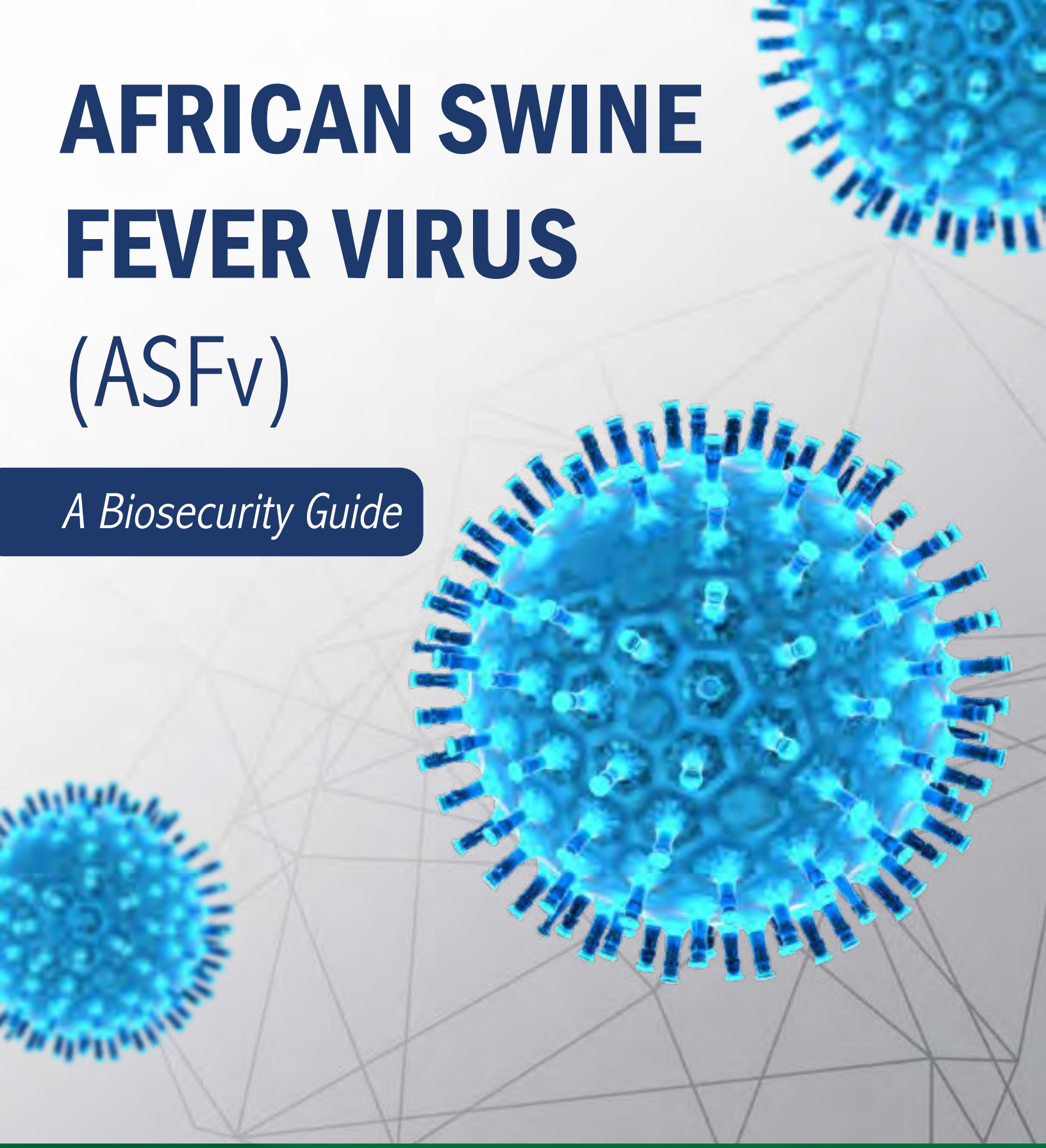
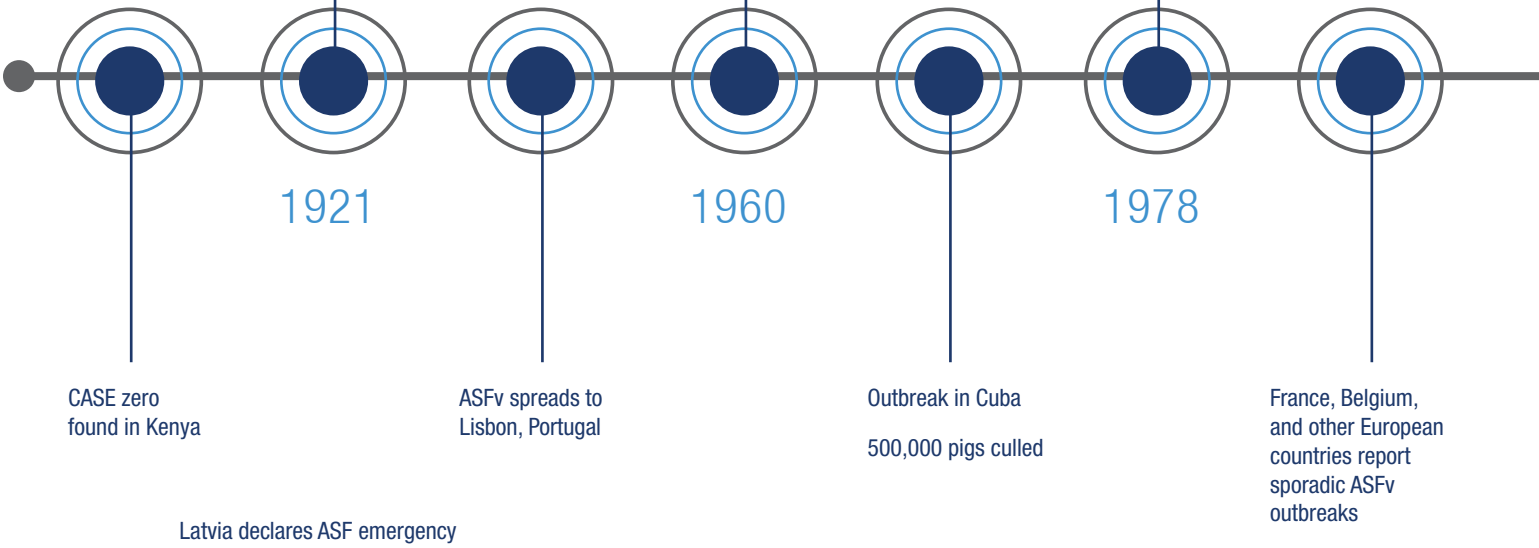
AFRICAN SWINE FEVER VIRUS (ASFv)

