, I think it's the reason why we keep doing epidemiologic investigations every time there's a high path avian influenza outbreak. Sometimes the situations can be different with every outbreak and every virus, we do see overlap. We do see some risk factors that come up repeatedly, and others tend to be unique to particular outbreaks. Some of these things we saw in this case control study from 2015. Maybe wouldn't be totally relevant in the next outbreak. This case control study took place only in -- operations, so would apply to other production types and for outbreaks that happen in other parts of the country. I think there are some messages in there that are pretty fundamental and would apply generally, and other things that maybe wouldn't.

DOCTOR JULIE GAUTHIER: So, the next slide, we have got a -- I pulled down a few other pie pieces because this was

striking to me. These four measures on the right-hand side of the pie, they can control -- you deal with these, you control nearly half of the risk to the flock. Carol, what is your message to producers about that half of this pie?

CAROL CARDONA: I think you are exactly right, Julie. I think the importance of these four measures are that they really do represent sort of the first line of defense, the perimeter buffer area, and the last line of defense, the strict line of separation enforcement. And those two, you know, along with the other four -- the other -- these four criteria are also controlled by the producer at the local level, by the farmer, the rancher, that every, you know, the person who is on the farm can control these things, these are not things that come from outside of his control. So wild birds, you know, rodents, these are all things that he can control, and therefore, can -- are best, some of our best defenses against disease.

DOCTOR JULIE GAUTHIER: Tim, will you comment about the importance of addressing these four areas of concern?

TIM BOYER: Well, perimeter buffer area is the first line of defense, and the Line of Separation is the last line of defense. We have already talked about how they can overlap and include a lot of other risk factors, so they are very important. Visitors can potentially be -- vulnerability if they don't understand or follow biosecurity procedures, and equipment can serve as a means of disease spread. When you have measures in place to restrict shares as much as possible and correct other procedures.

DOCTOR JULIE GAUTHIER: The next slide, we have been talking mostly about everyday biosecurity. So, let's turn the conversation to riskier times and places. The risk of avian influenza introduction increases at a time when wild birds carrying influenza congregate near poultry farms that share services with other farms is infected.

I will ask you first, Carol, what is the difference between biosecurity in peace time when no detections have been made?

CAROL CARDONA: The difference is the amount of virus that's out there. If you think about normal times, maybe you have a hundred virus particles that are on your person and could make it across your biosecurity mitigations. If you are 99 percent effective, then what -- you might be able -- one single variant might make it through. And that's not enough to infect the bird.

On the other hand, if you have a hundred billion virus particles in the environment and on the person that might be coming through your Danish entry, and they are 99 percent effective in eliminating those, you still have a billion virus particles that can make it into the farm. And that's certainly enough to infect a flock of birds. The risk is about the amounts of virus that's out there or the amount of bacteria that's out there and therefore the need for precision and more effective measures at eliminating those virus particles. I just want to mention here something from the previous slide on showers. You might think about including showers at a time when things are really risky. And they can be very effective, although Doctor Boyer's study

shows that they were counter intuitively not as effective. And I think when you do take on showers, they have the potential to really help, but you have got to take a big bite and really make sure you are including scheduling, including people to take care of the showers. You make sure that you have enough shower capacity to handle surges in people, so when crews come through, you have got a lot more people coming on to a farm or into a barn than you do in normal times. All of those things, I think, you have to go and look at your biosecurity system and make sure that you have considered the contingencies that can cause breakdown, and that's especially true with showers.

DOCTOR JULIE GAUTHIER: Tim, what do you think?

