Second Edition

Color Atlas of Farm Animal Dermatology

Danny W. Scott

WILEY Blackwell

Color Atlas of Farm Animal Dermatology

Color Atlas of Farm Animal Dermatology

Second Edition

Danny W. Scott, DVM, DipACVP
James Law Professor of Dermatology
Emeritus at Cornell University
College of Veterinary Medicine
Ithaca, New York, USA

WILEY Blackwell

This edition first published 2018

Edition History
John Wiley & Sons (1e, 2007)

Registered Office
John Wiley & Sons, Inc., 111 River Street, Hoboken, NJ 07030, USA

Editorial Office
111 River Street, Hoboken, NJ 07030, USA

For details of our global editorial offices, customer services, and more information about Wiley products visit us at www.wiley.com.

Wiley also publishes its books in a variety of electronic formats and by print-on-demand. Some content that appears in standard print versions of this book may not be available in other formats.

Library of Congress Cataloging-in-Publication Data

Names: Scott, Danny W., author.
Title: Color atlas of farm animal dermatology [electronic resource] / by Danny W. Scott.
Description: Second edition. | Hoboken, NJ : Wiley, 2018. |
Includes bibliographical references and index. |
Identifiers: LCCN 2017033959 (print) | LCCN 2017055416 (ebook) |
ISBN 9781119250593 (pdf) | ISBN 9781119250616 (epub) | ISBN 9781119250579 (cloth)
Subjects: LCSH: Livestock–Diseases–Atlases. | Skin–Diseases–Atlases. | Veterinary dermatology–Atlases. |
MESH: Skin Diseases–veterinary | Skin Diseases–diagnostic imaging | Animals, Domestic | Atlases
Classification: LCC SF901 (ebook) | LCC SF901 .S37 2018 (print) | NLM SF 901 | DDC 636.089/65–dc23
LC record available at https://lccn.loc.gov/2017033959

Cover Design: Wiley
Cover Image: Courtesy of Danny W. Scott

Set in 10/12pt Warnock by SPi Global, Pondicherry, India

10 9 8 7 6 5 4 3 2 1

This atlas is dedicated to my colleague and friend, Israel Yeruham, whose untimely death in 2005 left a huge void in the world of farm animal dermatology. Israel devoted much of his professional career to the recognition, reporting, and teaching of farm animal skin diseases. His work is liberally referenced in this atlas. Israel, thanx for all you did. I miss you. I look forward to seeing you again in the hereafter.

Danny W. Scott

Contents

Preface and Acknowledgments

This second edition of *Color Atlas of Farm Animal Dermatology* has been extensively updated. New material includes 95 additional diseases, 231 additional color images, and a novel section on camelids (alpacas and llamas).

Like the first edition, this book is divided into species-specific units: bovine, caprine, ovine, porcine, and the newly added unit of camelids. Individuals interested in a particular species can easily go to the appropriate section of the *Atlas.* Concise historical and physical findings, a short list of reasonable differential diagnoses, and the essence of definitive diagnosis are provided. Therapy, prevention, and control measures are not addressed. The reader will need to consult the references and current in-depth textbooks to pursue such information. Concerning references, all of those in the first edition of this book have been replaced by more contemporary sources.

Many of the diseases in this *Atlas* are – from an American's viewpoint – foreign ("exotic"). I have had to draw upon the collections of several colleagues. I am eternally grateful to my "sisters and brothers" in farm animal practice.

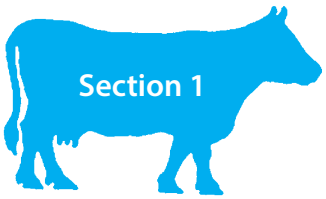
My wife and soulmate for the last 48 years – Kris – has always been my staunchest supporter and special source of encouragement. Her love and good karma are priceless!

Abraham Lincoln said:

> *"In the end, it's not the years in your life that count. It's the life in your years."*

I can truly say that all the erosions, excoriations, exudations, and excrescences I have encountered in farm animal dermatology have added a lot of life to this old guy's years!

Danny W. Scott
Ithaca, New York



Bovine

Color Atlas of Farm Animal Dermatology, Second Edition. Danny W. Scott.

Bacterial Skin Diseases

Impetigo
Folliculitis and Furunculosis
Ulcerative Lymphangitis
Corynebacterium pseudotuberculosis Granuloma
Dermatophilosis
Actinomycosis
Actinobacillosis
Clostridial Cellulitis
Opportunistic Mycobacterial Granuloma
Farcy
Miscellaneous Bacterial Diseases
- Abscess
- Cellulitis
- Bacterial Pseudomycetoma
- Necrobacillosis
- Necrotic Vulvovaginitis
- *Treponema*-Associated Ulcerative Mammary Dermatitis and Hock Lesions
- *Corynebacterium ulcerans*–Associated Eosinophilic Granuloma
- Nodular Thelitis
- Nocardiosis
- *Mannheimia granulomatis* Panniculitis
- Anthrax
- Septicemic Slough

Pododermatitis
- Digital Dermatitis
- Interdigital Dermatitis
- Interdigital Necrobacillosis

Impetigo

Features

Impetigo (Latin: an attack; scabby eruption) is a superficial pustular dermatitis that does not involve hair follicles. It is uncommon, cosmopolitan, and caused by *Staphylococcus aureus*, and predisposing factors include trauma, moisture, and the stress of parturition. Dairy breeds and lactating females are predisposed.

Lesions are most commonly seen on the udder (especially the base of the teats and the intramammary sulcus) and teats, with the ventral abdomen, medial thighs, vulva, perineum, and ventral tail less commonly affected (Figs. 1.1-1 and 1.1-2). Superficial vesicles rapidly become pustular, rupture, and leave annular erosions, epidermal collarettes, and yellow-brown crusts (Fig. 1.1-3). Lesions are neither pruritic nor painful, and affected animals are otherwise healthy. Up to 48% of a herd may be affected. Staphylococcal mastitis is a possible but uncommon complication. Occasionally, lesions can become nodular and painful (furunculosis) and spread to adjacent haired areas.