A Biosecurity Guide



NEOGEN®

AFRICAN SWINE FEVER VIRUS Timeline



1909 — CASE zero found in Kenya

1921 — ASFv first described

1957 — ASFv spreads to Lisbon, Portugal

1960 — Second outbreak in Portugal

ASFv established in Iberian Peninsula

1971 — Outbreak in Cuba

500,000 pigs culled

1978 — Brazil, Haiti, Dominican Republic report ASFv

1985 — France, Belgium, and other European countries report sporadic ASFv outbreaks

2015 — Estonia reports ASF

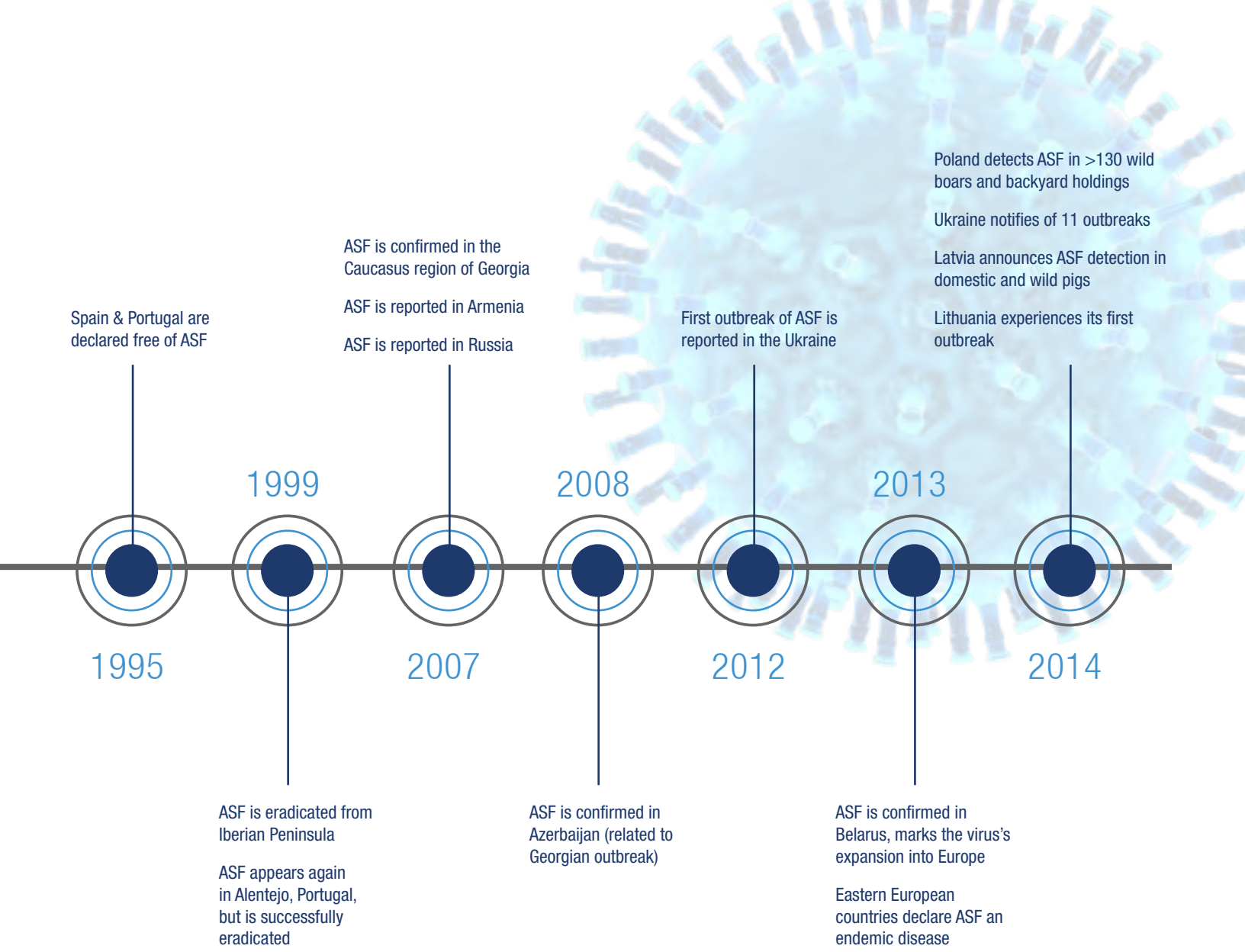
2017 — Latvia declares ASF emergency

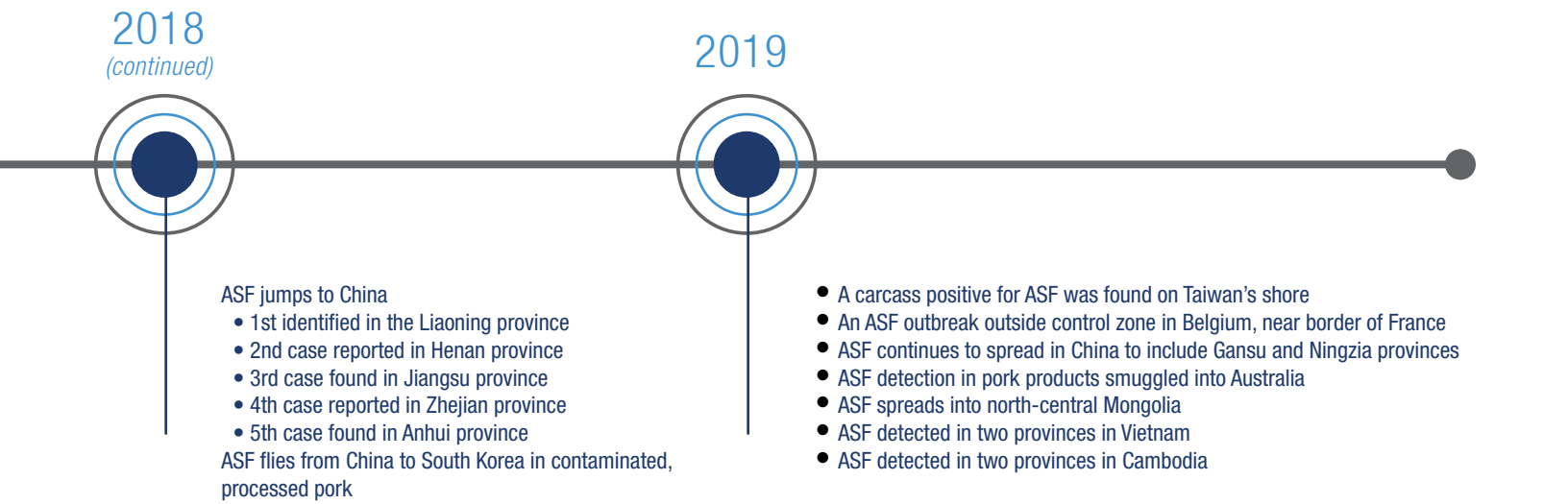
Romania announces its first outbreak

Czech Republic experiences ASF for first time

2018 — Romania experiences 591 outbreaks mainly in the Danube Delta region
Poland reports an additional 63 ASF cases
Bulgaria reports 7 backyard pigs infected by ASF
Romania announces another 42 outbreaks resulting in the culling of 140,000 pigs
Belgium reports two infected wild boars have been found on a military base

Neogen • 944 Nandino Blvd. • Lexington, KY 40511 • inform@neogen.com • animalsafety.neogen.com


Spain & Portugal are declared free of ASF
1995
1999
ASF is eradicated from Iberian Peninsula
ASF appears again in Alentejo, Portugal, but is successfully eradicated
ASF is confirmed in the Caucasus region of Georgia
ASF is reported in Armenia
ASF is reported in Russia
2007
2008
ASF is confirmed in Azerbaijan (related to Georgian outbreak)
First outbreak of ASF is reported in the Ukraine
2012
2013
ASF is confirmed in Belarus, marks the virus's expansion into Europe
Eastern European countries declare ASF an endemic disease
Poland detects ASF in >130 wild boars and backyard holdings
Ukraine notifies of 11 outbreaks
Latvia announces ASF detection in domestic and wild pigs
Lithuania experiences its first outbreak
2014


2018
(continued)
ASF jumps to China
• 1st identified in the Liaoning province
• 2nd case reported in Henan province
• 3rd case found in Jiangsu province
