

Management practices for prevention and control of swine bacterial diseases based on China practitioner's Experience

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China P.R. Nov 16th, 2021



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Passion for Pigs



- 01 The most common bacterial diseases in pig production
- 02 Prevention and control strategies in China farms
- 03 Challenge and opportunities
- 04 Take-home messages

- Infectious diseases is one of the biggest risk for pig production in China, including viral diseases, bacterial diseases and parasitic diseases.
- The most economic loss of pig diseases is related to PRRSV, PEDV and ASFV in China farms
- Some of bacterial diseases frequently cause high economic loss and high mortality, for example *E.coli* diarrhea(suckling piglets), *Streptococcus suis*, *Haemophilus Parasuis*(nursery) and *Actinobacillus pleuropneumoniae* (grower-finishers).
- Some of bacterial diseases cause low mortality, but impact the production performance and production cost, for example *endometritis*, *iliitis* and *Mycoplasma*.

- Many bacterial diseases (*Strep suis*, *Haemophilus parasuis*, *Mycoplasma*) are secondary infection of viral diseases, especially *PRRSV*, *PCV2* and *Swine influenza A*..
- To control bacterial diseases, many antibiotics are using in water, feed or injection. But antibiotic usage only reduces the economic loss related to the bacterial diseases, but can not eliminate the bacteria in farms.
- More than 6 US dollar antibiotic per marketing pig (including sow medication) were used. Antibiotic resistance is a big challenge for pig production and human health.
- The most frequent antibiotic is as follow: Amoxicillin, ceftiofur, tilmicosin, florfenicol, tiamulin, sulfa and so on.
- China government has awared the impact of irresponsible usage and banned to add antibiotic as growth promoter since the end of 2020.

The most common bacterial Diseases/pathogens in pig production

Based on infected system

Mycoplasma hyopneumoniae
Pasteurella multocida
Bordatella bronchiseptica
Haemophilus Parasuis

APP
A



Respiratory
system

Clostridium botulinum
Salmonella typhimurium
Salmonella cholerae-suis
Escherichia coli, ilietis

B



Digestive
System

Brucella suis
Brucella abortus
endometritis

C



Reproductive
System

Streptococcus
E. Coli

D



Systemic diseases

The most common bacterial pathogens in pig production



Based on pig production stage

Actinobacillus pleuropneumoniae (APP)
Swine Erysipelas
Porcine ileitis

A

Sow/Boar

E.coli
Clostridium perfringens

B

Suckling Piglets

Streptococcus
Haemophilus suis
E.coli
Salmonella

C

Nursery

Actinobacillus pleuropneumoniae (APP)
Swine Erysipelas
Porcine ileitis
Mycoplasma hyopneumoniae
Salmonella typhimurium

