Sheep diseases

Possible diseases of sheep are various enough similarly to other animals.

According to their category they are:

1. bacterial diseases
2. viral diseases
3. diseases of complex etiology
4. parasitic diseases
5. diseases caused by fungal toxins
6. traffic of material and deficiency diseases
7. medical diseases
8. intoxications
9. genital diseases
10. disease of the limb

Appearance of the diseases can be slight and serious degree of clinical symptom that usually leads **to death of the animal.**

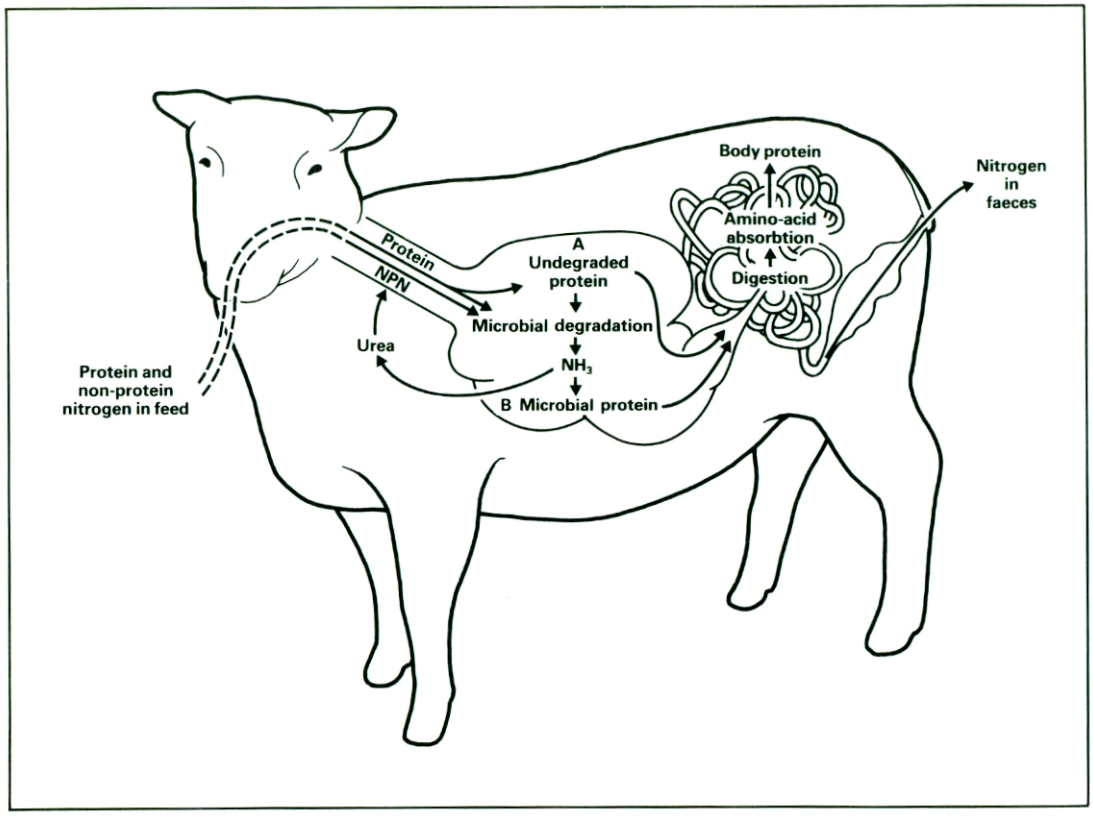
Every variant of diseases reduces or prevents raw material productivity of farm animals, and increases the loss of economic benefit.

Only a healthy livestock is capable of producing animal products under optimal productive conditions.

Keywords: sheep, disease, bacterium, virus, inflammation, breathing, heart-beat, mastitis, infectious, abortion, pneumonia, locomotion disorder, parasite, intoxication, deficiency, muscle degeneration, rumen, protrusion, lameness, teg, milch-ewe, ram prion.

The aim of sheep breeding and keeping is the economical production of animal products. Only healthy animals are suitable for this reason.

Healthy sheep have a good constitution, long and useful lifetime, appropriate liveweight characteristics concerning its species/gender, have good fodder eating capacity and grazing habits, and they are disease and parasite resistant. Depending on their species, female (milch-ewe/ewe) sheep have the ability for oestrus and conception in less seasonal or seasonal period of time. The rams have continuous mating temper (libidó sexualis), and covering/fertilizing ability.



Protein digestion in the lamb
(from Ref. 26: Figure 8.1)

Abilities of sick sheep are moderate, latent or clinical disorders reduce the economical production of animal product (lambing, meat, milk, wool).

Sheep diseases can be bacterial, viral and parasitic, furthermore traffic of material and deficiency diseases, limb, medical, genital diseases, as well as intoxications.

1. Bacterial diseases

- **Anthrax** is caused by Bacillus anthracis that has the ability to form spores. Sheep usually get infected through fodder or water.
  Symptoms associated with anthrax may be staggering, fever, trembling and oozing blood from body openings. Oedematous hemorrhagic infiltration can also be observed in the organs of carcasses. The infected animals usually die.
  The disease cannot spread from animal to animal.
  Animals must be vaccinated in potentially contaminated areas twice per year.

- **Sheep diseases caused by Clostrídium (Cl.) bacteria**

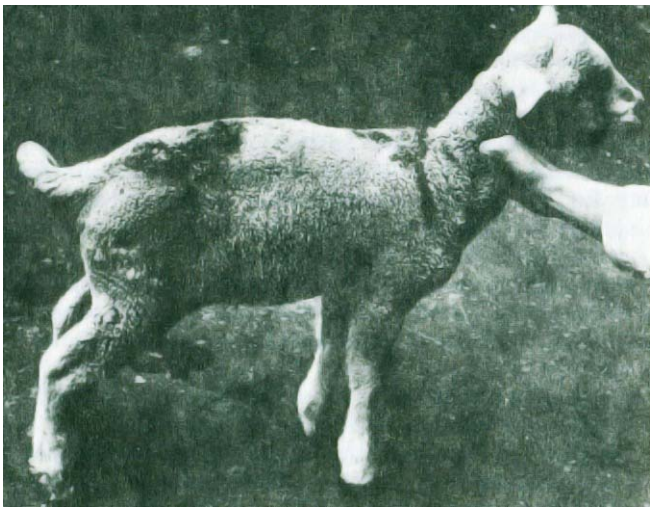
  - **malignant oedema (**oedema malignum**)** is a wound infection. Symptoms may be high fever but sizzling, edematic, painful swellings can occur in the muscles and in the connective tissue under the skin. The infected animals usually die.