• 4th case reported in Zhejian province
• 5th case found in Anhui province
ASF flies from China to South Korea in contaminated, processed pork
2019
• A carcass positive for ASF was found on Taiwan's shore
• An ASF outbreak outside control zone in Belgium, near border of France
• ASF continues to spread in China to include Gansu and Ningzia provinces
• ASF detection in pork products smuggled into Australia
• ASF spreads into north-central Mongolia
• ASF detected in two provinces in Vietnam
• ASF detected in two provinces in Cambodia

AFRICAN SWINE FEVER VIRUS

African swine fever (ASF) was first observed in Kenya in 1909 following the introduction of the European (exotic) domestic pig. It was then described retrospectively in 1921 as a highly contagious hemorrhagic disease in both wild and domestic pigs. ASF has extremely high morbidity and mortality, spreads rapidly and causes severe illnesses, thus is a notifiable disease with the World Organization for Animal Health (OIE).

In the third quarter of 2018, ASF made its biggest leap into China. The first case was reported in Shenyang, in the district of Shenbei New, in the Liaoning province which is in the north east of the country – a pig dense area. A second case was confirmed in a slaughterhouse in the city of Zhengzhou, in the Henan province – about 870 miles south west of the first case. The third case of ASF virus was reported in a farm in Liangyungang, in the Haizhou district, in the Jiangsu Province – approximately 350 miles east of the 2nd case. The fourth case was found in Yueging City and Wenzhou City, in the Zhejiang Province – about 500 miles further along the Pacific coast from the 3rd case. The fifth case was reported in Wuhu, in Nanling district, in the Anhui province – directly west of Shanghai. And finally, we received proof of ASF contaminated, processed pork being brought to South Korea via a traveler flying in the Incheon Airport.

