



NORTH AMERICAN RENDERERS ASSOCIATION
Reclaiming Resources, Sustainably

Rendering = Cooking = Safety

The core concept in all food safety is the fact that heat kills. Heat kills pathogenic bacteria and virus quickly at high temperatures, and will kill at lower temperatures if given more time. For example, the time and temperature combinations for beef can be found from the Food Safety and Inspection Service guidelines, <http://www.fsis.usda.gov/oa/fr/95033f-a.htm>:

Min Internal Temp °F	6.5 log lethality	7.0 log lethality
130°F	112 min	121 min
135°F	36 min	37 min
140°F	12 min	12 min
145°F	4 min	4 min
150°F	67 seconds	72 seconds
155°F	22 seconds	23 seconds
160°F	0 seconds or instantaneous	0 seconds or instantaneous

Note that at 160°F, 7 log lethality is gained instantaneously. Achieving 7 log lethality makes food safe to eat. FDA and USDA provide similar tables for many foods.

The typical rendering process cooks in the range of 240°F to 290°F for 40 to 90 minutes. The rendering process was developed to separate fat from other tissues. This requires breaking cell walls and liquifying fat for pressing and separation. The temperatures required for fat separation far exceed those required to kill pathogenic bacteria and virus. Compared to the food safety temperature table above, it is readily accepted that rendering temperatures are sure to kill all the different pathogenic bacteria and viruses very early in the process with large margins of safety.

Pathogenic bacteria can multiply in food, animal feed, and in the environment under favorable growth conditions including warmth and moisture. Viruses are different than bacteria—they can only multiply inside of living cells, and they will die outside of living cells with the passage of time. (reference: <https://www.webmd.com/a-to-z-guides/qa/how-do-viruses-differ-from-bacteria>). African Swine Fever (ASF) virus can only reproduce inside host pig cells. ASF virus has been shown to live (but not multiply) for months in certain environments, but their survival time is shortened greatly with heat. Recommendations have been made to warehouse animal feed for a period of time to allow virus to die off passively. (Reference:

<https://www.avma.org/javma-news/2019-05-15/us-braces-african-swine-fever>). Rendering temperatures, being very high, are sure to kill African Swine Fever virus instantaneously. Rendering is not a passive process.

Direct research on killing ASF virus in rendering equipment has not been done because the virus is too dangerous for most laboratories and certainly should not be brought into the country for research without strict precautions. However, viruses are similar enough that temperature lethality research on other pathogenic viruses or temperature lethality research on ASF virus in non-commercial settings is relevant, particularly when rendering temperatures much higher than the necessary inactivation ranges in all observed situations. The effectiveness of rendering temperatures in killing avian influenza virus is verified in this research: "Investigation of avian influenza viral ribonucleic acid destruction in poultry co-products under rendering conditions." A.B.Leaphart, T.R.Scott, S.D.Chambers, W.C.Bridges Jr., & A.K.Greene. 2012. J. Appl. Poult. Res. 21 :719–725. <http://dx.doi.org/10.3382/japr.2011-00345>.

Time/temperature studies have been done on ASF virus in laboratory settings. At Only 48°C (118.4° F), ASF virus was inactivated in infected pig blood within 10 min.

https://www.sciensano.be/sites/www.wiv-isp.be/files/tignon2017-asf_inactivation.pdf

Rendering cooking is done at higher temperatures for longer periods ensuring ASF virus kill.

The USDA Animal and Plant Health Inspection Service requires garbage (food waste) to be cooked at 112° F for 30 minutes to ensure it is safe to feed to pigs even if infected with ASF or other viruses. https://www.aphis.usda.gov/publications/animal_health/fs-swine-producers-garbage-feeding.pdf

Rendering far exceeds this time and temperature.

Another core concept of all food safety and disease prevention is prevention of contamination. All farms and feed facilities should practice biosecurity procedures to make sure any occurrence of viral infection is not accidentally carried from an infected facility to healthy animals. The animal feed industry, including renderers adhere to standard biosecurity procedures every day and add more stringent disease preventing measures during outbreaks. (reference: <https://www.afia.org/pub/?id=E348BF9F-98ED-09DB-A45D-504737FE7AE2>)

Additional information that could be used:

ASF virus survival has been estimated in feces and urine up to eight and 15 days, respectively, and five days at 21° C (70° F). (Davies et al., 2015.

<https://www.ncbi.nlm.nih.gov/pubmed/26104842>). Survival times in the environment of up to 18 months have been reported. Meat must be heated to at least 70° C (158° F) for 30 minutes to inactivate ASF virus, and 30 minutes at 60° C (140° F) for serum and body fluids.

<https://global.alltech.com/malaysia/news/dr-cat-berge-shares-tips-how-protect-your-herd-african-swine-fever>

In studies to find conditions to minimize risk in feed, the maximum level of porcine epidemic diarrhea virus (PEDV) inactivation occurred at 90°C for 30 min ([33](#), [34](#))

33. <https://www.ncbi.nlm.nih.gov/pubmed/28542235>

34. <https://www.ncbi.nlm.nih.gov/pubmed/28932412>

There's never been a documented case of an animal disease outbreak caused by bacteria or virus from rendered animal by-products.