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Strains of African Swine Fever Virus Isolated from Domestic Pigs and from the Tick Ornithodoros Moubata in South Africa


The new Animal Genetics and Disease 2017 conference committee organized a Research Topic for the proceedings of this inaugural conference. The meeting brought together specialists working on the interface between genomics, genetic engineering, and infectious disease, with the aims of improving animal and human health and welfare. This conference was funded by Advanced Courses and Scientific Conference at the Wellcome Genome Campus, Hinxton, UK. The conference will highlight breakthroughs in genomic technologies that are rapidly increasing our understanding of the fundamental role that host and pathogen genetics play in infections and epidemics. This Research Topic focuses on how infections spread and how they further affect the productivity of livestock systems and food supply chains. Thanks to technological advances, we now have the tools for real-time surveillance of zoonoses affecting wildlife, farm animals and animal-to-human disease transmission.

Biology of Ticks is the most comprehensive work on tick biology and tick-borne diseases. This second edition is a multi-authored work, featuring the research and analyses of renowned experts across the globe. Spanning two volumes, the book examines the systematics, biology, structure, ecological adaptations, evolution, genomics and the molecular processes that underpin the growth, development and survival of these important disease-transmitting parasites. Also discussed is the remarkable array of diseases transmitted (or caused) by ticks, as well as modern methods for their control. This book should serve as a modern reference for students, scientists, physicians, veterinarians and other
specialists. Volume I covers the biology of the tick and features chapters on tick systematics, tick life cycles, external and internal anatomy, and others dedicated to specific organ systems, specifically, the tick integument, mouthparts and digestive system, salivary glands, waste removal, salivary glands, respiratory system, circulatory system and hemolymph, fat body, the nervous and sensory systems and reproductive systems. Volume II includes chapters on the ecology of non-nidicolous and nidicolous ticks, genetics and genomics (including the genome of the Lyme disease vector Ixodes scapularis) and immunity, including host immune responses to tick feeding and tick-host interactions, as well as the tick's innate immune system that prevents and/or controls microbial infections. Six chapters cover in depth the many diseases caused by the major tick-borne pathogens, including tick-borne protozoa, viruses, rickettsiae of all types, other types of bacteria (e.g., the Lyme disease agent) and diseases related to tick paralytic agents and toxins. The remaining chapters are devoted to tick control using vaccines, acaricides, repellents, biocontrol, and, finally, techniques for breeding ticks in order to develop tick colonies for scientific study.

Trends in Emerging Viral Infections of Swine includes sections on global trade, vaccination regimens against new and emerging viruses, epidemiology and control, as well as significant new outbreaks like the West Nile virus. A contributor to Diseases of Swine, 8th edition, Dr. Zimmerman has selected three additional editors with international expertise.

This report describes a campaign to limit the use of antimicrobials – specifically antibiotics – in the Danish swine-producing sector. It is a testimony of the collaboration between the regulatory sector within the Ministry of Environment and Food (and its agriculture-focused precursors), private veterinary practitioners and swine producers (large and small), to tackle the unsustainable overuse of antibiotics in the industry, and is a retrospective tribute to all those who had the foresight to make significant changes to ensure consumer protection: improving hygiene at primary sites of swine production, developing options for intervention through a system of surveillance and collation of data from feed mills to veterinary practitioner prescriptions, identifying sites for intervention, setting targets, restructuring the relationship between the veterinary services and farmers, and implementing changes in behaviour for greatest impact. Denmark in many ways laid out a plan before there was any known roadmap to follow; each step was based on continuous analysis and feedback to the operators – private and public – for ongoing monitoring and accountability as a driver for change. It is hoped that this historical guide may serve other countries, food producers, regulators, veterinarians and those responsible for veterinary structures, as well as academia, to identify ways forward to limit the emergence and spread of antimicrobial resistance, which is threatening public health, animal health and safe food production worldwide.

The last twenty years have witnessed a significant growth of interest in optimal factorial designs, under possible model uncertainty, via the minimum aberration and related criteria. This book gives, for the first time in book form, a comprehensive and up-to-date account of this modern theory. Many major classes of designs are covered in the book. While maintaining a high level of mathematical rigor, it also provides extensive design tables for research and practical purposes. Apart from being useful to researchers and practitioners, the book can form the core of a graduate level course in experimental design.