D

Grower-finishing



Passion for Pigs



01

The most common bacterial diseases in pig production

02

Prevention and control strategies in China farms

03

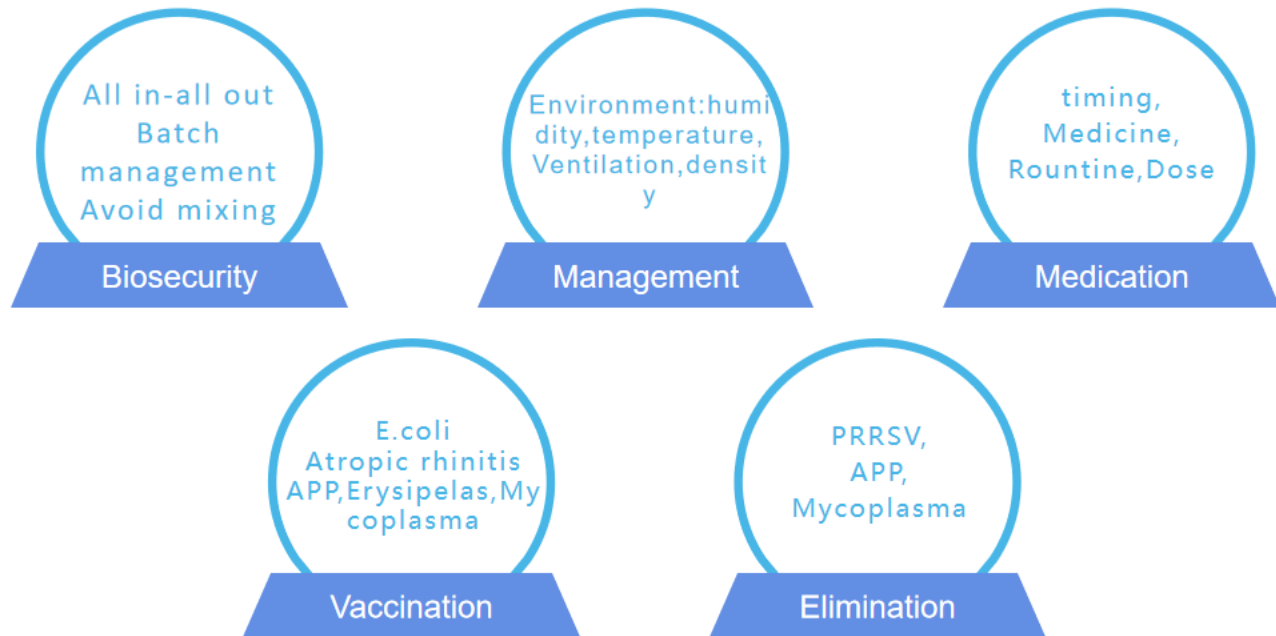
Challenge and opportunities

04

Take-home messages

Prevention and control strategies in China farms

5 Principles:



1. *Actinobacillus pleuropneumoniae* (APP)



- The bacterium *Actinobacillus pleuropneumoniae* (App) is carried in the tonsils and upper respiratory tract.
- The organism usually may affect grower-finisher and sow herd.
- The incubation period is very short, as little as 12 hours through to three days.
- When App attacks the lungs the toxins produced cause severe damage to the lungs which turn red to black (necrosis) with extensive pleurisy. The chest cavity rapidly fills up with fluid.

1. *Actinobacillus pleuropneumoniae* (APP)

Clinical signs

- Sudden death/mortality – only sign is a bloody discharge from the nose.
- Deaths are often caused by a combination of heart failure and toxins.
- Severe heavy breathing .
- Abdominal breathing rather than chest breathing.
- Blueing of the ears.
- **Badly affected pigs are:severely depressed+off feed+breathing**



1. *Actinobacillus pleuropneumoniae* (APP)

Diagnosis

- Post-mortem examinations
- slaughterhouse checks
- culture of the organism in the laboratory



1. *Actinobacillus pleuropneumoniae* (APP)

Management

- Avoid stress and overcrowding.
- Maintain good ventilation and a warm air flow.
- Keep pigs warm, dry and draught free.

Medication

- It is important to determine when the onset of the disease is likely to occur, to assess adverse environmental factors and to apply strategic medication just prior to this time.
- Feed medication: Tilmicosin, Tiamulin, amoxycillin;
- Injection: Amoxycillin, Ampicillin, Ceftiofur, Enrofloxacin;

Vaccination:

- Effective vaccines are commercially available. But the vaccine is too expensive for pig farmers.

2. *Streptococcus Suis*

- 35 serotypes of *S. suis* are recognized.
- In pigs and humans, *S. suis* can cause septicemia, pneumonia, endocarditis, arthritis, and meningitis
- Severe cases of *S. suis* infection may rapidly be fatal following infection causing septic shock.
- Usually occurs in piglets in nusserr(4-10 weeks of age)



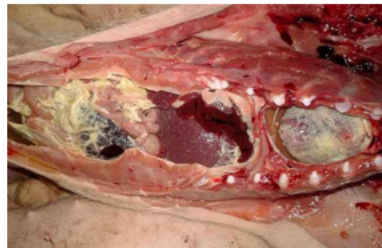
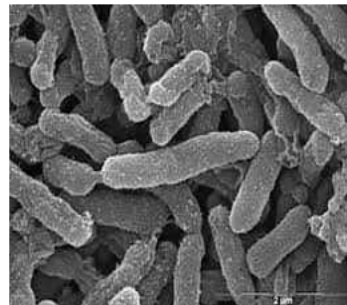
Prevention:

