

New study: risk of ASF infection by contaminated feed is very low

African Swine Fever virus (ASFV) continues to spread within the domestic, feral, or wild boar populations of several countries and affects the global trade of pork. ASFV is primarily spread by pig to pig contact or by swill feeding of ASFV contaminated garbage that has not been cooked adequately to inactivate the virus.

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ASFV can also be spread by vehicle or people movements between farms, and/or by blood sucking insects. ASFV can survive under a wide variety of environmental conditions for a long time, but it can be inactivated by adequate heat or chemical treatments. Therefore, it is critical that swine producers use good security practices to reduce the risk of their pigs becoming infected with ASFV.

Research has demonstrated that ASFV can survive for extended time periods on feed and certain feed ingredients that are globally traded between countries. However, there is limited information about how much ASFV contamination is needed in processed feed to cause infection if fed to pigs.

A recent study showed that 10,000 ASFV particles (10^4 TCID₅₀) in a liquid medium that

Fig. 1. Study 1. Feeding 20,000 ASFV particles daily for 14 days did not cause infection.

- During observation pigs received zero particles of ASFV in feed for five days.



- All pigs remained healthy through day 19.
- All pigs healthy and free of symptoms through day 19 as confirmed by tissue analysis (two pigs) on day 19 and by blood analysis – no infective ASFV detected.

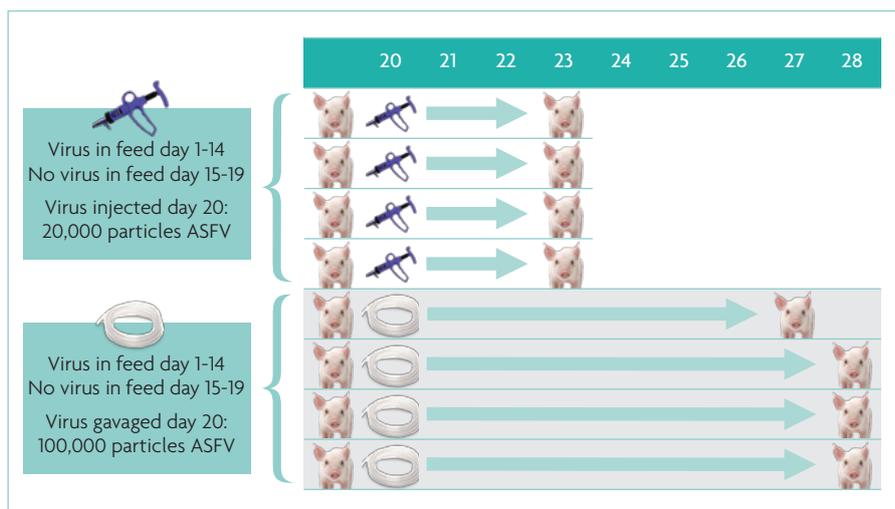


Fig. 2. Pigs receiving the ASFV contaminated liquid plasma either by injection or gavage all developed clinical symptoms. Pigs confirmed infected in both tissue and blood.

was mixed on feed and offered in a single feeding to pigs was able to cause some of the pigs to become infected.

Prediction model

Using a prediction model, the authors estimated that the minimum amount of ASFV in feed to cause infection would be much lower if pigs were provided ASFV contaminated feed in repeated feedings which would be more typical of pig feed consumption patterns under commercial production conditions.

However, a new publication has reported that ASFV added to unprocessed liquid porcine plasma that was mixed on commercial mash form feed to provide a daily feeding of 20,000 ASFV particles (10^4 TCID₅₀) in the feed did not cause ASFV symptoms, fever, or infection in various tissues, even after observing the pigs for another five days (Fig. 1).

Therefore, some of the remaining pigs were given a single intra-muscular injection of the ASFV inoculated liquid plasma used to contaminate the feed and other pigs were given a single intra-gastric gavage of the liquid plasma to determine if the pigs could be infected by different routes of administration.

These pigs were either injected with 20,000 virus particles or given an intra-gastric gavage of 100,000 virus particles, then observed for another eight days. All pigs that had been injected or gavaged with the ASFV inoculated plasma developed symptoms and infection (Fig. 2).

These results demonstrated that the ASFV inoculated liquid plasma used to contaminate the feed was able to infect the pigs if given by these routes of administration. So, it is unknown why using the ASFV inoculated liquid plasma on the feed did not cause the pigs to get infected.

There were not any additives in the commercial mash form feed used in the study that would be known to prevent ASFV

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Fig. 3. Study 2. Feeding 100,000 ASFV particles daily for 14 days did not cause infection.

- During observation pigs received zero particles of ASFV daily in feed for nine days.
- No pigs were infected with ASFV



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infection. The authors reported that the ASFV in the contaminated feed was recovered at the expected amounts which confirmed that the feed used in the study did not affect the potential for ASFV to cause infection by feeding.

Second feeding study

Therefore, a second feeding study was repeated with a different group of pigs provided a higher daily feeding of 100,000 ASFV particles (10^5 TCID₅₀) for 14 consecutive days. As in the first study, none of the pigs developed symptoms or infection, even after observing the pigs for an additional nine days (Fig. 3).

Therefore, some of the pigs after the feeding and observation period in study 2 were given a single intra-gastric gavage of the ASFV contaminated liquid plasma providing 500,000 ASFV particles ($10^{5.7}$ TCID₅₀) to see if it could cause infection by a different route of administration.

Some of these pigs developed ASFV infectivity, again demonstrating that the unprocessed ASFV inoculated liquid plasma used in the feeding study could cause infection if given by oral gavage directly to the stomach (Table 1).

The conclusions from this new publication suggest that the minimum infectious dose of

Route	Pig ID	Day of necropsy	Gastro-hepatic node	Sub-maxillary node	Tonsil	Spleen	Blood
Gavage*	2	32	Negative	Negative	Negative	Negative	Negative
Gavage	3	32	Negative	Negative	Negative	Negative	Negative
Gavage	7	32	Negative	Negative	Negative	Negative	Negative
Gavage	1	32	Negative	Negative	Suspect	Negative	Positive
Gavage	4	32	Negative	Negative	Positive	Negative	Negative
Gavage	10	32	Positive	Positive	Positive	Positive	Positive
Contact pig	9	32	Positive	Positive	Positive	Positive	Positive
Contact pig	5	32	Negative	Negative	Negative	Negative	Negative
Contact pig	6	32	Negative	Negative	Negative	Negative	Negative

Table 1. Study 2. Necropsy PCR results. Intra-gastric gavage of 500,000 ASFV particles infected some pigs. *Pigs challenged by gavage on day 23 became infected with ASFV demonstrating the ASFV contaminated liquid plasma inoculum contained infective virus.

ASFV in commercial mash form feed is much higher than previously reported and that 14 repeated daily feedings of 20,000 or 100,000 ASFV virus particles per day did not cause infection when the ASFV was added to unprocessed liquid porcine plasma and mixed on the feed.

Much is yet to be learned about the potential risk of ASFV spread by contaminated feed or feed ingredients. However current information suggests the

amount of ASFV contamination in feed needed to infect pigs is relatively high. Feed and feed ingredient suppliers using good manufacturing practices with high biosecurity standards should represent a very low risk of ASFV spread by contaminated feed or feed ingredients. ■

References are available from the author on request