For these reasons, Neogen has created a comprehensive biosecurity strategy. It is intended for producers, veterinarians and allied industry partners to reference and develop an effective biosecurity plan against ASF in the United States. This plan will cover the etiology and ecology of ASF and control and eradication strategies for producers and veterinarians.

What is ASFv?

African Swine Fever is a virus that belongs to the Asfivirus genus of the Asfarviridae family. ASFv is an enveloped virus like PRRSv, PEDv, CSFv, and TGEv. Unlike the majority of the viruses we manage in the U.S., ASF is a double-stranded DNA virus. Currently, there is only 1 recognized serotype, but within that serotype, there have been 22 different genotypes.

Susceptibility

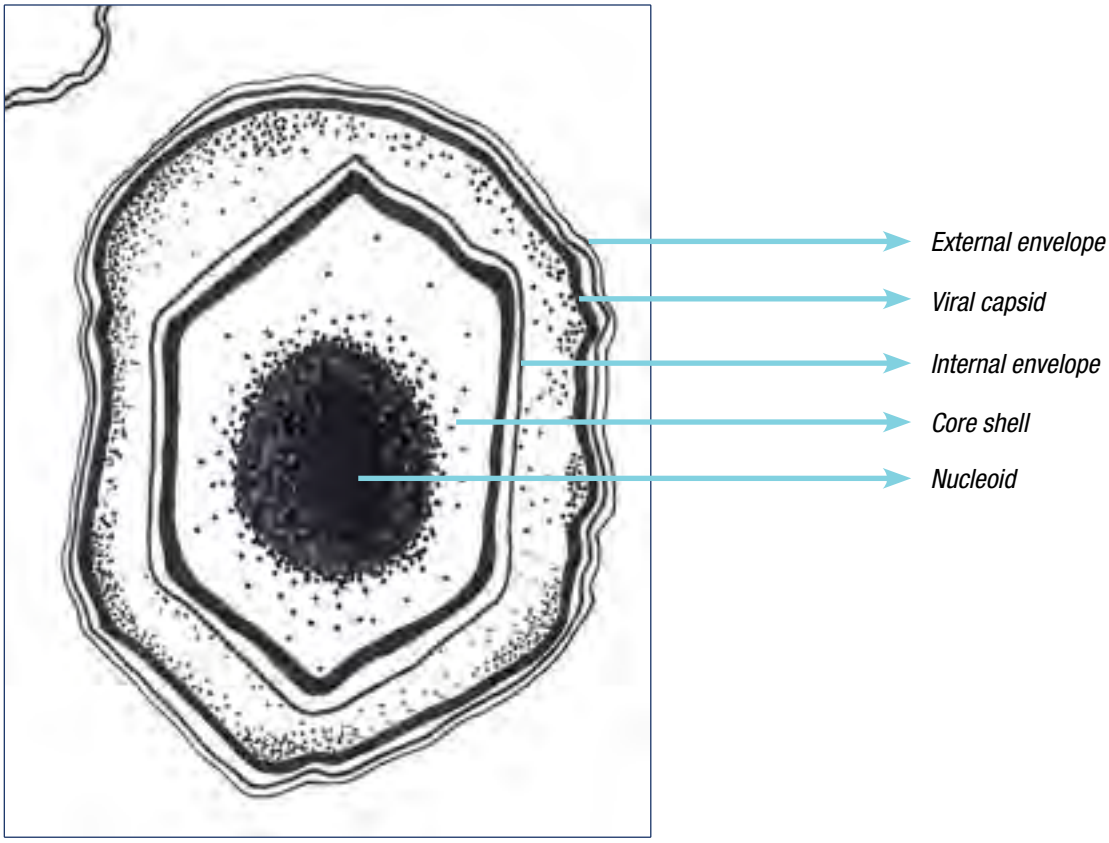
Viral susceptibility is a concern to most of the species within the Suidae family including, but not limited to domesticated pig, European wild boar, bush pigs, and giant forest hogs. Though susceptible to the virus, African pigs and some pigs native to South America are believed to be resistant to clinical disease.

Disease Forms

Infection presents itself in four clinical forms: Peracute, Acute, Subacute, and Chronic infections, and are based on the virulence of the strain, immune status of the herd, clinical signs being seen, and overall gross lesions.

Transmission

There are three modes of transmission: Direct, Indirect, and Vector-borne transmission. Direct transmission can occur through infected saliva, respiratory secretions, urine and feces. Indirect transmission occurs from contaminated fomites, such as infected garbage that is fed to pigs. Vector-borne transmission is typically seen via the Orinthodorus tick, where the virus can spread via sexual reproduction, through their offspring (transovarial), or through different phases of life (transstadial).



Adapted from DISEASE RESPONSE STRATEGY AFRICAN SWINE FEVER. Sept. 2018, www.aphis.usda.gov/animal_health/emergency_management/downloads/asf_strategies.pdf.

AFRICAN SWINE FEVER VIRUS

Incubation Period—3 to 15 days

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		Day 0 - Exposure	Day 1	Day 2	Day 3	Day 4
Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11
Day 12	Day 13	Day 14	Day 15			

Window begins with first signs of clinical disease

Window ends with last signs of clinical disease

Clinical Signs—Those that survive are lifelong carriers

Clinical signs will vary by disease form and virus strain where the Peracute form will have almost no clinical signs before sudden death to the Chronic form which may easily be confused for other diseases like PRRS, Erysipelas, Salmonellosis, or Pasteurellosis.

