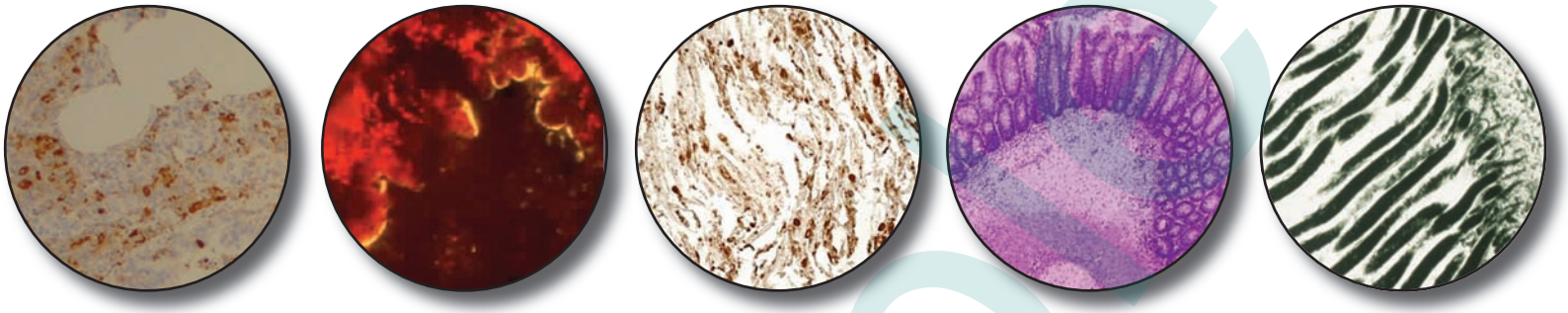

SWINE DISEASE MANUAL

FOURTH EDITION

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PREFACE

This manual was written primarily for veterinary students and those who teach swine diseases. It also may be of interest to veterinary practitioners, veterinary technicians, and others interested in swine diseases in production systems. This manual attempts to update, condense and simplify the great mass of information available. Only basic material appropriate for students is included. More detailed information is available via an array of texts, websites, and scientific publications.

Disease topics are listed as individual entities. The student should be reminded that in reality, the occurrence and severity of disease outbreaks are strongly influenced by production practices, housing, environment, nutrition, and genetics. Diseases may occur concurrently in modern production systems with large populations of animals; for example, porcine respiratory disease complex (PRDC) is usually a co-infection with *Mycoplasma hyopneumoniae* and/or other bacteria or viruses. Diagnostic methods for disease complexes are usually more complicated than finding a single agent. Likewise, control of disease frequently involves not only specific intervention, but also modification of environment, husbandry, and production practices. For this reason, the prevention and control sections in this manual refer to specific agents but are not always appropriate or complete in terms of control of disease complexes. Swine practitioners expend considerable effort in diagnosis, herd investigation, and understanding the interactions of risk factors before implementing cost-effective control strategies. These activities are beyond the scope of this manual but our vision is that this manual will serve as a foundation on which to build a better understanding of the complexities of disease in swine populations.

Familiarity with the organization of the manual will make it more useful. The table of contents lists the diseases and conditions of swine covered in this manual. Most sections are based on the nature of the etiologic agent, and all are preceded by their own table of contents. The time-saving index at the back of the book lists each major disease by name, often cross-referenced with a synonymous name.

A section on exotic (foreign to the US) diseases is provided for ready reference. Any of these diseases may be introduced to the US as a consequence of international trade in swine, pork products, and other contacts. A basic knowledge of these diseases is a good defense against US epidemics.

Several tables are included. Some are designed to help in differential diagnosis. Others list major diseases of a single body system and permit a rapid overview of diseases of that system. The tables may be of special value in preparing for board exams.

Comments on the manual and how it can be made more useful are encouraged and appreciated. They can be mailed to Dr. Kent Schwartz, 1642 Veterinary Medicine, Iowa State University, Ames, Iowa 50011 or e-mailed to **kschwart@iastate.edu**.

Table of Contents

Actinobacillus suis

Most entries are two pages long; we picked this one to show all the headings on one page.

Definition

An infectious disease characterized by hemorrhages and embolic lesions at multiple sites, more obviously in the lungs, and often by serous or serofibrinous exudates in the thorax and abdomen.

Occurrence

Outbreaks occur predominantly in immunologically naïve populations. These include primary and secondary specific pathogen free (SPF) pigs or in segregated early weaned (SEW) pigs. Most outbreaks are in recently weaned pigs and in grow/finish pigs derived from an SEW system. Outbreaks occur in both younger and older swine and, less often, in conventionally raised pigs.

Historical information

There have been reports of the disease since 1962. In the 1980s, after management techniques were introduced that minimized exposure of neonates to many endemic pathogens, the incidence of *Actinobacillus suis* infections appeared to increase in the US industry. Misdiagnosis of the disease as *Actinobacillus pleuropneumoniae* (APP) infection or other septicemias likely contributes to underreporting of the true prevalence of the disease.

Etiology

The etiologic agent, *Actinobacillus suis*, is only now being studied in detail. It is a Gram-negative, nicotinamide adenine dinucleotide (NAD)-dependent, non-motile coccobacillus. It is aerobic and facultatively anaerobic. All isolates appear to be of a single serotype. Strains from swine appear to be clearly different from those isolated from horses.

Thus far there is no serologic test to reliably identify infected swine and establish *A. suis*-free herds. Antibodies to *A. suis* and *A. pleuropneumoniae* may cross-react with some serologic tests.

Epidemiology

The epidemiology is not completely understood but carrier pigs probably introduce *A. suis* into herds. It can be isolated from the nasal cavity and tonsils of many healthy pigs and has been found in the reproductive tract of healthy sows. It is believed to be an "early colonizer" of neonates. Less than optimal environmental conditions or concurrent diseases may increase the ability of *A. suis* to cause disease.

