

## SHEEP AND GOAT POX

- [Definition](#)
- [Etiology](#)
- [Host Range](#)
- [Geographic Distribution](#)
- [Transmission](#)
- [Incubation Period](#)
- [Clinical Signs](#)
- [Gross Lesions](#)
- [Morbidity and Mortality](#)
- [Diagnosis](#)
- [Field Diagnosis](#)
- [Specimens for the Laboratory](#)
- [Laboratory Diagnosis](#)
- [Differential Diagnosis](#)
- [Vaccination](#)
- [Control and Eradication](#)
- [Public Health](#)
- [References](#)
- [FAD Table of Contents](#)

### Definition [top](#)

Sheep and goat pox (SGP) is an acute to chronic disease of sheep and goats characterized by generalized pox lesions throughout the skin and mucous membranes, a persistent fever, lymphadenitis, and often a focal viral pneumonia with lesions distributed uniformly throughout the lungs. Subclinical cases may occur.

### Etiology [top](#)

The virus that causes SGP is a capripoxvirus, one of the largest viruses (170-260 nm by 300-450 nm) (10). It is closely related to the virus that causes lumpy skin disease; SGP virus and lumpy skin disease virus cannot be distinguished serologically. There is only one serotype of SGP virus (SGPV). Various strains of SGPV cause disease only in sheep, others only in goats, and some in both sheep and goats (2,3,9).

The SGPV is very resistant to physical and chemical agents.

### **Host Range** [top](#)

Sheep and goat pox virus causes clinical disease in sheep and goats. The virus replicates in cattle but does not cause clinical disease. The disease has not been detected in wild ungulate populations.

### **Geographic Distribution** [top](#)

The disease is endemic in Africa, the Middle East, the Indian subcontinent, and much of Asia.

A goat-pox-like disease was reported in the western United States (15), but no attempt was made to indentify the agent with a reference serum against SGPV. Serum samples from animals representing the affected group of goats were submitted to the Foreign Animal Disease Diagnostic Laboratory (FADDL) at Plum Island, NY, and tested for antibody to SGPV; no antibodies were found against SGPV. The serums were not tested for antibodies to bovid herpesvirus 2 or contagious ecthyma at the FADDL. Unfortunately, the viral isolate was not available for study. It is conclusive that what was reported in the literature was not goat pox.

### **Transmission** [top](#)

Contact is the main means of transmission of SGPV. Inhalation of aerosols from acutely affected animals, aerosols generated from dust contaminated from pox scabs in barns and night holding areas, and contact through skin abrasions either by fomites or by direct contact are the natural means of transmitting SGPV. Insect transmission is possible. The virus can cause infection experimentally by intravenous, intradermal, intranasal, or subcutaneous inoculation.

### **Incubation Period** [top](#)

Under field conditions, the incubation of SGP is between 4 and 8 days. Experimentally, the first sign (fever) may appear within 3 to 5 days after inoculation. The course of the disease is 4 to 6 weeks with various stages of pox lesions present at the same time. Full recovery may take up to 3 months.

### **Clinical Signs** [top](#)

Sheep and goat pox virus may cause subclinical infection; clinical cases vary from mild to severe (3). The course of the disease in sheep and goats is similar. The first signs may include fever, depression, conjunctivitis, lacrimation, and rhinitis. Within a few days of the prodromal signs, pox lesions develop in the skin. These are more easily observed on the wool-free or hair-free parts of the body such as the perineum, inguinal area, scrotum, udder, axilla, and muzzle. Lesions do occur in woolled or haired skin. Generally, more severe (extensive) skin lesions correlate with more severe illness. The skin lesion first appears as an erythematous area (macula). This lesion progresses to a raised, slightly blanched lesion that presents erythema with edema in the central part of the lesion (papule) (Fig. 103). Pox lesions with a transudate, representing the vesicular stage of the lesion, may be noted, but rarely is there any gross vesicle in the skin. The center of the lesion then becomes depressed and gray (necrotic) and is surrounded by an area of hyperemia (Fig. 104). Late in the course of the disease (2 to 4 weeks after the first signs), the lesion becomes dry, and a scab forms (Fig. 105). A characteristic feature of a pox lesion is that lesions involve the entire epidermis and dermis and penetrate into the subcutaneous tissue; it feels like a nodule. Depending on the severity of the skin lesion, there may be a scar, an area devoid of wool or hair, after the lesion heals. Secondary bacterial infection may complicate the healing process. The muzzle may be swollen, and the nares and oral mucosa may have extensive lesions. In many cases, pneumonia may occur with labored breathing and a respiratory rate approaching 90 per minute. Depression, anorexia, and emaciation are common and may persist. Nervous signs may occur, but how these are related to the SGPV infection is not clear.

