Evaluation of Mycoplasma hyopneumoniae vaccine efficacy

In growing pigs, enteric and respiratory diseases are the major clinical challenges and can be observed in almost all commercial pig farms. With regard to respiratory pathogens, Mycoplasma hyopneumoniae (Mhyo) is one of the major pathogens with significant economic importance in pig production globally.

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Because of the economic impact and global distribution, most farms vaccinate their pigs for Mhyo and expectations with regard to vaccine efficacy are high. Expectations are usually 'no cough', 'no transmission of Mhyo', 'no infection', 'no lung lesions' and 'no economic losses'.

However, Mhyo is a local infection of the lung so that the immune system realises quite late that Mhyo has already entered the respiratory tract.

We have to accept that none of the currently available Mhyo vaccines can protect pigs against Mhyo as well as a PCV2 vaccine can protect against PCVAD (PCV2 Associated Diseases).

The reality is that after any Mhyo vaccine there will be pigs that get infected, transmit Mhyo and even may cough a bit and have some lung lesions – but performance is usually unaffected.

So, the detection of Mhyo, some slight cough and some minor lung lesions are not an indication for lack of Mhyo vaccine efficacy and we also have to keep in mind that other respiratory pathogens can cause similar clinical symptoms and lung lesions.

Essential questions and answers

In case there is cough in a Mhyo vaccinated herd or Mhyo-like lung lesions have been detected at slaughter, the following questions and answers can help to assess Mhyo vaccine efficacy:

Q: Is there a relevant cough?

A: Depending on the Mhyo infectious load or in combination with poor environment, a mild cough cannot always be avoided by vaccination. However, this should not affect pig growth performance.

Q: Is there a relevant reduction of pig performance?

A: To answer this question correctly, a side-by-side study is needed to investigate the vaccine efficacy against a non-vaccinated control group or a group with another Mhyo vaccine. In some farms the slaughter age of pigs (days to market) is used to measure vaccine performance.

Q: Is there a relevant quantity of Mhyo at the time of cough or is there a relevant Mhyo antibody response about three weeks after pigs start coughing?

A: This can be evaluated using oral fluids as a diagnostic tool. Detection of Mhyo in oral fluids is not very sensitive, but when pigs are coughing due to Mhyo infection, the quantity has to be quite high so that it can be detected even with the lower sensitivity of this method.

Oral fluids allow the additional investigation for other respiratory pathogens like PRRS, swine Influenza virus and others.

In case oral fluid investigation is not possible, serology is a good alternative. Most vaccines do not induce persistent antibodies after vaccination but trigger a very fast and effective response after contact to Mhyo.

Blood sampling of 10-30 coughing pigs at the time of cough and three weeks later should demonstrate a significant increase of antibody titer at the second sampling time if Mhyo infection is responsible for the outbreak of coughing.

Q: At what age do pigs start coughing?

A: Except for a first outbreak in a naïve herd, where pigs at all ages can be affected, Mhyo is usually a disease in fattening pigs at the age of three months or older so that coughing in the nursery is rarely associated with Mhyo infection.

In addition, there have been some papers that demonstrated Mhyo to be mainly a secondary pathogen in vaccinated herds.

As a secondary it may increase or prolong symptoms of a primary pathogen, whereas in non-vaccinated herds it is usually the primary pathogen.

Q: What is the severity of lung lesions at slaughter?

A: In general, the monitoring of lung lesions at slaughter over time is a great method to rate the overall respiratory health of the individual farm

However, lesions are not specific for any disease – they are just indicators which infection may or may not be responsible.

In addition, it is just a snapshot in time. Recent investigations on farms using a Cough Monitor (SOMO, Soundtalks) for the diagnostic investigation of the respiratory disease complex (PRDC) in a pig farm allows for a better understanding in real time of the clinical situation on a farm.

With the example of swine influenza virus infection, the investigation found that two compartments on the same farm broke at different times and when evaluating the gross lesions at slaughter were found to be similar to Mhyo lesions and that a slightly later infection resulted in a much higher lung lesion score. The time period between the coughing episode and slaughter is therefore a highly relevant factor for the interpretation of lung lesion scores. ■

Take home messages

- Vaccination will not eliminate Mhyo and will also not eliminate cough and lung lesions totally.
- Detection of Mhyo in a vaccinated farm is no indication of low Mhyo vaccine efficacy.
- Mhyo-like lung lesions at slaughter are not necessarily an indication for an economically relevant Mhyo infection.
- Lung lesion score at slaughter is not only correlated to severity but also to the time period between infection and slaughter.