- Choose antibacterial drugs that are sensitive to S.suis. Penicillin, amoxicillin, ceftiofur. medication at least one week before clinical signs.
- Do a good job in disinfection. remove the source of infection, isolate and treat sick pigs.
- Maintain environmental sanitation
- Do a good job of vaccine vaccination, best to choose the same serotype vaccine (autogenous vaccine)



3. Haemophilus suis

- Causative agent of Glässer's disease
- Systemic infection and **polyserositis, meningitis, and arthritis**
- high mortality and morbidity, especially in PRRSV positive herd.
- difficult to isolate and cultivate under normal conditions, especially after the application of antibiotics



Epidemiology

- The disease is spread through the respiratory system. When PRRSV, PCV2, SIV are present in the pig herd, the disease is more likely to occur.
- In pneumonia, *Haemophilus parasuis* is assumed to be a random invading secondary pathogen. It is a typical "opportunistic" pathogen, which causes disease only when it cooperates with other viruses or bacteria.
- Weaning, mixed groups or transportation are also common causes. *Haemophilus parasuis* was once thought to be caused by stress.
- Affect young pigs from 2 weeks to 4 months of age. Mainly occurs before and after weaning and nursery. Usually seen in pigs at 5 to 10 weeks of age.

Control/Prevention:

- Strict disinfection: thoroughly clean for hygiene.
- Strengthen management: enhance body resistance and reduce stress response.
- Isolate sick pigs, treat them with sensitive antibiotics(Florfenicol, Tilmicosin)
- Antibiotic through drinking water may not be effective for serious outbreaks of the disease.



4. Mycoplasma hyopneumonia

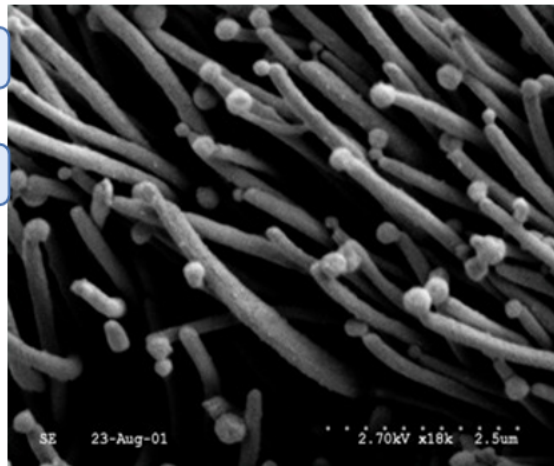
Mycoplasma hyopneumoniae is the principal aetiological agent responsible for enzootic pneumonia (EP) in pigs.



- High morbidity and low mortality under an endemic scenario.
- Pigs of all ages are susceptible.
- EP is mainly observed in growing and finishing pigs(>6 weeks of age)

Small genome

Lack a cell wall



Slow growth

Pleomorphic

overgrowth
with other
mycoplasmas

Mycoplasma hyopneumoniae attached to the swine ciliated respiratory tract epithelium.
Source: Dr. Carlos Pijoan.

4. Mycoplasma hyopneumonia

Clinical signs and Diagnosis

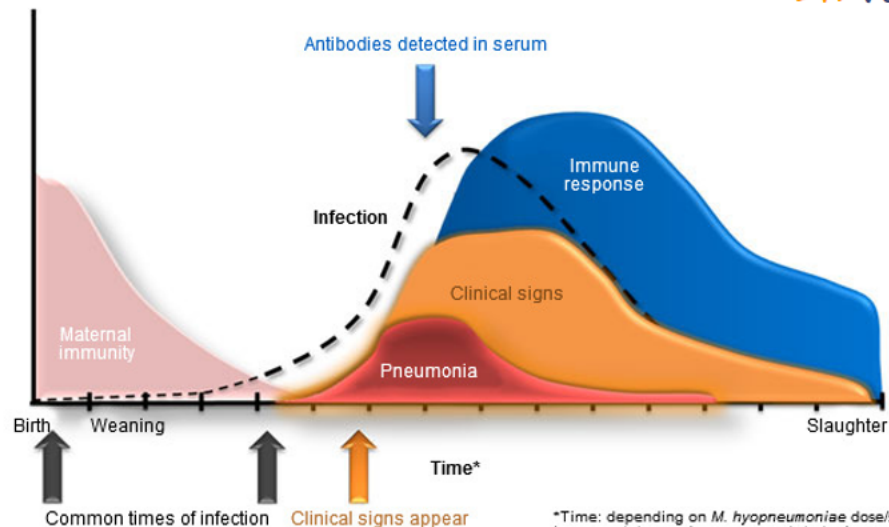
Separate infection (subclinical course with mild clinical signs)

