

Featured Speaker

Doug Groth, DVM

Host

Sarah Probst Miller, DVM

Commentary

Jim Lowe, DVM, MS



SARAH:

Well welcome to our next edition of *P's in a Pod*. I am sitting here with Dr. Jim Lowe, Dr. Doug Groth, and I am Dr. Sarah Probst Miller. Today we are going to be talking about pandemic H1N1 and our experiences with this virus as it has been diagnosed in the U.S. swine herd. To start our conversation, I'd like to back track a little bit to April 24th. Jim, refresh our memory about what happened on that day.

JIM:

April 24th was a really bad day, Sarah. I was sitting in my office at home. It was a Friday... Friday afternoon... and working through some stuff... I'd had the good fortune to be really involved in quite a few influenza projects along the way. And so when I saw the news flash come across that they identified a new SIV virus, which we subsequently called pandemic virus in Mexico . . . that they thought was related to pigs, I was concerned. By the weekend, we had the swine nomenclature hung on it and I thought, "This isn't going to be good." And it really was probably worse than what even I thought it was going to be there on that Friday afternoon.

SARAH:

Right. Did you ever think that on October 22nd, we would be sitting where we were talking to a very wonderful farm owner and farm manager about signs similar to flu that they were seeing in their pigs after all the employees on the farm had been sick?

JIM:

Yeah. So, I think we will go through that case maybe a bit here in a minute, but I think that was interesting that it really took us until late October to find the first case in pigs. And so, that tells me something a little bit about the virus strain. I think what is important to remember is that this is a swine origin virus with swine genes in it. But if you look at that history, I would have expected to find the virus before that. And there was some discussion in the industry about whether to look . . . I can say honestly, we looked for it pretty hard all summer. I wanted to know if it was there; because there are some interesting biological things. And so, I'm actually surprised it took that long. It does show us that it's probably not as host adapted to the pig as it has been to humans.

But maybe it's important we spend a little bit of time remembering what is in that pandemic virus. And so, the swine virus, this influenza virus, has eight gene segments, so just the basic review here again. If you like, picture Marie Gramer putting up that familiar slide to show the eight pieces of the swine influenza virus. The H gene, the hemagglutinin gene, is the H thing we talk about that. The N gene is the neuraminidase gene that we talk about. Those are the two on the outside. The other six are what we call the internal genes. And so the six internal genes are currently a triple re-assortment. There are swine, human, and avian genes there. That's actually what we see in pigs all the time, Amy Vincent named that the TRIG cassette, the triple re-assortment gene cassette. We think the important part is the avian

polymerase gene; it creates a mutation. That's the internal gene, but the interesting part is that on the outside, the N and the H gene.

So the H gene is a swine origin virus. It's the one that has been circulating in the states for several years. If you take it all the way back to it's great, great, great grandparents on the family tree, it goes way back to the 1918 pandemic virus, which was originally a bird virus. And so, we have the human 1918 virus that went into people that went into pigs that we identified in 1930, the classic. Descendants of that become the circulating virus today in pigs. And that's the H gene that we have in the pandemic virus.

The N gene is actually not related to that virus at all. The N gene came out of what looks like what we call the Eurasian virus, or the European lineage. That parent doesn't go back to the 1918 virus. That family tree weaves back to a pure-avian virus. So there is an avian/H1N1 introduced into pigs. And so, we've never seen this pandemic N gene in the U.S. before.

And so, the interesting part of the scenario here is that we do see co-circulation of the, let's call it, the U.S. like H1 or we call it the Indiana02 like virus. And we've seen the European like virus H1N1, which is a completely different virus, circulating in Asia at the same time. So there's been some speculation (I can't emphasize enough on the speculation) that the re-accommodation of these viruses and the passage to humans most likely occurred in Asia (because we have not seen co-circulation) and subsequently was brought to the North America. So, I think as everybody is aware, that public health surveillance in Southeast Asia is suspect on a good day, except for probably Hong Kong, and there is a really nice group in Hong Kong that is a British legacy that does a lot of work there, but if you look at what comes out of China, we don't know-- that's probably at best, but. . . . The other countries on that part of the world just don't have surveillance programs.