Disaster management is a vibrant and growing field, driven by government spending in the wake of terrorist attacks and environmental debacles, as well as private-sector hiring of risk managers and emergency planners. An ever-increasing number of practicing professionals needs a reference that can provide a solid foundation in ALL major phases of supervision – mitigation, preparedness, response, communications, and recovery. As climate change leads to further costly catastrophes and
as countries around the world continue to struggle with terrorism, the demand for solutions will only grow. This revised edition of Coppola’s revered resource meets said demand head-on with more focused, current, thoughtfully analyzed, and effective approaches to disaster relief. Expanded coverage of global approaches to disaster management with enhanced data and research on disasters around the world, including Cyclone Nargis, the H1N1 pandemic, and the tsunami in American Samoa. More material on risk management, mitigation, myths that affect behavior during crises, and post-disaster evaluation of the response. Up-to-date information on the role of aid organizations and international financial institutions like the World Bank in disaster response, as well as commentary on the latest research in disaster management and policy studies.

The National Academies of Sciences, Engineering, and Medicine was asked to articulate a 5-year strategic vision for international health security programs and provide findings and recommendations on how to optimize the impact of the Department of Defense (DOD) Biological Threat Reduction Program (BTRP) in fulfilling its biosafety and biosecurity mission. Because BTRP is just one of several U.S. government programs conducting international health security engagement, both the strategic vision and the success of the program rely on coordinating actions with the U.S. government as a whole and with its international partners. This report provides several recommendations for optimizing BTRP success in its current mission and the wider-looking strategic vision it proposes.

Provides a fully revised Eleventh Edition of the definitive reference to swine health and disease. Diseases of Swine has been the definitive reference on swine health and disease for over 60 years. This new edition has been completely revised to include the latest information, developments, and research in the field. Now with full color images throughout, this comprehensive and authoritative resource has been redesigned for improved consistency and readability, with a reorganized format for more intuitive access to information. Diseases of Swine covers a wide range of essential topics on swine production, health, and management, with contributions from more than 100 of the foremost international experts in the field. This revised edition makes the information easy to find and includes expanded information on welfare and behavior. A key reference for anyone involved in the swine industry, Diseases of Swine, Eleventh Edition: Presents a thorough revision to the gold-standard reference on pig health and disease. Features full color images throughout the book. Includes information on the most current advances in the field. Provides comprehensive information on swine welfare and behavior. Offers a reorganized format to make the information more accessible. Written for veterinarians, academicians, students, and individuals and agencies responsible for swine health and public health. Diseases of Swine, Eleventh Edition is an essential guide to swine health.

African swine fever (ASF) is a disease with a mortality rate close to 100 percent. There is no vaccine and no conventional treatment against the disease. To reduce the effects caused by ASF outbreaks, optimal response mechanisms against probable ASF emergency disease situations need to be planned and rehearsed so that the disease can be controlled and eradicated in the most rapid and cost-effective way. These plans should be refined from time to time through simulation exercises and personnel should be trained in their individual roles and responsibilities. This manual provides information on the nature of ASF, and on the principles of, and strategic options for its prevention, control and elimination. Guidelines are given for individual countries threatened by ASF to formulate their own national policy on control and eradication of a possible incursion of the disease. The manual identifies both personnel and equipment and other facilities that are needed in a national ASF contingency plan. An outline of the suggested format and contents of a national contingency plan is also provided as a guide, which can be modified to suit the needs and circumstances of individual countries.
Wild pigs inhabit vast areas in Europe, Southern Asia and Africa, and have been introduced in North and South America, while feral pigs are widespread in Australia and New Zealand. Many wild pig species are threatened with extinction, but Eurasian wild boar populations, however, are increasing in many regions. Covering all wild pig and peccary species, the Suidae and Tayassuidae families, this comprehensive review presents new information about the evolution, taxonomy and domestication of wild pigs and peccaries alongside novel case studies on conservation activities and management. One hundred leading experts from twenty five countries synthesize understanding of this group of species; discussing current research, and gaps in the knowledge of researchers, conservation biologists, zoologists, wildlife managers and students. This beautifully illustrated reference includes the long history of interactions between wild pigs and humans, the benefits some species have brought us and their role and impact on natural ecosystems.