Lambs and kids under 1 month of age may suffer a very severe generalized form of SGP. The signs described above for older animals are exaggerated, and there is an increased mortality.

### **Gross Lesions** [top](#)

At necropsy, skin lesions have congestion, hemorrhage, edema, vasculitis, and necrosis and will be seen to involve all layers of the epidermis, dermis, and, in severe cases, extend into the adjacent musculature. Lymph nodes draining affected areas are enlarged up to eight times their normal size owing to extensive lymphoid proliferation, edema, congestion, and hemorrhage.

Mucous membranes of the eye, mouth, and nose have pox lesions that, in severe cases, may coalesce. In severe cases of SGP, the eyelids may be so seriously affected that the proliferative lesions and inflammation cause the eyes to close. Lesions on the muzzle and nares may coalesce, and proliferative changes and inflammation may be extensive. Pox lesions may occur in the pharynx, epiglottis,

and trachea. These usually appear as rounded blanched areas surrounded by an area of hyperemia. Occasionally there may be lesions in the epithelium of the rumen and omasum.

Pox lesions in the lungs may be severe and extensive; the lesions are focal and uniformly distributed throughout the lungs as the result of hematogenous infection (Fig. 106). Early lesions are congested areas; these then progress to discrete areas of congestion and edema and finally to white nodules. Areas distal to the pox lesions have lobular atelectasis. Mediastinal lymph nodes are often enlarged up to five times their normal size and may be congested, hemorrhagic, and edematous.

Pox lesions also may be present on the vulva, prepuce, testicles, udder, and teats.

### **Morbidity and Mortality** [top](#)

The severity of SGP varies depending on the strain of the virus and the age and breed of the animals affected (5). In adult sheep and goats, morbidity may range to 80 percent with some subclinical infections. Mortality can approach 50 percent. In susceptible lambs and kids under 1 month of age, morbidity may approach 100 percent, and mortality may be as high as 95 percent. Factors that may complicate the course of the disease and increase the mortality are poor nutrition, heavy parasitism, and severe climatic conditions.

### **Diagnosis** [top](#)

#### **Field Diagnosis** [top](#)

A tentative diagnosis of SGP can be made on the basis of clinical signs consisting of skin lesions, which on palpation involve the whole thickness of the skin, a persistent fever, lymphadenitis, and often pneumonia; mortality may approach 50 percent in adults and 95 percent in lambs and kids under 1 month of age.

### **Specimens for the Laboratory** [top](#)

For laboratory diagnosis of SGP, skin biopsies of early lesions can be used for virus isolation and histopathologic and electron microscopic studies. Samples aspirated from enlarged lymph nodes can be used for virus isolation. Necropsy samples should include a full set of tissues, but samples of the lungs, trachea, and rumen containing gross lesions are especially valuable for histopathology. Samples for virus isolation should be shipped to the laboratory under wet ice if they will arrive

in 2 days and shipped under dry ice if delivery will take longer (send in screw-capped vials with the caps secured with electrical tape). Samples for histopathology should be preserved in 10 percent buffered formalin (DO NOT FREEZE). Serum samples should be taken from acute and chronic cases. Followup serum samples from acute cases may be taken 2 to 3 weeks after the first sample.

### **Laboratory Diagnosis** [top](#)

The laboratory procedures for the diagnosis of SGP include virus isolation; observation of the virus by electron microscopy; detection of antibody by virus neutralization, the indirect fluorescent antibody test (4), or both; and characteristic histopathologic lesions (3).

