Skin diseases of swine

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The skin is the largest body organ and in the normal state, forms a complete anatomic and physiologic barrier between the animal and its environment. While providing protection against a variety of noxious physical, chemical, and microbiological agents, it serves as a sensory organ which is in constant communication with internal body systems and reflects pathological processes that may be either primary or secondary in origin (Figure 1). In addition, the skin is responsible for thermoregulation, vitamin D synthesis, and immunoregulation.

Skin disease in a swine herd can adversely impact production by causing a significant decrease in growth rate and feed efficiency.[1] Skin lesions can decrease carcass value by causing damage to the hide and excess trimming at the packing plant. In the case of breeding stock and feeder pigs, poor cosmetic appearance can have a detrimental effect on reputation and sales.

The number of important skin diseases in swine are fewer than encountered in companion animal medicine, but diagnosing and treating them can be no less challenging. As with all diseases, a complete clinical history is an essential component of a thorough diagnostic workup. Note the age, morbidity and mortality, distribution of lesions, appearance and progression of lesions, and any other clinical signs that exist concurrently. Then, physically examine a number of animals in various stages of disease. Often the location and gross appearance of lesions can lead to a presumptive diagnosis and initiation of proper therapy.

It may be necessary to collect appropriate samples to obtain a definitive diagnosis. Many tests can be performed in the veterinary clinic by trained personnel. Skin scrapings are useful for diagnosing dermatomycosis and mange. When you suspect dermatophytosis, take scrapings from the edge of several lesions (Figure 2). Transfer the material to a commercially available dermatophyte culture medium (Fungassay, Synbiotics Corp., San Diego. California 92127; and InTray DM™, Biomed Diagnostics, San Jose, California 95112) or submit it to a veterinary diagnostic laboratory for fungal culture. Include hairs plucked from the edge of the lesion in the sample. Hair and material from suspected lesions can be examined directly for the presence of mites or dermatophytes after placing them in 10% solution of potassium hydroxide. However, remember that *Microsporum nanum* does not invade hair shafts. Growth is limited to keratinized skin. Therefore, epidermal crusts are the specimens of choice and must be examined carefully in order to demonstrate mycelial filaments of *M. nanum*.

Take skin swabs for bacteriologic culture in cases of exudative dermatoses. Because of the likelihood of secondary contamination, results of surface cultures should be interpreted with caution. Comparing results from bacteriologic cultures collected from several different lesions or sites may yield useful information regarding the bacterial flora that may be involved in the disease process.

Vesicular diseases may be diagnosed by collecting fluid from vesicles and submitting samples for virus isolation and electron microscopy examination. However, if lesions have progressed and vesicles are no longer present, other methods for diagnosis must be used.

Skin biopsies are important in diagnosing dermatoses. Your primary goal is to submit samples characteristic of primary lesions and to avoid sampling areas that may not yield useful information. If possible, multiple samples that are representative of the disease process should be included. Most "wedge biopsies" can be obtained using local anesthesia and minimal chemical or physical restraint. The area selected for biopsy should not be scrubbed, cleansed, or unduly prepared in any manner as surface materials are important components of the specimen and may yield significant information regarding the condition in question. The biopsy should include normal epidermis, dermis, and subcutis. Prior to placing them in 10% buffered formalin, samples may be touched to the surface of a blood agar plate, which can be submitted for bacterial culture and sensitivity testing. With widespread lesions, it may be beneficial to include large areas of skin from a necropsy for laboratory evaluation.

Bacterial dermatoses

Exudative epidermitis (greasy pig disease)

Exudative epidermitis is caused by *Staphylococcus hyicus* and is most commonly seen in pigs 1–8 weeks of age.[2] Lesions generally start on the face and progress over the body. In the acute form, affected pigs are covered by an odoriferous, moist, greasy exudate comprised of sebum and bacteria (Figure 3). In the chronic

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form, lesions consist of scabby patches of skin, which are most prominent over the head and shoulders (Figure 4).

