

Killing Aleutian disease virus by heat - A progress report.

How does heat kill AD virus?

Aleutian disease virus (AD), like many other viruses, has a protein shell, which covers the viral DNA. This shell is essential for the virus to find its way into the mink's body and infect its cells. If this shell is damaged, the virus becomes inactivated, meaning that it cannot infect the mink. Heat is one of several factors which can break down the protein shell and thereby inactivate the virus.

How high must the temperatures be to kill AD virus?

AD virus is one of the most heat-resistant viruses that infects animals. It has been shown that AD virus remained alive when heated at 60°C for up to 4 hours, and heating even at 80°C for 30 minutes did not completely kill the virus.

Survival of AD virus at 65°C for a few days, which is the temperature likely to be produced by composting, is not known. We decided to test if AD virus can be killed by heating at 65°C for 3 days.

Preparations

To answer this question, we had to do some groundwork. Following is a brief explanation of these steps. These steps were expensive and time consuming, but they were necessary for performing a scientifically valid experiment.

Step 1: We needed to have access to a well characterized source of the virus. The source is usually the spleen of infected mink. It is where a large number of AD viruses reside, and it is easy to locate and harvest the spleen in mink. We injected a few mink with a local strain of AD virus, collected their spleens, homogenized them in a blender, and used the mixture as a source of live AD virus.

Step 2: We then needed to determine how much of this mixture is needed to infect a group of mink and how long it would take to identify infection by counterimmunoelectrophoresis (CIEP) and polymerase chain reaction (PCR)? Using too little of the homogenate does not infect mink. Using too much causes sickness as a result of overdose and immune system complications. The amount of the spleen homogenate that infects all injected mink without causing overdose was determined.

Step 3: The number of days after injection that mink should be tested by CIEP and PCR to determine if the injected virus was alive needed to be established. A suspension of the spleen homogenate was heated to 80°C to kill the virus, injected into mink and animals were sampled and tested 5, 9, 12, 16, and 19 days after injection. The results

showed that testing should be performed no less than 9 days after injection of dead viruses.

The primary battle - killing the AD virus by heat

Samples of the spleen homogenate were heated at 45°C, 55°C and 65°C for 3 days and three different amounts of each were injected into groups of 4 mink. Positive and negative controls were also used (51 mink in total). Animals were killed on day 21 after injection, to give the mink enough time for the virus to replicate. Samples of blood were tested by CIEP and PCR and tissues were tested by PCR.

The results indicated that the 65°C temperature for 3 days completely killed the virus. However, the 55°C temperature resulted in partial inactivation and 45°C did not kill the virus at all.

Conclusions

- The AD virus is quite resistant to heat and cannot be easily destroyed.
- Heating the virus in spleen suspensions at 65°C for 3 days kills AD virus.

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