

Selection of mink tolerant to the AD virus -what methods are available and which is the best?

The message: Some ranchers in North America and Europe are embarking on selecting mink for tolerance to the AD virus infection. Although different methods are being used, there is currently no assured method of identifying mink that can tolerate the virus.

It's no secret that Aleutian disease (AD) has no treatment or vaccine (yet). Some ranchers in Canada, USA and The Netherlands have started selecting animals that can tolerate the AD virus as an alternative to virus eradication measures. Many years of testing and killing infected mink, along with implementing biosecurity systems, disinfection and depop-repop practices have not completely eliminated the virus from their ranches. It is estimated that approximately 3,000,000 mink are currently (2014) under selection for tolerance in Canada, USA and The Netherlands.

Obviously, ranchers who have an AD-free ranch should do everything in their power to keep it that way, and should try to eliminate the virus if their ranch is infected for the first time. Dealing with an infected herd is not an easy task. Selection for tolerance is an alternative strategy only for those ranchers who have tried to eliminate the virus for several years without success.

Selection for tolerance is based on the observation that some mink, particularly dark color types, do not develop disease symptoms after being infected, even with very nasty types of the AD virus such as the Utah strain. Most tolerant animals carry the virus throughout their lives, while there is evidence that some mink can even clear the virus from their bodies. These days there are mink ranchers who have successfully established tolerant herds, proving that creation of tolerant herds is possible.

Using the natural differences that exist among individual mink in response to infection by the AD virus to create a tolerant herd is a logical approach under some circumstances, but is an expensive and prolonged undertaking if you start from scratch. You will experience increased adult and kit mortality, reduced reproductive performance, small litter size and low pelt quality (sprinklers) for several years until the number of resistant mink increases. All animals in your herd will eventually succumb to the disease in one way or another, and you should be looking for those individuals who remain healthy, despite the presence of the virus all around them. The duration of time that you need to create a tolerant herd depends on several factors:

1-The genetic makeup (genotype) of your mink, both the color type and individuals within each color type,

2-The strain of the virus,

3-The level of infection of your herd. The most efficient strategy is to infect the whole ranch with the virus strain that is on the ranch and identify those with natural resistance. Although some ranchers have done this, most ranchers rely on the natural transmission of the virus in the herd, which is still an accepted approach but would prolong establishing a tolerant herd.

'What options do I have to identify animals that can tolerate the virus so that I can establish a tolerant herd as fast as possible with minimum costs?' This is the question that many ranchers have asked me during the last year or so. There are a few possibilities.

1-You can just select healthy animals with good litter sizes without performing any laboratory test. Knowing your mink and regularly eyeballing them to identify healthy individuals is one possible strategy. At least one rancher in Nova Scotia has established a tolerant herd using this method.

2-Iodine agglutination test (IAT), which is cheap and easy to do. This is an old test which was used in the early 1960's by mink ranchers for AD virus eradication. This test is used to identify sick animals, whether the cause is the AD virus, other viruses or bacteria. It is thus not specific to the AD virus. This makes sense because you want healthy animals anyhow. Don't you? Currently most ranchers in North America and The Netherlands are using this test. One rancher in Nova Scotia and a few ranchers in other Canadian provinces and the US have established resistant herds using this simple and inexpensive method. There is also a more sophisticated method that does almost the same job as the IAT with a higher accuracy called MALDI-TOF. No comparison has been made between IAT and MALDI-TOF to know the advantages of one over the other.

3-Quantitative ELISA, a new method which can rank your animals for the amount of antibodies against the AD virus. This test works somewhat differently from the iodine test and is specific for the AD virus infection. There are three ELISA methods at the present time, which were developed in Finland, Denmark and the USA, but no information is currently available on their accuracy for ranking mink for the amounts of antibodies against the virus. The relationship between the amount of antibodies and tolerance to the AD virus is not clearly known for all mink color types and virus strains either.

4-Polymerase chain reaction (PCR). Contrary to the iodine, MALDI-TOF and ELISA tests which measure blood serum components, PCR directly measures the AD virus in blood, saliva, feces, etc. This test is much more expensive than IAT or ELISA.

5-DNA or immunological markers of resistance. DNA markers can be used to identify tolerant animals very early in life, but no such marker for tolerance to AD virus exists at the present time.

Which of the above methods is the best?

DNA markers, if found, would be the best method. Of the other methods, we simply do not have sufficient information to declare which is the best.

It is not clear how much one can gain by using a laboratory test once or twice per year compared with selecting healthy animals visually. The issue is too complicated to explain here, but one reason is that blood serum proteins used by the IAT and MALDI-TOF, antibody levels used by ELISA, and presence of the AD virus used by PCR, are not constant during an animal's lifetime. They vary from month- to- month, season- to -season and year- to- year. You will certainly detect those mink that are sick by the IAT and MALDI-TOF, those with high antibodies by ELISA and high virus replication by PCR, but these parameters will become normal in some of the animals within a few weeks or months. Conversely, some animals that are doing fine at the time of sampling will turn bad at a later date. Keep in mind that you want to predict if an animal will suffer from the infection in the future based on one test result that you do now.

I cannot tell you which test is the best at the present time because of lack of sufficient information. All these tests are somewhat useful, but they cannot identify all susceptible animals which you keep, and some tolerant animals will be sacrificed. The only advice that I can give is that regardless of the laboratory test that you uses, regularly monitor all your mink and identify those that look unhealthy.

We are working on some of the issues related to the above tests at the AD Research Centre in Nova Scotia.

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