Porcine cutaneous spirochetosis

Porcine cutaneous spirochetes may be occasionally encountered in a group of pigs but frequently go undiagnosed because lesions resemble those caused by a variety of other bacteria, including *Fusobacterium necrophorum* and *Actinomyces pyogenes*. Lesions consist of a severe ulcerative dermatitis.[3] *Borrelia suis* is the etiologic agent. Lesions are seen most often in young pigs shortly after weaning. They often develop secondary to trauma inflicted by ear biting, fighting, or castration and are frequently associated with poor sanitary conditions. The most common site of occurrence is at the base of the pinna and extending along the ventral margin to the tip of the ear. Lesions are characterized by necrosis and ulceration, which may result in extensive granulation tissue formation (Figure 5). In sows, affected areas are seen on the ventral abdomen and consist of a severe ulcerative dermatitis. Diagnosis is based on observing numerous motile spirochetes by dark-field examination of smears of fresh tissue. Silver stains can be use to identify organisms in histological sections.

Porcine necrotic ear syndrome

This skin condition may occur as a progression of porcine cutaneous spirochetosis although spirochetes have not been demonstrated in typical lesions, which consist of massive necrosis of the pinna. *Staphylococcus hyicus* and beta hemolytic streptococci have been recovered from cultures of typical lesions but their presence may reflect secondary involvement.[4] The pathogenesis of the lesion is complex and thought to be initiated by damage to the epidermis followed by bacterial invasion.

Vesicular and viral dermatoses

When confronted with acute vesicular disease in swine, you should be aware of the possibility of a reportable or foreign disease. While the probability of an exotic disease is remote, you should immediately seek the diagnostic assistance of state and federal authorities. Vesicular diseases of swine include foot and mouth disease, vesicular stomatitis, vesicular exanthema, and swine vesicular disease. Vesicular stomatitis is not a foreign animal disease but clinical signs and gross lesions are indistinguishable from other exotic vesicular diseases. Laboratory tests are required for identification. Consider each case of vesicular disease in swine to be foot and mouth disease until laboratory tests confirm otherwise because of its highly contagious nature and huge economic consequences.[5]

Parvovirus dermatitis

A vesicular-like dermatitis has been described in young pigs ranging from 1–4 weeks of age.[6] Lesions initially consist of vesicles on the snout, coronary band, interdigital band, and tongue, which rupture to form erosions (Figure 6). Concurrently diarrhea, conjunctivitis, and rhinitis may be observed. Gross and microscopic lesions are not pathognomonic. Diagnosis relies on demonstrating parvovirus in the lesions using fluorescent antibody microscopy or virus isolation. Similar lesions have been described in swine acutely infected with *Staphylococcus hyicus*, suggesting that the condition may occur as a result of concurrent viral and bacterial infections.[7]

Swine pox

Swine pox is a common skin disease that has little economic impact and is often associated with poor sanitation. Clinical signs are typical of those seen with a pox virus infection. Pigs less than 3–4 months of age are more commonly infected than adults. Animals become immune after clinical disease subsides and serve as the reservoir of infection for the remainder of the herd. Congenital infection is occasionally noted.[8] Lesions are most obvious on the nonhaired portions of the body (Figure 7). Pox lesions are self-limiting and resolve over 3–4 weeks. Secondary bacterial infection is common and may obscure the primary condition unless you carefully examine affected animals early in the course of disease.[9] The swine louse, *Haematopinus suis*, has been implicated as a vector in the spread of swine pox.