Severe trauma (e.g., milking machine, laceration, and crush) can lead to deeper staphylococcal infection – staphylococcal mammillitis. In such cases, ulceration, crusting, and variable degrees of necrosis are seen – usually affecting a solitary teat (Fig. 1.1-4).

Occasional reports – often anecdotal – have indicated that humans can develop pustular dermatitis due to *S. aureus* infection on hands and arms that contact bovine impetigo lesions.

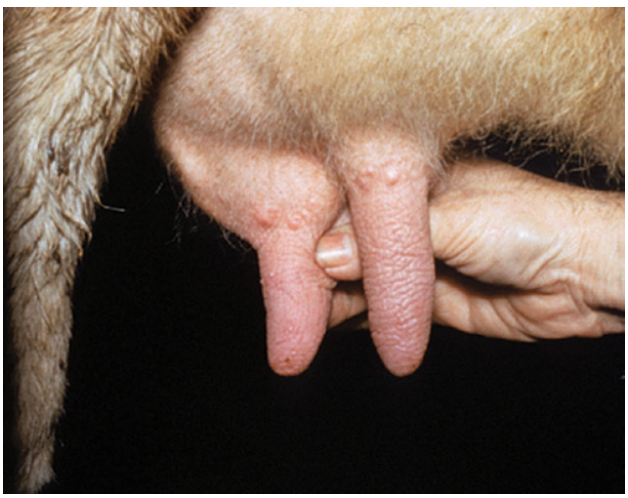


Figure 1.1-1 Impetigo. Superficial pustules on the base of the teats.

Color Atlas of Farm Animal Dermatology, Second Edition. Danny W. Scott.

Figure 1.1-2 Impetigo. Pustules and erosions on the udder.

Figure 1.1-3 Impetigo. Annular erosions, crusts, and collarettes. *Source*: Courtesy of J. Gourreau, AFSSA.

Figure 1.1-4 Staphylococcal mammillitis. Ulceration, crusting, and necrosis due to milking machine trauma.

Differential Diagnosis

Other bacterial infections, dermatophilosis, dermatophytosis, stephanofilariasis, and viral infections.

Diagnosis

1) Microscopy (direct smears): Suppurative inflammation with degenerate neutrophils, nuclear streaming, and phagocytosed cocci (Gram-positive, about 1 µm in diameter, often in doublets or clusters) (see Figs. 1.1-10 and 1.1-11).
2) Culture (aerobic).
3) Dermatohistopathology: Subcorneal pustular dermatitis with degenerate neutrophils and intracellular cocci.

Folliculitis and Furunculosis

Features

Folliculitis (hair follicle inflammation) and furunculosis (hair follicle rupture) are uncommon, cosmopolitan, and caused by *Staphylococcus aureus* or, less commonly, *S. hyicus*. Predisposing factors include trauma (e.g., environment or insects) and moisture. There are no apparent breed, sex, or age predilections.

Lesions can be seen anywhere, most commonly over the rump, tail, perineum, distal limbs, neck, and face (Figs. 1.1-5 to 1.1-9). Lesion location often is indicative of inciting cause(s). Tufted papules become crusted, then alopecic. Intact pustules are often not seen. Furuncles are characterized by nodules, draining tracts, and ulcers. Lesions are rarely pruritic, but furuncles may be painful. Affected animals are usually otherwise healthy. Pending the inciting cause(s), single or multiple animals may be affected.

Differential Diagnosis

Dermatophilosis, dermatophytosis, demodicosis, stephanofilariasis, and sterile eosinophilic folliculitis and furunculosis.

Diagnosis

1) Microscopy (direct smears): Suppurative inflammation with degenerate neutrophils, nuclear streaming, and phagocytosed cocci (Gram-positive, about 1 µm in diameter, often in doublets or clusters) with folliculitis (Figs. 1.1-10 and 1.1-11). Furunculosis is characterized by numerous macrophages, lymphocytes, eosinophils, and plasma cells in addition to the findings described for folliculitis (Fig. 1.1-12).
2) Culture (aerobic).
3) Dermatohistopathology: Suppurative luminal folliculitis with degenerate neutrophils and intracellular cocci; pyogranulomatous furunculosis.

Figure 1.1-5 Staphylococcal folliculitis. Multiple annular crusts over rump and tail.

Figure 1.1-6 Staphylococcal folliculitis and furunculosis. Multiple tufted papules and annular areas of crusting, alopecia, and ulceration. *Source*: Courtesy of J. Gourreau, AFSSA.

Figure 1.1-7 Staphylococcal folliculitis caused by *S. hyicus*. Multiple annular crusts on face, neck, and shoulder. *Source*: Courtesy of T. Clark.

Figure 1.1-8 Staphylococcal furunculosis. Plaque with draining tracts and ulceration on the caudolateral aspect of the pastern.

