



Research on African swine fever is crucial for its prevention and control

The IVI deals with fundamental research, applied research and laboratory diagnostics so as to support the control of highly infectious epizootic diseases and other viral animal diseases, including zoonoses. The outbreaks of ASF in wild boars in several, somewhat widely separated EU member states, have shown that Switzerland has to be prepared to respond. The IVI plays a key role in the prevention and early detection of ASF: its diagnostics laboratory uses PCR tests to analyse samples from dead, diseased or injured wild boars. These tests are validated *inter alia* for the strains of genotype II that are currently circulating in Europe, and are updated as needed to correspond to the development of the virus and the epidemiological situation. The IVI also investigates the development of the diseases linked to these strains so as to describe them better and to enable pig farmers and veterinarians to recognise them in good time. It investigates the virus at the molecular level and the reaction of the immune system to an infection, in order to determine which type of immune reaction leads to protection. Finally, the IVI uses its research findings to develop vaccines against ASF.

Interview with Dr. med. vet Nicolas Ruggli, veterinarian and virologist at the IVI



In the vast majority of cases the ASF is deadly. How do you conduct your research on the immune reaction of pigs?

The current strains of ASF that are circulating in Europe lead to almost 100 per cent of fatalities; this means that almost all wild boars and domestic pigs die within 3 to 7 or 10 days after the appearance of symptoms. Therefore they die before the specific immune reaction can develop; this means before we are able to study it. This is why we are investigating the rare strains that have lost their virulence and lethality in a natural manner, such that we are able to study the total disease cycle up to physical recovery.

At this juncture, I would like to mention that all experiments carried out in the IVI are subject to the strict requirements of the Animal Welfare and Animal Experimentation Ordinances and are authorised by the cantonal Veterinary Office only after a detailed examination of all procedures and particularly the harm-benefit analysis.

Can the ASF be clinically distinguished from the classical pig fever?

It is not possible to differentiate the two diseases from the clinical symptoms – except based on the rate at which they spread: The ASF spreads relatively slowly within a farm and initially infects only a few animals. It is relatively weakly contagious, even though it is classified as a “highly contagious disease” in the Epizootic Diseases Ordinance, as the virus spreads mainly through the intake of virus-containing blood, body secretions or meat products. The ASF is not transmitted by droplet infection like the classical pig fever or foot and mouth disease, and is therefore not transmitted as quickly as them.

What are the visible symptoms that the pig farmer and veterinarian have to watch out for?

The animals may die - even before the appearance of external bleeding or a “blue discoloration” of the ears - although the ASF is clearly a haemorrhagic disease.

Therefore, one should especially pay attention to the following initial non-specific occurring symptoms in the first 3 to 5 days of the disease:

- loss of appetite
- apathy (loss of vitality)
- high temperatures up to 41 °C and above
- frequently with weakness or paralysis of the back legs.

Thus, one should not wait for skin bleeding or “blue ears” before taking action. It is better to preclude ASF once too often rather than react too late! A definitive diagnosis can only be made by laboratory analysis, however.

From when can a blood test confirm or preclude ASF?

As soon as the first non-specific symptoms and fever occur then the virus load in the blood is very high – already nearly at its maximum. Therefore, the ASF virus can be reliably detected by a PCR test already in this early stage of the disease. This means that in the case of non-specific symptoms and fever, if the laboratory test (PCR) of a blood sample is negative, then the result is certain.



Interview with Prof. Dr. med. vet Charaf Benarafa, veterinarian and immunologist at the IVI

The virus has been known for hundreds of years but there is still neither a vaccine nor a medicine against ASF. Why is this?

The ASF virus is large and complex. It has a large genome with almost 160 genes, of which for almost half of them, we (still) do not know their function! The complexity also arises because the ASF virus infects specific cells of the immune system of pigs, principally the macrophages, whose normal functionality is impaired by it.

In parallel to researching the disease at the clinical level are you also studying the immune reaction of the pigs – what is the objective?

We are trying to understand why certain pigs develop a lethal disease, whereas others survive. Certainly, many factors play a role here, e.g. the virus strain, the genetics of the pigs, environmental influences, the presence of other pathogens etc.

Does a vaccine exist?

Up to now no authorised product exists in any country; at the experimental level success remains mixed. The sole experimental vaccines that offer a certain protection are live vaccines; these, however, involve problems of a possible dissemination of the vaccine strain into the environment. Moreover, it is still not really clear which factors of the immune reaction contribute to the protection and which not. Much work must be carried out in order to better understand the immune reaction, by which the pig can be healed or protected prior to the disease.

Why is that so difficult?

Many challenges are associated with the fundamental properties of the virus: it possesses many mechanisms to evade the immune reaction. Furthermore, experimentally there does not exist a small animal model, on which one could comprehensively test the immune reaction or the efficacy of a vaccine. All studies have to be carried out on pigs or wild boars in a high security laboratory like that in the IVI.