13. Project PathoPig – A practical approach to strengthen post mortem analyses and early detection of pig diseases and zoonoses

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Abstract

Post mortem examinations are important for early detection and diagnosis of animal diseases and zoonoses. Over the last ten years, the number of necropsies in livestock has decreased considerably in Switzerland. To counteract this decline, the Federal Food Safety and Veterinary Office (FSVO) launched a project in 2014 called PathoPig. The aim is to evaluate the significance of pathologic-anatomical examinations for early detection of pig diseases and to investigate the impact of the findings on the improvement of pig health.

Pig producers can participate if at least one of the following criteria is fulfilled: high morbidity and/or high mortality, unusual clinical signs, recurrent problems of unknown aetiology resistant to therapy or increased use of antimicrobials. Accordingly, the veterinarian examines the herd, fills in a standardised anamnesis protocol and submits one to three pigs representing the health problem to a designated pathology laboratory. After post mortem examination, the veterinarian offers specific recommendations to the farmer. Three to six months later, the Swiss Pig Health Service (SPHS) follows up the success of the veterinary recommendations.

In 2014, 371 farms submitted pigs for PathoPig. In 84% of these cases, a conclusive diagnosis was obtained. In 56% of the cases, gastrointestinal problems were determined, most often (44%) caused by pathogenic Escherichia coli. In more than 80% of the cases, the animal health status could be improved considerably after the veterinary consultation.

Increased post mortem examinations allowed more specific therapeutic treatments and management recommendations. Additionally, an improvement of collaboration between diagnostic laboratories, veterinarians and producers was achieved, thereby strengthening disease awareness and early detection of pig diseases and zoonoses in Switzerland.

Introduction

Post mortem examinations are an essential tool for surveillance and early detection of emerging and re-emerging animal diseases and zoonoses (FSVO, 2010; Kimpfler et al., 2007). In this regard, one important objective of the Swiss Animal Health Strategy 2010+ (AHS 2010+) is to reinforce necropsies and laboratory diagnostics to further strengthen animal health in Switzerland and to keep the good quality feature for Swiss food products (FSVO, 2010).

However, over the last ten years, the number of post mortem examinations in livestock has decreased considerably in Switzerland (Gurtner & Posthaus, 2013). To counteract the decline of post mortem examinations in livestock, the FSVO launched a project in 2014 called PathoPig. The aim of this project is to evaluate the significance of pathologic-anatomical examinations for early detection of pig diseases and zoonoses (FSVO, 2014; Hadorn Schneider et al., 2014). Furthermore, the strengths and weaknesses of further diagnostic testing for pig diseases in Switzerland and the improvement of pig health after examinations have to be evaluated. A further objective of PathoPig is the improvement of collaboration between diagnostic laboratories, veterinarians and producers.
Materials and Methods

Pig producers with animal health problems on farm level can participate in the project if at least one of the following criteria is fulfilled: high morbidity and/or high mortality, unusual clinical signs, recurrent problems of unknown aetiology resistant to therapy or increased use of antimicrobials. If the health problem fits one of these criteria, the herd-attending veterinarian examines the herd, fills in a standardised anamnesis protocol and submits one to three pigs representing the health problem to a designated pathology laboratory (Figure 1).

Eight different laboratories conducting post mortem examinations in livestock are participating in the project. The lab costs are subsidised by the FSVO up to a predetermined amount of money, depending on the number of examined pigs. After the post mortem examination, the veterinarian gives specific recommendations to the farmer to solve the animal health problem. Three to six months later, the Swiss Pig Health Service (SPHS) follows up the implication success of the veterinary recommendations.

Results

In 2014, 371 farms with animal health problems submitted pigs for PathoPig. Altogether 623 pigs were sent to a designated pathology laboratory for post mortem examination. In 84% of all cases, the most likely cause of the particular disease was diagnosed. In most cases without a final diagnosis, no additional examinations for determining the causal agent were conducted (mainly due to financial reasons). In other cases, the animals or carcasses were not representative for the animal health problem on farm level or they were severe autolytic.

The main criteria for sending pigs to a pathology laboratory was high morbidity and/or high mortality (40%). In 56% of all cases with a final diagnosis, gastrointestinal problems were determined most often (44%) caused by pathogenic Escherichia coli. In other cases, the animal health problem was mainly a consequence of septicaemic infections (15%), wasting diseases (5%) and polyserositis (5%).

In more than 80% of all cases, the animal health status could be improved considerably after the veterinary consultation (Figure 2). In cases where the animal health status remained unchanged or even got worse, the recommendations were only partially or not implemented by the farmer.

Discussion

Due to the increased number of post mortem examinations, a tentative overview of the actual spectrum of Swiss pig diseases was achieved. Results showed that diarrhoea linked to a bacterial infection with E. coli is still one of the most important pig diseases in Switzerland.

Based on the increased number of necropsies within the first year, the laboratories found few weaknesses concerning further testing and made adaptations to improve further diagnostics.