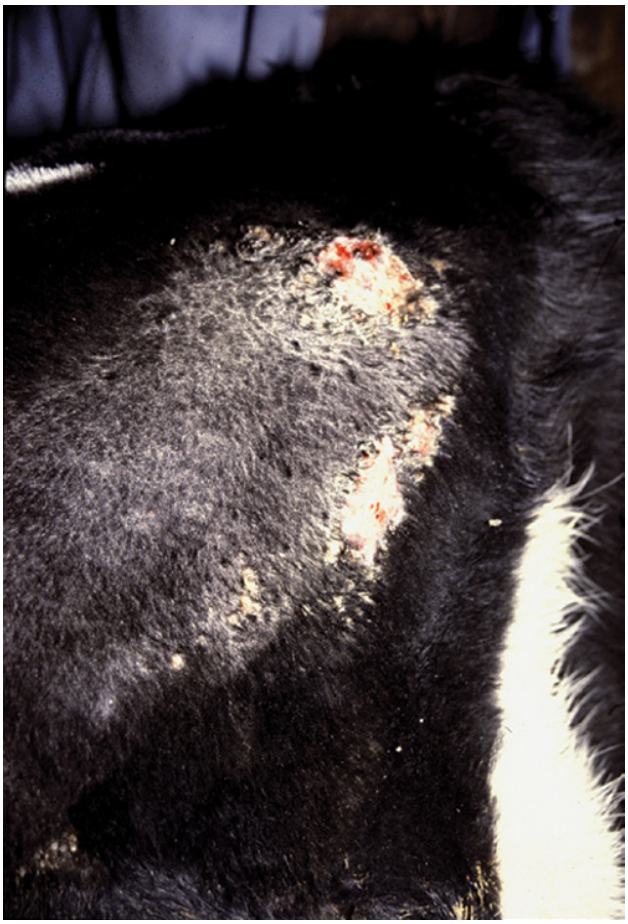


Figure 1.1-9 Staphylococcal folliculitis. Hair loss, tufted crusts, and erosions due to *S. aureus*. *Source*: Courtesy of M. Sloet.

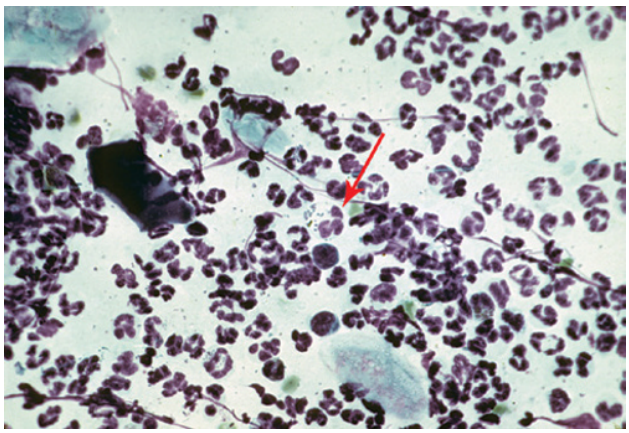


Figure 1.1-10 Staphylococcal folliculitis. Direct smear (Diff-Quik stain). Suppurative inflammation with degenerate neutrophils, nuclear streaming, and phagocytosed cocci (arrow).

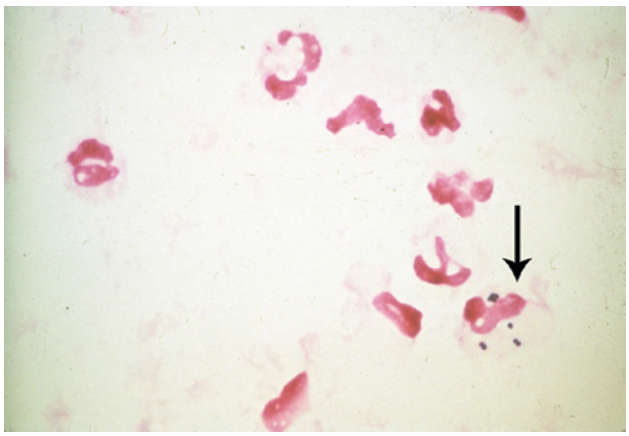


Figure 1.1-11 Staphylococcal folliculitis. Direct smear (Gram stain). Degenerate neutrophils and phagocytosed Gram-positive cocci (arrow).

Ulcerative Lymphangitis

Features

Ulcerative lymphangitis is a rare bacterial infection of the cutaneous lymphatics. Cutaneous wounds may be contaminated by numerous bacteria, especially *Trueperella* (*Arcanobacterium*) *pyogenes*, *Corynebacterium pseudotuberculosis*, *Staphylococcus aureus*, and ß-hemolytic streptococci. Mixed infections are not uncommon. There are no apparent breed, sex, or age predilections. Lesions are typically unilateral and seen on the distal leg, shoulder, neck, or flank (Fig. 1.1-13). Firm to fluctuant nodules often abscess, ulcerate, and develop draining tracts. Exudate may be gelatinous and clear to suppurative. Affected lymphatics are often enlarged and palpable ("corded").

Lesions often take a linear distribution, and heat and pain are variable findings. Regional lymphadenopathy is very common. Affected animals are usually otherwise healthy. Typically, only one animal in a herd is affected.

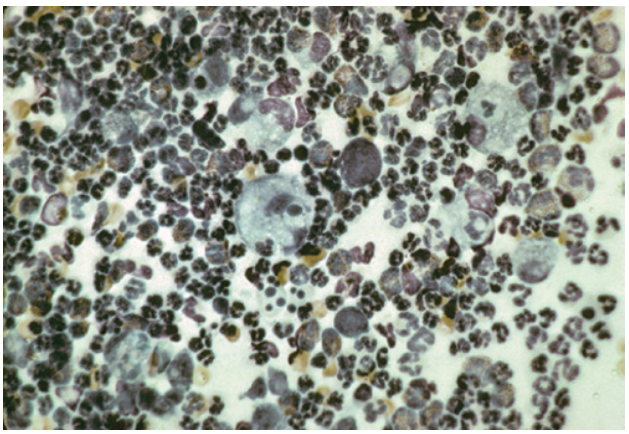


Figure 1.1-12 Staphylococcal furunculosis. Direct smear (Diff-Quik stain). Pyogranulomatous inflammation with degenerate and nondegenerate neutrophils, macrophages, lymphocytes, and plasma cells.

Figure 1.1-13 Mixed bacterial lymphangitis. Left pelvic limb is swollen, and multiple papules, nodules, and draining tracts are present.

Differential Diagnosis

Opportunistic mycobacterial granuloma, farcy, actinomycosis, and sporotrichosis.

Diagnosis

1) Microscopy (direct smears): Suppurative inflammation with degenerate neutrophils, nuclear streaming,

phagocytosed bacteria (cocci and/or rods), and variable numbers of macrophages, lymphocytes, and plasma cells.
2) Culture (aerobic).
3) Dermatohistopathology: Nodular to diffuse suppurative or pyogranulomatous dermatitis and panniculitis with intracellular bacteria; lymphangitis often not seen.

