North American Spray-Dried Blood and Plasma Producers (NASDBPP)
and
European Animal Protein Association (EAPA)

Operating production facilities within China

Statement concerning African Swine Fever - Technical Version

Safety of Spray-Dried Porcine Blood Products

The Chinese Center for Disease Control and Prevention recently reported several cases of African Swine Fever (ASF). In each case, the herd animals were slaughtered and movement of pigs in and out of the affected areas was banned along with the feeding of untreated food waste (SHIC August 23, 2018). **African Swine Fever does not infect or harm humans (FAO, 2017)**.

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 is primarily transmitted by oral-nasal pig to pig contact, through excretions from infected pigs, or from ingestion of pork or other contaminated products (swill, waste, carcasses, etc.) containing the virus (FAO, 2017). Other transmission pathways are indirect contact through fomites or vector-borne insects.

NASDBPP and EAPA spray-dried blood products are safe ingredients for use in animal feed.

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 (Pérez-Bosque et al., 2016) reported that spray-drying inactivates several swine viruses including PRRS virus, pseudorabies virus (PRV), swine vesicular disease virus (SVDV) and porcine epidemic diarrhea virus (PEDV).

Heating at 56ºC for 70 minutes or 60ºC for 20 minutes inactivates the ASF virus (OIE: ASF Technical Swine Disease card). Also, heat treatment of **80°C throughout substance** of meat is recognized **to inactivate many viruses** including Foot and Mouth Disease, Classical Swine Fever, Swine Vesicular Disease, **African Swine Fever**, Avian Influenza, Newcastle Disease, Rinderpest, and Sheep and Goat Plague (EU Directive 2002/99/EC, Annex III).

The **NASDBPP and EAPA** spray-dried blood products for use in animal feed are heated to **80°C throughout substance** during the manufacturing process.

Research has shown that spray-drying inactivates several swine viruses including African Swine Fever. In the table below tested viruses were grown in culture, inoculated in liquid plasma, and then spray-dried. Specific virus detection procedures for each of the tested virus were completed for the inoculated liquid and spray-dried plasma, and no viable virus was detected for PRRSV, PRV, PEDV or SVDV, indicating that these viruses were completely inactivated by spray-drying.

Virus	Envelope	Thermal Stability	Inactivation Logarithm	Reference
PRRSV	Yes	Low	> 4.0	Polo et al., 2005
PRV	Yes	Medium	> 5.0	Polo et al., 2005
PEDV	Yes	Low	> 5.2	Pujols & Segales, 2014
PEDV	Yes	Low	> 3.6	Gerber et al., 2014
SVDV	No	Medium	> 6.0	Pujols et al., 2007
ASF	**Yes**	**High**	**4.1**	**CReSA, 2018 unpublished data**

The **World Health Organization** (WHO, 2004) recognizes that a reduction of 4 logs (logarithms) of virus assures safety of human plasma products used for transfusions. Inactivation means that the virus is killed, removed or not capable of replicating. A 4-logarithm reduction of virus is considered equivalent to inactivation of 99.99% of the virus.

A recently completed study (CReSA, 2018) was conducted to determine the effects of commercial spray-drying conditions on ASFV. Liquid concentrated porcine plasma (28% solids) was inoculated with ASFV (Strain Badajoz 1971 – BA71) to a final median tissue culture infective dose ($TCID_{50}$) of $10^{5.77}$ per mL of liquid concentrated plasma. Triplicate 0.5 kg samples of inoculated plasma were spray-dried using a laboratory spray-dryer (Büchi 290 Mini Spray Dryer) at an inlet temperature of 200°C and at an outlet temperature of 80°C. 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 under commercial conditions 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 4 logarithms (99.99%) of the inoculated ASFV. This result aligns with the EU Directive 2002/99/EC, Annex III, which recognizes that heat treatment of 80°C throughout substance of meat inactivates many viruses, including ASFV. In fact, inactivation of 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).

The scientific evidence indicates that spray-dried porcine blood products are safe and that the spray-drying process effectively inactivates tested swine viruses, including African Swine Fever.

Additional Safety Features:

Members of NASDBPP and EAPA, and their respective plants in China, manufacture spray-dried blood products with several independent features that contribute to the safety of blood products.

1. Blood is **ONLY** collected from healthy animals to be slaughtered for human consumption.
2. Collected blood is pooled from multiple animals which contributes to a dilution effect. **Pooling is a recognized biosafety feature for human plasma products used for transfusions**.
3. The spray-drying process at high temperatures (**80ºC throughout its substance**) has been shown and is accepted as effective in inactivating heat resistant viruses, including non-enveloped or enveloped viruses (**EU Directive 2002/99/EC, Annex III)**.

Therefore, the spray-drying processes used by the NASDBPP & EAPA members globally and within China, for spray-drying blood products are aligned with the WHO guidelines providing several independent safety features that assure that the final products are safe from pathogens of concern for the swine industry including ASF virus.

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