And so, we picked it up in Mexico. It is clearly human adapted, but that virus has migrated from pigs, re-combined in a person or re-combined in a pig and moved to a person; we don't know and now has moved back to pigs. And so, you asked the question originally, "Did we think we'd get there?" I am shocked that it didn't happen before October 22nd, Sarah.

SARAH:

Now, I know as a clinic--and Jim and Doug you can comment on this--we sat down and had a conversation about diagnostics. And there was a clear message sent to all the veterinarians that this was not going to affect our routine surveillance of herds.

DOUG:

Yeah, that is true, Sarah. We sat down and discussed it. The positive aspects of the diagnostics outweighed the risk and what we went forward with. So, we stayed on track obtaining samples, getting them tested, and doing further genetic testing. Putting those viruses on a dendrogram, we wanted to see whether they were related so we knew how to handle herd health.

SARAH:

And I bring this up because I know that some folks might say, "Well, you didn't see it for that long, because you weren't looking."

JIM:

I feel very good about our aggressiveness. In all honesty, there weren't a lot of submissions over the summer; (but if we look back historically over our database the number of submissions were slightly

lower than what we would have done in previous summers) but that really indicates what we saw this year. There was just less flu this summer. We had a very, very mild flu season last spring. We've had less influenza and maybe that's because Doug is a really good veterinarian and we stomped out disease.

SARAH:

Yes.

JIM:

But I know that in my herds, I'm still probably the same bad veterinarian as I was two years ago. So, but I think seasonally it was that this summer we've just not had as much flu; so there were some submissions that were down. And in the economic condition of the industry right now, not everybody wanted to spend money. So, we backed off a bit within our group as did a lot of veterinarians. But, I'm really proud of what we did in terms of going out and getting it when it was there and certainly we've been subject to some criticism for maybe being "the cowboys" and saying we're going to find it. But, I think it's better to find it and deal with it in my mind than to hide it and have to come back and explain why you were trying to cover it up.

SARAH:

Yeah, why you weren't looking...

DOUG:

Yeah. And as a result, the public perception was very positive to us. We could honestly say we were still looking for it and it is very positive on the fact that it took that long to find it in pigs. It helped to build a case of that human to human transmission was clearly the driver of what was spreading it.

SARAH:

Speaking of human to human transmission, let's...let me take you in time to mid-September when I received a call from a very astute farm manager. We had circulated to all our farms on a managed farm basis and a client basis, the CDC recommendations for what to do with employees were experiencing symptoms similar to flu. Jim, you want to summarize what those recommendations were?

JIM:

Yeah, so I think really there in the early days in May, that CDC came out with a recommendation on what we should do. These weren't pig farmer recommendations, they were work recommendations and so we adapted those for pig farms and that was kind of generally across the industry I think. The adaptation or the rules said, if you have influenza like symptoms (and in the early days there was actually some testing and that testing dropped off the human side) . . . but if we had influenza-like symptoms, we'd ask employees to stay home for 48 hours *after* the symptoms went away. So, we're really talking four to five, six days away from work depending upon the severity symptoms through the summer. And so, this index case, the index herd that had a break and did absolutely fantastic job. And so, the farm manager called you, Sarah, about "Hey, I don't very feel good. I guess this might..." or was his son sick?

SARAH:

His son was diagnosed with pandemic H1N1 and he called and said, "I don't have any symptoms, but I *do not* want to transmit this to my herd. What do I do?" And we talked, Jim, and we decided that, you know, its manure hauling season! Why don't you haul manure for a week and just make sure that you

are not picking up any symptoms and then go back to the farm. And he did absolutely that...and had no symptoms, no signs.

It wasn't until October that we heard more communication from the farm and it was the manager calling again and saying, "I have some sick employees." And we reiterated that we follow those 48 hour post fever recommendations, and then on October 22nd, we received a call saying, "We have rolling inappetence in the herd. Temperatures of the sows are ranging between 104.5 and 106. We have some sows coughing. It's not a barking cough; it's a raspy cough and we have some sows vomiting." And it was at that moment that we suspected we might have something and based upon our clinic viewpoint, we would normally take diagnostics at that point and we decided to take diagnostics at that point.