TIM BOYER: Those are great. I think the 14 biosecurity principles are meant to apply to poultry facilities during routine operations during peace time, as you said, and they are aimed at mitigating the common pathogens. During high-risk times, they would really need to be reevaluated, making sure you are doing what you say you are going to do and think about maybe additional things that need to be done during high-risk times. Along with those things, there may be heightened measures, target on certain pathways, but the virus can get into an affected farm during outbreak. If it's circulated and you find yourself in an affected zone, because you are close by to an infected premises, there are other things that you might be required to do to obtain a movement permit. There's a measure called the pre movement isolation period, that's a period of time

when there's heightened biosecurity and only critical operations are allowed onsite. During normal times your plan may have requirement for vaccination crews that will wear boots and clothes and properly cross the Line of Separation. During the premovement isolation period, no crews would be allowed to visit the farm for at least five days prior to movement. So, its revisiting and reevaluating your biosecurity plan and considering things that might need to be done differently during periods of risk.

DOCTOR JULIE GAUTHIER: Thanks. Let's move on to -- we touched on compliance a couple of times, and the next slide, let's get into that in more detail. How well everyone who enters the farm sticks to the rules of the biosecurity plan, and research has shown that people carry out biosecurity measures in the papers that I have seen, and this accounts for poultry premises even hospitals that people carrying out the biosecurity measures generally do it right about half the time, maybe less. So, what are the ways that have been shown to be helpful in increasing compliance with biosecurity measures making sure that everyone on the farm follows the rules all the time, Tim?

TIM BOYER: Compliance is tough. Biosecurity can be inconvenient. There is some research that shows that observation, things like presence of a visible camera at a barn entrance can help improve compliance over the short term, but that compliance still declined over time, even with that measure present.

I think it really just comes down to developing a culture

within your production system that involves education, repeated education, revisiting these concepts with your employees, because employee turnover is an issue. And gaining employee buy in. Compliance depends on understanding in describing why these procedures are important and making sure your employees really get that. And doing things to minimize inconvenience, things like providing choices for footwear and clothing and emphasize comforts and safety, if you are requiring showering, having clean showers and a nice environment for doing that, can help. Getting feedback on what is happening versus what is written in your biosecurity plan is what is important, what is happening is anonymous for getting feedback needed. Making sure that you are consistent, and everybody is following the same procedures, your visitors, contractors, the employees, the managers, everybody should be doing the same thing to get a culture of biosecurity.

DOCTOR JULIE GAUTHIER: And Carol, would you like to weigh in on that? How can we increase compliance?

CAROL CARDONA: Yeah, I agree with Tim. I think I would add, you know, an audit, especially an educational audit where someone can come out and look at your farm and see where the problems might be. This -- in this barn, in this picture is clearly a problem. But my guess is lots of people have seen this and have walked right past it, because they have gotten used to it. Sometimes someone who is an outsider can provide really good, pointed comments about what you are not seeing anymore.

And I think that's always important. And then I would agree, I think the most important reason for a lack of compliance is really that people, you know, call it cognitive dissonance, but seeing the veterinarian come to the farm, this person in authority with knowledge, not entering the barn following the same procedures that workers are asked to follow, or the owner of the farm or anyone else. Every single person who comes on that farm has to follow the same procedure. One of the better ways to do that is making sure that someone who is new to the farm is always followed. There should be an escort for that person to help them through the biosecurity -- those things like Line of Separation procedures.

DOCTOR JULIE GAUTHIER: Thanks. And next slide, please. Where can producers go to get help in assessing their site-specific risks? Where would you point people, Tim, for information on building their plan and trying to encourage people to be compliant with it?

TIM BOYER: There are some great suggestions on the slide here, University of Minnesota extension has a lot of useful videos and other resources to help develop your plan and the National Poultry Improvement Plan website has detailed information on the 14 biosecurity principles. Also, the Centers for Food Safety and Public Health at Iowa State University has a lot of resources including templates for creating a biosecurity plan. Those things are all focused on the plan and how to create it. But an important step before that is the risk assessment piece.

You should spend some time looking, and with some local resources, maybe a veterinarian, someone else in your area who has expertise in biosecurity, like Carol mentioned, having an objective set of eyes looking at your operation and observe, assess it and evaluate what's the risks, what's the layout of your operation, where the traffic flows of people and vehicles, where are the things like dead bird disposal, things like that, how are they placed relative to the barns?