Pathogenesis

Invasion probably occurs through the tonsil and spreads through the bloodstream. This is suggested by the presence of the organism in emboli in the vasculature at many lesion sites. The agent's pathogenic effect is probably a result of production of hemolysin and other toxins similar to those produced by *A. pleuropneumoniae*.

Clinical signs

The first signs of an outbreak may include sudden death of young pigs with lesions attributed to a bacterial septicemia. Sick piglets are febrile, breathe rapidly, and may have congested or cyanotic extremities. Cyanosis, arthritis, enteritis, and rarely necrosis of the feet, tail and ears have been reported and are similar to other causes (streptococcal, erysipelas, salmonella) of bacterial septicemia. Occasionally, infected pigs may show central nervous system (CNS) signs including tremors, shaking or paddling. Mortality within affected litters can be high, up to 50%.

Older growing pigs and adults can have similar signs but may also have signs of acute respiratory distress. Lethargy or depression, anorexia, and rarely irregular reddened skin lesions that resemble those of erysipelas may be observed. Pregnant sows may abort.

Lesions

Lesions are similar in pigs of all age groups. They include petechial and ecchymotic hemorrhages in many organs. Frequently, lesions are present in the lungs as disseminated foci of hemorrhagic to necrotizing pneumonia, the latter more marked in older piglets and growers. A consistent lesion in all age groups is serous or serofibrinous exudate in the abdominal and thoracic cavities. Polyarthritis may occur in grow/finish pigs.

Microscopic lesions occur in many major organs. These develop around small colonies of *A. suis* within the vascular emboli or thrombi. Occasionally there are eosinophilic clubs surrounding the colony. Both gross and microscopic lesions are typical of embolic, bacterial septicemias.

Diagnosis

History, signs and lesions are suggestive of the diagnosis but it should be confirmed by culture of *A. suis* from multiple organs. Serologic diagnosis is unreliable because antibodies to *A. suis* and APP may cross react.

Control

Autogenous vaccines have been used but have not been evaluated critically. Because there are multiple types of lipopolysaccharides (LPS) in *A. suis*, the LPS profile of the vaccine strain must match that of the pathogen. Although unproven, vaccines against APP may offer some cross-protection.

Actinobacillus suis is sensitive to many antibiotics including ampicillin, amoxicillin, oxytetracycline and others. Sick pigs should be treated parenterally as soon as possible. The exposed group can be treated by medicating the water.

Internal Parasites

Common and/or scientific names of parasitism and parasite	Usual location and gross length	Intermediate hosts or direct cycle	Mode of infection	Treatment*
Ascariasis *Ascaris suum*	Small intestine, bile ducts, stomach 15-30 cm	Direct	Orally from contaminated environment	All
Coccidiosis *Isospora suis*	Small intestine	Direct	Orally from contaminated environment	None
Eperythrozoonosis *Mycoplasma suis*	On erythrocytes 0.8-1.0 □m	Intermediate hosts. Possible direct	Arthropod bites? Contaminated instruments?	Tetracyclines Arsenicals
Kidney worm infection *Stephanurus dentatus*	Adults in perirenal fat, kidneys, ureters walls. Juveniles in ectopic sites. 20-45mm	Earthworms. Also direct	Larvae in earthworms. Prenatally, orally; skin penetration by juveniles	FBZ, AVE, LVM
Lungworm infection *Metastrongylus* spp.	Posterior border of diaphragmatic lobes of lungs. 20-50 mm	Earthworms. Also direct	Ingest larvae or earthworms with encysted larvae.	DCV, FBZ, AVE
Thorny-headed worm infection *Macracanthorhynchus hirudinaceus*	Small intestine, usually ileum Up to 30 cm	Direct	Prenatally, transcolostrally, orally, cutaneously	None
Threadworm infection *Strongyloides ransomi*	Small intestine of suckling pigs 3.3 -4.5 mm	Direct	Prenatally, transcolostrally, orally, cutaneously	DCV, FBZ, AVE, LVM, TBZ
Whipworm infection *Trichuris suis*	Cecum and large intestine 5-8 cm	Direct	Ingestion of embryonated ova	DCV, FBZ
Gullet worm *Gongylonema pulchrum*	Subepithelium of esophagus, tongue	Dung beetles	Ingestion of beetle with encysted larvae	FBZ, AVE, LVM
Red stomach worm *Hyostrongylus rubidus*	Stomach < 10 mm	Direct	Ingestion of larvae	DCV, FBZ, AVE, TBZ
Thick stomach worms *Ascarops strongylina* and *Physocephalus sexalatus*	Stomach	Dung beetles	Ingestion of beetle with encysted larvae	FBZ, DCV
Hookworm *Globocephalus urosubulatus*	Small intestine of feral and pastured swine in southern US	Direct	Larvae bore into skin	DCV, FBZ, AVE, LVM
Liver flukes *Fasciola hepatica*	Liver of pigs on pastures used by sheep. 30 mm	Snails	Ingestion of encysted metacercariae on grass	None
Trichinosis *Trichinella spiralis*	Muscle of many mammals, especially swine and bears	Many mammals	Ingestion of muscle with encysted larvae (raw garbage, wild animal carcasses, rats, infected domestic animals)	Not practical
Pork measles *Taenia solium* (a tapeworm of man)	*Cysticercus cellulosae* in skeletal and cardiac muscles of swine. < 18 mm	Swine	Ingestion of human feces containing gravid proglottids	None

Key: DCV=dichlorvos, FBZ=fenbendazole, AVE=avermectin, LVM=levamisole, PIP=piperazine, PRT=pyrantel tartrate, TBZ=thiabendazole.