Mycotic dermatoses

Ringworm

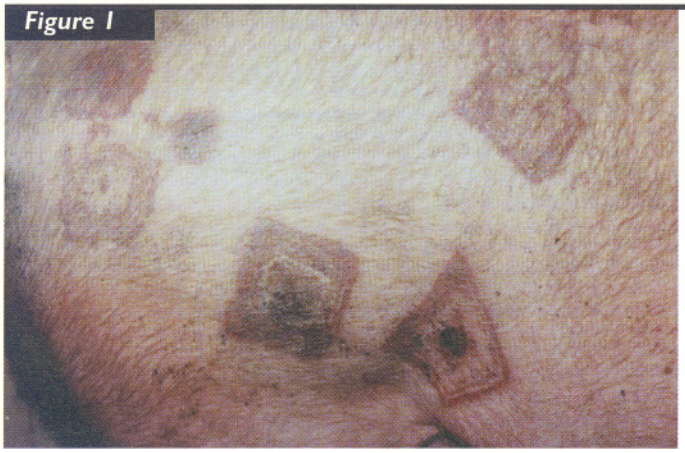
Microsporum nanum and *Trichophyton verrucosum* are the most common dermatophytes of swine, although *M. canis, M. gypseum*, and *T. mentagrophytes* have been reported to occur.[10] Each is a zoonotic pathogen. Incidence of infection with *M. nanum* and *T. verrucosum* is sporadic but may reach 100% in groups of closely confined sows. Lesions begin as small reddish brown foci, 1 to 2 cm in diameter, that spread concentrically and may reach up to 12 cm in diameter (Figure 8). Foci may be covered with a thin loose crust and may be either single or coalescent. They may occur anywhere on the body but are most commonly found behind the ears. Hair loss and pruritus are generally minimal. Diagnosis is based on typical gross lesions and demonstrating the organisms in skin scrapings or histological sections. Culture and identification are needed for a etiologic diagnosis.

Parasitic dermatoses

Sarcoptic and demodectic mange

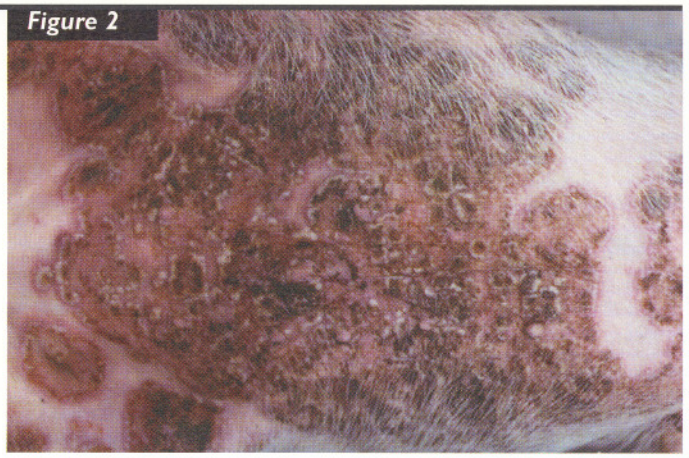
Parasitic skin diseases of swine include sarcoptic mange, demodectic mange, lice, and flies.[11] Other biting insects, such as fleas, are rarely important in swine production. *Sarcoptes scabiei* var. suis is the most economically important ectoparasite of swine and can significantly reduce the rate of gain and efficiency of feed conversion.[1,12] Infection is often unrecognized due to its ability to become endemic in a herd. Infection can be manifested as a chronic dermatitis affecting a few pigs or a cutaneous allergic response to the mites that involves most members of the herd and produces intense pruritus.[13] Sarcoptic mites are permanent parasites of the epidermis and live in tunnels within the epidermis. Lesions resembling a hypersensitivity reaction occur as early as 3 weeks after contact with the mites. They begin as small