Corynebacterium Pseudotuberculosis Granuloma

Features

Corynebacterium pseudotuberculosis infection is a rare to uncommon, suppurative to pyogranulomatous disease. *C. pseudotuberculosis* contaminates various wounds. Moisture and flies are important contributing factors. Older dairy cattle are predisposed.

Lesions may occur anywhere, especially the head, neck, shoulder, flank, and hind leg above the stifle (Figs. 1.1-14 through 1.1-16). Lesion location is often indicative of inciting cause(s). Single or multiple subcutaneous abscesses rupture to drain a serosanguineous to blood-stained yellow pus. Ulcerated granulomas may

Figure 1.1-14 *Corynebacterium pseudotuberculosis* granuloma. Large ulcerated nodule over shoulder. Note draining tracts.

Figure 1.1-15 Close-up of Figure 1.1-12. Note areas of necrosis, ulcerations, and draining tracts.

Figure 1.1-16 *Corynebacterium pseudotuberculosis* granuloma. Large ulcerated nodule on fetlock.

have necrotic margins. Regional lymph nodes may be involved, but systemic signs are not usually seen.

Differential Diagnosis

Other bacterial infections, especially due to *Trueperella pyogenes*, *Actinomyces bovis*, and *Actinobacillus lignieresii*.

Diagnosis

1) Microscopy (direct smears): Pyogranulomatous inflammation. Intracellular Gram-positive pleomorphic bacteria (coccoid, club, and rod forms) that may be arranged in single cells, palisades of parallel cells, or annular clusters resembling "Chinese letters." Bacteria usually few in number and not seen.
2) Culture (aerobic).
3) Dermatohistopathology: Nodular to diffuse pyogranulomatous dermatitis and panniculitis. Intracellular Gram-positive bacteria not commonly seen.

Dermatophilosis

Features

Dermatophilosis (also called "streptothricosis," "rain rot," and "rain scald") is a common, cosmopolitan skin disease. *Dermatophilus congolensis* proliferates under the influence of moisture (especially rain) and skin damage (especially ticks, insects, prickly vegetation, and ultraviolet light–damaged white skin). The disease is more common and more severe in tropical and subtropical climates and outdoor animals. In general, there are no breed, sex, or age predilections. However, endemic cattle are more resistant than exotic breeds.

Lesions may occur anywhere (Figs. 1.1-17 to 1.1-26). Lesion location is indicative of inciting cause(s). Common distribution areas include: dorsum and rump; brisket, axillae, and groin; face and pinnae; distal legs; udder and teats, or prepuce and scrotum; and perineum and tail. Tufted papules and pustules coalesce and become exudative, which results in large ovoid to linear ("run-off" or "scald line") groups of hairs being matted together ("paintbrush") in thick crusts. Erosions, ulcers, and thick, creamy, yellowish-to-greenish pus underlie the crusts. Acute lesions are painful but not pruritic. Chronic lesions consist of dry crusts, scale, and alopecia. Typically, multiple animals are affected.

In tropical climates, skin lesions can be generalized, and affected animals can become seriously ill, resulting in major economic losses through decreased meat and milk production, hide damage, reproductive failure, decreased ability to work, and death. From 15 to 100% of a herd can be affected. Generalized cases in endemic stock are invariably associated with concurrent diseases (e.g., poxvirus infection, trypanosomiasis, anaplasmosis, and babesiosis).

Figure 1.1-17 Dermatophilosis. Multiple thick crusts over back, rump, tail, and perineum.

Dermatophilosis is a zoonosis. Human skin infections are rare and characterized by pruritic or painful pustular lesions in contact areas (especially arms) (Fig. 1.1-27).

Differential Diagnosis

Staphylococcal folliculitis, dermatophytosis, demodicosis, stephanofilariasis, sterile eosinophilic folliculitis and furunculosis, and zinc-responsive dermatitis.

Figure 1.1-18 Dermatophilosis. Multiple thick crusts on head. *Source*: Courtesy of L. George.

Figure 1.1-20 Dermatophilosis. Generalized crusts.

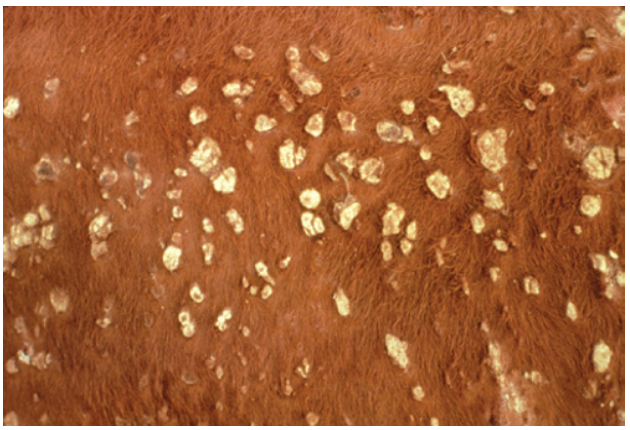


Figure 1.1-21 Dermatophilosis. Multiple annular to linear ("run-off" or "scald line") crusts over trunk.

Figure 1.1-19 Dermatophilosis. Crusts on the muzzle of a calf.

Figure 1.1-22 Dermatophilosis. Multiple tufted ("paintbrush") crusts over thorax.

Figure 1.1-23 Dermatophilosis. Greenish pus coating ulcers and underside of avulsed crusts.

Figure 1.1-24 Dermatophilosis. Multiple crusts and ulcers superimposed on erythematous, ultraviolet light–damaged skin.

Figure 1.1-25 Dermatophilosis. Thick crusts on perineum, caudal thighs, groin, and scrotum associated with tick infestation.

Diagnosis

1) Microscopy (direct smears): Suppurative inflammation with degenerate neutrophils, nuclear streaming, and Gram-positive cocci (about 1.5 µm in diameter) in 2 to 8 parallel rows forming branching filaments ("railroad tracks") (Fig. 1.1-28).
2) Culture (aerobic; difficult).
3) Dermatohistopathology: Suppurative luminal folliculitis and epidermitis with palisading crusts containing Gram-positive cocci in branching filaments.
4) Polymerase chain reaction (PCR) (cultures; animal samples).