The Food and Agriculture Organization of the United Nations (FAO) has been involved in the Emerging Pandemic Threats Programme (EPT-2), funded by the United States Agency for International Development (USAID) since 2014. The programme sets out to minimize the impact of existing global pandemic threats and to detect, respond to and improve the prevention of emerging threats. Implementation of this programme at FAO has been carried out through 20 projects with efforts concentrated in 36 countries in Africa and Asia. It builds upon lessons learned in the first phase of the programme, in which FAO was involved in improving livestock disease surveillance, enhancing capacity of veterinary epidemiologists and laboratories and improving response to the avian influenza. EPT-2 focuses more in-depth on preventative measures to zoonotic novel pathogens thereby reducing the risk of emergence of such diseases. This evaluation aims to trace the contribution of FAO’s interventions to the programme and assess its outcomes at the global, regional, and national levels. EPT-2 has largely achieved its objectives and outputs in terms of technical capacity development and disease strategy, but less so in terms of enabling policy, value chains, and production. In line with FAO’s 2011 One Health Action Plan (FAO, 2011), EPT-2’s technical focus has strengthened traditional partnerships between FAO and technical livestock departments and ministries and built stronger collaborations with health and environment ministries. The next phase of the EPT-2 programme could take advantage of renewed national, regional, and global interest in ensuring that the COVID-19 experience is not repeated. FAO needs to fully utilize its convening power, partnerships, trusted status, and experience of emerging pandemic threats to engage political and business leaders on the need to consolidate and scale up EPT-2-induced gains to improve pandemic preparedness.

Zoonotic Viruses of Northern Eurasia: Taxonomy and Ecology provides a review of modern data of the taxonomy, distribution, and ecology of zoonotic viruses in the ecosystems of Northern Eurasia. With climate changes, increasing population density of arthropod vectors and vertebrate hosts, development of unused lands, transfers of viruses by birds, bats, infected humans, and animals, vectors allow virus populations to adapt to the new environment. This leads to the appearance of emerging or re-emerging infections. This book presents data about circulation and evolution of influenza viruses, tick-borne encephalitis virus, West Nile virus, Crimean-Congo hemorrhagic fever virus, hantaviruses, Sindbis virus, California encephalitis group viruses and other pathogenic viruses as well as of novel viruses classified for the first time using next-generation sequence. Features summarized data about the circulation of approximately 80 viruses isolated in natural foci of Northern Eurasia Provides descriptions of the main ecosystems of Northern Eurasia in the context of the ecology of viruses with environmental factors Delineates the potential impact of climate change for the distribution of viruses Includes virus taxonomy, ecology, distribution and pathogenicity for humans and animals.
African swine fever (ASF) is caused by a virus that is classified as a member of the Iridovirinae family. The disease in the warthog, the natural host, in Africa was described in 1921 by R. E. Montgomery. The reservoir of the virus is ticks. The introduction of domestic pigs into territory occupied by warthogs infected with ASF in the 1960's has endangered the pig industry around the world. The domestic pig is highly sensitive to ASF and develops a devastating disease that kills the pig without giving the immune system a chance to defend the animal against the virus infection. The ability of ASF virus to infect and destroy cells of the reticuloendothelial system leaves a defenseless host that succumbs to an infection which may be described as an acquired immune deficiency disease of domestic pigs. Introduction of the virus into Iberia in the 1960's led to a series of ASF epidemics in Spain and Portugal and later in France, that caused heavy economic losses. Between 1976 and 1960, ASF virus made its appearance in Malta and Sardinia as well as in Brazil, The Dominican Republic, Haiti, and later in Cuba. In 1985-6 ASF appeared in Belgium and The Netherlands.

Predation, one of the most dramatic interactions in animals' lives, has long fascinated ecologists. This volume presents carnivores, raptors and their prey in the complicated net of interrelationships, and shows them against the background of their biotic and abiotic settings. It is based on long-term research conducted in the best preserved woodland of Europe's temperate zone. The role of predation, whether limiting or regulating prey (ungulate, rodent, shrew, bird, and amphibian) populations, is quantified and compared to parts played by other factors: climate, food resources for prey, and availability of other potential resources for predators.

African swine fever (ASF) is endemic in some parts of eastern and southern Africa. The introduction of ASF into free areas leads to losses because of the devastating effects it causes. In order to minimise these losses, it is essential that there is a strong early warning and early reaction capacity. The key to such a system is disease recognition. The purpose of this manual is to enhance recognition of ASF at all levels for early warning and early reaction, so that the disease can be identified and eliminated at its earliest appearance in any area. Special attention has been given to the clinical, anatomical and pathological similarity of African swine fever with classical swine fever.