The local vet in that area went in, got nasal swabs and blood work. Actually with the rolling inappetence and the raspy cough, I was concerned it could be a PRRS break too; it's a PRRS negative herd. And we submitted those diagnostics to Minnesota and attention to Marie Gramer. The diagnostics came back PCR positive to flu and we choose to go forward with finding out which type of flu that was. Jim, you remember that day...we were talking *a lot* and we were nervous; I was nervous. I *did not* want to be that vet who had to experience this and I remember you said, "Sarah, it's just the right thing to do. We're not out here to be cowboys. We're just being vets. Pigs get flu. We're taking diagnostics and we're moving forward as we would to figure out what type of flu this is, so we can do the best thing for our client." And the client also was onboard in that same sense. And he said this several times, he knew what we were headed into, but he wanted to just do the right thing. And that...I mean Jim, you can comment on...

JIM:

I mean, right. It was always a good combination. I was probably a little more cavalier than you were, Sarah, because I thought, "It is what it is and if it is positive; it is positive. We've got to move." I mean, I think the big take home lesson out of me that was, one, we were really blessed to have a good client, who understood...

SARAH:

Yes.

JIM:

...and wanted to buck up and do what was necessary and recognize that there was risks. But two, I think the take home message, to me, out of all of this was...is that we as veterinarians and we as an industry made this a whole lot worse than it really was.

SARAH:

Right.

JIM:

I can't stress enough how positive the interaction was with the Indiana state veterinarian.

SARAH:

Oh my goodness, yes. Dr. Bret Marsh was just *fantastic*.

JIM:

And better yet, really subsequent follow-up with both CDC and the Indiana public health and then with your experience Doug . . . the Illinois public health and further conversation with CDC. But the public health side really was very, very proactive on this. I think we had a lot to fear, probably because we don't have a lot of conversations with those entities. And the take home to me was is that all those conversations that I've been partied to and to some of these other things really did pay off at the end of the day, because you could pick up the phone and talk and shockingly, even though they work for public health, they are not the devil. They're rational human beings and just want to do what's right. And so...

DOUG:

That was one of the benefits though, of having that time delay from April to September/October time period.

SARAH:

Absolutely.

DOUG:

A lot of communication had happened within the industry and laid the ground work to make this work a lot easier.

SARAH:

Yes. And the public wasn't...I mean, they were getting sick and experiencing the flu and so I think they logically could understand that if pigs are susceptible, that it could transfer from a human to a pig. When that first case was released, it was on the local news, but the public response was pretty quiet for the most part.

JIM:

Yeah. I think Doug brings up a really good point. The five or six months delay that we had there and really, we as an industry really need to go find Liz Wagstrom and Jen Greiner and Bobby Ackourt and pat them on the back for the leg work and the communication and opening lines. And really, that gave us the time to get everybody on board.

DOUG:

Definitely, that was the key part of success, limiting the explosiveness of the news story.

SARAH:

Now for our producer, the thing that we were most concerned about was whether or not we were going to be able to move pigs and how that response was going to be. I think the ground work was there, that if the pigs don't have clinic signs that it's ok for movement. And what was your perception of how that moved forward?

JIM:

Yes, we had an index case in Indiana and the first index case in Illinois was a herd of Doug's. I think in subsequently with testing what we're up to is ten to twelve or fourteen cases in Illinois, I mean we've kind of found it everywhere. And clearly there is an up take in following the human outbreaks, so I think, Sarah, , if you look at the cases, we tend to have an index case with a person in the herd and a week to two weeks later, we saw the secondary wave of human infections. In about the peak of human infections in the secondary wave, we would see the outbreak in pigs. You've certainly did a fantastic job

there in the index case and we've subsequently replicated that and we presented that data that there were pretty clear transmission patterns...human outbreak; subsequent, pig outbreak following that.

SARAH:

And we were able to timeline that in all circumstances for the state vets and that has been a very helpful thing for them as they look at it and move forward.

DOUG:

Yeah, it's been extremely positive to set that up when you are communicating with state vets and state vets between Illinois, Iowa, and Missouri were all very receptive of the conversation and very appreciative of the timeline setting it up.

SARAH:

And we had time to create those nice timelines, because by the time the diagnostics are final and through; you have time to sit at your desk, think it through, and present your case. So that when it is confirmed, 1, you have your timeline and 2, for the most part the clinical signs are resolved.

