Effect of commercial spray-drying process on inactivation of African swine fever virus inoculated in concentrated porcine plasma

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African swine fever virus (ASFV) is an enveloped dsDNA virus that can cause high mortality (up to 100%) in all ages of swine. The ASFV does not infect humans and is primarily transmitted by close oral-nasal pig to pig contact, through excretions from infected pigs, or from ingestion of pork or other contaminated products containing the virus (swill, waste, carcasses, etc.). Other transmission pathways are indirect contact through fomites or vector-borne transmission insects. Heating at 56ºC/70 minutes or 60ºC/20 minutes inactivates the virus (OIE ASF Technical Disease card).

Spray-dried porcine plasma (SDPP) is used globally in feed to enhance weaned pig performance (Torrallardona, 2010) and can effectively reduce morbidity and mortality of growing pigs during outbreaks of diseases like porcine reproductive and respiratory syndrome (PRRS), porcine circovirus 2 (PCV-2)-systemic disease and swine influenza (Messier et al., 2007). A research review reported that spray-drying inactivates several swine viruses including PRRS virus, pseudorabies virus, swine vesicular disease virus and porcine epidemic diarrhea virus (Pérez-Bosque et al., 2016). Therefore, the objective of the present work was to study if spray drying conditions of commercial SDPP (80ºC throughout its substance) for use in animal feed can inactivate ASFV.

Liquid concentrated porcine plasma (28% solid) was inoculated with ASF virus (Strain Badajoz 1971 – BA71) to a final $TCID_{50}$ (median tissue culture infective dose) concentration of $10^{5.77}$ per mL of liquid concentrated plasma. Triplicate 0.5 kg samples of spiked plasma were spray-dried using a laboratory spray dryer (Büchi 290 Mini Spray Dryer) at an inlet temperature of 200°C and at 80°C outlet temperature. Both liquid and spray dried samples were analyzed for ASFV infectivity in VERO cell monolayers using a titer assay procedure on 25cm^2 flasks and subjected to 2 consecutive serial passages to new VERO cell culture. After the second passage the cells were analyzed by immune peroxidase monolayer assays (IPMA) against ASFV antigens to determine the amount of virus inactivation**. Titration results determined that spray drying inactivated 4.11 ± 0.20 log_{10} $TCID_{50}$/mL of the inoculated ASFV.**

In conclusion, the spray-drying process typical of commercial conditions (80ºC throughout its substance) for spray dried porcine blood products was able to inactivate high amounts of ASFV. This result fits with the EU Directive 2002/99/EC, Annex III, that indicates that heat treatment of 80°C throughout substance of meat and dairy proteins inactivates many viruses, including ASFV. In fact, inactivation of 3 to 4 logs of a pathogen is considered an effective safety assurance process for reducing risk of transmission in food or feed products according to guidelines of the WHO (2004).

References:

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