- S**izzling heifers** (gangroena emphysematosa**)** caused by the Cl. Chauvoei, which has similar clinical symptoms like oedema malignum.

- **Enterotoxaemia** is caused by types C and D of Cl. perfringens. The bacteria can be found everywhere in the environment.
  The type D toxins slow down and stop gut peristalsis that may occur after a sudden fodder change or overfeeding. Convulsions and teeth grinding are observed as sypmptoms concerning infected animals. They are found dead after 3-6 hours. The disease is incurable, but can be prevented if cut off the excess consumption of green fodder, protein rich and fiber poor fodder crops.
  Type C causes hemorrhagic enteritis in grazing animals. The most common signs are wobbly gait, gently distended abdomen. Affected animals usually stand with their head hung down, fall behind from the flock, remain lying down then drop shortly.

- **Lamb dysentery** is caused by Cl. perfingens type B, or sometimes type C. This is an acute disease affecting newborn lambs. The faeces of the infected animal may become unclean, foamy, blood streaked, and its odour is foul. The infected animal usually dies within 2 or 3 days.
  There are some vaccines to prevent these diseases. Using antibiotic treatment can save the life of the animal at the early appearance of clinical symptoms.

- **Tetanus** (lockjaw) is a fatal disease of sheep caused by the bacterium Cl. tetani. It usually occurs when spores of the bacillus are introduced into a wound (for instance, following navel disinfection, docking, shearing, castration or an accidental penetrating wound, etc.). Signs of infection appear after the incubation period of several days or weeks.
  Symptoms: swallowing difficulty and bloating can occur first. Further typical symptoms are lockjaw, rigidity of the ears and tail, stiffness of the trunk muscles and sawhorse posture. The disease is incurable, after the first signs infected animals usually drop in a few days.



Tetanus
(from Ref. 29: Figure 21)

- **Listeriosis** is a seasonal disease and caused by Listeria monocytogenes. It usually occurs at winter feeding and indoor breeding. The disease may also occur if sheep are fed with soil contaminated or air-exposed silage. Pregnant and newborn sheep are the most susceptible to this bacterial disease.

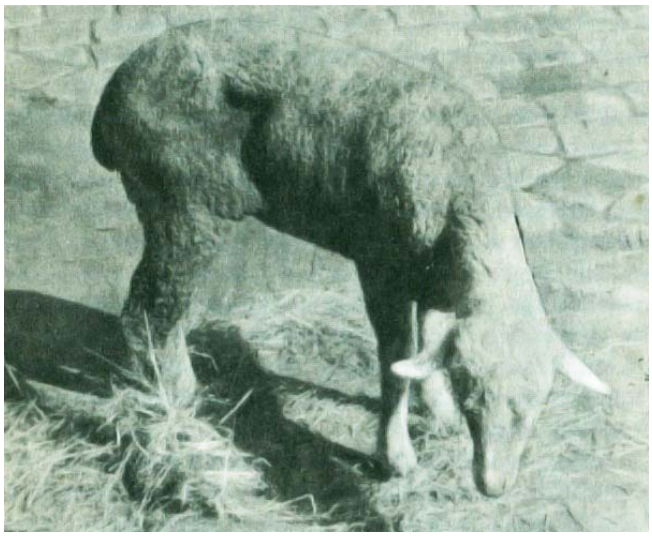
  The disease may cause bacterial infection of the central nervous system. The affected animal shows the signs of fed off, serous nasal discharge, confusion, excitation, stiffness of the neck. Then convulsions and ataxia can be observed. The disease results in death within 3-5 days. Bacteremia may occur in lambs that are younger than 10 days. The disease can cause low fever. Death happens within 1-2 days.

  The disease may cause abortion as an only symptom in pregnant ewes. Metritis can also occur in this case, but death usually does not happen.

  Medicinal treatment is hopeless in case of infection of the central nervous system, but metritis is curable with antibiotic treatment.

  If the above symptoms are noticed, discontinue feeding silage. Feeding good quality hay can be effective. Make sheep walk or graze can be advantageous.

  Active immunity can be reached by vaccination.

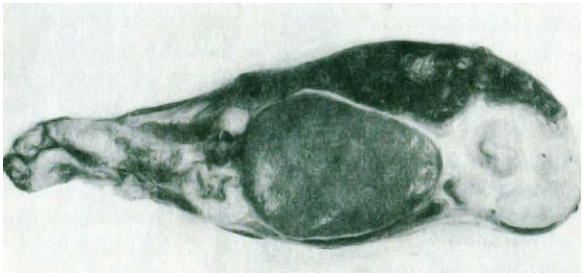


Listeriosis
(from Ref. 29: Figure 22–23)

- **Pasteurella** bacteria are the inhabitants of animals' respiratory tracts.
  There are several factor that can weaken sheep's immune system and cause this disease, such as cold, wet and blowy barns, overcrowded conditions, low quality, mouldy nutrition, lack of vitamin A feed, water supply deficiencies, excessively long trips and transportation, shearing, sudden environmental change, etc. In case of bacteremia, fever 41 ^{0}C and lack of appetite may occur. In case of pneumonia, lack of appetite, high fever, difficult breathing, coughing, serous and purulent nasal discharge, oedematic infiltration of the neck and chest tissue can be detected.
  Antibiotic therapy should be given as a treatment.

- **Salmonella abortus ovis** is a bacterial infection. It may result in abortions, stillborn or unviable lambs. The disease also can cause symptoms of complications that are associated with abortions, as well as a huge economic loss.
  In order to avoid an epidemic outbreak, hygienic regulations must be kept at the first signs of the disease: disinfection, aborted animals must be isolated and abortion products must be destroyed etc.
  An aimed antibiotic therapy is used to cure sick animals.

- **Brucella ovis** causes contagious inflammation of the testicle and epididymis of rams. As a result of this, seminiferous tubules blockage and sperm stagnation may occur. Infected rams infect other rams through their urine and ewes through their sperm.
  The infected ram's scrotum becomes enlarged, reddish and painful enough. Firstly, serious edema, then testicle atrophy and accretion can occur in the testicle and the epididymis. Larger and/or smaller abscesses also may occur in the substance of the testicle and the epididymis.
  Sick rams and infected ewes must be culled.



Brucella ovis
(from Ref. 29: Figure 33–34)

- Inflammation of the testicle and epididymis also can occur in the following cases:
  histophilus ovis causes enlargement of the scrotum, and considerable abscess of the testicle and the epididymis.

