Transmission and survivability of African swine fever virus

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Keypoints:

- New introductions of ASF to free areas of the disease are usually by uncooked pork fed to pigs.
- Virus can be inactivated with temperature and low pH.
- Survivor animals may play a role in the transmission and persistence of the disease.

Further outbreaks of African Swine Fever virus (ASFV) were reported last week in China several miles away from what is thought to be the first outbreak. This geographic dispersal leads us to think about dissemination mechanisms within the country and between countries.

EPIDEMIOLOGY

Infected animals will go through a viremic phase and can shed the virus through nasal secretions, feces and urine. Therefore, the main transmission route is oral-nasal, as pigs can be exposed to ASF positive secretions or tissues (i.e. pork products). Indirect transmission can also occur by exposure to contaminated fomites. This virus can also be transmitted by ticks. This vector-borne route becomes relevant when the wild boar population is present and moves across regions and countries.

The common introduction route into ASF free regions is usually through positive pigs transported into the area, or contaminated pork products that are fed to other pigs. ASFV has also been detected in air samples; however, airborne transmission is considered a secondary route of transmission due to the high virus load needed.

VIRUS SURVIVABILITY

Inactivation and persistence

Although ASFV is highly resistant, the virus can be inactivated at pH < 4 and pH >11. Survivability outside the host is heavily related to temperature. For instance, the infectious half-life in urine and feces can range from 3 to 15 days and 4 to 8 days at 37°C and 4°C, respectively.

The virus may persist for several weeks or months in frozen, fresh, or uncooked pork, as well as in salted dried pork products. In contrast, ASFV is inactivated at high temperatures (i.e. 70°C - cooked or canned hams) and in cured or processed products such as Spanish cured pork products after day 122–140 of curing.

Pigs can become persistently infected and the virus can stay viable in their carcasses for up to six months. Therefore, infected carcasses represent a risk to other pigs.

More recently, an investigation simulating a trans-Atlantic shipping of ASFV contaminated feed ingredients from Europe proved that viable virus can be recovered after 30 days.

The role of survivor pigs

ASFV recovered and sub-clinically infected pigs become a source of virus to other pigs. This plays an important role in disease transmission and persistence in endemic areas as well as becoming one of the most important routes of transmission into disease-free zones. *In-vivo* experiments have revealed an infectious period of moderately virulent virus isolates ranging from 20 to 40 days. In another *in-vivo* transmission study, pigs that had been exposed to ASFV 90 days prior were commingled with naïve pigs and the virus was transmitted to naïve pigs.

Serological field studies performed in positive regions of Brazil, the Iberian Peninsula, East Africa, Kenya and Uganda revealed that the there was a very low percentage of seropositive animals one year after the outbreak. It was hypothesized that those few seropositive pigs were still carriers and could have been responsible of some of the newer outbreaks.

CONCLUSION

ASF has a complex epidemiology with different routes of transmission that can involve animals and ticks as direct transmission, and contaminated clothes, tools, and surfaces as indirect transmission. Thus, early detection and intervention of the diseases are key to containing disease spread in absence of an effective vaccine.

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