Actinomycosis

Features

Actinomycosis (Greek *aktis*: rays and beams of light) is a sporadic but common, cosmopolitan, suppurative to pyogranulomatous disease of the skin and bone. *Actinomyces*

Figure 1.1-26 Dermatophilosis. Thick crusts on leg due to prickly vegetation damage.

Figure 1.1-27 Dermatophilosis in a human. Ruptured pustule and surrounding erythema on the elbow.

bovis (an oral cavity commensal) and occasionally *A. israelii* contaminate various traumatic wounds. The disease is most commonly seen in 2- to 5-year-old cattle, with no apparent breed or sex predilections.

Lesions are most commonly seen on the mandible and maxilla ("lumpy jaw") (Figs. 1.1-29 to 1.1-31). Firm,

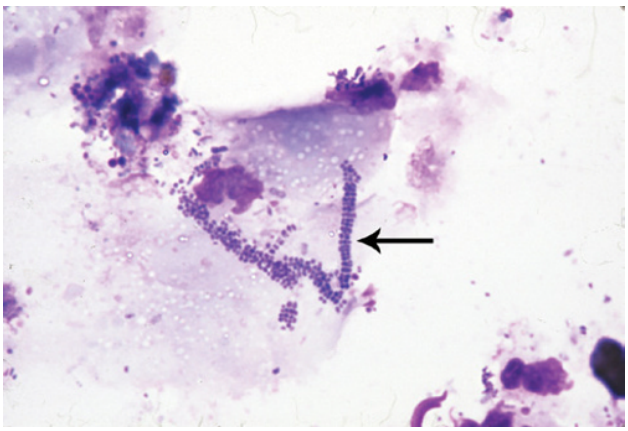


Figure 1.1-28 Dermatophilosis. Direct smear (Diff-Quik stain). Branching filaments composed of cocci ("railroad tracks").

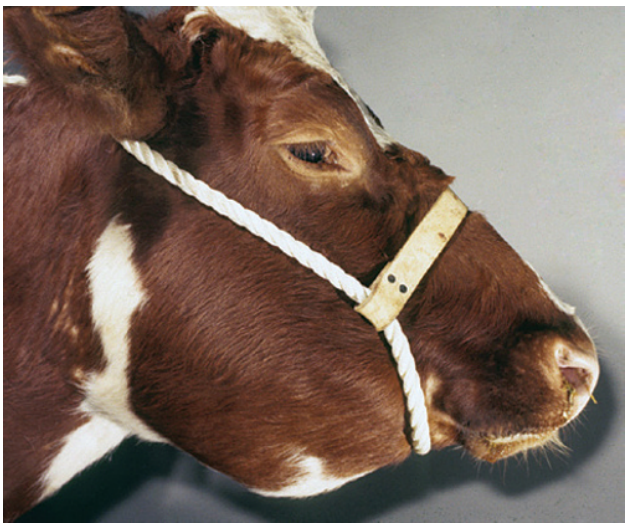


Figure 1.1-29 Actinomycosis. Firm, immovable swelling over mandible.

Figure 1.1-30 Actinomycosis. Firm, immovable swelling with alopecia and crusting over mandible. *Source*: Courtesy of G. Bosquet, coll. J. Gourreau, AFSSA.

Figure 1.1-31 Actinomycosis. Firm, immovable, ulcerated nodule with draining tracts on mandible.

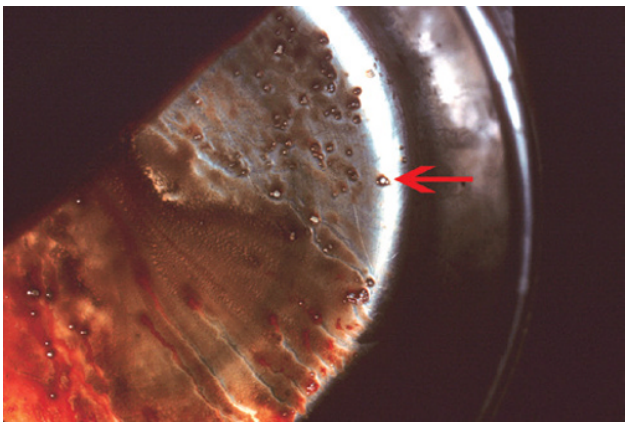


Figure 1.1-32 Actinomycosis. Seropurulent exudate containing "sulfur granules" (arrow) in a stainless-steel bowl.

variably painful, immovable bony swellings (osteomyelitis) extend to the overlying skin, resulting in nodules, abscesses, and draining tracts. The discharge may be honey-like in color and consistency, and contain hard, yellowish-white granules ("sulfur granules"; 1 to 3 mm in diameter) that are the size and consistency of sand (Fig. 1.1-32). Rarely, lesions may occur in other locations, such as the legs (Fig. 1.1-33) and udder (Fig. 1.1-34). Affected animals are usually healthy otherwise. Typically, a single animal is affected.

Differential Diagnosis

Other bacterial infections, especially due to *Actinobacillus lignieresii*, *Trueperella pyogenes*, and *Corynebacterium pseudotuberculosis*.

Figure 1.1-33 Actinomycosis. Multiple ulcerated, crusted nodules on leg. *Source*: Courtesy of J. Gourreau, AFSSA.

Diagnosis

1) Microscopy (direct smears): Suppurative to pyogranulomatous inflammation with degenerate neutrophils and nuclear streaming. Organisms may or may not be seen as Gram-positive, long filaments (less than 1 µm in diameter) and as shorter, V, Y, or T forms. Tissue granules contain Gram-positive long filaments (less than 1 µm in diameter).
2) Culture (anaerobic).
3) Dermatohistopathology: Nodular to diffuse, suppurative to pyogranulomatous dermatitis and panniculitis. Tissue granules are coated with Splendore-Hoeppli material and contain Gram-positive filaments.