  In case of inflammation caused by **actinobacillus seminis,** the epididymis adheres to its surroundings, its tail becomes enlarged and firm. Abscesses usually occur on the surface of the altered parts.
  Corynebacterium pyogenes is a kind of infection that may cause intense unilateral or bilateral abscesses on the testis. It also can cause abortions or stillbirths in a flock.

- **Paratuberculosis** is caused by Mycobacterium paratuberculosis. The first signs of the symptoms may include lassitude and lying. Then the wool becomes dry and broken, the mucosas become ischemic and oedemas appear in the head tissues. Chronic diarrhoea and weight loss can also occur. Sick animals become weak, and then usually die.
  Breeding animals should not be imported from countries where this disease is present.

- **Mastitis** is usually caused by facultative pathogenic bacteria and fungi. The pathogens are the inhabitants of the milk ducts, but they can also be introduced into the udder from the environment. After having proliferated in the udder tissue, they cause serious garget. It is usually spread by mechanical milking, if hygienic rules are not kept. Lambs, that steal milk from other ewes, also can spread the disease.
  The success of the recovery of the inflammed udder depends on giving aimed antibiotic therapy to the animal in time. Delayed or inappropriate treatments are usually unsuccessful. In the best case, the udder half stops producing milk, in the worst case, the garget causes necrosis then loss of the udder half. As a result of this emergency slaughtering is often inevitable.
  The most frequent pathogenic bacteria are the Staphylococcus pyogenes aureus and the Pasteurella haemolytica.
  Sick animals become feverish, go off feed, become depressed and consume plenty of water. Their pulse is quick, their breathing is shallow and rapid. In serious cases, fibrillation can also occur. The udder part is swollen, enlarged, warm and extremly painful, its skin turns blue or purplish red, the substance of the udder is firm and pasty consistency can be palpated. The disease may cause abnormalities in the milk such as flakes, clots, serous discharge or other unusual appearance. Lameness or stiff-legged walking may signify a sore udder.

After the ewe has been milked, a treatment involves an intramammary infusion of antibiotics is necessary. Then, a local massage should be given in order to promote the dispersal of the vaccine. Beyond the antibiotic treatment of the udder part, injection of the appropriate vaccine into the neck muscle is also essential.

- **Abortions** have two main categories: contagious and non-contagious origin abortions (mechanical penetrations, frozen feed, metabolic disturbances etc.). Contagious origin abortions are caused by many kind of bacterium. The most frequent agent is **clamydia**, to which sheep are highly susceptible. The infection occurs through oral ingestion or inhalation. The pathogen gets activated only in pregnant animals, after having proliferated and settled down in the placenta. Infected animals can pass the pathogens and infect their environment during their abortions or after that for at least one and a half months. If some infected animals get into a flock, they can cause an outbreak that may last for months or years. The abortion usually occurs 3-6 weeks before the expected lambing. Aborted embryos are well developed for the period of the pregnancy. The abortion ratio can reach 20-40% in a newly infected flock. The number of abortions and non-viable lambs are usually below 5% in formerly infected flocks.
  The pathogens are antibiotic and sulfonamide sensitive, but there are some specific vaccines used for active immunity. Vaccination should be done twice, after 4-6 weeks interval.

- The **Morel's disease** is caused by Micrococcus abscendens ovis bacterium. The disease causes the enlargement of the lymph nodes, mostly: cervical, subiliac and mandibular. Sometimes the enlargement of other lymph nodes may occur. In case of Morel's disease, the involved lymph node becomes as big as a hen's egg or a man's fist. An abscess formation occurs in the swollen lymph node that raptures after some time, and then heals completely. The disease rarely ends in death, but makes sheep marketing impossible and sheep-milk marketing uncertain. The most economic way to stop the infection is to slaughter the flock and sell as meat.

2. Viral diseases

- **Foot and mouth disease:** the virus responsible for the disease is a picornavirus. Dieased animals shed the virus through their saliva, milk, urine, faeces and vesicle fluid. Transmission can occur by direct or indirect contact with infected animals and contaminated fomites. The incubation period is 2-7 days.
  Sheep usually develop vesicles on their lips, mucous membrane of the mouth, tongue or interdigital skin. Later, vesicles rupture and flat ulcers appear. These vesicles and ulcers are often so tiny that hard to recognise.
  If sudden feed off, salivation, lameness and marked rise in body temperature occur in the greater part of the flock, they can refer to the disease.
  Newborn and young lambs usually die in heart muscle damage, without any clinical symptomes. Adult sheep usually recover.
  Suspicious signs of the disease must be reported! Official rules must be kept strictly.

- **Aujeszky's disease** caused by a herpes virus and affects mainly pigs which are the reservoir of the disease.
  After the infection, within 3-6 days, fever and excitement occur, and then peelings appear on the skin. The animal starts scratching its lips and head until bleeding, pulls and gnaws the wool with its mouth. Sudden weakness and salivation may also occur because of the paralysis of the oesophagus. The symptoms last not more than 24

hours, the treatment of the disease is useless, infected animals die shortly. The disease cannot be transmitted from sheep to sheep. The best method to prevent the infection is separate farming and grazing of sheep and pigs.

- **Sheep pox** causes fever, lack of appetite, droop and catarrh after the infection, within 6-8 days. Affected animals may have signs including coughing and mucopurulent nasal discharge. After 1-2 days, spots can be seen on the skin. In the beginning the skin contains some red macules, then pink papules may appear, that can coalesce over the body or develop into wet nodules later. The disease may persist up to a month and result in death of 20% of the flock.
  As prevention, disease free countries should stop the import from endemic areas.

- **Rabies** is a viral disease and spread by the bite of an infected animal (fox, dog, cat). The incubation time is 2-10 weeks or more. The animal appears nervous, becomes aggressive and shows attacking behaviour. They have an abnormally increased mating temper. After a few days, paralysis symptoms might occur that can lead into complete paralysis or recumbency. Infected animals die within two weeks. Sick sheep do not infect other sheep.
  Treatment and emergency slaughtering of rabid sheep are forbidden!

