Question to EURCAW-Pigs

Question

What is the risk of spreading ASF through the use of pen enrichment materials such as straw, wood chips, branches and other organic materials?

EURCAW's response

Dr. Marisa Arias (on behalf of EU reference laboratory for ASF and the ASF Epidemiology CISA team) wrote the initial reply. The EURCAW secretariat did the final editing. For queries: info.pigs@eurcaw.eu.

Answer

We consider the risk is variable: in general any porous surface or areas where pathogens can be introduced is not recommended when looking for minimal risk. Specifically the risk would depend on the infectious material (blood, saliva, urine and faeces) and it will be associated with the temperature and pH.

The following recommendations are offered.

1) Directorate General for Health and Food Safety recommends to avoid using straw as bedding material originating from areas where ASF has been reported, unless treated to inactivate ASFV or stored for at least 90 days (http://ec.europa.eu/food/sites/food/files/animals/docs/ad_control-measures_asf_wrk-doc-sante-2015-7113.pdf).
2) Additionally, the Estonian Veterinary and Food Board established as compulsory biosecurity rule, no exchange feed and bedding material with other farms https://ec.europa.eu/food/sites/food/files/animals/docs/reg-com_ahw_20161004_pres_asf_est.pdf)
3) COST report: In affected territories, avoid using green mass (grass and grains) or straw as bedding material unless treated to inactivate ASF virus. ASF virus can be inactivated by heat (56°C/70 minutes or 60°C/20 minutes). The use of fresh fodder harvested in areas at risk for ASFV exposure, for instance areas with infected wild boar or zones of suitable habitat for wild boar, should be avoided.
4) DGSANTE recommends to perform treatments on grass or grains to inactivate ASFV or stored them, out of reach of wild boar, for at least 30 days.

In the publication of Jurado *et al* (2018), there are a compilation of references related to ASFV survival and preventive measurements for ASF transmission. In the annexed tables below are some survival data of ASF in different organic and food materials.

Relevant references

Jurado C., Martinez-Aviles M., de la Torre A., Stukelj M., Cardoso de Carvalho Ferreira H., Cerioli M., Sanchez-Vizcaino JM. and Bellini S. 2018. Relevant Measures to Prevent the Spread of African Swine Fever in the European Union Domestic Pig Sector. Front. Vet. Sci., 16 April 2018 https://doi.org/10.3389/fvets.2018.00077

Annex

ASF Virus survival review

Table 4
Comparison of commercial curing and processing time and survival of African swine fever virus in three different dry-cured Italian products.

Product	Curing time (days)	Shelf-life (days)	Days of processing after which samples were found:	
			virus positive	virus negative
Salami	27	90	18	26
Pork belly	14-21	90	60	137*
Loin	60	90	83	137

* day 83 = not tested.

Petrini et al, 2019 Survival of African swine fever virus (ASFV) in various traditional Italian dry-cured meat products. PVM. 162, 126-130.

Table 3. Estimated duration of survival of infectious ASFV in excretions at different temperatures. Estimated duration of survival of infectious ASFV in faeces, urine and oral fluid stored at 4, 12, 21 and 37°C, calculated assuming an infectious dose of 10 HAD_{50} initial mean viral titre of each sample type and half-life value (Table 2) for each sample type at 4, 12, 21 and 37°C

Estimated survival of ASFV (days)					
Sample type	Viable ASFV				
	Mean initial titre ($TCID_{50}$)	Temperature			
		4°C	12°C	21°C	37°C
Faeces	$1 \times 10^{4.83}$	8.5	6.5	5.1	3.7
Urine	$1 \times 10^{2.94}$	15.3	7.5	4.8	2.9
Oral Fluid	–	–	–	–	–

Davies et al. 2017.