- chronic, non-productive cough
- reduced rate of average daily weight gain (ADWG)
- reduced feed conversion efficiency

Concomitant pathogens

- anorexia
- lethargy
- laboured breathing
- pyrexia
- death

- Both clinical signs and macroscopic lesions are suggestive, but not exclusive, of *M. hyopneumoniae* infection.
- Other pathogens such as SIV, RRSV or *P. multocida* should be considered within the most probably differential diagnoses.
- Laboratory testing is necessary for a conclusive diagnosis.



The dynamics of *Mycoplasma hyopneumoniae* infection, clinical signs, and host immune response over time



4. Mycoplasma hyopneumonia

Control/Prevention:

◆ Optimized management practices and housing conditions:

- all-in/all-out production
- limiting factors that may destabilize herd immunity
- maintaining optimal stocking densities
- prevention of other respiratory diseases(PRRSV,PCV,PRDC)
- biosecurity measures
- optimal housing and climatic conditions

◆ Strategic medication with antimicrobials

- tetracyclines and macrolides(frequently)
- combinations of multi antimicrobials
- **added for about 1–3 weeks, commencing approximately 1 week prior to the expected time of disease onset**



4. Mycoplasma hyopneumonia

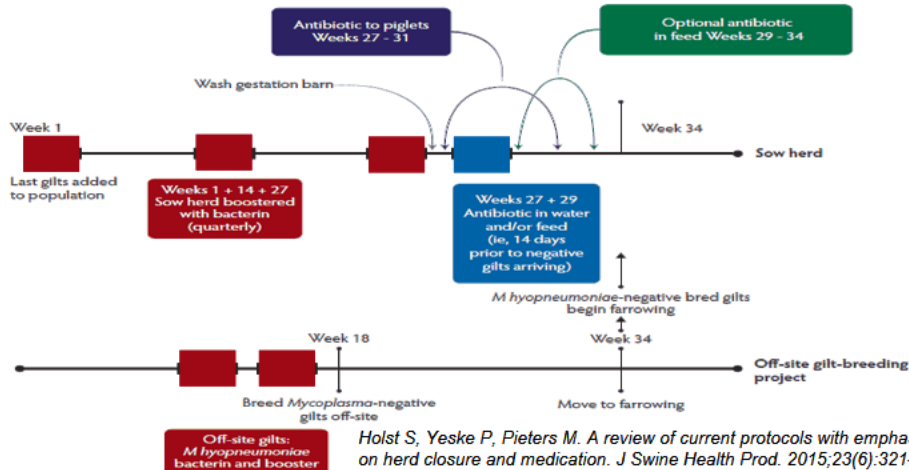
◆ Commercial vaccine:

- Widely used and effective
- Less clinical symptoms
- Less lung lesions
- Less medication use
- Less mortality rate
- Improved daily weight gain (2–8%),
- Improved feed conversion ratio (2–5%)

Vaccination of suckling piglets (early vaccination; <4 weeks of age)

◆ Eradication

- A depopulation and restocking was expensive and re-infections 2.6–10% per year occurred.
- Mainly applied in Denmark, Finland and Switzerland
- Total/Partial sanitation programme
- Medicated early weaning (MEW) in USA



Holst S, Yeske P, Pieters M. A review of current protocols with emphasis on herd closure and medication. *J Swine Health Prod.* 2015;23(6):321–330.

5. Swine Erysipelas

- Swine erysipelas is caused by a bacterium, *Erysipelothrix rhusiopathiae* that is found in most pig farms
- The most susceptible animals are growing pigs, non-vaccinated gilts and up to fourth parity sows.
- Clinical Signs
 - off-feed
 - Very high temperature.
 - Diamond shaped skin swellings – If the diamond markings are not obvious to the eye, they can be felt if the hand is run over the skin of the back or behind the back legs and over the flanks.