Table 1	Peracute	Acute	MS - Subactue	Chronic
Virulence of Strain	High	High	Moderate to low	Low
Immune Status	Death before blood detection	Many die before blood detection	Detectable in blood	Detectable in blood
Clinical Signs	Close to death or dead	Fever, loss of appetite, bloody stool, lethargic, red to bluing skin	Variable, but similar and less severe than acute	Reoccurring mild fever, abortions, reddened and necrotic skin
Gross Lesions	Death occurs prior to noticeable lesions form	Spleen enlarged, Multiple hemorrhages (kidneys and heart, lymph nodes), Swelling of gall bladder	Lesions are similar, but milder than Acute	Fibrinous pleuritis with pneumonia

Table 1. Adapted from: Kleiboeker, S.B. 2002. "Swine fever: Classical swine fever and African swine fever." Vet Clin Food Anim 18:431-451.

Neogen • 944 Nandino Blvd. • Lexington, KY 40511 • inform@neogen.com • animalsafety.neogen.com

Morbidity and Mortality

All forms of African Swine Fever experience high levels of morbidity. Mortality will vary by form, but it is not uncommon to experience a range of 20 to 100 % mortality in naïve herds.

Disease Form	Mortality Rate	Time Period
Peracute	Up to 100%	7-10 days
Acute	Up to 100%	6-13 days
Subacute	Younger pigs: 70-80% Older Pigs: <20%	6-15 days
Chronic	Low	Life Long

Persistence of ASFv

1. Environment

Very resilient virus that can withstand extreme temperatures, fluctuations in pH and remain viable for long periods in tissues and bodily fluids.

2. Within Host

If the host survives, they remain carriers for life. ASFv is able to persist in ticks for more than 5 years and maintain infectivity when ticks perform a blood meal.

Treatment and Vaccination

At this time, there are no effective, commercially available treatments or vaccinations to prevent African Swine Fever.

Morbidity is the condition of being diseased or the rate of disease in a population. Morbidity is considered high when clinical signs impair or degrade health and well-being to the point of being outside the realm of normalcy.

AFRICAN SWINE FEVER VIRUS

Control and Eradication Strategies

1. Prevent Contact
2. "Stamping Out"
   - Stop Production
   - Stop Transmission
3. Increase Disease Resistance

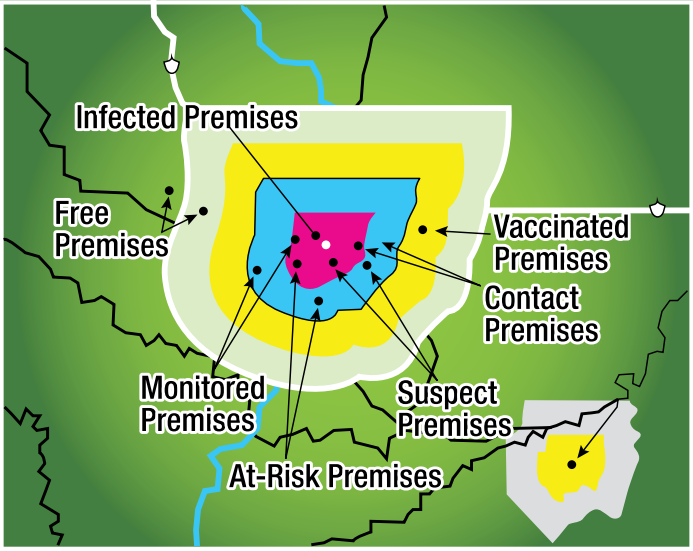
Prevent Contact

Preventing contact between African Swine Fever virus and susceptible animals can be difficult, but it can be achieved with a continuous and enhanced biosecurity plan. Though the idea of imposing a quarantine does not sound desirable, it provides a record of all things entering and leaving the premise by stopping movement of infected animals, contaminated animal products and fomites from premises within control area. A movement control program will also help regulate the coming and goings of people, vehicles, equipment, animals and animal products that leads to a successful quarantine program. Movement control is only as successful as the group instituting the program. It will fail if a breach in biosecurity, no matter the risk, occurs.

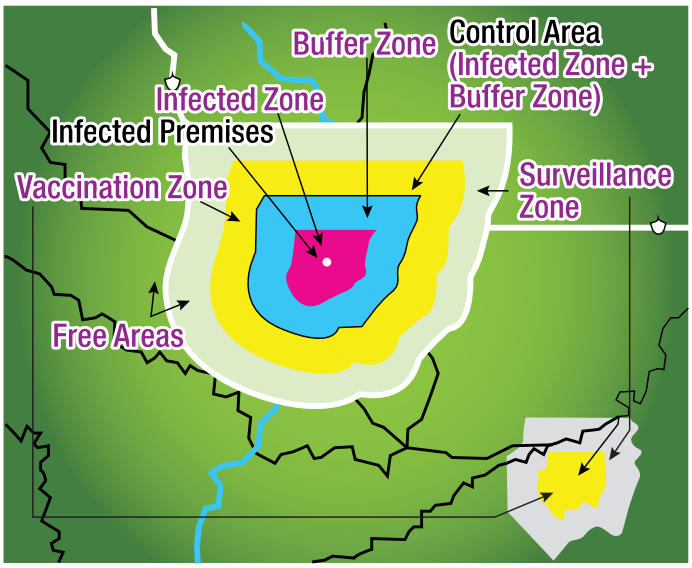
Within the quarantine are three premise designations: Infected Zone, Buffer Zone, and the Control Area (which is the sum of the first two zones). Identifying these areas and developing a contingency plan will be crucial to help prevent the introduction of this virus onto a premise or, prevent the virus from infecting other premises.