Figure 1



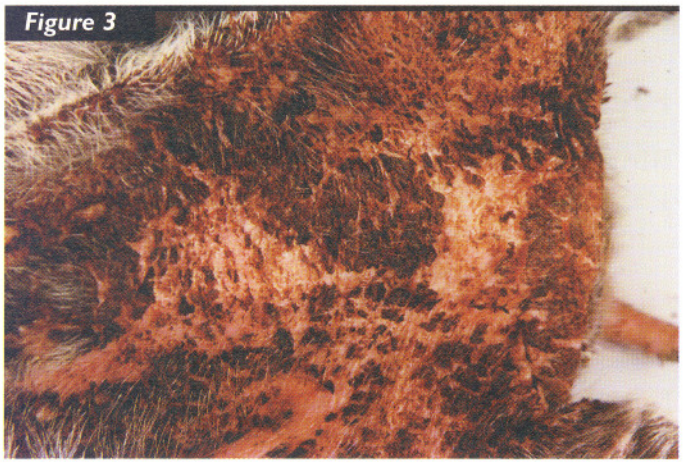
Typical cutaneous rhomboid lesions seen with *Erysipelothrix rhusiopathiae* infection in swine. The centers of several lesions are undergoing necrosis, desiccation, and detachment.

Figure 2



Trichophyton verrucosum infection in a pig. Samples for diagnostic evaluation should include deep skin scrapings and hairs plucked from the edges of lesions.

Figure 3

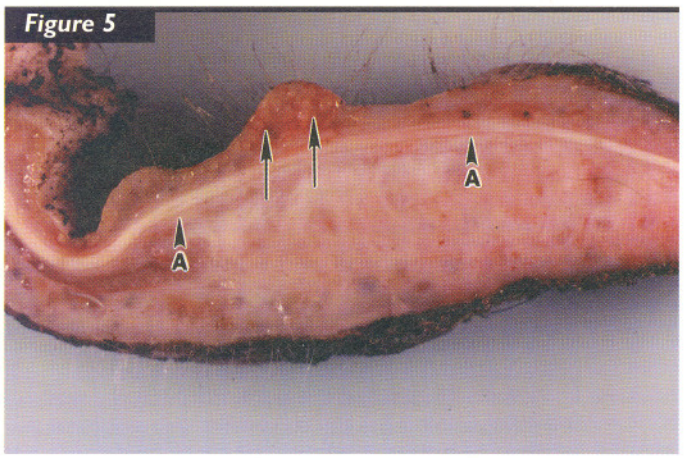


Ventral abdomen from pig acutely infected with *Staphylococcus hyicus*. The skin is covered with a greasy, brown, moist exudate consisting of serum and sebum.

Figure 4

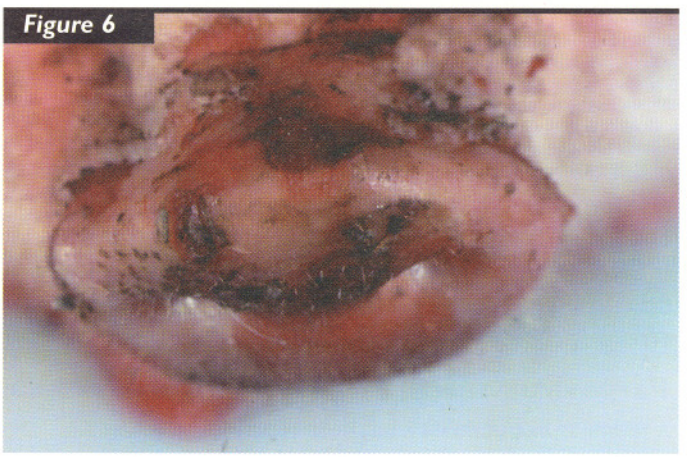
Chronic Staphylococcus hyicus infection involving the head and ears.

Figure 5



Cross section of the pinna of ear from pig with chronic *Borrelia suis* infection. Marked dermal fibrosis is noted on medial and lateral sides of the auricular cartilage (A). Foci of suppuration are present in the dermis (arrows).