- **Vesicular dermatitis** may occur in any age groups of sheep, however, young lambs become infected primarily. Sick animals can easily transmit the infection to humans too. The disease is caused by the Aynaud virus and can be spread from animal to animal.
  The infectious virus gets into the epithelial tissue through the mouth and the genital mucous membrane and through the foot skin, where proliferates and develops vesicles. The vesicles usually suppurate, then process to nodules or crusts. First, there are some red macules, then nodules, vesicles, purulent vesicles, and later brownish grey coloured, sticking crusts can be seen on the mucous membrane of the lips and the genitals and the skin of the foot. After two weeks, these crusts wither then fall off. Various other bacteria might increase the course of the disease, thus, foot rot also may occur.
  The crusts need to be sterilized and animals should be fed with pasty and soft fodder.
  The course of the disease is usually favourable, and may lead to death only in case of complications. Animals that are being exposed to infection must be scarified with some live virus vaccine on their concha or the inside surface of the leg.

Vesicular dermatitis
(from Ref. 29: Figure 3–4)

- **Lamb lung and viral enteritis** ususally occur at feeder farms where animals live together with different immune system. Several kinds of viruses may take part in this disease. Within 8-10 days, sneezing, serous nasal discharge, difficult breathing and diarrhoea can be seen, after lambs are introduced into the farm. Secondary, bacterium caused complications are common, when symptoms become stronger. Mass animal death may occur if environmental conditions are not optimal, or fodder content is inappropriate. It may also occur in case of having a bladder stone or vitamin A and selenium deficiency exists. Complications can be cured, but not the basic disease. Animals should be treated with special vaccines.

Lamb lung and viral enteritis
(from Ref. 29: Figure 1)

- **Bluetonque** disease virus is transmitted to sheep by mosquitos. After 2-7 days, fever, distress, torpor, lack of appetite, inflammation and hyperaemia of the mucous membranes of the head can be observed. The tongue becomes enlarged and cyanotic and lolls out of the oral cavity. Sick animals usually have a foul smelling discharge from their oral and nasal cavity. Difficult breathing and bloody diarrhoea also may occur. Pregnant ewes often abort or give birth to deformed lambs.

The course of the disease is extremely unfavourable in newly infected flocks. Death usually occurs after one week of the first signs of the disease.
In order to protect the animals against the pathogen, it is highly recommended to pay attention to mosquito control and be careful when introducing import or newly purchased sheep into the flock. Vaccines should be used to prevent the disease in endemic areas.

- **Borna disease** may infect lambs, older than 6 months. The disease usually occurs between the period of February and June. The incubation time is 2-3 months, while typical symptoms of encephalo-myelitis take shape. In the beginning, animals show the following signs: stamping, staggering, aimless running, remain standing before obstacles. At the end, they lie down, start twitching their head, make swimming movements then die. The disease ends within 1-20 (on average 4) days. Sick animals can be sold as meat after emergency slaughtering.
  December is the month, when vaccination is generally used for immunization purposes in contaminated areas.

- The **Louping ill** viruses proliferate in certain tick species. The infection is transmitted trans-stadially by the tick vector. Incubation period of the disease is 1-18 days. In many cases the course of the disease lasts 3-4 days, and then animals die. In other cases biphasic fever can occur, while convulsions, paraplegia, muscular tremors may take place. Some animals may recover without any signs, but others may suffer from residual paresis for life.
  Louping ill prevention requires the prevention of the introduction of the pathogen and permanent tick control.

- **Scrapie** is caused by a prion. Only sheep and goats are susceptible to this disease. Its incubation period is 6-32 months. In the beginning, the affected animal usually tends to stand apart from the flock and may trail and graze behind. While it is grazing, suddenly looks up and starts pricking up its ears and glancing at the flock. Later, the disease causes an itching sensation in the animal, the sheep scrape off the neck, side, back and hindquarters against walls or fences. Other signs can be ataxia such as altered gait and standing with the legs apart. The sick animal also may have a high-stepping or unusual hopping gait. As the disease progresses, ataxia grows worse thus, the animal remains liying and it is difficult to help up. Some sick sheep drink plenty of water and urinate, as a reaction to external stimulus. Intense loss of condition is common, despite the good appetite. Infected animals generally die within 3-8 weeks.

- The damage of **maedi-visna** disease spreads from generation to generation. It may spread horizontally (secretion, saliva) in overcrowded conditions. Rams have a major role in transmitting the virus through their sperm. The disease may have 2-3 years incubation period that is why clinical symptoms are usually seen in sheep, older than 2-3 years. In the beginning, dyspnea can occur gradually. Animals are breathing with their neck stretched out and nostrils opened wide. Besides the difficult and rapid breathing, dry cough can also occur. Seriously ill animals are left behind from the flock, become weak and remain lying. Fever can be experienced only in case of bacterial complication. Despite the good appetite, infected sheep lose weight, become ischemic then die without exception. Death occurs after 2-6 months following the first clinical signs. The virus may be adapted to the central nervous

system that causes a similar slow course of the disease. In this case head tilt, trembling of the lips and paralysis can be observed.
A laboratory test should be performed to set up the diagnosis of the disease. Symptom free animals are highly threatened by their clinically sick mates.

3. Diseases of complex etiology

- **Pinkeye** (infectious keratoconjunctivitis) is a disease that causes swellings and profuse ocular discharge to the surrounding tissues of the eyeball. Affected animals have an aversion to bright sunlight and prefer to stay in the shade or dark places. The cornea becomes cloudy or opaque, in some cases an ulcer can develop on it or corneal rupture may occur. The disease spread directly from animal to animal by discharge from the eyes or indirectly by insects.
  The disease affects mainly sheep and fatted animals. Besides other bacteria, rickettsia is the main pathogen. Antibiotics are usually used as a treatment. Fly control will aid in the control and spread of the disease.

- The pathogen of **Q-fever** is the Coxiella burneti that can spread from animal to animal either by arthropods or in several other ways as well. Ticks also may be important in transmission. General clinical signs (slight fever, droop, nasal discharge, reddish mucous membrane) mostly remain undetected. Pathogens localize in the uterus and the mammary glands, and can be shed in milk, the placenta and foetal fluid. Numerous animals usually get infected at the same time in case of a contaminated environment. Tick control has an important role in the prevention of the disease. As a treatment for Q-fever, vaccination has been introduced in some countries.

4. Parasitic diseases

- **Coccidiosis** occurs mainly at sheep fattening farms. Approximately 7 Eimeria species are present in sheep, but E. arlongi is the most significant. Ewes serve as sources of infection for the young. The infection can occur from oocysts being shed by ewes. Oocysts start proliferating in the epithelial of the small intestine that causes considerable damages of the intestinal lining. The intestinal lining becomes hyperemic, thick and the capillaries rupture. In the acut stage of the disease, watery diarrhoea containing blood or mucus may occur especially in lambs aged 2-6 weeks. Loss of appetite and anemia can be observed, and then sick animals grow thin and die in large numbers. Later, a balanced state gets developed due to the parasite's self control and the solid immunity of the animals that leads to a moderate shed of oocysts. As a result of this, additional susceptible animals may become infected.
  Flocks, where the disease occurs considerably, it is recommended to feed ewes and their lambs with fodder that contains monensin sodium.