5. Swine *Erysipelas*

Prevention:

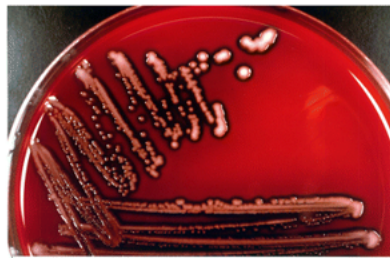
- **Vaccinate sows and boars twice a year, depending on the incidence and history of disease on the farm.**
- Killed vaccines are safe and have no adverse effects on the sow. Live vaccine is more cheaper and should be used in gilts first, then vaccinate sows herds.

Control:

- The erysipelas organism is very sensitive to **penicillin and Amoxycillin**.
Acutely ill animals should be injected twice daily for three days.
- And medicate amoxycillin in water.

6. *E.coli* Diarrhea

- *E. coli* infections occur at three main stages: **neonatal diarrhea, suckling piglet diarrhea and post-weaning scours**. They can also be present in combination with other pathogens including rotavirus.
- The signs and symptoms of *E. Coli* infection are: diarrhea (Scours), dirty appearance, dehydration.
- Diagnosis: It is particularly important to rule out viral or coccidial causes of diarrhea in suckling piglets. Antibiotic treatment is effective.



6. *E.coli* Diarrhea

- Prevention:vaccinate killed vaccine 1-2 time before farrowing.
- Treatment:
 - Medication:apramycin, neomycin, gentamycin,amoxicillin
 - electrolytes to reduce the severe dehydration.



7. Salmonella-Salmonellosis

- *S. Choleraesuis* is the specific serotype adapted to swine, and can produce a severe disease widespread in sows (fever, depression, septicemia, pneumonia, arthritis and diarrhea).
- The most commonly found serotype in pigs is *Salmonella Typhimurium* which sometimes is associated with diarrhea in grower-finishers.

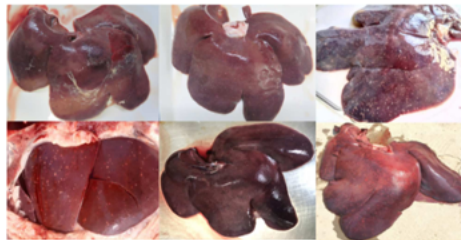
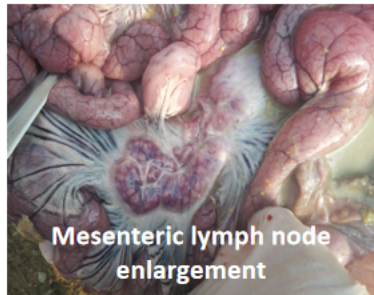


Figure 1 Necrotic foci on the liver showing salmonellosis in pigs

AkramKhan, 2019. The Harm of Salmonella to Pig Industry and Its Control Measures, International Journal of Applied Agricultural Sciences

7. *Salmonella*-Salmonellosis

Clinical signs:

- High temperature.
- Depression.
- Loss of appetite.
- Ears, nose and tail congestion (septicemia).
- Diarrhea, which sometimes can have blood and mucus.



Control/Prevention

- Improve hygiene by ensuring proper cleaning and disinfection (disease is dose dependent).
- All-in-all-out pig flow
- Vaccination: Vaccines can be very effective (do have some cross protection between *S. Choleraesuis* and *Typhimurium*).
- Medication: antibiotics can control disease but will not eliminate the pathogen.

8. Porcine *ileitis*

- Bacteria called *Lawsonia intracellularis*; Difficult to cultivate.
- The disease is world-wide in its distribution, the infectious organism exists on most if not all farms.
- Chronic case affects on performance including variations in weight gain, reduced feed efficiency.
- Acute case: the pig may die suddenly or appear very pale and anaemic and pass black bloody faeces.



Prevention&Control

- Strategically medicate incoming gilts with tylosin, tiamulin or other antibiotics if there are problems.
- Reduce environmental stress. All-in and All-out.
- Vaccinate gilt herd if the problem is severe. (Enterisol® Ileitis)
- Medication: tiamulin, tylosin, enrofloxacin, chlortetracycline, tilmicosin and so on.