In 2014, the animal health problem could be solved on the majority of the participating farms and there seems to be a positive correlation between health status and implementation of veterinary recommendations. Cases where the farmers did not implement the recommendations were mainly individual cases respectively not representing a health problem on farm level or cases where the animal health problem was solved by itself.

First experiences showed that the collaboration between participating stakeholders as well as the discussions about farm animal diagnostics could be improved. Through a more intense exchange of pig health information and results, diagnostic laboratories, veterinarians and producers are more aware of the current animal health situation whereby surveillance and early detection of diseases are strengthened. Especially veterinarians are an important source of information for early detection of animal diseases since they are often the first point of contact when there is an animal health problem on a farm. Hence, it is crucial to further reinforce networking and active cooperation with all stakeholders, institutions and organisations in the field of animal health.
Materials and Methods

Pig producers with animal health problems on farm level can participate in the project if at least one of the following criteria is fulfilled: high morbidity and/or high mortality, unusual clinical signs, recurrent problems of unknown aetiology resistant to therapy or increased use of antimicrobials. If the health problem fits one of these criteria, the herd-attending veterinarian examines the herd, fills in a standardised anamnesis protocol and submits one to three pigs representing the health problem to a designated pathology laboratory (Figure 1).

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Epidemiology and control of hazards in pork production chain – SAFEPORK
One health approach under a concept of farm to fork

Conclusion
Within the scope of PathoPig, increased post mortem examinations led to aetiological diagnoses allowing specific therapeutic treatments and management recommendations. An additional value of the project is the improvement of collaboration between diagnostic laboratories, veterinarians and producers, thereby strengthening awareness and early detection of pig diseases.

References
• FSVO, 2014, „PathoPig“: Pilotprojekt zur Stärkung der Sektionspathologie für die Früherkennung von Tierseuchen, Zoonosen und Krankheiten – Machen Sie mit!, Schweizer Archiv für Tierheilkunde, 156 (1), 50-51.

14. Streptococcus suis in German pig holdings – conventional and molecular detection
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Abstract
Streptococcus suis (S. suis) is a zoonotic agent worldwide. Pigs are the main reservoir, mostly asymptomatic. Humans get the infection by contact and consumption of contaminated meat and meat products. In this study, samples from 38 pig carcasses fit for human consumption from 17 holdings were arbitrarily selected. From each carcass, seven tissue samples were taken and examined for the presence of S. suis, using conventional microbiology and PCR. In addition, virulence-associated factors (epf, arcA, sly, mrp) were tested with PCR. More isolates were PCR-positive for S. suis as compared to conventional testing, mostly in samples from the heart and from the mandibular lymphnodes. All isolates were epf negative, combinations of arcA, sly and mrp were found in some isolates. Six isolates were positive for arcA and mrp, five for arcA and sly. For three isolates the triple combination arcA + mrp + sly was found. These isolates originated from different pigs.

Introduction
Streptococcus suis (S. suis) is a gram-positive coccus with about 35 serotypes with different virulence (Lun et al., 2007; King et al., 2001; Staats et al., 1997). Serotypes 1 – 9 were found in more than 70% of S. suis isolated from diseased pigs. Serotype 2 is most prevalent in human cases worldwide, followed by serotype 14. The distribution of serotypes varies between different regions in the world. In North America serotypes 2 and 3 were most prevalent, and in Asia serotype 2. In contrast, in Europe, e.g. Germany, The Netherlands and Belgium, serotype 9 was mostly found and in Italy, France and Spain serotype 2 (Goyette-Desjardins et al., 2014).

In humans, septicemia, meningitis and endocarditis are possible clinical signs (Lun, 2007; Skrikandan and Slater, 2006; Staats et al., 1997). Human cases are observed in particular from South-East-Asian countries, mostly expressed as meningitis (Coker et al., 2011; Lun et al., 2007; Gottschalk, 2006). The main route of human infection is through contact with contaminated animals (skin lesions), carcasses or meat (Goyette-Desjardins et al., 2014).

The respiratory tract of pigs is a natural habitat of S. suis. Clinical healthy pigs are a reservoir for S. suis. In pigs clinical signs such as meningitis may occur in case of predisposing factors like overcrowding, poor ventilation or coinfection with other pathogens (Staats et al., 1997).

For identification of S. suis, conventional microbiological identification, serotyping and PCR-tests are possible. In this study, samples were taken from 38 pig carcasses fit for human consumption and examined for S. suis by conventional microbiology and PCR. Serotyping was not performed. For virulence-associated factors, PCR was done.

Material and Methods
38 pig carcasses fit for human consumption from 17 holdings in Germany were arbitrarily selected. Each carcass was tested at seven sample locations (heart, kidneys, skin of the thoracic site or the belly, mandibular lymph nodes, tonsils, lymphonodi thoracici aortici and muscle from the diaphragm). In total, 608 samples were