



pork industry handbook

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Swine Arthritis

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Arthritis is commonly recognized as being a major factor in swine lameness. The disease is brought about by infection of the joint and the surrounding tissues by bacteria or mycoplasmas. U.S.D.A. meat inspection records indicate that trimming of parts of swine carcasses and discarding of whole carcasses due to arthritis are leading causes of loss at slaughter. Greater loss probably occurs on the farm because of slower and less efficient gains and reduced performance by adult breeding stock and lactating sows. Death loss occurs in some instances but is not generally considered to be a major factor.

Other factors in lameness in swine include those related to nutritional imbalances or deficiencies, foot and leg lesions resulting from trauma and improper conformation, and degenerative bone and joint changes.

Streptococcal Arthritis

Streptococci cause acute and chronic arthritis in 1-3-week-old pigs. Aside from the diarrheal and respiratory diseases, streptococcosis is probably one of the most common diseases affecting young pigs.

The streptococci are classified serologically according to the Lancefield system. Representatives from virtually every one of the 19 Lancefield types have been isolated from swine; however, most isolates from naturally occurring arthritis have been either the Lancefield Group C organism known as *Streptococcus equisimilis* or unnamed strains belonging to Group L.

Streptococcal infection occurs under many types of management and environmental conditions. The organisms are common in vaginal secretions, respiratory

tract secretions and sow milk. They may invade the baby pig's body by way of the navel, foot or skin wounds or the tonsils. Rough flooring or bedding material causes abrasions of the legs of nursing pigs that undoubtedly facilitate invasion by these organisms.

Streptococcal arthritis never affects a large percentage of pigs; the morbidity rate is usually less than 5%. Ten to 20% of affected pigs may die, either as a result of systemic lesions produced during the septicemic stage of the disease or of causes related to impaired mobility (starvation, overlaying, etc.).

Clinical Signs

Acute streptococcal infection is characterized by a fever, roughened hair coat, depression and lameness. As the disease progresses, the affected pig may lose weight and have marked enlargement of the affected joints. One or several joints may be involved; swelling is most often observed in the knee, elbow and hock joints. The pain associated with the condition and the resulting impairment of movement restrict the ability of affected pigs to nurse. Affected pigs are often stunted and have chronic arthritis for life.

Tissue Changes

Affected joints contain increased amounts of cloudy joint fluid with clots of fibrin. There is swelling, discoloration and redness of the membranes. The connective tissue capsule around the joint is thickened and may contain small abscesses. As the disease becomes chronic there may be damage to the articular cartilage. Lesions are also observed in the growth plates of the bones.

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Diagnosis

A sudden lameness with joint enlargement and a fever in pigs 1-3 weeks of age is highly suggestive of streptococcal arthritis. The joint and bone lesions are also very suggestive. The organism can be isolated from the acutely arthritic joint by culture technics.

Prevention and Treatment

The recommended treatment is penicillin. It is most effective if initiated very early before the disease is advanced. If the inflammation has become chronic, the response to treatment will be very poor.

Use of autogenous or mixed bacterins containing streptococci has been reported an effective method for prevention of this disease. Such products have been used to vaccinate pregnant sows to confer immunity to the baby pigs through colostrum. While this approach is scientifically sound, it has not been thoroughly evaluated. In fact, the variety of types of streptococci involved indicate that a bacterin containing antigens from several serotypes of streptococci is required. Such bacterins are not available.

Erysipelas Arthritis

Erysipelas is an acute, subacute and chronic bacterial disease affecting swine of all ages. In the acute form, the disease is generalized, involving all body systems. The chronic form consists primarily of arthritis and endocarditis and inflammation of the heart valves. Erysipelas causes serious economic loss in most areas of the world where swine are raised.

Erysipelothrix rhusiopathiae, the causative agent of erysipelas, varies in virulence causing no, or only mild, disease in some herds and, in other herds, causing severe, explosive outbreaks with considerable death loss. Other factors that influence the severity of erysipelas include age of the swine and level of antibodies resulting either from passive transfer via colostrum from the dam or from previous exposure to low-virulence strains of the organism. There may be differences in resistance related to genetic influences, the nutritional status, the environmental temperature and atmospheric or seasonal conditions.

E. rhusiopathiae is carried in the tonsils and intestines of convalescent swine. Although it can be isolated from soil contaminated with swine feces, there is no evidence to support the belief that it can survive for long periods or grow in soil. The organism also causes arthritis in lambs, acute septicemic disease in turkeys and localized infection in humans who handle meat and fish.