- **Dicrocoeliosis** is a frequent parasitic disease of those sheep, which are kept on dry pasture. The parasite lives in the bile ducts and remains asymptomatic. Despite it should not be underestimated, because the parasite affects the liver and can cause a production loss.
  The parasite cycles in two intermediate hosts: snails and ants.

- **Fasciolosis** is caused by Fasciola hepatica, which lives in the major bile ducts of the host. The fluke starts stimulating the epithelium of the bile ducts and causes a

constant inflammation. Reduction of both weight gain and general resistance can be seen in infected animals. The parasite cycles in one intermediate host: the slug that prefers to live near water or wet places.
Pasturing animals usually become infected mainly between August and October depending on the weather, that is why the acute stage of the disease occurs in October. Clinical symptoms including droom, enlarged and painful abdomen can be observed. The chronic stage of the disease occurs between January and April. Animals show the signs of weight loss, anemia, changing consistency of faeces and gradual development of bottle jaw.
Infected, but asymptomatic animals shed the pathogen continuously with their faeces, and infect pastures and other animals.
The diagnosis should be based on faeces examination that can show the degree of the infection and the necessity of the treatment. Other important tasks are the drainage from lower areas of pastures and refilling. It is recommended not to keep animals on pastures where ruminants were kept in the previous six months. Snail control should be also necessary (lime, cupric sulphate).

Fasciolosis
(from Ref. 29: Figure 44)

- **Monieziosis** (sheep tapeworminess) is caused by a parasite inhabiting the intestinal canal of sheep. Damage usually occurs among lambs being pastured for the first time. Older animals are the reservoir of the infection.
  The life cycle requires oribatid mites as intermediate hosts.
  Infected sheep shed great quantities of mite segments, show signs of condition loss and reduced general resistance. In some cases death also may occur.
  As a prevention, ewes of an infected flock should be dewormed before they are pastured. Treatment of lambs should take place in June.

- **Coenurosis** (gid of sheep) is caused by the intermediate host of a tapeworm of dogs (Tenia multiceps). Contamination of pastures or pens with dog faeces may cause the infestation of sheep. 2-3 weeks after the infection, animals show signs of excitement, teeth grinding, and incoordination. Some infected animals may die from encephalitis. Other affected animals apparently recover, but after 3-4 months, convulsions, ataxy and circling can be observed. Nut or egg sized bladder worm can be found inside the brain, near the cranial bone in dead or emergency slaughtered animals.

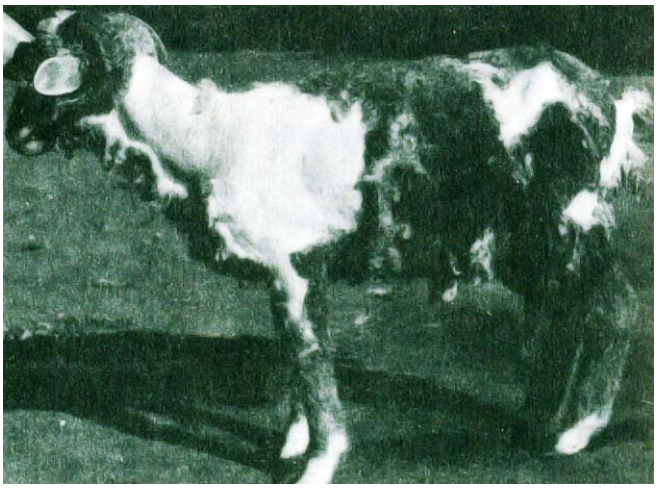
There is no possible treatment for this disease, but deworming sheepdogs should be necessary in order to prevent infestation of sheep.

- **Sheep gastro-intestinal verminosa** is the largest parasite caused damage of sheep livestocks. Nematoda species are responsible for the disease. If mild infection occurs, animals remain clinically asymptomatic (only some slight weight gain), and become premunitive that prevents further intensive infections. Gastro-intestinal verminosa can cause more serious symptoms in case of a secondary disease, lack of appropriate fodder content and abnormal environmental conditions. The disease results in decreased feed conversion ratio of sick animals. Diarrhoea, anemia and excessive weight loss also can be seen.
  In order to avoid mass infection or mass sickness, animals, which disseminate parasites, should be given treatment many times per year. Licking salt containing drugs is a good solution against parasites. Further infections can be decreased by avoiding dewed or wet pastures and those that have been grazed for 5-6 days. Water troughs should be placed high enough in order that animals cannot step or urinate into it.

- **Trachea verminosa** is caused by worms living in the bronchus and trachea of infected sheep. Animals with serious infection show the signs of dry cough, then catarrhal or protracted cough, nasal discharge and difficult breath. Besides the symptoms, loss of condition can also be observed. The disease often occurs in rainy years, in summer and in case of underfed livestocks after wintering.

- **Protostrongylosis** is caused by parasites living in the bronchiolus of the lung. The life cycle requires snails. Worms form nodules in the lung of infected animals. These nodules reduce the respiratory surface area. Animals with serious infection usually show signs of cough, difficult breathing and nasal discharge.

- **Manginess** (scabies) is a kind of eczema or inflammation of the skin caused by mites, especially the Psoroptes species. Mites usually can be found on the animals' back or the sacral area. In the places of the mites' bites, tiny red papules then serum filled blisters develop. The oozing serum on the skin soon dries and forms a crust. As sheep start to lick and nibble the affected area of their skin, the wool becomes wet with saliva and tangled. In advanced cases of the disease, the wool falls out, the skin becomes thickened and wrinkled. In serious cases, a rapid condition loss can be observed and emaciation may occur.
  Scabies is usually diagnosed from scrapings under a microscope.



Manginess (scabies)
(from Ref. 29: Figure 58)

- **Oestrosis** (nasal myiasis) is caused by the viviparous sheep nostril flies, which lay their larvae close to sheep's nostril. The larvae move to the nasal cavity, then to the skull. In case of infection, nasal discharge, sneezing and nervous system disorders can be seen.

- **Melophagus ovinus** (sheep ked) is a flat bodied, blood-feeding insect that is visible to the naked eye. Sheep ked lives in the wool of sheep and causes continuous irritation to the animal, leading it to rub and nibble.