### **Differential Diagnosis** [top](#)

Following are several diseases to consider in the differential diagnosis for SGP:

**Bluetongue** — Animals are depressed and have a nonpurulent conjunctivitis. The muzzle is swollen, congested, and edematous, and there may be a coronitis. Deformed aborted fetuses and deformed newborn sheep and goats may be encountered.

**Peste des Petits Ruminants** — Conjunctivitis, rhinitis, and oral lesions that are white, raised, and necrotic are common. Pneumonia, diarrhea, and mortality approaching 90 percent in lambs and kids under 1 month of age are characteristic signs.

**Contagious Ecthyma (contagious pustular dermatitis, ORF)** — This disease is most severe in lambs and kids. The proliferative pox lesions are common on the muzzle and eyes of affected neonates; mortality may approach 50 percent. Nursing females may have proliferative pox lesions on the teats and muzzle. This is a zoonotic disease; lesions in attendants are not uncommon.

**Photosensitization** — Dry, flaky, inflamed areas are confined to the nonpigmented parts of the skin.

**Insect bites** — The trauma from insect bites may cause local inflammation, edema, and pruritus. Insects seldom bite mucous membranes.

**Parasitic pneumonia** — Severe signs of respiratory distress may occur with extensive parasitic lesions; in these cases, there is no pox lesion in the skin.

Caseous lymphadenitis — Focal, raised lesions in the skin represent caseous abscesses; abscesses are not seen in SGP.

Streptothricosis (*Dermatophilus congolensis* infection) — Lesions are superficial and often moist. Lesions are common in the skin of the neck, axillary region, inguinal region, and perineum. The organism may be demonstrated by Giemsa staining.

Mange - Scab-like skin lesions are seen in psoroptic mange. Itching and scratching are not seen in SGP.

### **Vaccination** [top](#)

In endemic areas, vaccination is an effective means of controlling losses from SGP. Killed vaccines have not proven to be practical under field conditions because they do not provide solid lasting immunity. Several modified live virus vaccines have been used for protection against SGP. The most widely employed vaccine is probably the Romanian strain that has been used effectively for many years (14,16). The Kenya O 180 strain (6) is possibly the vaccine with the best safety and efficacy.

### **Control and Eradication** [top](#)

#### **Prevention**

The most likely manner for SGP to enter a new area is by introduction of infected animals. Restrictions on the movement of animals and animal products (meat, hair, wool, and hides) are essential to prevent introduction of SGP. Wool, hair, and hides must be subjected to suitable decontamination procedures before entry into nonendemic areas.

#### **Control**

If a new case is confirmed in a new area before extensive spread occurs, the area should be quarantined, infected and exposed animals should be slaughtered, and the premises cleaned and disinfected. Vaccination of susceptible animals on premises surrounding the infected flock(s) should be considered.

If the disease has spread over a large area, the most effective means of controlling losses from SGP is vaccination; however, consideration should be given to eliminating infected and exposed flocks by slaughter; properly disposing of

animals and contaminated material; and cleaning and disinfecting contaminated premises, equipment, and facilities.

## Eradication

A carrier state has not been shown for SGPV. However, the virus may persist for many months on contaminated premises. The imposition of quarantines on areas and premises containing infected or exposed animals is required to prevent disease spread. Depopulation of infected and exposed flocks should be used if limited spread has occurred. If the disease has spread extensively, massive vaccination followed by cessation of vaccination and control of animal movements from the area represent a strong strategy to control and then eradicate SGP.

## Public Health [top](#)

There is no conclusive evidence that SGPV infects humans. A report from India (17) that implied that goat pox caused human infection was merely based on clinical signs. There was no attempt to isolate the causative virus or perform serology on the convalescent serums of the three patients to differentiate the infection from contagious ecthyma, which is a known zoonotic agent that occurs worldwide. A report from Sweden (1) indicated that human infection occurred during an outbreak of goat pox. Although serological studies seemed to indicate that the apparent causative agent of the outbreak was not vaccinia or contagious ecthyma, no virus was isolated. Therefore, it cannot be said that goat pox virus caused human infection.

## GUIDE TO THE LITERATURE [top](#)

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