African animal trypanosomosis (AAT), also called nagana, is a trans-boundary disease that has had an immense impact on cattle and is ranked among the top global cattle diseases. This and tick-borne diseases have caused major obstacles to sustainable livestock-based agricultural production and food security and are important factors in underdevelopment. Due to decreasing efficacy of available drugs, widespread trypanosome resistance, and the difficulty of sustaining other control measures, there is a need for alternative sustainable strategies to reduce the impact these diseases have on livestock. Combating and Controlling Nagana and Tick-Borne Diseases in Livestock provides the latest empirical research findings on the effects of African animal trypanosomiasis (nagana) and tick-borne disease infection in livestock, their impact on farmer livelihoods, and the measures that can be undertaken to mitigate negative effects and reduce the number of infections. While highlighting topic areas such as disease history and transmission, treatments, and the economic impacts, this book is essential for farmers, animal health and animal production professionals and practitioners, non-government organizations, researchers, academicians, and students working in fields that include but are not limited to agriculture, livestock production, environmental science, veterinary medicine, veterinary pathology, and epidemiology.

This book, which is the first volume of the book series Livestock Diseases and Management,
summarizes the prominence and implications of the emerging and transboundary animal viruses. Although the livestock plays an important role in the economy of many countries, the emerging and transboundary animal viral diseases possess a serious risk to the animal-agriculture sector and food security globally. The book describes the precise and up-to-date information on animal viral diseases which have emerged in the recent past or are re-emerging due to various environmental factors and those which are not bounded in restricted national boundaries and attained the transboundary status. The chapters summarize the recent advancements in the molecular state-of-art tools towards the development of diagnostics, prophylactics, and therapeutics of these viruses. It also explicitly describes the challenges imposed by the emerging and transboundary viral infections and our preparedness to counter them.

The recent introduction and spread of African swine fever (ASF) into Europe and Asia has shown that an integrated, multidisciplinary effort is needed to tackle this disease and the complex challenges it poses. This book presents practical guidelines on surveillance for detection of ASF virus, how to prevent outbreaks in the domestic pig sector through biosecurity and cleaning and disinfection routines, including in backyard holdings, and how to control and eradicate this disease in wild boar. Information on pathological lesions and diagnostic practices are provided to support practitioners. Virus infection mechanisms and the consequent host immune response are reported together with an overview on the status of vaccine and treatment development. Information on ASF epidemiology and the European wild boar and domestic pig populations is presented to assist breeders, wildlife managers and policy makers in designing practices aimed at preventing, or controlling and eradicating, this disease. The book provides currently available knowledge in a single place, and identifies knowledge gaps, prompting policy makers and funding bodies to support the scientific community in investigating the gaps.

The purpose of document is to provide fact based overview of ASF ecology in the Northern and Eastern European populations of wild boar and briefly describe a range of practical management and biosecurity measures or interventions, which can help stockholders in the countries experiencing large scale epidemic of this exotic disease to address the problem in a more coherent, collaborative and comprehensive way. The handbook should not be viewed as an authoritative manual providing readymade solutions on how to eradicate ASF from wild boar. The facts, observations and approaches described in the document are presented with the intention to broadly inform veterinary authorities, wildlife conservation bodies, hunting community, farmers and general public about complexity of this novel disease and the need to wisely plan and carefully coordinate any efforts aiming at its prevention and control.