Actinobacillosis

Features

Actinobacillosis is a sporadic and uncommon, cosmopolitan, suppurative to pyogranulomatous disease of the skin and lymph nodes. *Actinobacillus lignieresii* (an oral

Figure 1.1-34 Actinomycosis. Firm, ulcerated nodules with draining tracts on udder. *Source*: Courtesy of J. Nicol, coll. J. Gourreau, AFSSA.

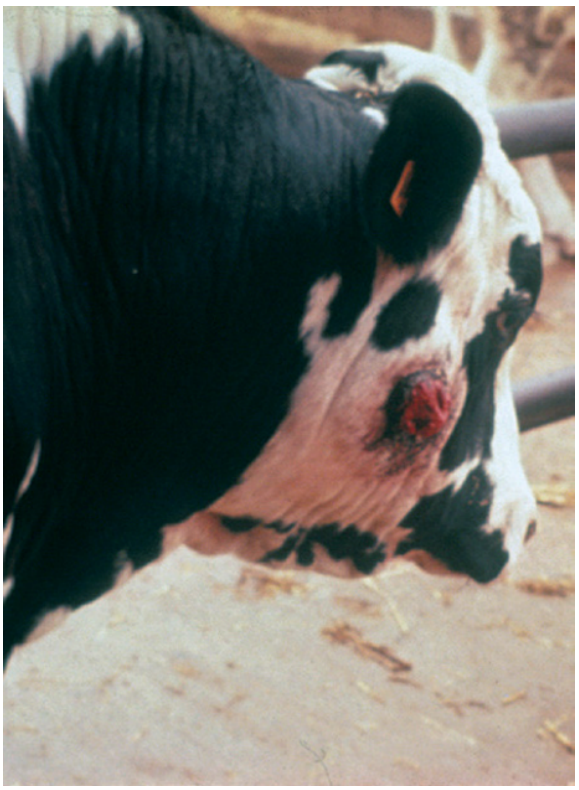


Figure 1.1-35 Actinobacillosis. Ulcerated subcutaneous mass below the ear. *Source*: Courtesy of J. Gourreau.

cavity and rumenal commensal) contaminates various traumatic wounds. There are no apparent breed, sex, or age predilections.

Lesions are most commonly seen on the face (cheek, lip, nostril, and eyelid), head, neck, and legs (Figs. 1.1-35 to 1.1-39). Lesions may be single or multiple, are usually unilateral but occasionally bilateral (bilateral facial swelling), and may be widespread on the back. Pyogranulomatous glossitis ("wooden tongue") is uncommon. Pyogranulomatous nodules and/or abscesses originate in regional lymph nodes and/or skin. Abscesses and draining tracts discharge a viscid to watery, mucoid white-to-greenish pus that is odorless and contains grayish-white to brownish-white granules ("sulfur granules"; less than 1 mm in diameter). Lesions are neither hot nor painful. Affected animals are usually healthy otherwise. Typically, a single animal is affected.

Differential Diagnosis

Other bacterial infections, especially due to *Actinomyces bovis*, *Trueperella pyogenes*, and *Corynebacterium pseudotuberculosis*.

Figure 1.1-36 Actinobacillosis. Ulcerated, crusted mass subsequent to dehorning operation.

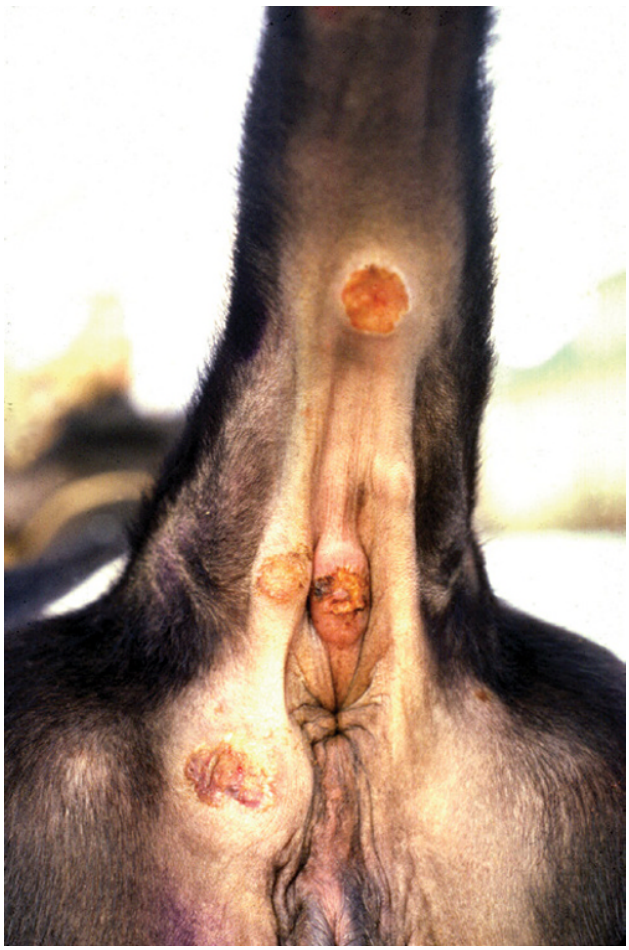


Figure 1.1-37 Actinobacillosis. Multiple ulcerated nodules in perineal area.

Figure 1.1-38 Actinobacillosis. Multiple ulcerated nodules on distal leg. *Source*: Courtesy of J. Segaud, Coll. J. Gourreau, AFSSA.

Diagnosis

1) Microscopy (direct smears): Suppurative to pyogranulomatous inflammation with degenerate neutrophils and nuclear streaming. Tissue granules contain Gram-negative coccobacilli or rods (about 0.4 to 1 µm in diameter).
2) Culture (aerobic).
3) Dermatohistopathology: Nodular to diffuse suppurative to pyogranulomatous dermatitis and panniculitis. Tissue granules are coated with Splendore-Hoeppli material and contain Gram-negative coccobacilli.