JIM:

Right. I think in your movement question, Sarah, I mean I think that was the other key point in the movement. That because of this natural delay between identification, the first clinic signs, and diagnostics returning in some cases we were as little as four days. The initial case was about two weeks, just because it was the initial case and there was a lot of dotting "i's" and crossing "t's". But, we're down to four, five, or six days now, kind of routine. But even in that, we've moved pigs in that time frame and right, we know about influenza, the biology there is that there's probably is significance of shutting down the virus prior to clinic signs. It's like the people. Once you start coughing, you're a whole lot less risk to transmit than before your coughing. I still have some concerns that the regulatory environment within the animal ag is maybe not quite right. We still view the primary tool of control as stopping movement. And as a veterinarian, I understand that; but the way the industry is structured today, it's not very practical, because we're going to be chasing our tail. Because we are moving pigs every day, literally in some of these farms at least twice a week in almost every farm. And so, just the onset of what's happening to when we can stop movement... We've probably already moved that virus most of the time across state lines. And whether it's foot and mouth disease or whether it's influenza, somewhat inconsequential. I think we, as an industry, really have to rethink what's the strategy, what's the control measure? Is really stopping movement going to be effective or just going to cost us a lot of money and not stop disease and that's kind of a soap box in one. But at the end of the day, you asked about the movement question...the index case in Indiana was very easy those pigs had stayed in the state. And so, Dr. Marsh was the saint and got everybody calmed down. In the index case in Illinois, those pigs had already crossed the state line. But they had moved really at the same time diagnostics were being taken and were probably positive if you look at the trend. I mean, we didn't get a 100% PCR positives; they weren't shedding four or five days before clinical signs. And so, the state that those pigs moved to, the state vet again being a saint and said, "Ok, fine. Tell us."

The other big take home I got out of all of this is that public health really said, "Ah ah, it's flu," which is maybe a different response than A) what we expected, B) what other people expected... in terms of wanting to make an issue out of it . . . so the timelines were helpful. And you've had a lot of conversations with the Illinois state veterinarian, Dr. Ernst, and it was very helpful for him; it was very helpful for Dr. Marsh.

I've had interaction with the public health side and their reaction was "That's really neat. Did we get human testing?" DOUG: That was exactly the question that I had directly from public health was, "Were any of them confirmed pandemic flu in the employee absences?" And at that stage on the public health side, they'd quit testing. So it's...you know, the case is there, it's all the signs and everything matches, but there's no confirmation just because of the public health sector just accepted it.

SARAH:

Yeah, and the same thing in Indiana. Almost all of the employees got sick and over half of them went to the doctor and none of them had any testing done.

So, but let's segway here a little bit. In the Indiana herd, one of the first things we did was go in and vaccinate that herd. And for me, as a veterinarian, my next decision was, "Ok, I have all these other herds that I'm working with. At this point, do I look towards preventing this disease that we think can easily transmit or fairly easily transmit from human to pig? Do I go ahead and use vaccine as a preventative?" And my own decision was, "Yes." I went to clients and said, "I think that we need to do this." And so, we implemented that. Doug, can you walk me through what your thought process has been as you've experienced these breaks on a number of herds?

DOUG:

When the first cases of flu came through with the pandemic H1N1, signs for us were fairly mild in a sow herd, maybe limited more to the gilt development. Didn't see a lot of signs in the pig flow or some of those typical things that when a flu blows up in a herd and so you look at it and say, "Did we have some partial protection? Did we have some of those other things that helped our herds?" But clearly we needed to look at...flu was going to be through our swine base herds from a locality... from people getting sick. It was running through the area, so we knew it was going to be exposure there. So that's when we did look at vaccinating the herds and did go down the road to eventually mass vaccinate in the sow herd, because we knew the exposure was coming. We needed to protect the herd as an entire herd.

SARAH:

So, you've had flu diagnosed in herds that have been vaccinated, correct?

DOUG:

Ah, yes. Previously, with the commercial licensed vaccines and have that in there as a routine vaccination, some herds have been, you know, in a mass vaccination three times a year. Others are on a pre-farrow type of vaccination schedule.

SARAH:

And so, describe for me the clinical signs you saw on those particular herds, because they were slightly different than what I saw in Indiana.