African swine fever (ASF) has been reported and confirmed in South Africa since the early 20th century, which lead to the inception of the Swine Fever control zone in 1935. In the South African context, the sylvatic cycle is the main maintenance and transmission cycle that leads to sporadic outbreaks in the domestic pig population, particularly reported in the designated ASF control area. ASF is endemic in sub-Saharan Africa and maintains itself through three different epidemiological cycles in different regions of the continent. The current outbreaks in the Caucasus and Russia have shown the ability of African swine fever virus (ASFV) to establish itself where low biosecurity conditions exist. In South Africa, the spread of ASF has been successfully controlled in the domestic pig populations with control based on the Animal Disease Act 35 of 1984. The act prohibits the movement of all suid species and their products from the ASF control area in the north, except where special permission has been granted by the Provincial Veterinary Services. One of the key uncertainties related to climate change is potential variations in the weather patterns and fluctuations
in climatic conditions that could lead to alterations in production systems and land use patterns. These in turn raise the possibility of redistribution of both the arthropod vectors and wild suids to environmentally suitable areas. It is therefore critical for the zoning of ASF that patterns of distribution of the reservoir hosts are monitored in line with the possible variations in the weather patterns around and along the ASF control line. Nonetheless, there are no known records of the reassessment of the swine fever control line, which was instituted based on the distribution of previous outbreaks and the presence of warthogs and tampans, since its inception in 1935. The objective of this study was to evaluate the distribution of the ASF disease determinants; warthogs and warthog burrows, *Ornithodoros moubata* and ASFV; along the ASF control line with the view of determining whether there was a need to re-align the trajectory of the line or not. A total of 304 farms were randomly selected 20 km north and 20 km south of the ASF control line from the North West, Gauteng, Limpopo and Mpumalanga Provinces through proportional weighting. A total of 73 farms from the initial sample, distributed along the ASF control line, were sampled for the presence of warthogs, warthog burrows and soft ticks of the *Ornithodoros* spp. (tampans). One hundred and fifty seven warthog burrows were found, of which 92% were recently used by warthogs. Tampans were recovered from 22.2% of the 63 farms where warthog burrows were found and 12.74% of the total (157) warthog burrows. Of the infested warthog burrows, only 5% (one of the twenty burrows) constituting 7.14% (one out of 14 farms) found south but in close proximity to the ASF control line, was positive for ASFV DNA. There were no warthog burrows found with PCR positive tampans north of the ASF control line. The spread of tampans beyond the ASF control line poses a question on whether the control line needs to be moved further south in the affected parts of the country. The study confirmed that the reservoirs are found beyond the current ASF control line. Although the causes for this apparent re-distribution are unclear, changes in land use and the increase in wildlife farming may contribute to this finding. Examination of weather data along the control line between 1993 and 2012 found the maximum temperatures was increasing and humidity is decreasing. In the absence of previous data on warthog and tampan distribution along the control line, the present study cannot evaluate if these changes have had an impact on the distribution of warthogs and tampans in the vicinity of the control line. This study provides baseline data for future monitoring of the control line and concluded that there was currently no need to realign the trajectory of the ASF disease control line but to conduct scheduled monitoring of the *O. moubata* status in the future.

Given the current worsening of the African swine fever situation worldwide, this field manual will be aimed to assist veterinarians in the prompt recognition and detection of the disease and the immediate control steps at farm level.

This book is a printed edition of the Special Issue "Porcine Viruses" that was published in *Viruses*

Several large dsDNA-containing viruses such as poxviruses (smallpox) and herpes viruses are well known among the scientific community, as well as the general populace, because they cause human diseases. The large dsDNA insect-infecting baculoviruses are also well known in the scientific community because they are used both as biological control agents and as protein expression systems. However, there are other large dsDNA-containing viruses, including the giant 1.2 M b mimivirus, which are less well known despite the fact that all of them play important roles in every day life. Seven of these virus families are reviewed in this book.

Bluetongue may be described as an acute insect borne disease of ruminants, manifested clinically in sheep by a catarrhal inflammation of the mucous membranes of the digestive and respiratory systems and associated with degenerative changes in the skeletal musculature. The profound emaciation and
weakness which follow the acute disease are responsible for a protracted convalescence and for serious economic losses due to diminished productivity. II. Historical During the early colonisation of Africa, susceptible Merino and other European breeds of sheep were introduced into the Cape, at first by the Dutch East India Company between 1652 and 1785 and again later in 1870. A report of the Cattle and Sheep Diseases Commission (1876) records the appearance of a serious febrile disease amongst these imported sheep in which both morbidity and mortality was high (cited by HENNING, 1949). HuTCHEON (1881) gave this disease the name of "Fever" or "Epizootic Catarrh", in order to distinguish it from other clinical conditions of a similar nature encountered amongst sheep. In the first comprehensive description of this clinical syndrome and its epizootiology HuTCHEON (1902) referred to it as "Malarial Catarrhal Fever of Sheep", a designation which was obviously influenced by the mistaken belief that an intracorpuscular parasite was the primary cause of the disease. More systematic studies were conducted by SPREULL (1902; 1905), who endeavoured to immunize sheep by the simultaneous inoculation of immune serum and infective blood.

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