5. Diseases caused by fungal toxins

- **F-2 fuzariotoxikosis** is a fungal toxin disease on cereal and long breeding season corn caused by Fusarium graminearum. Continuous feeding of contagious forage to tegs may cause oestrogenic syndrome (vulvar tumescence, dryness of vulvar mucous membrane, purplish discoloration of the vulva, oedematic infiltration of tissues, then vagina prolabse can occur). Furthermore, the disease may cause abortions in pregnant ewes and infertility in rams.
  If stop feeding contagious forage, symptoms may disappear, but in some serious cases the animal may become unsuitable for breeding.

- **Stachibotriotoxicosis** is caused by a mold toxin, which forms black stains on hay. The disease appears sporadically. Sick animals show signs of prostration, lay down a lot, the mucous membrane of the mouth and the nose becomes inflamed that ends in necrosis. Serous nasal discharge and diarrhoea also may be observed. Sheep with clinical symptoms usually die within 3 days.

6. Traffic of material and deficiency diseases

- **Rachitis** is a malfunction in development and reconstruction of the bone tissue at young age, which causes the softening of bones. Deficiency of calcium, phosphorus and vitamin D may cause this disease. Animals with rapid growth and weight gain are most at risk.

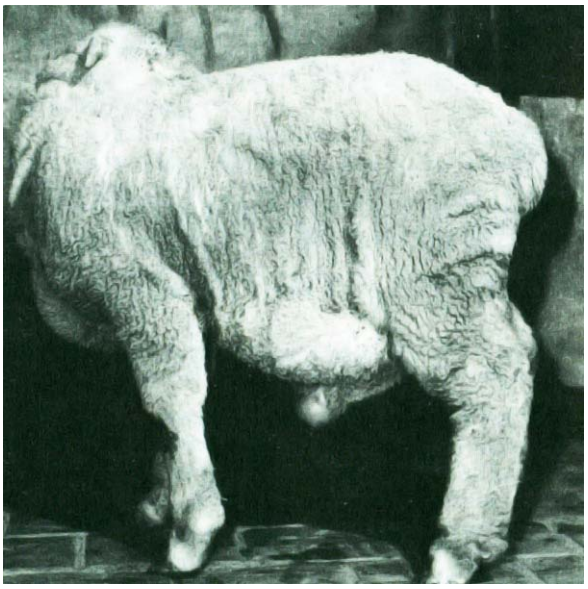
Sick animals lay down a lot, hard to make them move, if so, they prefer to assume a kneeling position. The joints become enlarged. Increased occurrence of spasmophilia can take place in affected animals. Emaciation is also possible.

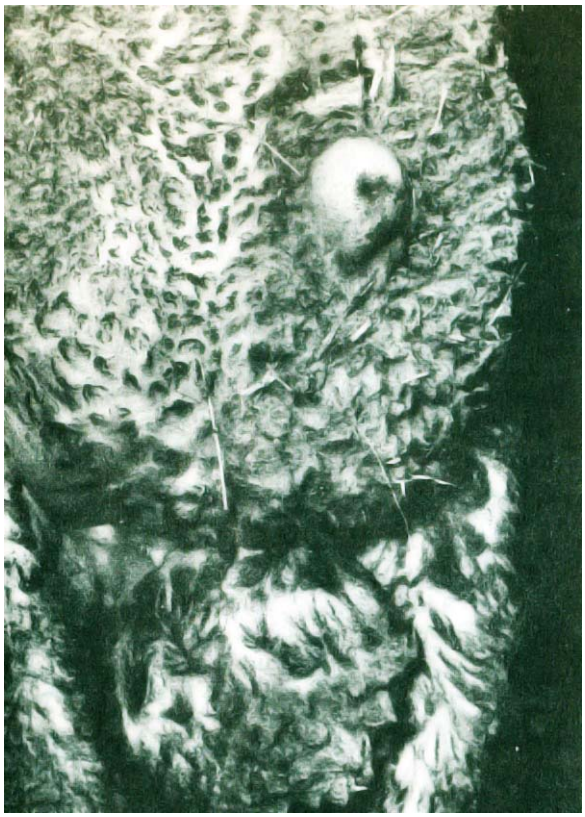
- **Osteomalacia** (softening of bones) is a disease similar to rachitis. Pregnant or nursing ewes usually suffer from this disease. It can occur after feeding phosphorus rich and calcium poor hay. Clinical symptoms including general health decline (malfunction in pregnancy, decreased pregnancy rate, oestrus and silent oestrus, absence of oestrus, torpid uterus involution etc.) and incoordination. Licking of mates, farm equipments and walls, eating of bedding can be premonitions. It is hard to make move affected animals.

- **Ketosis** is a disease of ewes and usually occurs in late pregnancy, especially in winter months. It is most prevalent in ewes carrying two or more lambs. Ketosis is caused by a disturbance in carbohydrate usage in the animal. The disease may occur in animals sporadically or in large numbers (sudden fodder change, reduced feed).
  Sick pregnant sheep have poor appetite, but at the same time licking of walls or bedding can be observed, they have an aceton breath, weak heart-beat, torpid rumen peristalsis and firm faeces covered by mucosa. The disease causes frequent urination that have a light yellow color and acetone odour. In serius cases, animals become lethargic, look dizzy and have a stiff gait. Sick animals generally recover only after lambing or abortion, otherwise, death occurs within 2-8 days, after falling sick. Besides the fatty degeneration of the liver and kidney, 2-3 foetuses can be found at a post-mortem examination.

Ketosis
(from Ref. 29: Figure 66)

- **Urolithiasis** (bladder stone in sheep) mostly occur in young and housed fattening rams. Bladder stones are generally formed in the urinary bladder or sometimes in the kidney. The stone may get stucked in the urethral strictures (the S shaped curve, the urethral process), leading to urethral obstruction. The disease usually occurs in case of continuous intake of phosphorous rich fodder.
  Sick animals show signs of increased heart action and respiratory rate, lose appetite and their rumen peristalsis stops working. Frequent then permanent need to urinate occurs, but the animal can eject only some drops. Oedematic infiltration can be seen in the tissue of the abdominal wall and the bag (where the penis takes place). In the last stage of the disease, uremia may occur, the exhailed air has a urine smell, and the animal becomes lethargic then dies shortly.