DOUG:

Yes. They ah...predominately, most of the herds were focused in growing gilts on the sow farm, in their gilt development units. And most of those were the typical cough, some lethargic type pigs, small amount of pig, bred animals off fed, usually bred gilts, they would be the ones affected. Typical older parities were not as much. You can have an occasional one, but very low symptoms. A couple of farms did have a few coughing piglets, but it wasn't consistent on the piglet side. And those piglets moved out to wean-to-finish buildings really cleared up within a week, five days. No ill effects. Producers reported

back, it's pretty uneventful. They still have kind of a little harder start to them, but also they kind of grew out of it and no long lasting effects.

JIM:

Yeah. And I think maybe the key difference between the herds is that we don't know much about the Indiana herd and the virus circulating around that herd, but we know in Doug's herds, those herds had actually had an all swine virus was actually somewhat similar to the human virus genetically circulating those and so the older animals within the last year. So, it makes sense these clinical signs the older animals had seen *live* virus that had natural infection with a kind of related bug. And the younger animals had not seen the live bug; they had only seen vaccine maybe from that. And so, it's a pretty good indicator, right, that it's really what Amy Vincent would say, "That animals with wide exposure have very deep and very broad protection." So, they cross protect a lot of different variants and that protection really precludes all other clinical signs. It doesn't mean they don't shed, but it really protects them against clinical signs. Killed vaccination without natural exposure, produces somewhat narrow and very shallow. So, it's very specific to the killed antigen that they put in there i.e. that strain, for a lack of a better word and it doesn't reduce as many clinical signs. Yes, it reduces clinical signs, but it doesn't reduce all of them.

SARAH:

Right. So, your signs were more mild compared to ours, but even as we've looked at the range of clinical signs. It...It was flu. I mean pigs get flu.

DOUG:

It acted, tasted, smelled like flu. It was all right there. To do that, it just minimized. It wasn't explosive. JIM: I've taken the converse argument on vaccination. I can't justify my mind the economic expense of vaccinating the sow farm, because the clinic signs were very mild and we had a lot of debate with my clients internally about is it a public health risk? And so, do we have to vaccinate from a public health stand point? And at least all the data and my conversations with the smart people, would suggest that, "No, we don't think there's any documented way that we're moving pigs to people." And so at least based on the clinical signs that I personally seen, we chose not to vaccinate. Now again, that's maybe because we know we've had kind of the same virus roam around on these farms in Illinois, because that happens to be... an Indiana02 like virus. We've actually had it roam in Illinois in the last couple of three years and so we've probably had just a lot higher natural immunity. And so, I think it's a herd-by-herd decision on how you are going to do that? But generally, avoid clinical signs weren't impressive at all compared to what we see in, you know, kind of novel, if you said this is a novel virus being introduced into a population. It's a pretty lengthy virus.

And that's where it's very hard to justify economics. You know, typically you can have an explosive flu, you can have potential abortions, high fevers, a lot of coughing, some respiratory complications was not a part of the scenario that we'd seen and in multiple herds it was not there. So, it's hard to justify some of that vaccine unless there's other reasons you need to do that . . . public perception, owner perception, helping the employee morale.

JIM:

It certainly slows down coughing pigs post wean. And as you said, Doug, it probably doesn't cost you any money, but if it drives the guy getting the pigs up the wall post wean, that's when probably the vaccination is worth it.

SARAH:

And that would have been my experience in Indiana is that we were able to...I mean, we're not experiencing pandemic flu in the finishers at this time. And so, for us, that has been a big plus in choosing to vaccinate and that it's not circulating and circulating and circulating in our finishers.

Let's wrap it up here and just go around and summarize. Jim, what are your take homes from the experiences we've had in the past six months?

JIM:

Well, really two huge take homes. One, is that we as a profession and we as an industry need to spend a lot more time interfacing with our counterparts in public health as we think about zoonotic disease and food born disease and right, there's just more potential and certainly a whole lot more public pressure. But what I really learned is that we don't have very good relationships or contacts, not that we have bad relationships, I probably said that wrong. We don't have any relationship with a lot of those folks and I think we would both sides of the equation would benefit to open up those lines of communication get that done. But I think that was a big, big take home for me is that our ability to call the state public health veterinarian, the head of the state public health department needs to be just as good as to call the state veterinarian. And we certainly don't pick up the phone and worry about calling the state veterinarian, but probably been hesitant to do it in the political side, because we don't know these people. And so I think that was a big take home to me. As practitioners and as leaders in the industry, we have to have those conversations and move that forward, because those relationships will be valuable.