Ref	Inactivation virus	
	Product/Tª	time
Alban 2005	detergents, lipid solvents and common disinfectants	
EFSA 2010	60ºC	30 min
	1% formaldehyde	6 days
	2% NaOH	1day
	Paraphenylphenolic disinfectants	very effective

Ref	Survival virus		
	Material infeccioso	Condiciones	Survival
Carvalho 2013	General	environment	longer than CSFV
EFSA 2010		environment	very resistant to inactivation
Montgomery, 1921	contaminated pig pens	tropics	3 days
EFSA 2010	sera or blood	room temperature	18 months
Dixon *et al*., 2005		frozen or stored at 4°C	long periods (months or years)
	Some infectious virus	treatment at pH4 or pH13	may survive

Table 3: Survival of ASFV in Iberian products and Serrano hams

Product	Time of commercial day (days)	ASF survival time (days)	Source
Iberian ham	365-730	140	Mebus *et al.* 1993
Iberian shoulder	240-420	140	Mebus *et al.* 1993
Iberian loin	90-130	112	Mebus *et al.* 1993
Serrano ham	180-365	140	Mebus *et al.* 1993
Parma ham	>365 days	183	McKercher *et al.* 1987

Table 2: Survival of ASFV in meat and meat products (Adkin *et al.* 2004)

Product	Virus survival time (days)
De-boned meat	105
Meat bone-in	105
Ground meat	105
Salted de-boned meat	182
Salted meat bone-in	182
Cooked de-boned meat*	0
Cooked meat bone-in*	0
Canned meat	0
Dried de-boned meat	300
Dried meat bone-in	300
Smoked de-boned meat	30
Frozen meat	1000
Dried fat	300
Offal	105
Skin/fat	300

*Cooked meat at least 70°C for 30 minutes

Table 4: Survival of ASFV in different conditions

Conditions	ASFV survival time	Source
Temperature of 50° C	3 hours	USDA, 1997
Temperature of 56° C	70 minutes	Mebus *et al*, 1997
Temperature of 60° C	20 minutes	Mebus *et al*, 1997
pH < 3.9 or pH > 11.5 (serum free media)	minutes	Mebus *et al*, 1997
pH 13.4 in serum free media	21 hours	http://www.oie.int/esp/maladies/fiches/e_A120.htm
pH 13.4 with 25% serum	7 days	http://www.oie.int/esp/maladies/fiches/e_A120.htm
Blood stored at 4 ° C	18 months	Technical disease cards of Lowa State University, 2006
Blood on wooden bars	70 days	USDA, 1997
Putrefied blood	15 weeks	USDA, 1997
Faeces held at room temperature	11 days	Technical disease cards of Lowa State University, 2006

Contaminated pig pens	1 month	Technical disease cards of Lowa State University, 2006
Slurry at 65° C	1 month	Turner and Williams, 1997
Product		
Susceptible to ether and chloroform		http://www.oie.int/esp/maladies/fiches/e_A120.htm
Inactivated by 0.8% sodium chloride	30 minutes	http://www.oie.int/esp/maladies/fiches/e_A120.htm
Hypochlorites - 2.3% chlorine	30 minutes	http://www.oie.int/esp/maladies/fiches/e_A120.htm
0.3% formalin	30 minutes	http://www.oie.int/esp/maladies/fiches/e_A120.htm
3 % ortho-phenylphenol	30 minutes	http://www.oie.int/esp/maladies/fiches/e_A120.htm
Iodine compounds		http://www.oie.int/esp/maladies/fiches/e_A120.htm
Slurry addition to concentration of of 1 % NaOH or Ca(OH)2 at 4° C	1 minute	http://www.oie.int/esp/maladies/fiches/e_A120.htm
Slurry addition to concentration of 0,5 % NaOH or Ca(OH)2 at 4° C	30 minutes	Turner and Williams, 1999
Environ (1/E) (o-phenylphenol) 1 %	1 hour	Stone and Hess 1973

Table 5: Disinfectant/chemical selections and procedures -African swine fever and classical swine fever (AUSVET PLAN, 2000)

Item to be disinfected	**Disinfectant/chemical/procedure**
Live animals	Euthanasia
Carcases	Bury or burn
Animal housing/equipment	Soaps and detergents, oxidising agents and alkalis.
Environs Consider	Insecticides (organophosphates and synthetic pyrethroids) for tick eradication, otherwise N/A
Humans	Soaps and detergents
Electrical equipment	Formaldehyde gas
Water	Drain
–tanks	N/A
–dams (reservoirs)	
Feed	Bury or burn
Effluent, manure	Bury or burn, Acids and Alkalis
Human housing	Soaps, detergents and Oxidising Agents
Machinery	Soaps, detergents and Alkalis.
Vehicles	Soaps, detergents and Alkalis.
Clothing	Soaps, detergents, Oxidising agents and Alkalis.
Aircraft	Soaps, detergents and Virkon.