

# Preface

For humans, pork meat is one of the most complete dietary sources of protein. According to the Food and Agriculture Organization of the United Nations, animal protein production will grow three times by 2050, and meat production, including of pork, will double. An increase in intensification is necessary, because arable land cannot be increased in proportion. However, viral diseases cause significant animal losses and represent a major threat to global pig farming industry. Therefore, the understanding of molecular biology, pathogenesis, host–virus interaction and epidemiology of these viruses is essential for reducing the burden of viral outbreaks.

The overall aim of this book is to review the most important and dangerous porcine viruses that have emerged in the global swine population. It covers different DNA and RNA viruses about which we have learnt much during the last decades. In Chapter 1, my colleagues and I discuss African swine fever virus (ASFV), the causative agent of highly lethal haemorrhagic fever of domestic pigs and wild boar. It is a large, enveloped, double-stranded DNA virus that is the only known DNA arbovirus since it is transmitted by soft ticks of the genus *Ornithodoros*. Most recently, ASFV was introduced into Georgia and then spread to the Russian Federation, Belarus, Ukraine, and some EU member states. In the absence of effective vaccines and antiviral drugs, this virus continues to pose a global risk for pig industry. Chapter 2 is about classical swine fever virus (CSFV), a small enveloped RNA virus of the genus *Pestivirus* in the *Flaviviridae* virus family. Although live attenuated vaccines are currently available, it remains a major threat to profitable pig production worldwide because CSFV infection is still associated with high mortality rates. Sandra Blome summarizes CSFV properties, pathogenesis, clinical picture and control options. Chapter 3 focuses on foot-and-mouth disease virus (FMDV), which is the prototypic member of the *Picornaviridae* family. It causes an acute systemic vesicular disease affecting livestock worldwide. Francisco Sobrino and colleagues discuss different aspects of FMDV infection, including new strategies for viral control by vaccination and other antiviral strategies. This chapter also covers the current approaches for virus diagnosis. In Chapter 4, Sheela Ramamoorthy and Pablo Piñeyro provide an overview of porcine circoviruses, focusing particularly on porcine circovirus strain 2 (PCV2), which was first isolated in 1997. PCV2 is a single-stranded DNA virus belonging to the *Circoviridae* family. PCV2 infection by itself causes only mild disease but co-factors such as other infections are involved in the development of severe diseases. Molecular biology, pathogenesis, immune response, diagnosis and control strategies are discussed in detail. Chapter 5 is about porcine epidemic diarrhoea virus (PEDV), the aetiological agent of severe diarrhoea and dehydration. Although this virus was first reported in

Europe, it has become problematic in Asian countries such as China, Japan, Thailand and the Philippines. Owing to high morbidity and mortality in piglets, PEDV has a substantial economic burden in affected countries. Changhee Lee discusses molecular and cellular biology of the virus, as well as diagnostic procedures, epidemiology and control strategies. In Chapter 6, André Felipe Streck and Uwe Truyen describe the biology, pathogenic potential and strain variation of porcine parvovirus (PPV). This virus is considered the main cause of reproductive disorders in pigs with no maternal clinical signs. PPV is a small, non-enveloped, single-stranded DNA virus belonging to the *Parvoviridae* family. Although losses are low in vaccinated herds, PPV can cause devastating abortion storms in unvaccinated herds, or in those herds, where new antigenic types are circulating. Chapter 7 is devoted to porcine reproductive and respiratory syndrome virus (PRRSV), a small enveloped RNA virus belonging to the *Arteriviridae* family. PRRSV causes reproductive failure in herds and respiratory tract illness in young pigs. In this chapter, Alexander Zakhartchouk and colleagues summarize the current understanding of PRRSV, including the virus molecular biology, virus–host cell interactions, pathogenesis, diagnostic procedures and epidemiology. They also provide an overview of currently available vaccines and a novel vaccine development. The last chapter (Chapter 8) is about swine vesicular disease virus (SVDV), which belongs to the *Enterovirus* genus within the *Picornaviridae* family. SVDV is genetically highly related to the human coxsackie virus B5. It causes a vesicular disease with clinical signs similar to those of foot-and-mouth disease. Francisco Sobrino, Belén Borrego and colleagues discuss different aspects essential for understanding the infectious cycle of SVDV. They also provide an overview of current strategies for SVDV control by vaccination and other antiviral strategies.

It took about a year to complete this book, during which time the chapters were written, edited and re-edited in order to improve and present high-quality reading material. My primary acknowledgement must go to all our contributing authors for their significant work, enthusiasm and cooperation. In addition, I thank Annette Griffin from Caister Academic Press for her great assistance and patience during all this time. Finally, but most importantly, I wish to extend appreciation to my family members, particularly to my beautiful wife, Kamila, for her invaluable support throughout the writing and editing process.

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