The second huge take home for me is that--and I've raised more than one eyebrow with this-- that our biosecurity measures for stopping introduction influenza in the barns are totally non-effective. Where we knew we had good compliances on the Indiana herd and certainly in the case in Illinois, we had fantastic compliance with the influenza like illness program. If you feel crappy, don't come to work. Maybe that's because they didn't want to come to work anyway, but we really did have compliance, right?! So, we really need to give a lot of credit to those farms and managers for getting that program on board, because they believed in biosecurity. But even with really good compliance on that, we were not effective in stopping the introduction. And if you actually look at the county data on when we had up takes in circulation in the counties, we can go pin point after that going back into the human outbreak we saw the pig outbreaks.

And so I think we have to think about long term, what are the strategies that we are going to have in place? How do we get the vaccines to the right tools or whatever? That we have to start thinking about proactive implementation strategies for prophylaxes in the face of the next human pandemic. And if we look at history, I know we're all worried about pigs creating the human pandemic. But we're going pretty good right now on humans to pigs at least in the U.S. So the 18 pandemic, so the dominate H1virus is human to pig. The dominant H3 virus came from the 67, so that was introduced in the late 90s. But it's the H3 virus from the late 60s in humans that was introduced to the human side and now we've got this one, which probably won't co-circulate, but certainly was the third introduction. So we've got kind of two dominant and a new one called the third in the swine population and those are all known human introductions. In our introductory trial, it was no big deal to move ours between species. We see it all the time when pigs are routinely under a surveillance program. They really in host; they don't adapt. But I think as we think about that, how do we start to build the models? Because if we just rely on biosecurity we are going to fail and fail miserably.

SARAH:

Right.

DOUG:

I think one of the things that I want to kind of recap is the practitioner's role and getting diagnostics and keep pushing forward and not be held back with the fear of some other result out there. I mean, with the communications being built with the public health sector, state veterinarians, we need to push forward and lead through potential problems. One other thing would be is that swine influenza is the topic today, but also it lends itself to model for other zoonotic diseases that veterinarians are on the fore front of and taking care of our clients and employees of the clients. So, that's part of the big picture that we've got to back up and say, "Alright, it's not just food sometimes that we need to worry about."

SARAH:

We have to maintain the public trust. That we, as veterinarians, are going to do the right thing.

DOUG:

That's right.

SARAH:

And for me to sum it up, I'm glad the vaccination is an option. It's a tool that we have, that we can use if we so choose. And in the cases we experienced, we did choose to use it. And so, I'm glad that's an option and that other swine vets need to be aware that it's out there and it's a something that is very helpful in these circumstances.

Well, with that, we want to wish you the best of luck. Thanks for joining us in the latest *P's in a Pod* and we want to wish you a safe trip. Take care.

This edition of P's in a Pod was sponsored by Pfizer Animal Health.

The AASV recommends vaccinations with currently improved vaccines for the control of swine influenza. In regards to pandemic H1N1, the AASV recommends the following:

- *Vaccination with currently approved vaccines for the control of swine influenza should continue to be used to control clinic signs of disease due to swine influenza virus as recommended on each products' label.*
- *Vaccination of swine, against the pandemic H1N1 2009 influenza virus, should be implemented if scientific evidence demonstrates that vaccination reduces viral shedding and the risk of transmission to pork production personnel.*
- *Producers should consult with and implement the recommendations of their veterinarians to fully understand any potential new infections in their herds.*
- *And these veterinarians need to use the best available information make science-based decisions on appropriate control measures for those herds.*

Pfizer Animal Health recently conducted a challenge study to demonstrate efficacy of its Swine Influenza Vaccine, pH1N1. In this study, virus isolation tests detected significantly less virus in nasal swabs for pigs in the vaccinate group when compared to the placebo group 1-5 days post-challenge. Lung lesion scores in pigs in the vaccinate group were significantly lower than the placebo group. Based on results of this study Pfizer Animal Health's Swine Influenza Vaccine, pH1N1 vaccine **does** reduce viral shedding and lung lesions. Producers are advised to consult with their veterinarian on the use of this

conditionally licensed vaccine, as well as continue to follow AASV recommendations for routine swine flu preventive measures and pH1N1 prevention.