Clinical Signs

Acute swine erysipelas often appears in a herd with sudden death of one or more pigs. Affected animals may be depressed, have temperatures of 104-106 F., have poor appetites and be stiff, lame and reluctant to move. There may be shifting of weight in an attempt to relieve the pain. The feet may be placed well under the pig, giving the back an arched appearance. Such arthritic pigs will lie down frequently and may be reluctant or unable to rise. Welt-like lesions may develop in the skin during the acute stage. These lesions are firm, raised and, in light skinned pigs, they may appear light pink to dark purple. Such lesions may heal or there may be sloughing of necrotic patches of skin later on, often called diamond skin disease.

Subacute erysipelas is similar to acute erysipelas except that it is milder. Temperatures are not so high, the appetite may be normal, and there may be only minimal skin involvement or lameness.

Chronic swine erysipelas consists of chronic inflammation in the heart valves and the joints. Chronic arthritis affects one or several joints and varies

considerably in the amount of interference with locomotion. Affected joints may be markedly enlarged, stiff and, in some cases, so severely damaged that joint function is no longer possible.

Tissue Changes

Lesions in acute erysipelas are similar to those seen in other septicemic diseases of swine, with hemorrhages in various organs and serous membranes and acute inflammation of lymph nodes. Affected joints have increased amounts of discolored joint fluid and swollen, reddened joint membranes.

In chronic arthritis the joints have thickened, discolored synovial membranes with increased amounts of connective tissues and infiltration of inflammatory cells. The changes may also extend into the ligaments and tendon sheaths near the joints. The joint fluid is red to brown and increased in amount. The cartilage covering the ends of bones in the joint may be severely eroded and necrotic. There may be growth of bone around the margins of the joint so that the joint cannot bend. Lymph nodes draining arthritic joints may be markedly inflamed and enlarged several times the normal size.

Diagnosis

Erysipelas arthritis is best diagnosed by isolation of the organism from affected joints; however, this is often difficult to do because the organism disappears or is present only in very small numbers in the chronic stages of the disease. Severe chronic inflammation of the joint membranes and surrounding tissues and damage to the bone and articular cartilage are highly suggestive of chronic erysipelas arthritis. A history indicative of acute erysipelas in the herd is suggestive of *E. rhusiopathiae* in cases of chronic arthritis. Serologic tests have been used for many years to aid in diagnosis, but because of difficulties in interpretation they generally are not used in the U.S.

Prevention and Treatment

Vaccination is well accepted as a preventive for acute swine erysipelas. Killed products known as bacterins and also certain live-attenuated vaccines are available. Selection of the appropriate product depends on the individual circumstances and experience on a given farm or in a given region. When bacterins are used, it is advisable to give 2 injections at 2-3-week intervals. Effective living avirulent vaccines for oral administration are also available. Vaccination apparently does not protect against the chronic arthritis as well as it does against the acute disease.

In general, it is advisable to vaccinate pigs against *E. rhusiopathiae* at 8-10 weeks of age. Vaccination of gilts and sows 6 weeks prior to farrowing and again 2 weeks later has been thought to induce antibodies that are transferrable to newborn pigs via colostrum.

Penicillin, in combination with antiserum against *E. rhusiopathiae*, is considered a good treatment for acute erysipelas. When this treatment is used properly in the acute stage, it is likely that little chronic arthritis will develop. Animals in which arthritis has already developed probably do not respond as well and those with chronic arthritis simply do not respond to this treatment. Corticosteroids may be used for temporary alleviation of the arthritic signs but probably do not influence the eventual outcome of the process.

Mycoplasma Arthritis

Two species of mycoplasmas have been shown to cause arthritis in swine. *Mycoplasma hyosynoviae* causes acute arthritis in pigs 10 weeks and older and *Mycoplasma*

hyorhinis causes acute and chronic polyserositis and arthritis in pigs 3-10 weeks of age and occasionally in young adult swine. Both species can be isolated from the nasal cavities, the throat or the lungs of swine; however, they are not known to be primary causes of disease in the respiratory tract. They can be distinguished from *Mycoplasma hyopneumoniae*, the cause of chronic pneumonia in swine.

Mycoplasma hyosynoviae

Arthritis caused by *M. hyosynoviae* occurs primarily in swine 12-24 weeks of age and occasionally in young adult swine. *M. hyosynoviae* arthritis occurs in all breeds of swine, but it seems to be more frequent and more severe in genetic lines that are heavily muscled and that have poor leg conformation and poor leg action. A degenerative joint disease (osteochondrosis) of swine may be an important predisposing factor in this disease. Stress associated with movement or mixing, transport or changes in weather are thought to predispose to the disease. It is quite common to see *M. hyosynoviae* arthritis in young boars 7-10 days after they have been introduced into a new herd.