Figure 6

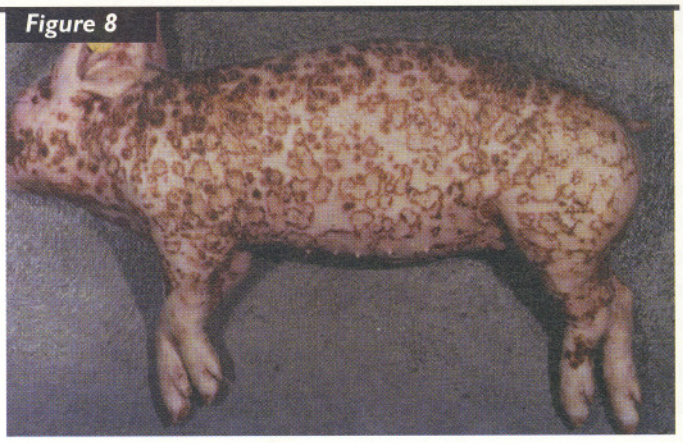


Ruptured vesicles and focal erosions are present on the snout of a feeder pig infected with parvovirus.

Figure 7

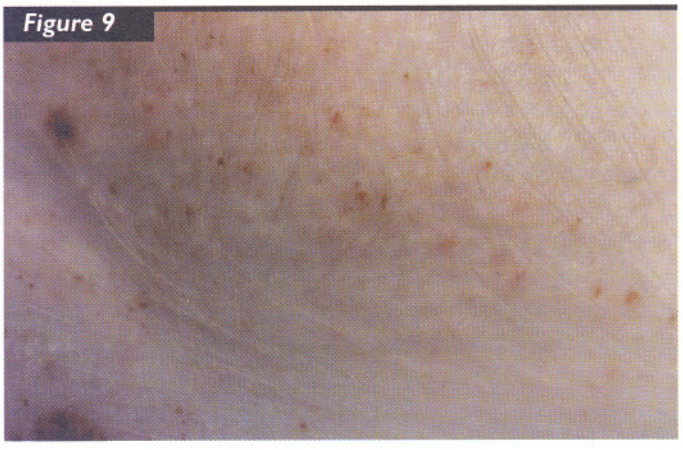
Ventral abdomen of a pig infected with swine pox. Numerous papules covered with dry epithelial crusts are observed.

Figure 8



Numerous coalescing scaly erythematous plaques due to *Trichophyton spp.* infection are seen over the body of a feeder pig.

Figure 9

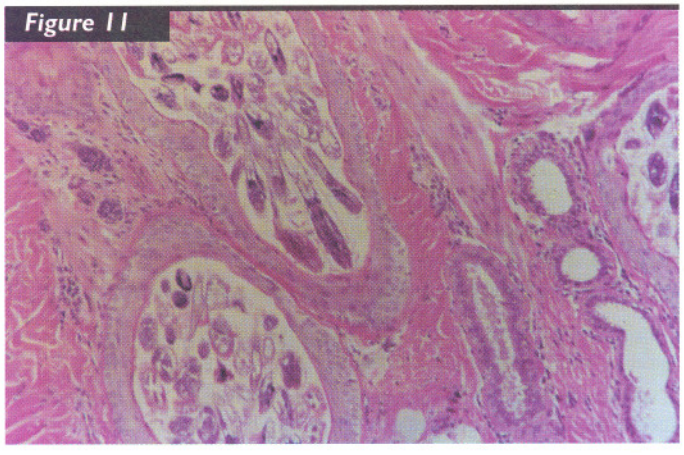


Cutaneous hypersensitivity reaction consisting of many small erythematous papules is noted on a pig infected with sarcoptic mange.

Figure 10

Marked hyperkeratosis and acanthosis are seen in a pig with chronic sarcoptic mange infection.

Figure 11



Microscopic section of skin containing numerous mites in hair follicles of a pig infected with *Demodex phylloides*.