Clostridial Cellulitis

Features

Clostridial cellulitis is an uncommon cosmopolitan disease. *Clostridium* spp. contaminate a variety of wounds. These disorders are typically acute in onset and rapidly fatal (within 12 to 72 hours).

Malignant edema ("gas gangrene") is caused by *C. septicum*, *C. sordelli*, or *C. perfringens*. Lesions may occur anywhere, especially in the inguinal, axillary, abdominal, shoulder, neck, and head areas. Lesions are initially poorly circumscribed, painful, warm, pitting, deep swellings. Later, the swelling becomes cool and hypoesthetic or anesthetic, and the skin becomes bluish to purplish, taut, and necrotic, then sloughs. Crepitus (emphysema) may or may not be present. Affected animals are febrile, depressed, anorectic, and weak. Typically, a number of animals are affected over a period of a few days.

Blackleg is caused by *C. chauvoei*. Lesions commonly occur on a leg (Figs. 1.1-40 and 1.1-41), and are initially poorly circumscribed, painful, warm, pitting, deep swellings. Later the swelling becomes cool and hypoesthetic or anesthetic, and the skin becomes purplish to black, taut, cracked, and necrotic, then sloughs. Crepitus is often present. Affected animals are febrile, depressed, anorectic, and weak. Typically, a number of animals are affected over a period of a few days.

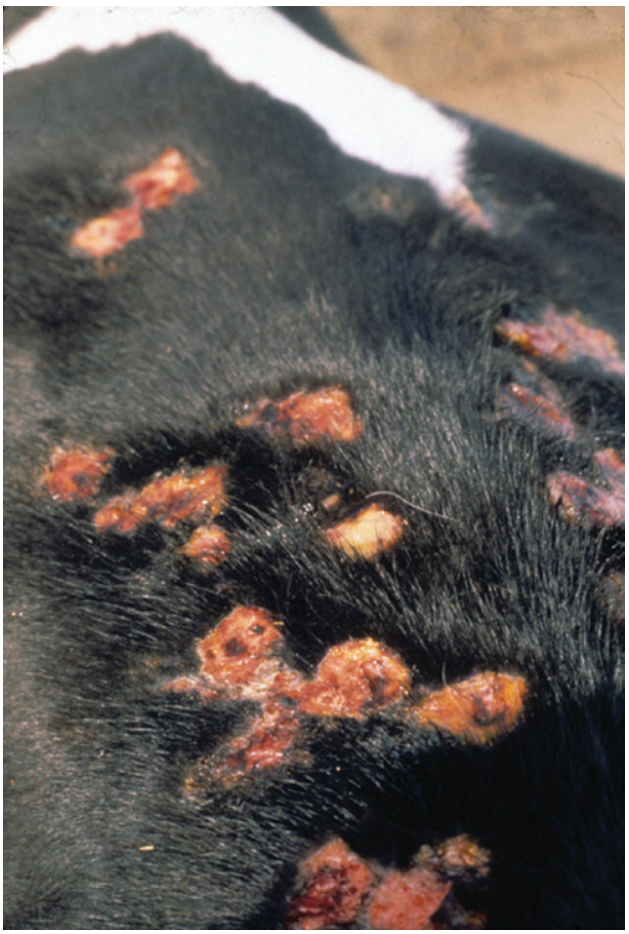


Figure 1.1-39 Actinobacillosis. Multiple ulcerated nodules over back.

Figure 1.1-40 Clostridial cellulitis. Swollen, painful left pelvic limb.

Differential Diagnosis

Other bacterial cellulitides, especially due to *Trueperella pyogenes*, *Staphylococcus aureus*, *Fusobacterium necrophorum*, *Bacteroides* spp., and *Pasteurella septica*.

Diagnosis

1) Microscopy (direct smears): Suppurative inflammation with numerous large (up to 5 µm in length) Gram-positive straight or slightly curved rods.
2) Culture (anaerobic).
3) Necropsy: Skin lesions are characterized by suppurative and necrotizing cellulitis and numerous Gram-positive rods.

Figure 1.1-41 Clostridial cellulitis. Area of necrosis, slough, and ulceration on pelvic limb.

Opportunistic Mycobacterial Granuloma

Features

Opportunistic ("atypical" and "nontuberculous") mycobacterial granuloma ("skin tuberculosis") is a rare to uncommon, cosmopolitan disease. Infection occurs by wound contamination, and *Mycobacterium kansasii* has been isolated from some lesions. There are no apparent breed, sex, or age predilections. Affected animals may have false-positive tuberculin tests.

Lesions are typically unilateral and affect the distal leg (Figs. 1.1-42 and 1.1-43). They may spread to the thigh, shoulder, or abdomen. Papules and nodules may be single or multiple, and often occur in chains with interlesional enlarged and palpable ("corded") lymphatics. Lesions may be hard or fluctuant, and may rupture and discharge a thick, cream-to-yellow-to-grayish pus. Pruritus and pain are absent. Regional lymph nodules are usually normal, and affected animals are healthy otherwise.

Differential Diagnosis

Ulcerative lymphangitis, farcy, actinomycosis, and sporotrichosis.

Figure 1.1-42 Opportunistic mycobacterial granuloma. Multiple papules and nodules, some with draining tracts on leg.

Figure 1.1-43 Opportunistic mycobacterial granuloma. Multiple papules and nodules on right pelvic limb.

Diagnosis

1) Microscopy (direct smears): Granulomatous inflammation with intracellular, Gram-positive, and acid-fast slender rods (up to 4 µm long).
2) Dermatohistopathology: Nodular to diffuse granulomatous dermatitis and panniculitis with intracellular Gram-positive and acid-fast rods.
3) Culture (difficult to impossible).
4) PCR (cultures and animal samples).

Farcy

Features

Farcy (Latin: full, stuffed) is a common, geographically restricted (Africa, Asia, and South America), pyogranulomatous disease of skin and lymphatics. *Mycobacterium senegalense* contaminates a variety of wounds (especially tick damage). Farcy has previously been attributed to infections with *Nocardia farcinica* or *Mycobacterium farcinogenes*, but these reports are probably erroneous.