In most outbreaks of *M. hyosynoviae* arthritis, less than 10% of the pigs are affected; however, in some severe cases more than 50% may be involved. Very few affected swine die.

M. hyosynoviae actually becomes established in many swine without producing evidence of arthritis. A high percentage of adult swine in infected herds carry the organism in their tonsils for long periods. Such carrier sows are undoubtedly the initial source of the organism, resulting in infection of some young pigs. The organism appears to spread from pig to pig after weaning (5-7 weeks of age). Later at 2-3 months of age, most pigs have the organism in their throats.

Clinical Signs

Onset of *M. hyosynoviae* disease is characterized by sudden appearance of lameness in one or more legs. The lameness varies in severity and duration, usually lasting 3-10 days. The pain may be so intense that the animal will not use the affected leg. Arthritis in rear limbs is characterized by limping, frequent flexion of the affected limb, shifting of weight, and altered stance. The feet may be carried well under the body with the back arched. Front limb involvement is characterized by limping, stiffness or kneeling on the fetlock. Affected animals usually have difficulty in rising or may be unable to rise. Joint enlargement is usually not observed unless the hock is involved. Acutely arthritic swine may show slight to moderate weight loss, slight to moderate loss of appetite, and slight rectal temperature elevations.

Tissue Changes

Joints with acute *M. hyosynoviae* arthritis are distended with turbid, yellow to red-brown fluid. Membranes lining the joints are thickened and yellow to red. The membranes often appear granular or velvet-like. Periarticular tissues may be swollen and the tendon sheaths may be inflamed. The joint cartilage generally appears normal.

Diagnosis

The age of the swine involved, the sudden onset of lameness and the nature of the lesion are helpful aids in making a tentative diagnosis. Joint fluid should be submitted for microbiological examination. *M. hyosynoviae* can be isolated from about 50% of the acutely affected joints. Samples collected from chronically affected swine or swine treated with antibiotics are usually negative for the organism.

Prevention and Treatment

Stressful conditions or practices that create unnecessary stress should be minimized during the susceptible age period in herds troubled with *M. hyosynoviae* disease. Breeding stock should be selected that have good leg conformation and leg action. Sows and boars should not be purchased from seed stock herds that have a history of severe arthritis problems.

Injectible tylosin (Tylan) has long been available as an effective treatment for *M. hyosynoviae* disease. Lincomycin (Lincocin) is another drug that has been shown to be effective for treatment of the disease. Treatment with either of these antibiotics is most effective if given during the early stages of the disease. Field reports as well as laboratory studies indicate the occurrence of cases of the disease which do not respond well to one or the other of these antibiotics. Well-documented evidence of the value of any medication given orally for prevention or treatment of *M. hyosynoviae* disease has not been presented. Corticosteroids are sometimes used to alleviate pain associated with the arthritis.

There is no vaccine for prevention of *M. hyosynoviae* disease.

Mycoplasma hyorhinis

M. hyorhinis is a common inhabitant of the swine nasal cavity and a common secondary invader in swine pneumonia. It occasionally produces inflammation of the serous membranes of the pig's body and arthritis. The serous membranes cover the heart, lungs, abdominal viscera and testes. Inflammation of the serous membranes is called polyserositis.

M. hyorhinis disease occurs more frequently in groups of swine with other diseases such as pneumonia or enteritis and where there is considerable stress caused by poor environmental conditions or poor management. The condition may occur in young adult breeding stock, especially first generation surgically-derived swine when they are stressed or mixed with conventional or second generation SPF stock.

In most outbreaks of *M. hyorhinis* disease, the incidence of clinical illness is low, but in occasional cases up to 25% of the pigs may be affected. Mortality is generally low.

M. hyorhinis is carried in the upper respiratory tracts of a small percentage of adult swine. It is probably most often transmitted from such carriers to a few young pigs which then serve to spread the organism among penmates. Most of these animals never show any clinical signs of illness. *M. hyorhinis* is known to be a very common secondary invader in pneumonia initiated by other organisms and may, under some circumstances, cause pneumonia in young pigs.

Clinical Signs

Swine with early stages of *M. hyorhinis* disease have roughened hair coats and are somewhat depressed. As the disease progresses, clear evidence of abdominal and chest pain is seen. The pigs show stretching movements with the front and hind limbs extended, particularly when first aroused. Affected pigs may be tucked up and exhibit labored breathing. Some animals lie on their chest rather than on their sides. Poor appetites and slight temperature elevations may be seen. Some of the affected pigs develop lameness and enlargement of the joints. Swelling of the scrotum may be seen, especially in young boars.

The inflammation in the body cavities may continue for several weeks or months and result in stunting of growth. The arthritis often continues for at least 6 months causing lameness and reduced mobility. Clinical characteristics of the lameness depend on the severity of the disease and the joints involved.