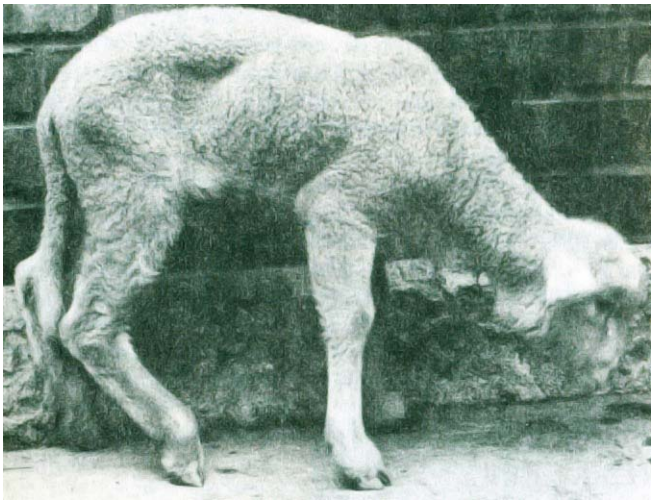


Urolithiasis (bladder stone in sheep)
(from Ref. 29: Figure 61–62)

- **Cardiac and skeletal muscle degeneration** is a disease in sheep that occurs worldwide and may cause a huge economic loss. Aborted foetuses or adult sheep are rarely included, but 3-6 weeks aged lambs are most at risk. The factors contributing to the disease process are vitamine E and selenium poor nutrition. The deficiency may cause metabolic disturbances or necrosis in certain muscles. Sudden death of animals can refer to cardiac muscle degeneration. Degeneration of limb muscles usually causes a stiff, fixed gait then ataxia. Difficult abdominal breathing can be

observed in case of the degeneration of intercostal muscles. The limb muscle disorder leads to serious weight loss then death follows.
Vitamine E or selenium injections should be used as remedy in the beginning of the clinical signs.

- **Trace element deficiency:** sheep need to intake many trace elements in small amounts. One or more trace elements are completely missing or can be found only an insufficient amount in the soil of certain regions. This deficiency causes metabolic disturbances.
  - **Iodine deficiency** may cause goitred disease of lambs. Signs of the disease are: stillbirths, weak lambs or death right after birth;
  - **Cobalt deficiency** may cause weakness, weight loss and anemia in sheep resulting in death;
  - **Copper deficiency** occurs generally in lambs resulting in bone fragility. Staggering gait or paralysis of the rear part of the body can be observed in sick lambs aged 1-4 months.



Copper deficiency
(from Ref. 29: Figure 71)

7. Medical diseases

- **Wool eating** occurs in flocks as an abnormal appetite. Biased feeding, silage and industrial by-products feeding without premix etc. may cause metabolic disturbances or deficiencies. Long transportation or starving of sheep can also cause similar problems. Parasite caused symptoms may result in wool eating too.
  The affected area of the wool is shorter than in other places, besides there is a change in color. The most frequent areas for wool eating are the stomach and thorax in adults. Lambs usually chew wool from areas such as the rectum, udder and tail. The skin is unhurt and there are no signs of itching in the affected area.

- **Dental diseases** occur en masse, in case of minerals, especially calcium imbalance in nutrition of lambs during teeth change. Animals' teeth wear quickly, if the soil is poor in fluorine. If feed is contminated with sand, it may also cause dental problems. A broken mouth results in difficult and slow chewing, salivation, accumulation of feed in the muzzle and condition loss. Dental deficiency is an important reason to remove 5-6 years old sheep from the flock after lambing.

- **Esophageal obstruction** often occurs when feeding potato, apple, beet or silage that may consist cobs. The esophagus usually becomes blocked in the chest cavity or before its entry. At this time animals are restless and coughing, regurgitating, salivating can be observed. The rumen fills with gas resulting in difficult breathing then choke.
  Items that are lodged before the entry of the chest cavity can be passed by hand into the pharynx or the oral cavity. Items that are stucked deep should be passed by an esophageal sound into the rumen.

- **Acute rumen inflates** occur when increased gas production takes place in the rumen that cannot be expelled by the animal. Bloat caused by a frothy fermentation in the rumen is one of the most dangerous diseases in sheep and needs only a short time to take shape and leads to death.
  The risk of bloat is the highest in early spring, late in the autumn or in case of a rainy weather after a dry summer. Bloat may be caused by feeding pre-bloomed green forage, papilionaceae containing saponin, plants, which are poor in fiber and grits.
  In the beginning of bloat, increased rumen peristalsis and belching can be experienced. The abdominal fullness is apparent at the two sides of the abdomen. As bloat becomes more intense, the abdomen grows wider and animals stand with their legs spread apart. They have a scared look; their necks are streched out and stand with an arched back. Affected animals kick towards their stomach and lash with their tail due to the colicky pain. Frequent defecation and urination also occur. Sick animals show empty chewing movements, they salivate, pull their tongue forward and regurgitate. Rumen contracts occur less frequently and grow weaker, the breathing and the pulse become superficial and rapid. Animals at the last stage of bloat fall on the ground and choke to death.
  During first aid, the front part of the animal's body needs to be higher than their rear part. At the same time, anti-foaming medicine should be introduced into the rumen. In serious cases the rumen must be aspirated and medicine should be introduced through that. Aspiration should be done on the groin at the highest point of the left side. As prevention, animals need to be fed hay before grazing or they should be grazed periodically.

- **Rumen alkalosis** occurs when protein rich (alfalfa, soya grits) and carbohydrate poor, easily fermenting forage are fed together. The disease can also occur if nitrogenous supplementary forage is fed in too large quantities without accustoming to animals, or if it is mixed in a wrong way.
  Affected animals may lose appetite, their rumination and rumen peristalsis become torpid, the abdomen is sligtly bloated and also diarrhoea can be seen in some cases. The water consumption of sick animals is higly reduced. Belching with ammonia odour is also typical. Deluted household vinegar or medicines consisting propion acid should be used as treatment.

- **Rumen rot** is usually caused by consuming soil contaminated, rotten, heat damaged forage or soil contaminated water.
  Torpid rumen, repeated bloat, diarrhoea and circulatory disturbances can be seen in affected animals. In prolonged cases, arthritis, eczema, eclampsia then paralysis may occur. A veterinarian should be called for treatment.

- **Sheep pneumonia** mostly occurs in lambs but sometimes adult sheep are also concerned. It can be caused by several pathogens.
  Affected animals are fallen behind from the flock; they are feverish, show signs of difficult breathing (even in rest state) that grows worse if moving. Wet or dry spontaneous coughing may occur that can be painful and repeated. The mucous, purulent nasal discharge is the sign of bacterial complication.

