

STANDARD DEVIATIONS: Porcine Pandemonium and Proselytizing Preparedness

Peeps,

Last week (4/15/19) we talked about the pig as a source of new, novel influenza strains that have led to pandemic outbreaks. These viral outbreaks pose risk for severe, lethal consequence in humans, and challenge us as laboratorians. We're challenged by the increases in testing volumes and by the risk of infectious material on the bench.

Today, I'm going to throw some pig virology at you that has nothing to do with flu, but everything to do with how we should think about risk. I think it's interesting biology and a good parable for the biosafety I preach. Although this is a biosecurity story, the safety aspect is one we can use to talk about our lab practices.

African Swine Fever (ASF) is a major disease of pigs. It's the only DNA arbovirus known; and the only member of its family (**Asfarviridae**, **African Swine Fever and Related virus**). The endemic virus is found in soft ticks of southern and eastern Africa and Eastern Europe where it coexists with warthog and wild boar pigs (the *sylvatic* cycle) and is widely distributed. ASF also has a distinct *domestic* cycle where direct contact, aerosol, and mechanical spread by people and fomites account for high transmissibility in domestic swine herds.

Wild pigs infected with ASFV show no signs of the disease. In domestic swine, the incubation period ranges from 5 to 15 days, and the clinical features of ASF include fever, diarrhea, incoordination, prostration, coma, and death. Vomiting, nasal and conjunctival discharge, dyspnea, and anal and nasal hemorrhages is seen. Abortion is common in affected sows. In regions where the disease is exotic, mortality rates often reach 100% (2 - 9 days). Death is the result of extensive organ necrosis (a. liver, b. spleen, c. lymph)



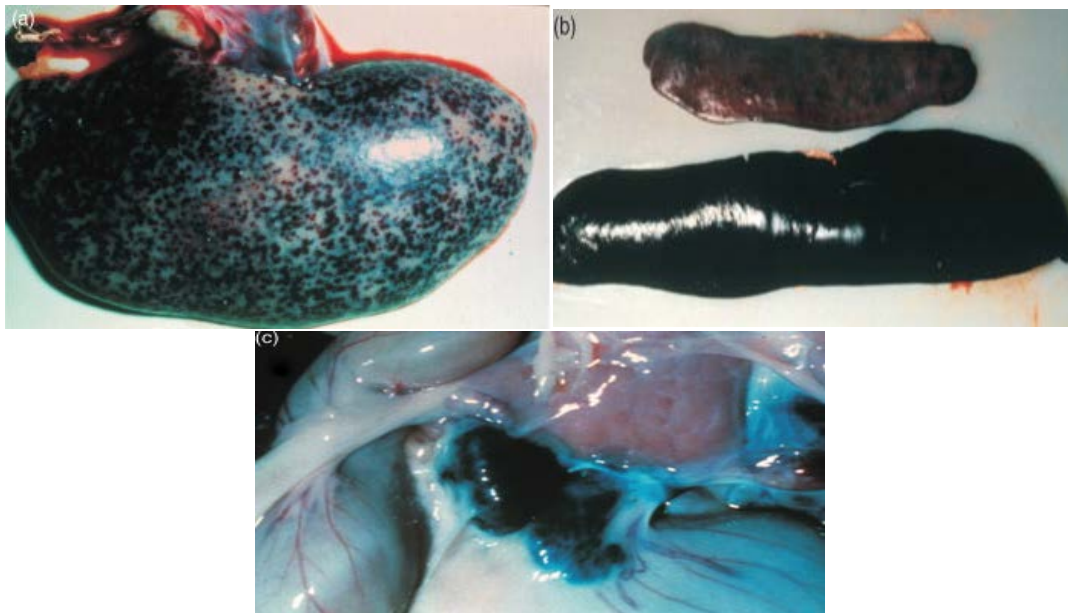


Figure 1. Organ necrosis w/ ASF

Outbreak of ASF is ongoing in China, Vietnam, and Europe. Hundreds of thousands of swine have been culled (once seen in a herd, the entire population is culled) in response to spreading disease. Under-reporting of incidence is a worry with China's huge pork industry. Neighboring countries are on high alert for any possible contaminants at their borders. Contaminated carcasses (from China) have washed ashore in Taiwan in recent weeks.



Figure 2. Chinese "known" cases of ASF thru 4/2019





Figure 3. Eurasian Distribution of ASF thru 9/2018

Like China, Russian reporting is probably well below the actual incidence and many Eastern European countries are now endemic for ASF in wild boar and the tick vector, resulting in outbreak for farm herds.

Closer to home, on 3/15/19, US Customs and Border Protection (CBP) agency seized roughly 1 million pounds of pork products attempting to be smuggled into the US from China. CBP seized more than 50 shipping containers at a New Jersey port before they could enter the US. This is the largest agricultural seizure in US history according to the CBP. It has been estimated that if ASF was detected in the United States, over \$10 billion in damage would occur in the first year.

Pigs with influenza are something we deal with as part of doing pork business. Morbidity may be high (it may approach 100% in an infected herd) but mortality is low. Our mitigation is reactive. Vaccination of pigs for influenza is part of the risk management. On the other hoof, AFSV has a more severe consequence for pigs (and business, because they all die) and our response is proactive. We mitigate the ASF risk in a different way; much more aggressively. There is no vaccine or treatment; so we monitor the disease around the world and at our borders. We try to avoid exposure to the pathogen, altogether, but like influenza, it's bound to show up.

In humans, we see a similar dynamic. Influenza is part of our laboratory workload and we treat those specimens with respect, as potential bio-threat. Our mitigation is reactive. Vaccination of humans for influenza is part of the risk management. On the bench, we know risk exists and we use precautions (vaccination, biosafety cabinets, isolated testing space, stringent PPE, etc.). On the other glove, there are pathogens which have more severe consequence for humans (Ebola comes to mind) and our response is proactive. Our strategy is much more focused. We use BSL3 precautions and/or reference labs as more aggressive mitigation. We try to avoid exposure to the pathogen, altogether.



So, what does this have to do with the price of peanuts in Panguitch? Remember, my job is helping you guys look at risk. Here's a model for how risks differ and change. What will our response be (not if but) when a swine-related pandemic influenza emerges? Our existing strategies will leave us vulnerable to an emergent flu we don't understand (immunologically). That vaccination barrier won't help, and our BSL2 practices may not either. Having a discussion about pandemic preparedness can't hurt. Having a plan is even better.

Take a look around you. Do you have backup for packing and shipping hazardous materials? Could you enhance your BSL2 practices, if necessary? Is the biosafety cabinet certified and ready for use? Are any technical staff fit tested for N95 protection, or are enough PAPRs around and their use understood? Do you have a bunch of disposable PPE on hand?

I realize that this sounds pretty dramatic. But....don't you have a disaster plan SOP, a fire plan SOP, a Code Pink SOP? (Of course you do.) Ever drill for those events? (Of course you do.) How many times have those SOPs been implemented and how many times have you asked yourself why they exist? (Never and never?) This is what risk assessment is all about; likelihood and consequence. We recognize that a pandemic is a rare occurrence, but deadly.

Maybe I'm beating a dead pig, but anybody who's worked in Micro will tell you, "Shit happens". I could mention tsunamis in Indonesia, floods in The Big Easy, Ebola in Africa, and Paradise burning like Hell. So, yeah, maybe you don't see pandemic threat coming tomorrow but when it does come, preparedness is preferred.

Have a great week and be safe,

Bryan

p.s. My Lab Week thoughts come in the next issue.

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