Figure A-1: Example Premises, Zones and Areas

Premises

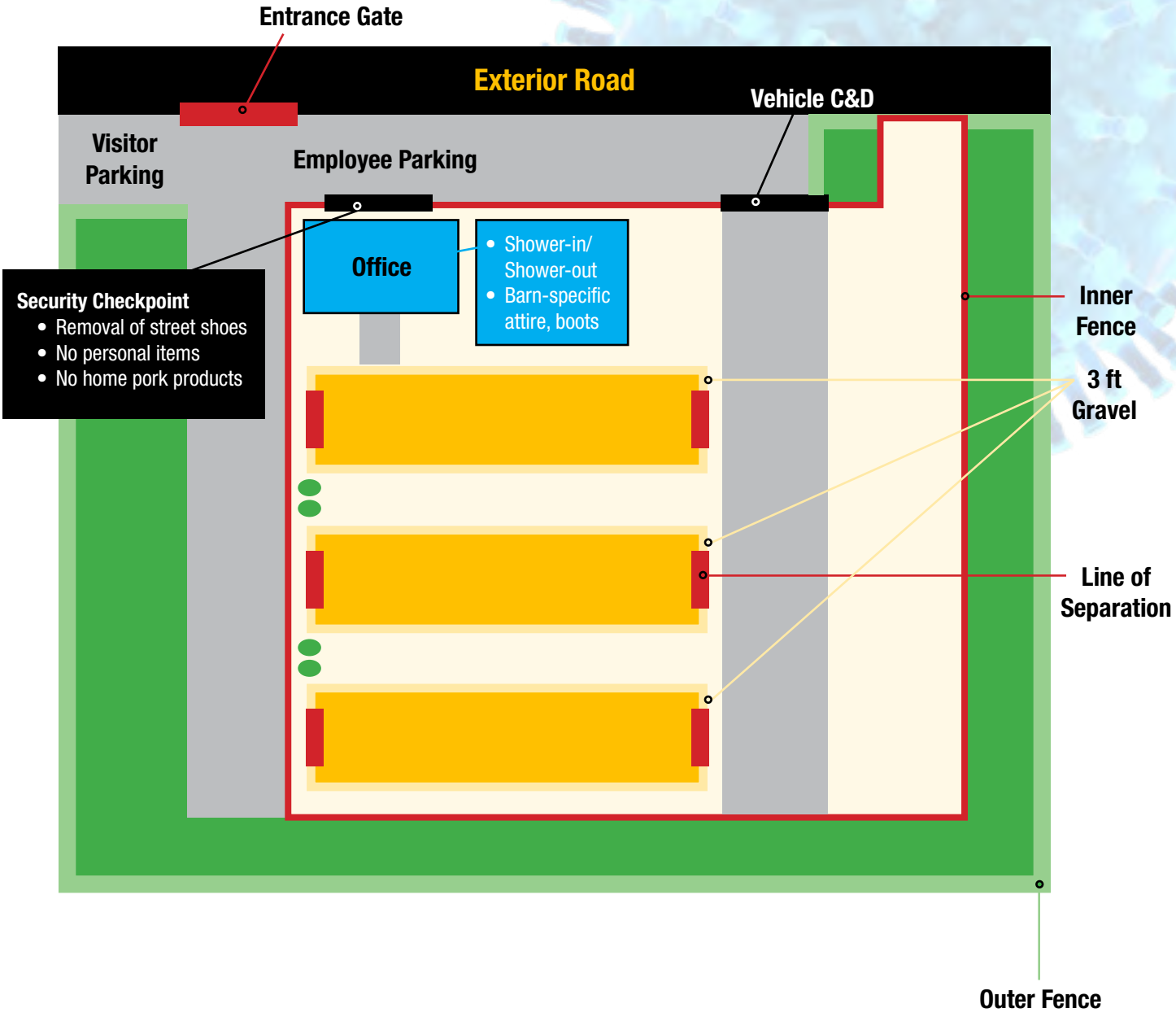


Zones and Areas



Neogen • 944 Nandino Blvd. • Lexington, KY 40511 • inform@neogen.com • animalsafety.neogen.com

Prevent Contact



Adapted from DISEASE RESPONSE STRATEGY AFRICAN SWINE FEVER. Sept. 2018, www.aphis.usda.gov/animal_health/emergency_management/downloads/asf_strategies.pdf.

African Swine Fever Virus

Cleaning and Disinfection

Goal: Prevent the Introduction of ASFv on Hard Surfaces

1. Identify Line of Separation
2. Mechanically remove all solid waste
3. Apply appropriate detergent
4. Wait appropriate amount of time for detergent to work
5. Pressure wash the area with water. Use hot water where available.
6. Audit area for cleanliness
7. Apply appropriate disinfectant
8. Allow disinfectant to dry
9. If available, heat surface

Water Disinfection

Goal: Prevent the Introduction of ASFv via Drinking Water

1. Identify Source of Drinking Water
    - If surface water, consider converting to deep well
    - Take water sample from source and at end of drinker line

2. Install filters to collect large particles and minerals if needed

3. Clean water lines regularly to minimize biology growth with an EPA-registered disinfectant
    - After every turn

4. Install Water Disinfection System

5. Determine appropriate disinfection levels
    - 3-5 ppm ClO2 is recommended at the end of the waterlines. Adjustments will be necessary based on ClO2 levels.