Tissue Changes

The lesions produced by *M. hyorhinis* in joints are similar to those produced by *M. hyosynoviae* except that they more often become chronic. There is increased, discolored joint fluid and the joint membranes are swollen and yellow to red. There may be fibrin clots in the joint fluid. Lesions in the chest, abdominal and heart sac cavities consist of accumulation of cloudy fluid with pieces of fibrin. As the disease progresses, adhesions develop. Such adhesions frequently are seen in slaughter swine.

Diagnosis

Appearance of arthritis accompanied by polyserositis (peritonitis, pleuritis and pericarditis) in 3-10-week-old pigs is very suggestive of *M. hyorhinis* disease. The organism can be isolated from the synovial fluid of arthritic joints and from the exudate in the body cavities. This disease must be differentiated from a very similar polyserositis and arthritis caused by *Hemophilus* spp.

Prevention and Treatment

Stress or other diseases that may predispose to *M. hyorhinis* disease such as pneumonia or diarrhea should be controlled.

There are no known effective treatments and no vaccine for this disease.

Arthritis Associated with Tail Biting

Tail biting is a vice that is becoming more common as use of confinement in growing and finishing of swine increases. It results in great economic loss each year. Growth and feed conversion are impaired, and there is frequently price docking at the time of sale of swine to the packer.

Bite wounds in the tail or other sites such as the ear provide access for organisms to the blood stream. *Streptococcus* spp., *Staphylococcus* spp. and *Corynebacterium pyogenes* are most often involved in arthritis of this type. Arthritis due to tail biting usually is manifested by large swellings of the shoulder, elbow, hock or stifle joints. Involvement of the vertebral column may result from direct extension from the tail injury.

Many management factors are involved in control of tail biting. It has become common practice to remove the tail of very young pigs at the first joint from the body. Good technique must be used since contamination of the open wound following removal of the tail may result in development of the very disease that one is attempting to prevent.

Treatment of arthritis resulting from tail biting is very unsatisfactory.

Osteochondrosis

A degenerative bone and joint disease of swine has been recognized in various western European countries in recent years. Very recent evidence indicates that it is also present in at least some of the better genetic lines of U.S. swine. The condition is sometimes described as leg weakness but should be more specifically identified as osteochondrosis.

Osteochondrosis is seen in rapidly growing, heavily muscled swine beginning at 4-6 months of age. The lameness associated with the condition develops progressively and varies widely in intensity from one animal to another. The elbow, stifle, hock and hip joints are most seriously affected; however, evidence has been presented that virtually all joints are involved. Swine with less heavy muscling generally have less severe lesions.

The principal lesion is a degenerative change in the growth plates of the bones and in the bone immediately beneath the articular cartilage. Damage to the articular cartilage and synovial membrane develops as a consequence of the damage in the bone growth areas. The lesion develops in areas that are thought to have greater amounts of stress—brought on by increases in muscle mass and the resulting displacement or improper relationship or position of bone ends in the joints. For instance, in many affected swine, there is damage and tissue destruction in the central portion of the medial condyle of the distal end of the femur (stifle joint). The lesions are non-inflammatory, and there is no evidence that infectious agents initiate the lesion. On the other hand, it is possible that this condition could predispose to more severe infectious arthritis if it were present before the infectious agent settled in the joint. It is tempting to speculate that this is exactly why heavily muscled lines of swine have more difficulty with *M. hyosynoviae* arthritis.

Diagnosis of osteochondrosis can be made by x-ray examination and by postmortem and microscopic methods.

Since infection is not involved as a primary factor, antibiotics would be of no value in the uncomplicated case. Corticosteroids may give temporary relief, but the disease is likely to become progressively worse despite such treatment. Selection of genetic lines with good leg action and good leg conformation should help to reduce the severity of osteochondrosis.

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Summary of major forms of infectious swine arthritis.

Type of arthritis	Primary manifestation	Age of pig affected	Recommended treatment*
<i>Streptococcus</i> spp.	Lameness, joint swelling (acute and chronic)	1 to 6 weeks	Penicillin
<i>Erysipelothrix rhusiopathiae</i>	Lameness, joint swelling along with generalized disease (acute and chronic)	1 to 8 months	Penicillin & antiserum
<i>Mycoplasma hyorhinis</i>	Lameness, occasional joint swelling and inflammation of membranes lining the heart, lung and abdominal cavities (acute and chronic)	3 to 8 weeks occasionally up to 12 months	None highly effective
<i>Mycoplasma hyosynoviae</i>	Lameness, acute and occasionally chronic	3 to 12 months	Tylosin Lincomycin

*Treatment generally effective only in acute stage.