Figure 1.1-44 Farcy. Multiple papules and nodules, some of which are ulcerated, on face. *Source*: Courtesy of J. King.

Skin lesions are most commonly seen on the head, neck, shoulder, and legs (Fig. 1.1-44), especially in adults. Firm, painless, slow-growing subcutaneous nodules may ulcerate and discharge a thick, stringy, odorless, grayish-white or yellowish material. Enlarged and palpable ("corded") lymphatics and regional lymphadenopathy are usually present. Farcy has a prolonged course with widespread organ involvement, emaciation, and death. Economic losses due to death, decreased productivity, hide damage, and carcass condemnation are considerable. Up to 32% of the animals in an endemic area may be affected.

Differential Diagnosis

Ulcerative lymphangitis, opportunistic mycobacterial granuloma, actinomycosis, and sporotrichosis.

Diagnosis

1) Microscopy (direct smears): Pyogranulomatous dermatitis with intracellular Gram-positive, acid-fast slender bacilli (up to 4 μm long), which are distinctly beaded and have a branching, filamentous appearance.
2) Culture (aerobic).
3) Dermatohistopathology: Nodular to diffuse pyogranulomatous dermatitis and panniculitis with intracellular Gram-positive, acid-fast bacilli.

Miscellaneous Bacterial Diseases

Table 1.1-1 Miscellaneous Bacterial Diseases

Abscess (Figs. 1.1-45 and 1.1-46)	Common and cosmopolitan; anywhere (especially infected knee and hock hygromas; facial associated with plant awn penetration); usually due to penetrating wounds; fluctuant, often painful, and subcutaneous; numerous bacteria, especially *Trueperella pyogenes*; culture
Cellulitis (Fig. 1.1-47)	Uncommon and cosmopolitan; leg (*Staphylococcus aureus*, *T. pyogenes*, and *Streptococcus dysgalactiae*) or face, neck, and brisket (*Fusobacterium necrophorum*, *Bacteroides* spp., and *Pasteurella septica*); *Clostridium* spp.; marked swelling and pain, variable exudation, draining tracts, and necrosis; variable systemic signs; culture
Bacterial pseudomycetoma ("botryomycosis")	Rare; udder; single or multiple crusted nodules and ulcers; *Pseudomonas aeruginosa*; culture and dermatohistopathology
Necrobacillosis (Figs. 1.1-48 to 1.1-50)	Uncommon and cosmopolitan; anywhere (especially axillae, groin, and udder); interdigital ("foot rot") associated with wet, humid conditions, sudden onset, fever, and lameness; moist, necrotic, ulcerative, and foul-smelling; *Fusobacterium necrophorum* biotypes A and B; variable systemic signs; culture
Necrotic vulvovaginitis	Rare (Middle East); sudden onset of inflammation and necrosis; usually post-parturient first-lactation cows; *Porphyromonas levii*; culture
Treponema-associated ulcerative mammary dermatitis and hock lesions (Fig. 1.1-51)	Common (hock lesions) to uncommon (mammary dermatitis), and cosmopolitan; often in dairy cattle herds where papillomatous digital dermatitis present; ulceration and foul odor on cranial aspect of udder and/or dermatitis with or without ulceration of the hocks; cytology and dermatohistopathology (spirochetes); PCR (*Treponema* spp.)
Corynebacterium ulcerans–associated eosinophilic granuloma	Rare; papules and nodules, occasionally ulcerated; nostrils; culture and dermatohistopathology

(*Continued*)

Table 1.1-1 (Continued)

Nodular thelitis and scrotitis (Figs. 1.1-52 to 1.1-54)	Uncommon (Europe and Japan); teats, udder, and scrotum; painful papules, plaques, nodules, and ulcers; occasional swollen teat with string of abscesses in lymphatics and yellowish, creamy pus; *Mycobacterium terrae* and *M. gordonae*; culture (difficult) and dermatohistopathology; PCR (culture and animal samples)
Nocardiosis	Uncommon (Africa); neck, chest, back, and occasionally rump, belly, scrotum, and legs; thick, annular, exudative crusts; *Nocardia* spp. (especially *N. nova*); culture and dermatohistopathology; PCR (culture and animal samples)
Mannheimia (Pasteurella) granulomatis panniculitis ("Lechiguana")	Uncommon (Brazil); interaction between *M. granulomatis* and *Dermatobia hominis*; shoulder and trunk regions; one to multiple large, rapidly growing abscesses; death within 3 to 8 months; culture and dermatohistopathology
Anthrax (Greek: coal; black eschar)	Rare and cosmopolitan; neck, brisket, flanks, abdomen, and perineum; massive edema; *Bacillus anthracis*; systemic signs; zoonosis (cutaneous, respiratory, and intestinal); culture and necropsy
Septicemic slough (Figs. 1.1-55 through 1.1-57)	Rare and cosmopolitan; especially calves; distal legs, tail, and pinnae; necrosis and slough; *Salmonella dublin* and *S. typhimurium*; systemic signs; zoonosis (intestinal); culture

Figure 1.1-45 Subcutaneous abscess (*Trueperella pyogenes*) on ventral abdomen.

Figure 1.1-46 Subcutaneous abscess. Abscess with purulent discharge on foot. *Source*: Courtesy of G. Dauphin, coll. J. Gourreau, AFSSA.

Figure 1.1-47 Cellulitis (mixed bacterial). Painful swelling involving side of face and neck.

Pododermatitis

Digital Dermatitis

Digital dermatitis ("Mortellaro disease," "strawberry foot wart," "hairy heel wart," "digital warts," "verrucous dermatitis," and "interdigital papillomatosis") is an infectious, contagious, painful condition of the digital skin. Current evidence suggests that digital dermatitis is multifactorial, involving environmental, microbial, host, and management factors. A polytreponemal (spirochete) etiology has been suggested, with *Treponema medium/Treponema vincentii*–like, *Treponema phagedenis*–like,