Who are your closest neighbors? How many other poultry operations are nearby? Is there open water, forest, wild birds, or other wildlife you see on your property at different times of the year? Thinking about assessing those risks and the potential pathways of diseases and destruction and having someone look at that with an objective set of eyes with you will go a long way in helping you put those other resources that were mentioned to use to build a good biosecurity plan.

DOCTOR JULIE GAUTHIER: Carol, you and your team have quite a bit of experience teaching adults. What sources are available to develop effective training plans? Do you have any tips on how to train workers properly?

CAROL CARDONA: It's always, it's a very, very tough, and very good question. I think every poultry manager, or really a people manager needs to think about that question. You know, just as Tim has advocated for taking a look at your site to see what risks are present on your site, your workforce is a specific group of people with a specific set of characteristics that you have

to consider when you are training them. And, you know, when you oftentimes I see with training that we tell somebody something, and we automatically assume that they are going to absorb that and go do what we suggested.

And that's very, very rarely the case.

Adults take, you know, go through several steps before they actually will take something on and do the action that they need to do. That is certainly what we have to get to if biosecurity is going to be effective.

So, one of the things I think we should always look for is, are there opportunities to take, make our operational biosecurity structural. Are there ways that we can force people to go through the right door, if that's the issue? Are there ways that we can keep people from not crossing little Line of Separation properly, if there's a side door on the barn that people tend to sneak back into the barn through, maybe you can lock that door or take the handle off the outside or something, to keep them from coming in that way.

But another thing is, I think you always have to consider what your final step is, your final step is the action. You really have to observe that. Are people doing what you have asked? If not, review your program and see where they are breaking down. Talk to them and see if you can get feedback on what has gone wrong. But I will remind you that it's often difficult for Hispanic to get those answers from Hispanic workers who tend to have a great deal of respect and/or fear of authority. So, it takes

some relationships, and it takes some time to get the answers that you really need. But my advice would be observe and evaluate what you observe.

DOCTOR JULIE GAUTHIER: Thanks so much, Tim, and Carol. I really appreciate your wisdom and advice that you have provided. I learned a lot during our sessions together. I will move on to the next few slides to give you an overview of the resources available through USDA APHIS that will help you prepare for future disease outbreaks and make biosecurity an everyday practice. APHIS has developed a library of checklists; these provide practical tips and recommendations. We encourage you to visit the Defend the Flock website to view and download these materials. All of the checklists are available in multiple languages, including Spanish, Chinese, Vietnamese, and Tagalog. On our website you will find lots of other free tools including videos, recordings of prior webinars, info cards newsletters, posters, and other resources.

APHIS has also created social media content to help promote biosecurity. Infographics cover many of the best practices. We hope that you will share these with your colleagues, and fellow poultry keepers, you can share them on Twitter, Facebook, and Instagram, and other measures to make sure they are using them every time no matter the size of the flock.

Earlier this month, APHIS launched an all-Spanish language resource page. Now all resources can be found in one place.

Users will be able to download Spanish checklists, social graphics and much more. APHIS recently expanded the Defend the Flock biosecurity awareness campaign to include outreach to new and young poultry producers. The #FlockDefender program offers the next generation of poultry keepers with youth-oriented educational poultry care content. This is aimed at increasing awareness and adoption of best practices in biosecurity.

Be sure to check out more helpful information on your social media channels. This presentation along with answers to your questions will be available for download from the Defend the Flock website shortly. Be sure to follow the Defend the Flock on the Facebook and Twitter to be notified when the presentation is available.

And before we go, on behalf of APHIS, thank you so much to Tim and Carol for sharing your valuable insights and knowledge with us today. Thanks to all of you for joining us on this webinar. Let's keep our poultry healthy together.