Figure 12

Scaly erythematous plaques are present on the ventral abdomen of a feeder pig with pityriasis rosea.

focal erythematous papules over the back and abdomen (Figure 9). Hair loss and skin abrasions may result as sequelae to rubbing. Few animals develop chronic dermatitis even though incidence of infection in the herd may be quite high (Figure 10). Auricular infections are probably the most common. Diagnosis is made by use of deep scrapings from affected skin and examination of exudate from the external auditory canal for the presence of mites. Often samples obtained from the auditory canal are more rewarding than skin scrapings for demonstrating the mites.[13]

Demodectic mange is relatively uncommon in swine. The causative agent, *Demodex phylloides*, lives in hair follicles and produces a mild to moderately severe dermatitis over the snout, inside the thighs, and over the flanks (Figure 11). Occasionally, whole body involvement can occur and lead to excessive trimming or condemnation at slaughter. Infestation may produce skin nodules that resemble swine pox. Nodules contain a mixture of cheesy exudate and mites.[11]

Lice

Clinical signs produced by *Haematopinus suis* infection in swine are often confused with mange as both provoke an intense pruritus. Pediculosis and sarcoptic mange are common concurrent infections, but swine herds routinely treated for mange seldom are infected with lice. Observing clinical signs coupled with close examination of affected swine for lice leads to a definitive diagnosis.[11]

Biting flies

Biting flies such as the stable fly (*Stomoxys calcitrans*) and black flies (family *Simulliidae*) are important pathogens in swine health management.[14] Not only are flies a nuisance and a source of annoyance, they are blood suckers and can produce an intense nonspecific dermatitis that can be confused with other parasitic skin diseases. Diagnosis is based on observance of clinical signs. Biting flies have also been incriminated as vectors in the spread of eperythrozoonosis and swine pox virus.

Miscellaneous dermatoses

Pityriasis rosea

Skin lesions associated with pityriasis rosea may be clinically indistinguishable from those caused by ringworm.[15] The cause of pityriasis rosea is unknown but is thought to have a hereditary disposition in the Landrace breed.[16] No infectious agent has been identified and attempts to transmit the condition to susceptible animals have been unsuccessful. Lesions consist of small erythematous papules which develop on the medial thigh and ventral abdomen (Figure 12). Papules become scaly, expand centrifugally, and may coalesce to form a mosaic pattern where the centers return to normal. Rarely are lesions seen on the dorsum of the body. Diagnosis is made from physical examination and recognition of characteristic lesions. The condition is usually self-limiting and resolves within 4 weeks.

Physical and chemical dermatoses

Sunburn, photosensitization, frost-bite, and exposure to dermotoxic chemical agents are occasionally encountered in swine practice.[17] Physically examining affected animals and collecting a thorough clinical history usually leads to a definitive diagnosis without laboratory assistance. Photodynamic substances found in alfalfa, clover, rape, oats, buckwheat, St.-John's-wort, lucerne, and various drugs including phenothiazine, tetracyclines, and sulfonamides may cause an acute exudative dermatitis upon exposure to sunlight. Initiating proper husbandry measures and in the case of photosensitization or chemical-induced dermatitis, removing the causative agent leads to an uneventful recovery.

Nutritionally induced dermatoses

Nutritionally induced dermatoses in swine are rare as optimal diet formulation and feeding practices are becoming standard procedures in swine production during the course of producing quality pork at a lower price. Detailed information regarding dietary needs, ingredient quality, and milling procedures are readily available to the average producer and have an acceptable margin of error built into their recommendations. Dietary deficiency is usually only a temporary event that has minimal effect on the appearance of skin disease. Nevertheless, evaluating nutritional status and feeding practices should be part of a routine investigation of an outbreak of skin disease in a swine herd.

Summary

After you've made a definitive diagnosis of skin disease, you can implement specific treatment or control measures. While treatment is of concern at the outset, prevention is more important. To avoid a recurrence of the problem, use your knowledge of swine practice and medicine to review management and husbandry practices.

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