8. Intoxications

- **Lactacidaemia** is caused by the excess consumption of highly fermenting carbohydrate feed (fodder, grain, beet, corn etc.). At this time overproduction of lactic aid occur resulting in ruminal inflammation and intoxication. 3-6 hours after feeding affected sheep appear depressed, their breathing is difficult and their heart beat is rapid. Bloat may also occur in some animals. Diseased sheep have torpid rumen peristalsis and their belch have sour odour. Affected animals are listless, have a stiffed gait and consume plenty of water. 25-30 % of intoxicated animals may die from respiratory deficiency.
  In the beginning of the disease the best thing to do, remove the ruminal content by a sound and feed high quality hay (alfalfa).

- **Ammonia poisoning** occurs in case of the excess consumption of forage that is rich in carbamide and protein.
  Clinical symptoms show up after 2-4 hours after feeding such as difficult, rapid breathing, increased heart action, ruminal atony, limb weakness, myoclonus, salvation, distress.

- **Copper poisoning** often occurs in sheep. It is caused by the overdose of cupric medicines and anti parasite chemicals, resulting in hemorrhagic enteritis. Chronic copper poisoning occurs if the copper compound is being fed permanently in small quantities. Copper is stored mostly in the liver.
  Affected sheep are easily tired; they have a difficult breathing and yellowish, yellowish brown discoloured mucous membrane. Their urine is reddish or red-brown in colour and they have greenish, watery faeces.
  Every diseased sheep die.

- **Salt poisoning** occurs if there is an overabundance of salt after a longer period of deprivation. Affected sheep show symptoms such as increased thirstiness, salivation, frequent urination, colicky spasms, serious diarrhoea, incoordination, fibrillation, and coma. Diseased animals die within 8-48 hours.

- **Nitrite poisoning** is caused by consuming forage, water or chemical materials with high level nitrite content. Symptoms of the intoxication occur sooner in case of nitrit intake than nitrate. Affected animals show signs of myasthenia, incoordination, unsteady gait, sometimes tetanic spasms and bluish-purple discolour of the mucous membrane may occur. Rapid heart beat, difficult breathing can also be seen and death follows within 10-14 hours.

9. Genital diseases

- **Praeputium inflammation** may affect the skin, the preputial opening, the mucous membrane and the end of the penis. The disease is caused by the ammonia that

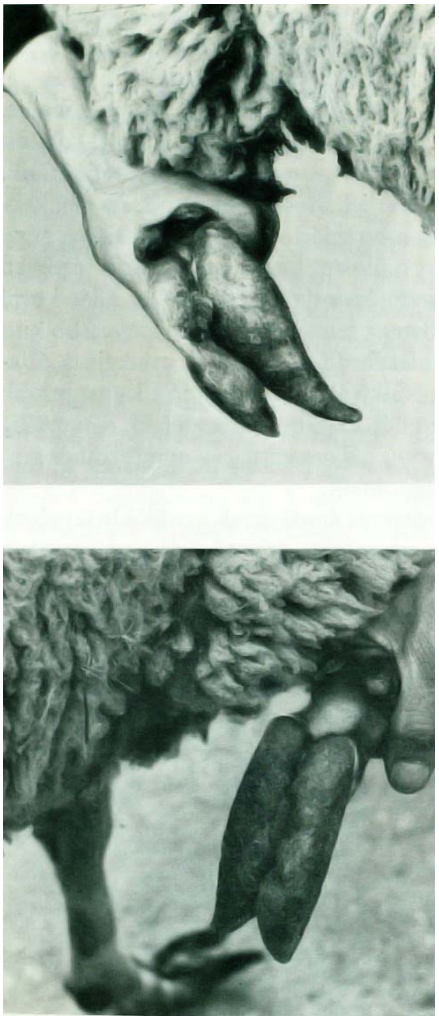
derives from the dissolving urine. It can cause severe inflammation around the preputial opening. In the beginning the prepuce and the lymph nodes become swollen, and catarrhal inflammation of the inside surface of the prepuce can be seen. Later, the prepuce becomes painful; bleeding ulceration of the skin covered by crusts can be seen around the preputial opening. Muco-purulent discharge, accumulation of urine in the prepuce and fed off can also be observed. Affected animals lay down a lot and have a stiffed gait. Uraemia and laceration of the bladder may occur in case of urinary retention that ends in death.

- **Vagina prolapse** (protrusion of the vagina) most commonly occurs in ewes during the last month of pregnancy and in ewes with multiple fetuses in their second pregnancy.
  The major cause of the disease is the vaginal laxity. Partial prolapse occurs when an occasional bulge of pink flesh emerges from the vulva if the ewe lies down and retracts when gets up. Complete prolapse means that if a red flash protrudes and stays out when the ewe is standing. In some serious cases the cervical orifice is also visible. In case of partial and complete prolapse the mucous membrane of the vagina becomes infected that can cause serious inflammations. In case of complete prolapse, the bladder usually becomes obstructed. Vaginal prolapse may cause lambing complications, stillbirths, rupture of the bladder or the wall of the vagina, uterine or intestine prolapse.

- **Uterine prolabse** may occur after lambing. Due to the compression of the blood vessels, venous hyperaemia, then oedematic or gelatinous infiltration of the endometrium may occur. The longer the prolapse lasts, the higher the danger is for an infection or a lesion. The wall of the uterus may rupture that result in emergency slaughtering of the animal.

10. Disease of the limb

- **Foot rot** may occur in every sheep breeding country and all of the age groups of sheep may be concerned. Affected animals show signs of decreased weight gain, milk production and wool yield. Furthermore, the delay or the absence of the oestrus can cause a significant economic loss. The etiology of the disease is varied; several bacteria, viruses or environmental conditions may lead to it.
  Wet, muddy roads, pastures or faeces contaminated beddings may soften the coronary border and the interdigital skin leading to inflammation. The solar border turns under the foot involving some faeces or other contaminated materials that causes rotting in the horn tissue.
  The clinical symptoms of the disease are typical. Affected sheep walk lamely and hang back from the flock. If one of the forelimbs is affected, the disease accompanies by nodding of the head. Kneeling is typical when both forelimbs are affected. Sheep remain lying down when each limb are diseased. The inflammation of the outer tissues of the hoof may spread over the horn tissue resulting in a foul smell. In serious cases the inflammation may infect the joints or the hoof bone.
  Treatments should be used such as cleaning the foot, cutting off the overgrown, necrotic and segregated horn parts. After it, the animal should be kept dry and treated with antibacterial products.
  As prevention, foot trimming should be done twice a year, and foot treatment if necessary.



Foot rot
(from Ref. 33: Figure 10–11)

Foot rot
(from Ref. 33: Figure 13)

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