6. Determine appropriate acidification levels based on water treatment program
    - A 2:1 ClO2 to acid ratio is recommended; however, adjustments may be required to reach optimal levels.

7. Continuously evaluate chemistry levels
    - ClO2 test strips will provide an easy and economic solution to evaluate water treatment chemical concentrations. Weekly to Monthly evaluations will be important to ensure adequate water palatability, volume and quality.

Neogen • 944 Nandino Blvd. • Lexington, KY 40511 • inform@neogen.com • animalsafety.neogen.com

Pest Control

Goal: Minimize pest populations to prevent the introduction of ASFv via vector introduction

1. Identify level of infestation with an infrared surveillance system and/or performing a manual audit
2. Maintain a minimum of 3 foot gravel barrier around all buildings
3. Mow and maintain weeds, grass and brush to help control rats, mice, and ticks from having easy access to facilities
4. Continuously apply rodenticides and insecticides inside and outside of barns
5. Maintain continuous rotation programs to prevent resistance to active ingredients
6. Evaluate effectiveness by performing monthly manual audits and conducting an infrared surveillance annually

The Human Element

Goal: Prevent the Introduction of ASFv via human movement

1. Develop a visitor control plan
2. Ensure only invited visitors and employees have access to the premise
3. Ensure all visitors utilize disposable boots, gloves, and coveralls prior to entering the facility
4. Provide farm-specific attire to all visitors and employees who may have access to pigs
5. Require all visitors and employees to follow the following programs where applicable:

Shower-in/ Shower-out

Vehicle disinfection

Boot bath disinfection

Supply and equipment disinfection

Any other farm-specific biosecurity protocols

6. Require that no personal items are brought into the facility
7. Perform regular evaluations and trainings to ensure all employees are aware of the biosecurity protocols on site

Biosecurity Audit

Audit Date:		**Auditor:**		**Barn Name:**
This column lists the Biosecurity standard being checked and asks questions that are related to each standard, which you must answer.		**Answer the questions by selecting the answer in these columns.**		**In this column:** • List the supporting documents and records you keep and where they are located in your system to substantiate that you met the standard, AND • All corrective actions (dated) that you have taken to meet the standard.
1.0	Movement of pigs and other livestock/ animals	Yes	No	Corrective action(s) (are reactive - something has gone wrong and these are the actions taken to deal with and eliminate the problem to ensure it will not happen again)
	Do you permit drivers and other transport personnel to enter buildings that house pigs?			
	Are vehicles banned from entering 'clean' areas unless otherwise instructed?			
	Do you receive transportation records prior to authorizing vehicles from entering 'clean' areas?			
	Do you keep records of movement documents, including records of pigs movements between properties, including their farm of origin?			
	Do you quarantine all introduced animals until they have been acclimated and cleared of any diseases?			
	Do you prohibit the reintroduction of livestock or show pigs on your farm?			
	Do you clean and disinfect trucks between movements after transporting pigs to slaughter houses?			
	Do you separate your farrow to wean trucks from your market trucks?			
Comments:				

Neogen • 944 Nandino Blvd. • Lexington, KY 40511 • inform@neogen.com • animalsafety.neogen.com

2.0	People, Equipment and Vehicle Movements	Yes	No	Corrective action(s)
	Is a visitor log completed by all persons entering a production system?			
	Do visitors identify their last known contact with pigs?			
	Do you deny access to pigs if visitors have had contact with other pigs within a 72 hour window?			
	Do you disinfect and dry any and all equipment or supplies prior to bringing them into the barn?			
	Do you have a vehicle disinfection station on the premise?			
	Do you require all visitors to change out of street clothes and into farm-specific attire?			
	Do you require all visitors to shower-in and shower-out of the facility?			
Comments:				

3.0	Feed	Yes	No	Corrective action(s)
	Is prohibited feed (swill) or any food scraps that contain meat, other matter from animals, or any other substance prohibited under state legislation, fed to pigs?			
	Do you have records for all feed ingredients to ensure they do not contain chemicals and are not contaminated?			
	Do you know where your feed or feed ingredients are originally sourced?			
	Do you have a feed decontamination program in place?			
Comments:				