Elanco



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- China banned the use of antibiotic growth promoters in swine feeds since 2020, some bacterial diseases became severe clinically, such as *Clostridium*, *Atrophic rhinitis*, *salmonella*, *ileitis* and so on .
- Government is closely monitoring the withdrawal period of antibiotics, especially for finishers and culled sows. No medication for marketing pigs.
- Clinical monitoring and individual injection is helpful to control bacterial infection at the early stage. But to control the transmission of ASFV in farm, caregivers are asked to avoid to contact with pigs, and less individual injection compared with before.

- After ASFV infection in China, more and more large-scale farms were established with PRRSV free gilts and good environmental control. The clinical impact of *Mycoplasma*, *Haemophilus Parasuis*, *Streptococcus Suis* become mild for PRRSV free herd.
- To control ASFV, farmers pay more attention to internal biosecurity, especially all-in and all-out, hot water washing, batch management. It is helpful to reduce the impact of bacterial diseases.
- Currently autogenous vaccine is not allowed to use in China, although the autogenous vaccine is more effective than the commercial vaccine for some bacterial diseases, for example *Streptococcus suis*, *Haemophilus parasuis*.

The application of bacterial vaccine in China

- Too many viral vaccine should be vaccinated in China farms, for example PRV,CSFV,PRRSV,FMD,PEDV,Parvo and so on.
- Pig farmers are used to medicating to control bacterial diseases.
- China researcher should pay more attention to develop effective bacterial vaccine.

The available commercial bacterial vaccine in China market

Bacterial diseases	Vaccination or not	Efficacy	vaccine	Common
Mycoplasma	Majority	good	killed or modified	High morbidity
Erysipelas	low	Excellent	killed or modified	low morbidity
E.coli	medium	foreign vaccine is better	killed	middle morbidity vaccine is too expensive
APP	medium	foreign vaccine is better	killed	High morbidity, vaccine is too expensive
Atropic rhinitis	low	foreign vaccine is better	killed	low mortality
ilietis	low	BI product	alive	too expensive
Salmonella	low	good	alive	low mortality
Strep suis	low	not good enough	killed	autogenous vaccine better
Heamophilus	Low	not good enough	killed	autogenous vaccine better



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Take-home message

- There are more than 20 kinds of bacterial diseases in Swine.
- In China pig farms the most important bacterial diseases includes *Actinobacillus pleuropneumoniae (APP)*, *Porcine ileitis*, *Swine Erysipelas*, *Streptococcus Suis*, *Haemophilus suis*, *Mycoplasma hyopneumonia*, *Salmonella*, *E.coli* and so on.
- The most common prevention and control strategies for bacterial diseases: Medication, Vaccination, environment control and internal biosecurity(All in-all out ,batch management, and so on) and elimination.

Take-home message

- Vaccination: Swine *Erysipelas*, *E.coli*, *Mycoplasma hyopneumonia*, *APP* and *Swine infectious atrophic rhinitis*. Farmers usually do not use bacterial vaccination, except *Mycoplasma Hyopneumonia*.
- Medication: China banned the use of antibiotic growth promoters in swine feeds since 2020, some bacterial diseases became severe clinically, such as *Clostridium*, *Atrophic rhinitis* and *salmonella*.
- It is very difficult to eradicate the bacterial diseases from swine farms. Some farms are trying to eradicate *APP* and *Mycoplasma Hyopneumonia* from swine herds, But not common.
- Environmental control: very important for some diseases, for example: *APP*, *Haemophilus Parasuis*, *E.coli*.

- After ASFV infection in China, more and more large-scale farms were established with PRRSV free gilts and good environmental control. The clinical impact of *Mycoplasma*, *Haemophilus Parasuis*, *Streptococcus Suis* become mild for PRRSV free herd.
- Looking forward to develop more efficacy bacterial vaccine in future to reduce the antibiotic usage

Dr. Vet team: promote pig production based on scientific practice



Dr. Vet team has 18 pig vet consultants providing veterinary service for China farms.

We are serving for more than 1 million sows

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Support **P**igs

Support **P**rofits

Question&Answer

Thank you !

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