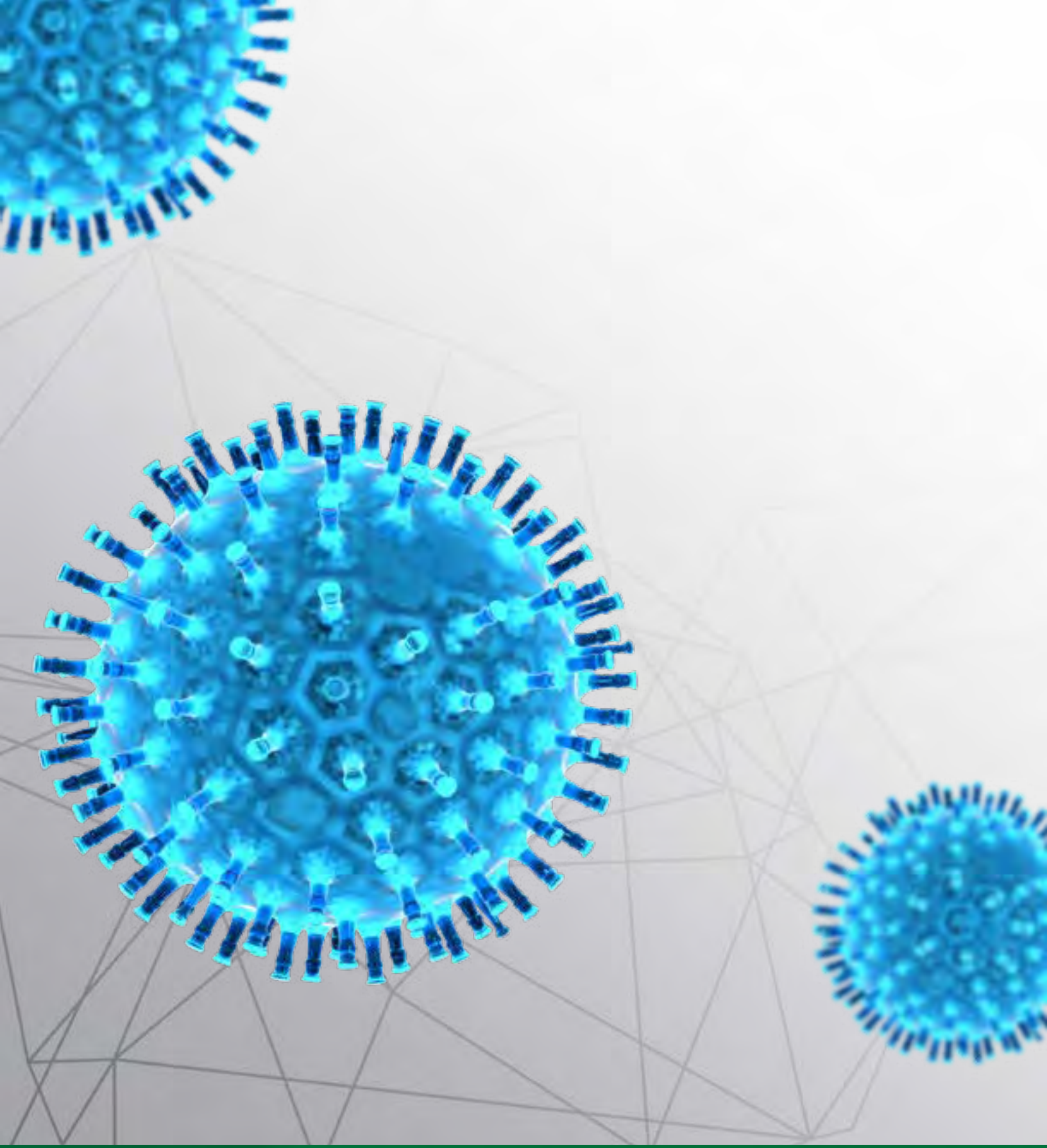
Biosecurity Audit (continued)

4.0	Cleaning and Disinfecting	Yes	No	Corrective action(s)
	Do you dry clean by scraping and brushing organic matter prior to wet cleaning?			
	Do you use an effective detergent to degrease or descale surfaces?			
	Do you rotate detergents based on acidic and alkaline formulations when necessary?			
	Do you rinse and power wash surfaces to remove all organic material prior to disinfecting?			
	Do you use an effective, EPA registered disinfectant?			
	Do you dry or heat surfaces prior to moving animals in?			
Comments:				

5.0	Pest Control	Yes	No	Corrective action(s)
5.1	Insect Control	Yes	No	Corrective action(s)
	Do you follow an integrated insect management program?			
	Do you apply insecticides inside barns?			
	Do you feed through insecticides?			
	Do you apply insecticides outside barns?			
	Do you rotate active ingredients to minimize resistance?			
5.2	Rodent Control	Yes	No	Corrective action(s)
	Do you follow an integrated rodent management program?			
	Do you apply rodenticides inside barns?			
	Do you apply rodenticides in attics, crawl spaces or pits?			
	Do you apply rodenticides outside the barn?			
	Do you rotate active ingredients to minimize resistance?			
5.2	Wildlife Control	Yes	No	Corrective action(s)
	Are domestic pigs separated from feral pigs, domestic poultry and other animals of risk, where possible, by secure containment in buildings and/or perimeter fencing or other suitable means?			
Comments:				

Neogen • 944 Nandino Blvd. • Lexington, KY 40511 • inform@neogen.com • animalsafety.neogen.com

6.0	Management	Yes	No	Corrective action(s)
	Do you have an on-farm Biosecurity Plan?			
	Do you have a controlled entrance to the barn through which visitors, animals and transport movements are admitted?			
	Do you provide shower facilities and farm specific boots and clothing prior to all authorized visitors contact pigs?			
	Do all your staff sign an employee Biosecurity Declaration confirming their adherence to the farm biosecurity procedures?			
	Do you ensure all equipment used with pigs or brought into barns are cleaned?			
	Do you ensure all equipment used with pigs or brought into barns are disinfected?			
	Are warning signs displayed on entry gates and/or shed doors, along with locked entrances where appropriate, to discourage unauthorized entry by pig and feed truck drivers or unauthorized visitors?			
	Does the barn have a documented herd health plan to manage the risk of infectious diseases entering the barn and to treat existing disease problems?			
	Do you inspect all pigs at least once daily and more frequently when needed?			
	Are pigs with illness identified and treated with an appropriate treatment as soon as practicably possible?			
	Do you maintain detailed health and treatment records including mortalities and cases of disease?			
	Have policies and procedures been put in place to ensure that for all introduced semen, the disease free status of the boars and type of extenders used have been verified and supported, where possible, by a vendor declaration?			
Comments:				



NEOGEN®

800-621-8829 • 859-254-1221
inform@neogen.com • animalsafety.neogen.com